JUDICIAL COUNCIL
OF CALIFORNIA

CALIFORNIA TRIAL COURT FACILITIES STANDARDS

2020

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Adopted by the Judicial Council on November 13, 2020

Published by the Judicial Council of California
Administrative Division, Facilities Services
455 Golden Gate Avenue
San Francisco, CA 94102-3688

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ACKNOWLEDGMENTS

The Judicial Council of California, under Government Code section 70391, has full responsibility, jurisdiction, control, and authority over trial court facilities, and shall adopt appropriate facilities standards. The Facilities Services office of the Judicial Council has the responsibility under Government Code section 70391 and rules 10.180 and 10.181 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 Judicial Council 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 Facilities Services staff, in accordance with rule 10.180 of the California Rules of Court, will apply these *California Trial Court Facilities Standards* (hereinafter Facilities Standards) for design and construction of court facilities.

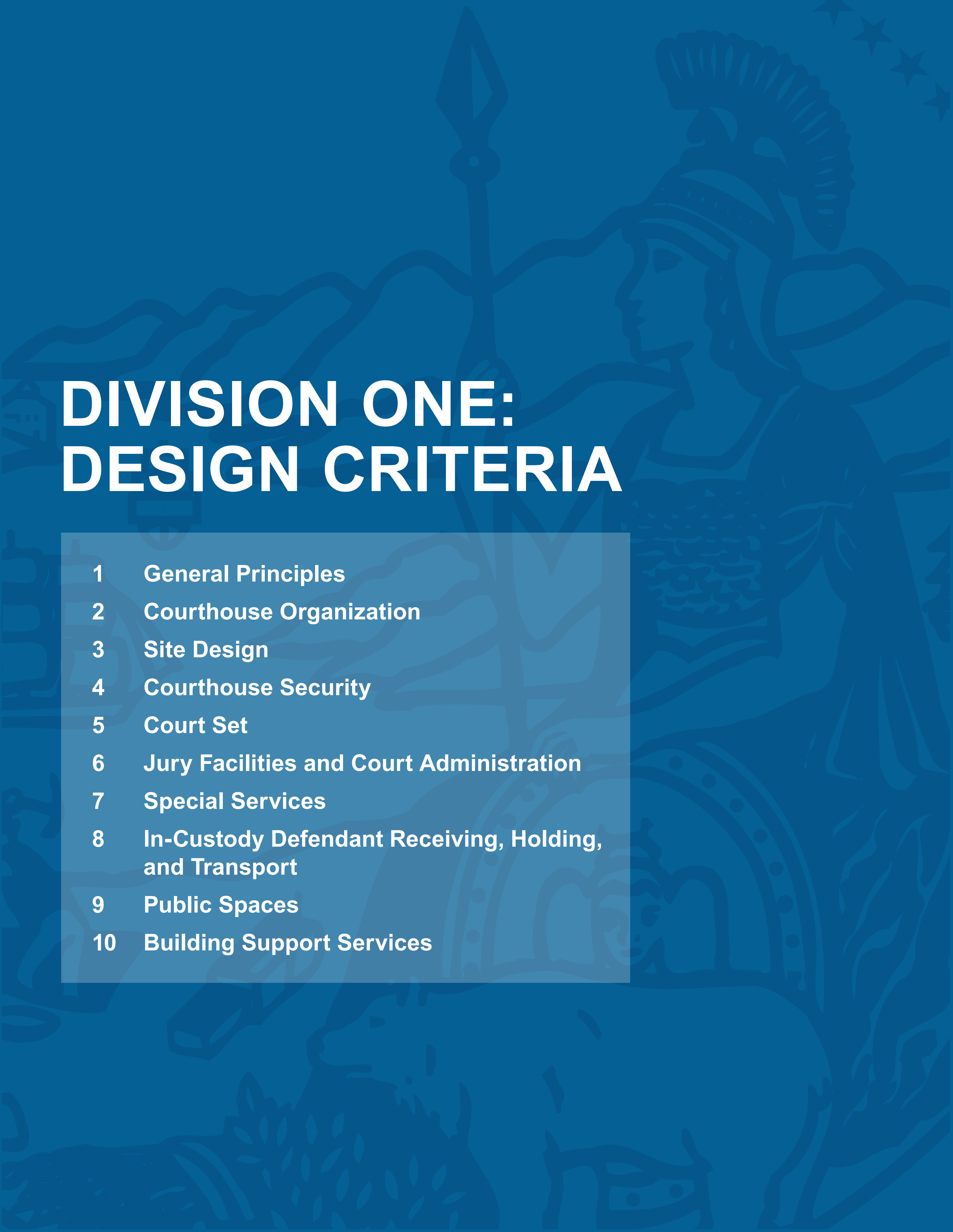
This edition supersedes the *California Trial Court Facilities Standards* adopted by the Judicial Council effective April 2006, the amendment to 2006 Facilities Standards effective March 2010, and the 2011 draft update to the Facilities Standards, which was not officially adopted.

This 2020 edition is an expansion of the earlier Facilities Standards; it has been developed using input from a variety of sources, including comments from knowledgeable judges, court administrators, court facility planners, and facility operations technicians; insight from experienced architects, engineers, and building code officials; and reference sources 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 2011 edition, were identified and incorporated in this 2020 edition.

These Facilities Standards shall be utilized with professional care as stated in the service agreements between the Judicial Council 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 construction or major renovation project, the council and the affected court will establish an advisory group in accordance with rule 10.184(d) of the California Rules of Court; the advisory group will assist the council with implementing the Facilities Standards for that specific project.

The Facilities Standards will promote buildings that are functional, durable, maintainable and efficient that provide long-term value to the public, the judicial branch, courthouse occupants, the community in which they reside, and court users and 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 costs and the long-term life cycle costs of owning and operating institutional buildings.

Judicial Council of California
Facilities Services



DIVISION ONE: DESIGN CRITERIA

DIVISION ONE: DESIGN CRITERIA

1

GENERAL PRINCIPLES

Superior Court of California, San Joaquin County
Stockton, CA
NBBJ

Important References

California Green Building Standards Code (CALGreen), California Code of Regulations, title 24, part 11 (current version)

Facilities Standards for the Public Buildings Service (U.S. General Services Administration)

Savings By Design energy-efficiency program

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), an international organization for advancing heating, ventilation, air-conditioning, and refrigeration

LEED (Leadership in Energy and Environmental Design), a registered trademark of the U.S. Green Building Council and a voluntary program in which buildings obtain Silver, Gold, or Platinum certification based on the number of points achieved through the LEED rating system, where each level represents a more sustainable building

The most recent version of applicable code requirements, which shall be used during design (for more information, see the appendix Codes and Standards)

"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)

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 design and construction of functional, durable, maintainable, efficient, and secure contemporary court facilities.

The Facilities Standards are criteria to be used by designers, the judiciary, court administrators, and facility planners. They 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 Facilities 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 indicated in some cases, but designers have flexibility to propose solutions that are appropriate to specific project requirements.

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

This document is intended primarily for new 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, buildings shared with other related justice agencies, leased facilities, and tenant improvements.

1.A FUNCTIONAL USEFULNESS, PHYSICAL DURABILITY, AND MAINTAINABILITY

1. Design Team Guidelines

California court facilities shall be functional, durable, and easy to maintain. The design team shall:

- Select value-driven solutions benefiting the Judicial Council and the taxpayers for the entire life cycle of the building.
- Define a clear approach to space planning, space use, and the integration of building systems to positively impact occupants and maximize efficiency.
- Provide easily accessible, operable, and maintainable building systems, products, and materials.
- Provide long-term value by balancing initial construction costs with projected life cycle operational costs.

To achieve value and limit total ownership costs, architects, engineers, and designers shall develop building components and assemblies that function effectively for the durations (target functional lifetimes) outlined in chapter 21, Life Cycle Cost Analysis.

2. 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 total cost of ownership for design alternatives over the useful life of components or systems in a court facility. The council will consider life cycle cost analysis, along with other project-specific factors, in determining acceptability of design alternatives.

a. Whole-building life cycle assessment should be conducted, including operating energy, showing that the building project achieves the code-required percentage improvement for at least three impacts—including climate change, stratospheric ozone depletion, and photochemical oxidants (smog)—when compared to a reference building of similar size, function, complexity, and operating energy performance, and that it meets the 2019 California Energy Code, at a minimum.

b. LCCA shall be applied over a 30-year life cycle for design alternatives. The target functional lifetimes for components and systems are outlined in chapter 21, Life Cycle Cost Analysis.

c. Life cycle assessments shall be compliant with International Organization for Standardization's ISO 14044. 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 council, or the LCCA tool provided for use by the council.

d. Energy consumption costs shall be calculated from annual energy usage reports generated by compliance software and utility rate schedules.

e. The discount, inflation, and escalation rates shall be determined as described in the council LCCA procedure.

f. Unless otherwise directed, a 5 percent real discount rate shall be used for all studies.

g. 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.

h. In certain projects, to be determined by the council, the LCCA should be based on known and established methods and techniques, including simulations, to estimate probable losses—resulting from seismic events—at various confidence levels for individual event scenarios or over a considered time frame. In complicated scenarios, a formal risk analysis should be undertaken.

i. Table 1.1 lists the building components, materials, or systems that may be subject to LCCA, depending on the size or scale of a particular court facility.

1.B 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.

1. Universal Design

Because 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 with the goal of providing equal access to court facilities and making 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.

Universal Key Goals

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

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

FEMP = Federal Energy Management Program

- *Simple and Intuitive Use*: 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, The Principles of Universal Design (Raleigh, N.C.: North Carolina State University, 1997).)

2. Application

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 baseline standards of equal facilitation for public buildings, in addition to applicable federal regulations. Compliance with chapter 11B incorporates the Americans with Disabilities Act of 1990 (ADA) guidelines.

1.C DESIGN PRINCIPLES

1. Building Orientation and Wayfinding

Many court facility users, especially first-time visitors and people 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 shall 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, 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:

- Locating the entries of high-volume public-use spaces so that they can be seen directly from the public entry lobby, or if locations of high-volume spaces cannot be seen from the lobby, providing visual clues immediately on entering the building;
- Providing weapons screening that is integral to the design of the lobby, including path-of-travel and queuing considerations;

- Providing vertical circulation (public stairs and/or elevators) directly adjacent to, or clearly visible from, the public lobby;
- Providing 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; and
- Planning and locating public toilet rooms, waiting areas, courtrooms, and public areas in the same areas on each floor to enhance orientation.

2. Small, Medium, and Large Courthouses

The Facilities Standards provide guidance about appropriate systems or components for small (1 to 6 courtrooms), medium (7 to 19), or large (more than 19) court buildings. 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 size, and building system 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 the court serves.

3. Flexibility and Growth

California court facility space needs change over time.

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

b. 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.

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

4. Design Excellence

The Facilities Standards require implementation of design excellence principles outlined by the Judicial Council's Facilities Services office in its *Project Procedure A-14: Quality Management Plan*. To promote accountability and consistency and to focus on results for all projects, Facilities Services developed success factors that are measurable: scope, budget, schedule, quality, customer satisfaction, and team satisfaction.

The success factors are measured based on the quality of the court building that is being designed and constructed, because the building transcends the completion of the project.

Following are the elements that are evaluated in measuring quality and finalizing a quality score during each stage of design:

1. Reflection of the dignity of the law and the stability of the judicial system.
2. Responsiveness to local context, geography, climate, and setting.

3. Reflection of the importance of the activities within the courthouse, with adequate spaces that are planned and designed to be adaptable to change.
4. Consideration of the economics of operation and maintenance, including controlling long-term ownership costs.
5. A sustainable, healthy, safe, and accessible environment.
6. Technical excellence in building systems.

1.D 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.

1. Objectives

a. 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.

b. All new courthouse projects shall be designed in conformance with the Nonresidential Mandatory Measures of the current version of the California Green Building Standards Code (CALGreen) (Cal. Code Regs., tit. 24, pt. 11), as well as the current version of the California Energy Code (Cal. Code Regs., tit. 24, pt. 6).

c. Implementation of CALGreen Tier 1 Nonresidential Voluntary Measures will depend on a positive net present value result of the Tier 1 LCCA design options or Judicial Council LCCA procedure-based design against a code-compliant design.

d. Additionally, all new courthouse projects shall be designed for sustainability to receive certification of the building to the current LEED Silver rating or higher without an increase in the authorized project budget or long-term operating costs.

2. Design Criteria and Performance Goals

2.1 Compliance Requirements and Goals

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

a. Comply with CALGreen Mandatory Measures as described above.

b. Comply with the current version of the California Energy Code (Cal. Code Regs., tit. 24, pt. 6).

c. Comply with the current LEED criteria as described above.

d. Plan and design for flexibility and to anticipate future changes and enhance building longevity. Use modular planning and flexible building infrastructure for HVAC (heating, ventilation, and air-conditioning), power, security, and communication systems.

e. 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 bioretention, bioswales, and permeable paving.

f. Improve energy efficiency and provide thermal comfort. Optimize the building envelope and develop passive solar strategies. Design energy-efficient HVAC systems. In addition to complying with CALGreen, use whole-building energy model analysis to refine the design so that whole-building energy consumption is permissible for ASHRAE 90.1–compliant court buildings. Whole-building energy models must be optimized to comply with the location-specific California Building Climate Zone. Perform building commissioning to verify that systems perform as designed. The building commissioning is required per the current Building Energy Efficiency Standards section 120.8, Nonresidential Building Commissioning, and current CALGreen chapter 5 criteria, as described above.

g. 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. Coordinate daylighting with high-efficiency electric lighting and programmable controls. Develop systems and detailing that maintain thermal comfort and prevent microbial contamination.

h. 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.

2.2 Best Practices

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

a. Conserve water. Install building-level water meters to allow for the management of water use during occupancy, including detection of leaks. Use low-flow plumbing fixtures that meet the current State of California regulations and water-efficient appliances; eliminate any designs with single-pass cooling, and optimize cooling tower operations through the use of pH conductivity controllers. Where feasible, request connection to the utility nonpotable water main for use in irrigation and evaporative cooling systems. Use energy-efficient HVAC equipment.

b. Use environmentally preferable building materials. Evaluate the life cycle environmental impacts such as embodied carbon, 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. Do not use tropical hardwoods.

c. Use appropriate plant materials. Reduce maintenance and irrigation requirements by giving preference to native plant species. Explore opportunities to provide habitat for wildlife, including protection and promotion of pollinator habitat, and to restore degraded site areas.

d. Seek opportunities to redevelop existing sites. Develop links to public transit, and create strategies for pedestrian-friendly, mixed-use communities.

e. Install HVAC, refrigeration, and fire suppression equipment that does not contain the ozone-depleting gases regulated by the Montreal Protocol, specifically chlorofluorocarbons (CFCs) or halons. Specify low global warming potential refrigerants for use in HVAC, refrigeration, and fire suppression systems, as defined in the Regulation for the Management of High Global

Warming Potential Refrigerants for Stationary Sources, California Air Resources Board: (1) any refrigerant with a global warming potential value lower than 150, or (2) any refrigerant that is not an ozone-depleting substance (Cal. Code Regs., tit. 17, § 95382). For systems containing fluorinated greenhouse gases equivalent to more than 500 metric tons of CO_2, the design should incorporate an automatic leak-detection system. The leak-detection system must alert building maintenance staff, or a service company responsible for maintaining the relevant equipment, if a leak is detected.

3. Participation in Energy Savings Programs

The Judicial Council recommends participation in new-construction incentive programs sponsored by investor-owned utilities or other programs that are or may become available. Participation is encouraged to promote energy efficiency and environmental awareness, and as a guide for sound energy usage and cost decisions. Programs such as Savings By Design address energy efficiency in new construction and renovation projects and are funded by utility customers through the public purpose program surcharge applied to gas and electric services. Some services offered under programs such as these include design assistance, energy-efficiency analysis, life cycle cost (LCC), and financial incentives for the facility owner and design team.

a. As long as the Savings By Design program is funded, all new California court projects may participate in the program and evaluate energy-efficiency measures.

b. For Savings By Design and other energy savings programs, a court project must analyze energy-efficiency measures using the “whole building approach” and life cycle cost analysis to determine the financial feasibility of incorporating these measures into a court building.

Table 1.1 Typical Components to Be Considered in a Life Cycle Cost Analysis

COMPONENT	TYPICAL ALTERNATIVES TO BE ANALYZED
Predesign	
	Impacts of new acquisition, leasing and/or public-private partnerships
	Renovation, upgrade, or revitalization of an existing facility
	Use of other state facilities
General Life Cycle Cost Issues for All Components	
	Element/component service and replacement life
	Maintenance and maintainability
	Direct and indirect energy impacts
Site and Program	
	Building shape and orientation on the planned site (including impact on adjacent buildings)
	Alternative site(s)
	Seismic, environmental, and community issues
Architecture	
Substructure	
	Foundations—Water infiltration, special seismic features
	Slab on grade—Special loads, vibration isolation
	Basement excavation—Use of import/export materials
	Basement and retaining walls—Water infiltration
Superstructure	
	Floor construction—Seismic impacts, floor displacement, noise isolation, security
	Roof construction—Seismic impacts
	Stair construction—Long-term maintainability, safety
Wall construction	
	Increased insulation levels, insulation placement, etc.
	Mass (passive solar thermal storage)
	Daylighting
	Building envelope (exterior closure) type
Fenestration	
	Type, amount, and location/orientation of glass
	Indoor/outdoor shading devices
	Daylighting
Interior space plan	
	Space arrangement and circulation
	Demising walls and partitions
	Finishes and colors
	Ceiling and plenum heights

Table 1.1 continues on next page

Table 1.1 Typical Components to Be Considered in a Life Cycle Cost Analysis *continued*

COMPONENT	TYPICAL ALTERNATIVES TO BE ANALYZED
Architecture *(continued)*	
Roof construction	
	Increased insulation levels, type of insulation
	Roof membrane type and color
	Daylighting
Conveyances	
	Selection of elevators and dumbwaiters
	Escalators
Secondary HVAC systems	
	System types and zoning
	Operating plans, economizer cycle(s) and optimization
	Heat recovery (exhaust air, internal source, etc.)
	Controls
Primary HVAC systems	
	System types and energy sources
	Pumping/piping configuration
	Heat recovery (waterside economizer cycle, etc.)
	Thermal storage (electrical demand shifting)
	Controls
Plumbing	
	Domestic hot water generation (method and energy source)
	Water source—Municipal, well, or harvested
Electrical	
Lighting and communications	
	System selection
	Artificial lighting levels, methods, and control
	Daylighting
	Photovoltaic sources
	Communications and data management
Power	
	Voltage selection (building and large equipment)
	Transformers (quantity, locations, efficiencies)
	Emergency power

DIVISION ONE: DESIGN CRITERIA

2 COURTHOUSE ORGANIZATION

Superior Court of California, San Benito County
Hollister, CA
SmithGroup

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

Any courthouse program must include adequate courtroom space to serve all the public needs that arise in the administration of justice. Courtrooms provide flexible, efficient and functional space which, to be sufficient, generally should be planned as one courtroom for every JPE (judicial position equivalent).

2.A PROGRAM STACKING AND ZONING

The courthouse program outlines the sizes and adjacencies required for courthouse organization. Courthouse organization is segregated both horizontally and vertically. The horizontal zoning and vertical stacking of spaces is determined based on the program and design review comments during the predesign phase. In courthouses with in-custody defendants, functionality and efficiency should be optimized by providing courtrooms in multiples of two, sharing one court floor holding area and a security elevator to the central in-custody defendant holding area. 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.

1. Layout of Large Facilities

a. High-volume public spaces and services should be conveniently accessible to the public entrances, 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. These lower-floor functions typically include the clerks' offices, jury services and the jury assembly room, child waiting rooms, records, a public cafeteria, self-help centers, alternative dispute resolution centers, and other frequently visited public areas, in addition to high-volume courtrooms (for arraignments, felony dispositions, and high-profile cases). Clerks' offices shall be located on lower floors for functional efficiency and adjacency to public and semipublic functions.

b. Consider providing exterior clerk/public transaction windows on the ground level to eliminate unnecessary public entry into the courthouse to pay traffic citations.

c. If high-volume functions are located on the second floor, a connecting set of stairs—in addition to public elevators—shall be provided from the main public lobby to access these areas. Functions requiring less public contact or quieter surroundings—including courtrooms, court administration, and judges' chambers—shall be located on the upper floors.

d. Functions requiring higher levels of security and control—including law enforcement waiting, in-custody receiving and holding, and security command centers—should be

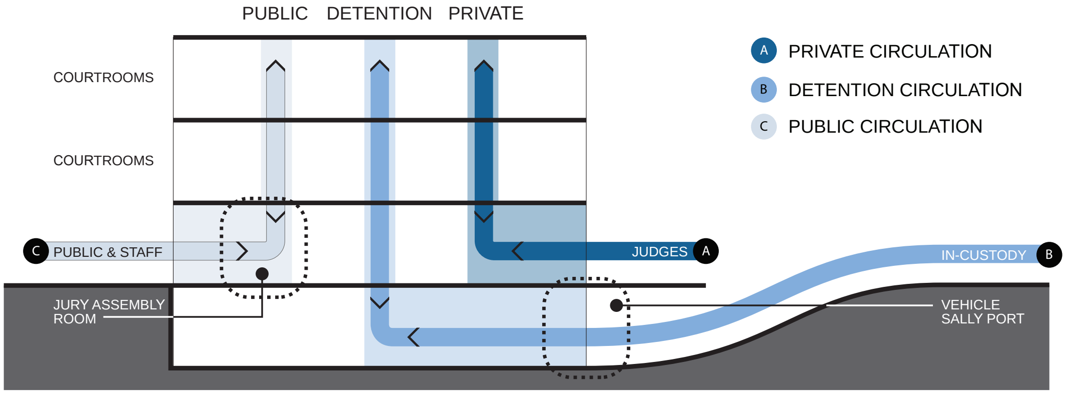


Figure 2.1 Cross-Section Showing Three-Part Circulation System

located on or below the ground-level floors to minimize the transport of in-custody defendants within the courthouse and the security 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 they should be located on a lower floor closer to the central holding area).

2. Layout of Small Facilities

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

b. Courthouses that counties don't currently anticipate using as criminal courthouses may require only two dedicated circulation zones, public and private, because in-custody cases are not frequently processed in these facilities.

c. 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 sally ports monitored from a central security operations center, 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 intersect only in controlled areas, including courtrooms, sally ports, and central holding. A brief description of the three circulation systems is illustrated in figure 2.2.

d. For court facilities in which juvenile delinquency cases are adjudicated, the detention circulation for juveniles must be separated from adult detention circulation in a manner consistent with the requirements of state law. For additional requirements, refer to chapter 8, In-Custody Defendant Receiving, Holding, and Transport.

3. Public Circulation System

a. 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. A corridor circulation system should link 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.

b. Introduce natural light into public and restricted corridors where possible.

c. Simplify building orientation and wayfinding to and from all public spaces and courtrooms.

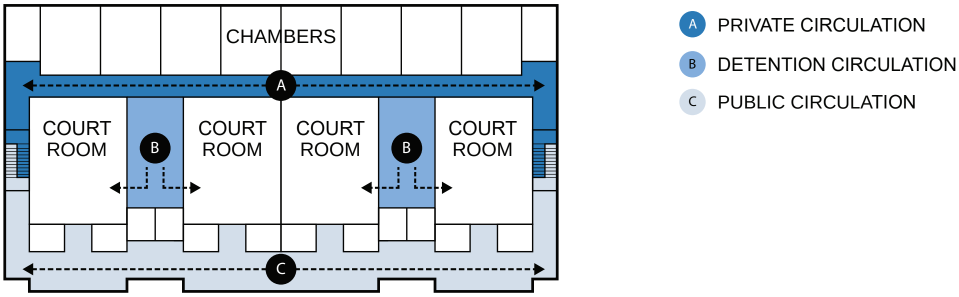


Figure 2.2 Three Circulation Zones

d. Ensure that all areas that have a public service counter or require access by the general public are accessible from the public circulation system. These areas include the courtrooms, public counter areas, jury assembly room, mediation and alternative dispute resolution centers, self-help centers, administrative offices, public waiting areas, food service or vending areas, children's waiting area, public restrooms, public elevators, and other public reception areas.

e. All participants and visitors to the building shall pass through security screening at the main building entry. In buildings in which justice partners also occupy space in the courthouse building, their employees are to be screened but may have a separate passing lane with keycard access.

f. The public circulation system also includes the public waiting areas immediately adjacent to courtrooms and attorney conference rooms. Appropriately size the public circulation corridors to allow for adequate waiting areas by providing benches or other breakout areas for conversation and waiting.

g. The public circulation system may be located on the perimeter of the court floors, thereby providing windows that allow natural light in and promote a sense of the transparency of the judicial process to the outside public. 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.

4. Private Circulation System

The private circulation corridors provide access to court staff, 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. Building service functions—including storage, staging and loading areas, security staff offices, and other support areas—are located within the private circulation zone.

a. The private circulation system cannot be bisected by the public circulation system.

b. 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 prohibit reentry to the floors. If dedicated egress stairs are provided for the private circulation system, intercommunicating connecting stairs may be used between staff areas on other floors. For the staff located closer to the egress stairs, the building's required emergency egress stair system can be used as an intercommunicating stair between floors. Analyze the security, fire exiting, and smoke control system requirements before implementing this option.

5. Detention Circulation System

a. The detention circulation system provides access between the secure in-custody entrance (sally port), central holding and intake areas, secure attorney-client 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.

b. Separate the detention circulation system for in-custody defendants from the public and private circulation zones. Court holding facilities must have, for in-custody defendants, a secure path of travel that is separate from paths used by the public.

c. 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.

d. Central holding, located in the basement or ground floor, shall have direct exiting to the outside per code requirements for I Occupancy (California Building Code's Institutional occupancy classification for in-custody holding). Upper-floor 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

1. Space Standards

The standards for the size of typical functional areas in California court facilities are listed in table 2.2. A selection of sample layouts is provided in figures 2.4–2.6.

2. Ceiling Heights

Table 2.1 lists the ceiling height requirements for functional areas of 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.

3. 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′–8′ in most areas where in-custody defendants are transported, and 8′ in central holding areas where two detainees may be escorted in opposite directions, to minimize the risk of contact or conflict.

Table 2.1 Ceiling Heights

SPACE	HEIGHT
Courtroom	12′–15′
Chambers	9′–10′
Public Lobby	35′
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 BSCC stds.
Holding Cells	per BSCC stds.

BSCC = Board of State and Community Corrections.

Computation of CGSF

NSF = net square feet

CGSF = component gross square feet

CGSF = NSF × (1.15 to 1.30)

Exterior Gross Area = CGSF × (1.30 to 1.40)

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.

Any public spaces that extend above the first story shall be limited to 35′ maximum height to the bottom of ceiling and shall not exceed 5 percent of the ground floor area, for buildings with fewer than 10 courtrooms, and 8 percent for buildings with 10 or more courtrooms.

1. 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. 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 component gross square feet (see 2.C.2, Component Gross Square Feet (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 command center, security operations centers, enclosed parking spaces, vehicle sally ports, and enclosed receiving and recycling areas.

2. 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. 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.

3. Exterior Gross Area

The gross area of California court buildings shall be measured in accordance with Building Owners and Managers Association's BOMA 2018 *Gross Areas: Standard Methods of Measurement*. Gross Area 1 (Leasing Method) shall be used to calculate Exterior Gross Area computed in accordance with the BOMA 2018 standards. Gross Area 4 (Construction Method) shall also be computed and provided for additional building analysis. These measurement methodologies are included within internal procedures to be used for designing and reports to the Judicial Council.

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 is typically 1.3 to 1.4 times the CGSF.

Figure 2.3 illustrates the relationships between NSF, CGSF, and Exterior Gross Area.

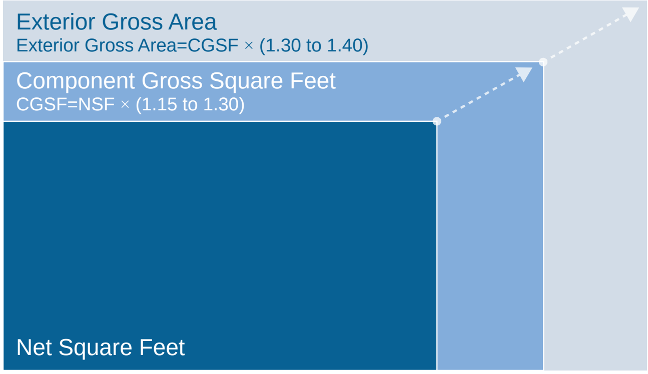


Figure 2.3 Courthouse Grossing Factors

4. Ratio of Total Building Area to Total Number of Courtrooms

a. The application of the space standards and the planning factors should result in a range of 9,000 to 14,000 Exterior Gross Area per courtroom. During conceptual planning, a parametric modeling tool may be used to establish a typical Exterior Gross Area associated with a conceptual building program. This tool can identify the anticipated square footage for a facility based on facility characteristics such as jury assembly, central holding areas, and self-help centers. The basis range of 9,000 to 14,000 Exterior Gross Area for each courtroom can be further developed and refined through use of the parametric model.

b. In general, courts that include a relatively large ratio of office departments to court sets, a unique program, or other specialized functions may have a larger-than-average Exterior Gross Area per courtroom. Conversely, court facilities that are used part time, have no in-custody holding capacity, or have no jury facilities may have less than the average Exterior Gross Area per courtroom. As the number of courtrooms increases, the overall efficiency (by this measure) of the building should increase and result in a total Exterior Gross Area that is lower than the average Exterior Gross Area per courtroom.

c. 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 and jury deliberation room.

5. 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.

6. Predesign Planning Factors for Mechanical and Electrical Equipment Spaces

Mechanical and electrical equipment spaces are considered functional areas that are included in the assignable NSF.

a. For planning purposes, mechanical spaces may be estimated to require 5 to 6 percent of the total estimated building gross.

b. Electrical spaces will require an additional 2 to 3 percent of the total estimated building gross.

DIVISION ONE:
DESIGN CRITERIA

1 General Principles
2 COURTHOUSE ORGANIZATION
2.A Program Stacking and Zoning
2.B Space Standards
2.C Area and Volume Definitions
3 Site Design
4 Courthouse Security
5 Court Set
6 Jury Facilities and Court Administration
7 Special Services
8 In-Custody Defendant Receiving, Holding, and Transport
9 Public Spaces
10 Building Support Services

Table 2.2 Space Standards

DESCRIPTION	SIZE (NSF)
Court Set	
Multipurpose Courtroom	1,600–2,050*
Large Courtroom	2,000–2,500
Arraignment Courtroom	1,800–2,300
Chambers (incl. private toilet)	400
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 (including toilet)	400
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 Rooms	
Large	1,100-1,600
Medium	800
Small	550
IS Workroom and Storage	150–300
Active Records Storage	
Inactive Records Storage	
Staff Break Area	
Lactation Room	50
Private Office	
CEO	240–300
Large	150–200
Medium	120–150
Standard	100
Mediator	120–150
Workstation	
Large	64
Standard	48
Counter Workstation	40–48
Conference Room	
Large (16–20 people)	420
Medium (8–12 people)	280
Small (4–6 people)	140

Table 2.2 continues on next page

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
In-Custody Defendant Receiving, Holding, and Transport	
Vehicle Sally Port	Size per bus dimensions*
Pedestrian Sally Port	50–100
Detention Control Room	100–250
Central Holding Cells	per Holding Metric[†]
Attorney Interview Booth	60–80
Courtroom Holding Core	per Catalog[‡]
Storage Rooms	40–100

DESCRIPTION	SIZE (NSF)
Public Areas	
Public Queuing Area	14/person
Security Screening Station	250
Information Kiosk or Counter	48
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	100–120
Mailroom	150–300
Staff Toilet With Shower	80
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.

CEO = court executive officer.

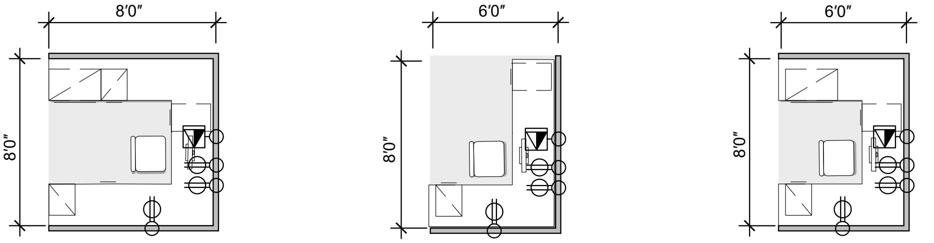
IS = Information Systems.

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

[†] Sizes determined by the Court Facilities Advisory Committee's metric approved in December 2013.

[‡] Courtroom holding cores are determined by the layouts in chapter 22, Catalog of Courtroom Layouts for California Trial Courts.

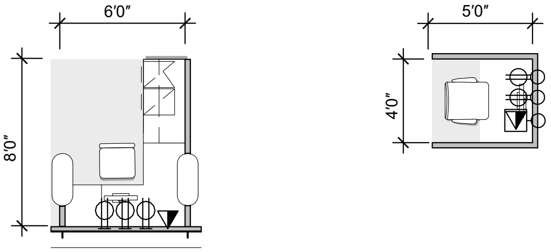
Space standards illustrations are diagrammatic; project-specific furniture and equipment requirements should take precedence.



LARGE WORKSTATION
64 SF

STANDARD WORKSTATION
L CONFIGURATION
48 SF

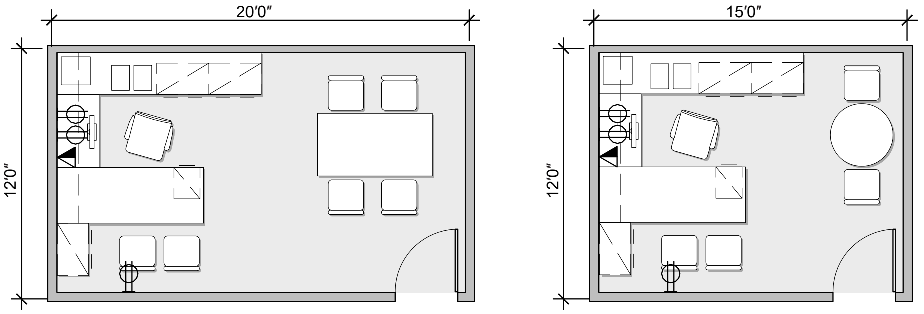
STANDARD WORKSTATION
U CONFIGURATION
48 SF



COUNTER WORKSTATION
48 SF

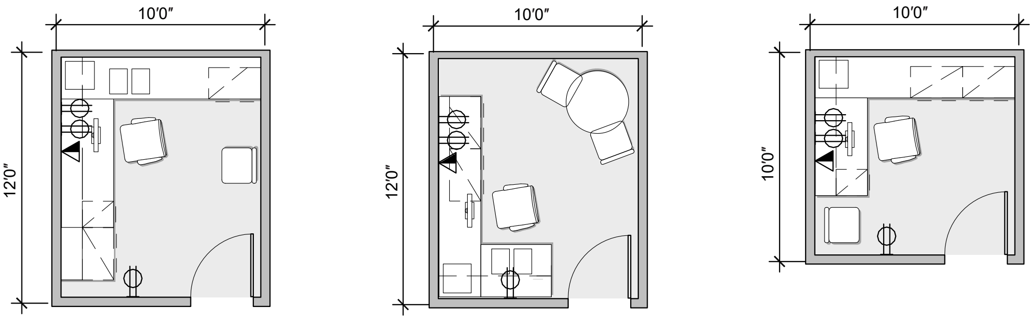
CARREL WORKSTATION
20–25 SF
(20 shown)

Figure 2.4 Open Plan Workstations*



DIRECTOR OFFICE
240 SF

LARGE OFFICE
175 SF

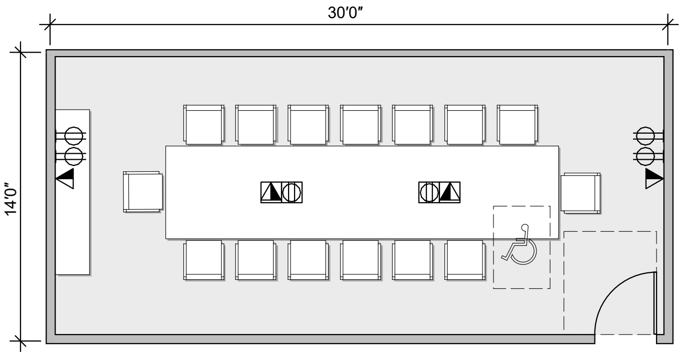


MEDIUM OFFICE
120 SF

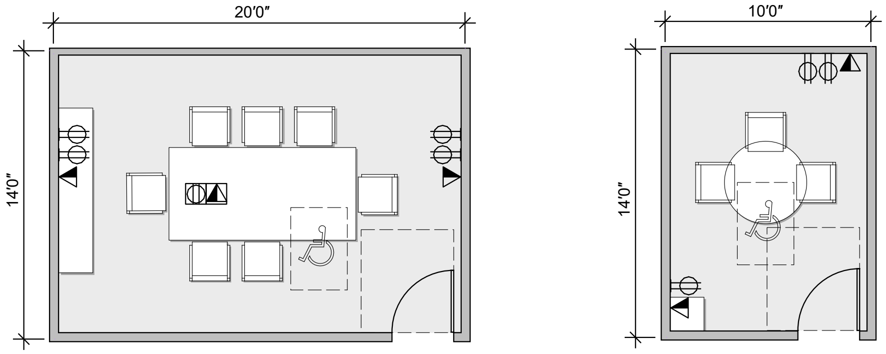
MEDIATOR OFFICE
120–150 SF
(120 SF SHOWN)

STANDARD OFFICE
100 SF

Figure 2.5 Offices



LARGE CONFERENCE ROOM
420 SF
(16 people)



MEDIUM CONFERENCE ROOM
280 SF
(8 people)

SMALL CONFERENCE ROOM
140 SF
(4 people)

Figure 2.6 Conference Rooms

DIVISION ONE: DESIGN CRITERIA

3

SITE DESIGN

Kings County Superior Court
Hanford, CA
DLR Group

Courthouse Site Design Shall

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

3.A OBJECTIVES

The selection of a site affects the building design, the building's users, and the surrounding area. To provide the courts with the most well-located and thoughtfully sited facilities, the project team must consider the following:

- Initial and life cycle costs, including site development and site purchase, which should include features that have ongoing maintenance costs (i.e., landscaping and irrigation).
- Convenience and access to public transportation, major roads, and parking. This consideration 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' points 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.
- Site orientation. Sites with a longer east-west axis should be preferred, within plus or minus 15 degrees of geographical east-west, to allow a longer south-facing façade for optimal solar orientation.

The selection of an appropriate and successful site will serve the best interests of the courts, building users, and the community. The Judicial Council's Administrative Director has the final authority for approving a site for acquisition.

3.B PARKING

The transportation contexts in which trial court facilities will be designed and built vary greatly throughout the state and have changed 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 and 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.

1. Public Parking

Study access to and availability of adjacent public parking for staff, visitors, and jurors before determining how to provide parking for each new or expanded court building. Study public transit service to the site, as parking demand may be correspondingly reduced. Consider shared parking agreements with adjacent property owners, to use existing parking with demand times that might be different from those of the trial court. In areas where the 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 2.34 spaces per 1,000 building gross square feet, which is a metric that the Court Facilities Advisory Committee approved in July 2013 for planning onsite parking for use by the public, jurors, and court staff. Application of the metric described above does not preclude site-specific parking studies from being conducted or consideration of factors to reduce or increase onsite parking requirements, such as the following:

- The size and location of the courthouse, number of courtrooms, and types of matters to be heard.
- Public transit availability and 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 Facilities Services staff indicate a parking demand for all courthouse users except judicial officers ranging from 2 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' perspectives 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, and employees. TDM measures may differ 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.

2. Secure Parking

a. Provide secure parking adjacent to or within the courthouse for each judicial officer, the court executive officer, and a small number of staff who may require secure parking. See figure 3.1. If secure parking is provided beneath the courthouse, separate private

Figure 3.1 Secure Parking, Vista Courthouse, San Diego County

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.

b. On-grade parking spaces, except for accessible spaces, shall be 8′6″ × 18′. On-grade parking should range from 280 to 300 gross square feet (GSF) per space, assuming a 24′ drive aisle for double-loaded 90-degree layouts and some stormwater pollution prevention plan elements. Parking space depth can overhang a planting area by 1′6″, as in figure 3.2. Angled-parking-space layouts are also acceptable if designed efficiently.

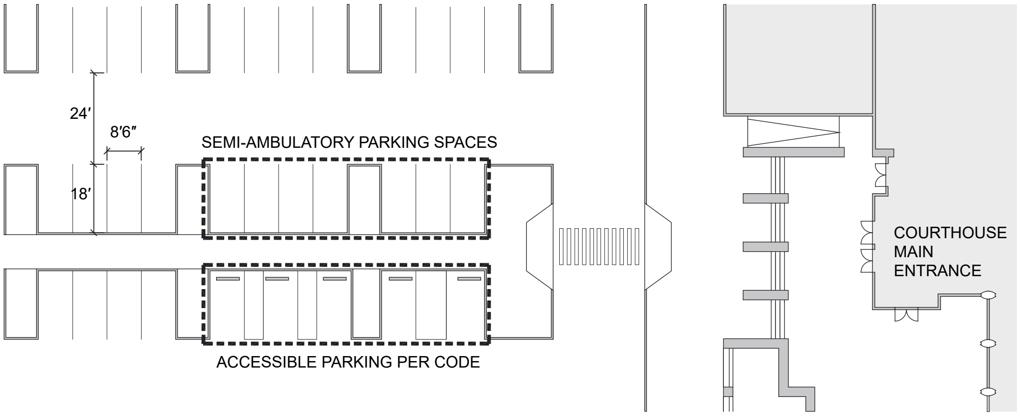


Figure 3.2 Parking Layout Showing Location of Accessible and Semi-ambulatory Spaces

c. Following are guidelines for structured parking space efficiencies:
    - A 27′6″ × 64′ bay should range from 350 to 375 GSF/space.
    - A 30′ × 64′ bay should range from 375 to 400 GSF/space.
    - A 36′ × 30′ bay should range from 350 to 360 GSF/space.

d. Consider the size of structural bay spacing, type of structure, column sizes, and location of columns in relation to the front or back of the parking space.

3. Accessible Parking

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

4. Loading Zones

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

3.C SITE AND BUILDING SECURITY

Balancing security and openness is an essential site design principle. 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.D INTEGRATION OF BUILDING AND SITE

The following planning criteria shall apply to site design.

1. Sustainable Locations

Consideration should be taken of the environmental impact of siting decisions when making new facility investments; those concerns should be balanced with cost and security.

a. Consider site-specific, long-term climate change impacts such as drought, flood, wind, and wildfire risks.

b. Prioritize sites that offer robust transportation options—including walking, biking, and transit—and minimize the combined greenhouse gas emissions of the building and associated commuter and visitor transportation emissions over the project's life.

c. Leverage existing infrastructure, and align, where possible, with local and regional planning goals; protect natural, historic, and cultural resources.

2. Orientation

a. 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.
- Orient the buildings along an east-west axis for longer north- and south-facing façades.
- Maximize solar orientation for outdoor seating and to cool the buildings. In hot climates, position the building on the site to minimize the solar exposure on façades enclosing permanently occupied space.
- Consider orientation for purposes relating to daylighting, glare, solar gain, and passive solar heating.

b. Orient main entrances of new buildings toward pedestrian areas, to facilitate safe and barrier-free access.

c. Orient buildings to take advantage of views; conversely, in new buildings, do not block major view corridors. Orientation for views should not compromise optimal solar orientation.

d. Create spaces for programmed outdoor uses, scaled to the intended activity. Locate outdoor sitting and service areas away from building air intake units, to minimize the intake of smoke and exhaust fumes.

3. 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.

a. Building height and coverage may respect local zoning regulations, although such regulations do not strictly apply to state buildings.

b. Detail of architectural elements of large buildings should 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

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

buildings located in the sphere of influence caused by shading or reflectance, changes in airflow, and views to and from existing buildings.

4. Pedestrian Access

Access to and from the courthouse must be safe, convenient, and consistent with Universal Design principles.

5. Building Entrances

a. Provide a single building entrance for visitors, staff, and the public, to facilitate cost-effective security operations. See figure 3.3 for an illustration. For large courthouse projects, the Court Facilities Advisory Committee may approve the addition of a second entrance, if warranted.

b. Provide a separate entrance for judges and bench officers. See chapter 4, Courthouse Security, for specific security requirements.

c. 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 U.S. flag.

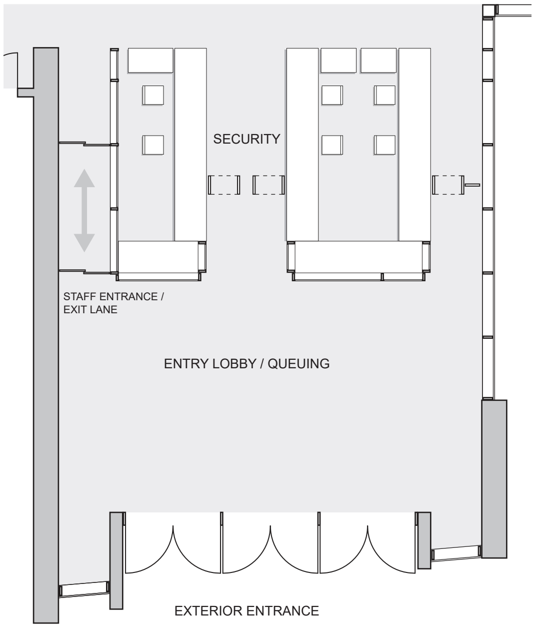


Figure 3.3 Illustration of a Single Entrance Lobby for the Courthouse Building

6. Site Utilities

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

b. For service areas and above-grade utilities, including backflow preventers, standpipes, gas docks, and emergency generators:

- Ensure that locations accommodate long-term maintenance requirements and minimize conflicts with landscape design;
- Locate enclosures away from primary entries, or if not possible, cluster components and screen from entries and primary pedestrian paths using appropriate lighting, materials, and planting material; and
- Consider maintenance access and serviceability requirements for site-located equipment (e.g., consider access for fuel delivery trucks when locating emergency generators on the site).

c. For 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, but if planted areas are the only option, integrate into shrub and ground cover plantings to conceal appearance; and
- Conceal vault covers in modular paving areas.

7. Landscape Design

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

a. Configure landscape elements per Crime Prevention Through Environmental Design strategies. See chapter 4, Courthouse Security.

b. Provide visual focus for the public entry and the path to it with appropriate planting scale and plant placement.

c. Define outdoor spaces consistently and with appropriate scale and function throughout the premises.

d. Design landscaping features so as not to compromise video and staff surveillance of the building or create hiding places.

e. Avoid use of landscaping that abuts the building surface to prevent water leakage. Provide adequate moisture control along the foundation walls.

f. Green walls, planters on the roof, underground landscaped plazas, and green roofs are prohibited because of maintenance concerns. Water features and fountains are not permitted.

g. Integration of green building and Leadership in Energy and Environmental Design (LEED) principles is encouraged in landscape and building design.

h. 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.

i. Provide surface parking lot shading, with a minimum of one canopy shade tree for every 10 parking spaces.

j. Respect sustainable performance goals described in 1.D, 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. Nonpotable-water connection with the local water utility systems should be evaluated for use in landscape irrigation.

k. 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 bioretention, bioswales, and permeable paving.

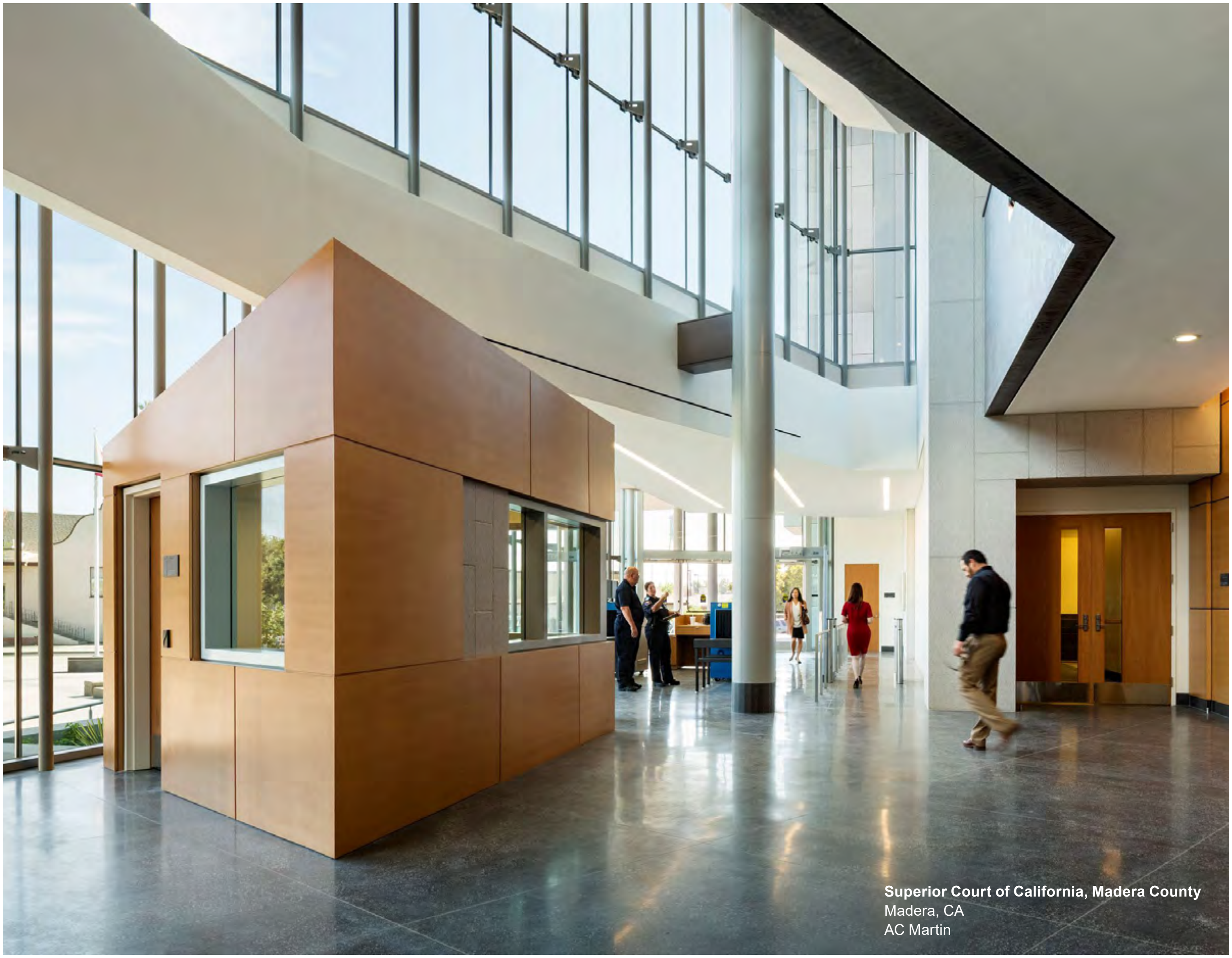
l. Design landscape elements to prevent unsightly damage by vandalism, birds, trash, transients, or skateboarders, where necessary.

m. 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 (e.g., tree species selected for parking lots should provide shade, but not drop excessive debris on parked cars).

n. Planting, landscaping sprinkler systems, and mulch material selection should take into consideration the abundance of smokers at courthouses. Dry mulch and certain plant types and grasses near walkways are vulnerable to fires from tossed cigarettes. Provide cigarette urns (secured to concrete pad or walk) at key areas of public access and gathering.

DIVISION ONE: DESIGN CRITERIA

4 COURTHOUSE SECURITY



Superior Court of California, Madera County
Madera, CA
AC Martin

"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

For security relating to in-custody defendants, see chapter 8, In-Custody Defendant Receiving, Holding, and Transport.

For electronic systems' infrastructure, see chapter 15, Electrical Criteria, and chapter 17, Network and Communication Systems.

Courthouse security planning must ensure a safe and secure environment for all users of the court, and must protect the functions and assets of California court facilities. Balancing security, accessibility, and comfort 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. It is of paramount importance that building systems be designed and maintained to protect public health and life safety. The design should 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:

- Provide 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; and
- Be responsive to the risk assessment.

4.B DESIGN, TECHNOLOGY, AND OPERATIONS

1. Approach

A comprehensive court facility security design approach integrates design, technology, and operations, including policies, procedures, and personnel. The most effective security approach is achieved when these three elements are coordinated during early project phases.

- 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 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 refers to policies and procedures for the court facility, and those for security program management, security staffing, and employee training.

2. Elements

This chapter addresses design and technology planning criteria. When developing a facility security design approach, 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. As figure 4.1 illustrates, architectural elements, electronic systems, and security staff and procedures are the significant elements of a security plan.

a. Security planning must consider and reflect security staffing levels at each facility. The project team shall develop a comprehensive plan with court administration and 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).

b. Technology and electronic systems shall be coordinated with architectural and engineering systems and with building operations.

c. The Operational Program Statement, together with the risk assessment measures and the security and detention space program are key elements of a comprehensive security approach, which shall be prepared for each new court building project—ideally in the program verification or predesign phase.

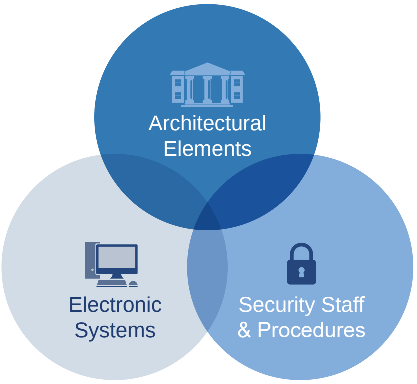


Figure 4.1 Security Plan Elements

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 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: History of incidents or threats may be interpreted as a site-specific increased risk factor. Intelligence from local police, the sheriff, 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.

1. Courthouse Risks

The project team will provide appropriate security design elements and countermeasures to mitigate potential risk and damage under the findings and recommendations of the risk assessment conducted by the Judicial Council's Emergency Planning and Security Coordination unit. Refer to 4.D, Risk Assessment Procedures. Per the National Center for State Courts, 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;

CPTED = Crime Prevention Through Environmental Design

Basic CPTED Strategies

- Natural surveillance
- Natural and constructed access control
- Territoriality

- Disruption of court activities; and
- Compromise of court process, including evidence, court records, jury sequester, and due process.

2. 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 affect security requirements. Examples of increased security during heightened threat and alert levels include escalating screening capacity in the lobby and increasing building setback distances between building and vehicles to protect against vehicular threats.

4.D RISK ASSESSMENT PROCEDURES

a. The Emergency Planning and Security Coordination unit shall conduct a risk assessment for each project.

b. The risk assessment shall identify potential threats and vulnerabilities, consider the likelihood and potential consequences of an event occurring, and recommend mitigation measures.

c. The risk assessment report shall be reviewed by the Court Facilities Advisory Committee in predesign phase.

d. 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 requirements, and electronic monitoring and control measures, including video surveillance.

Table 4.1 lists mandatory requirements and those 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 electronic security design elements for the site and the court building.

4.E PHYSICAL SECURITY PLANNING CRITERIA

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

1. Crime Prevention Through Environmental Design (CPTED)

Permanent, effective, and visually appealing security planning solutions are the basis of Crime Prevention Through Environmental Design. CPTED principles reinforce the ability of design and the built environment to minimize crime and the fear of crime and to improve the quality of life. There are three basic CPTED strategies:

- Natural surveillance: The placement of physical features, activities, and people to maximize visibility—for example, proper placement of windows overlooking sidewalks and parking lots and use of transparent vestibules at building entrances to divert persons to reception areas—can decrease the likelihood of crime in the surrounding areas of the courthouse. 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.

Designers must comply with the findings and recommendations of the risk assessment and accommodate their impact on the operational design criteria.

Designers must apply CPTED principles in site and building master plans and in the early phases of architectural and landscape design.

2. 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; these zones provide an opportunity for control, detection, evaluation, and response to undesired activity or to intruders or other unauthorized individuals.

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

3. 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, because blast pressure and impulse quickly decay as a function of distance. See figures 4.2 and 4.3.

By way of illustration, improvised explosive devices 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. Although 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.

The setback distance is measured from the face of the building structure, enclosure, or both to the location of the nearest parked vehicle for the passive vehicle threat and to the location of the antiram perimeter for the moving vehicle threat (see 4.E.5, Site Security). Increased setback may also reduce the cost of blast hardening as required. Every foot of setback distance is critical.

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

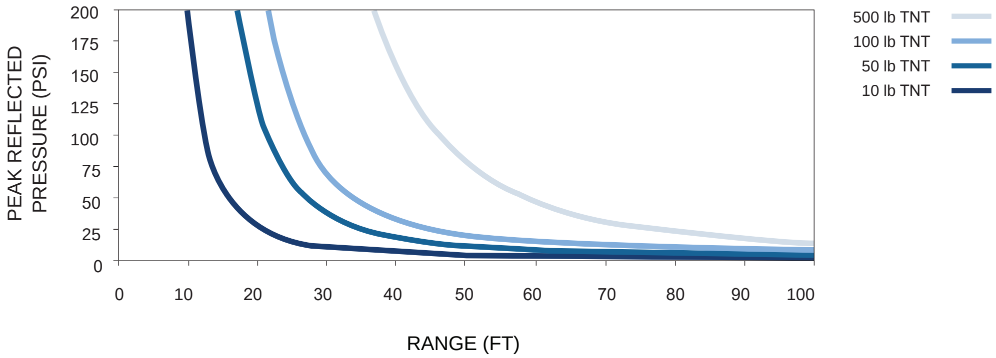
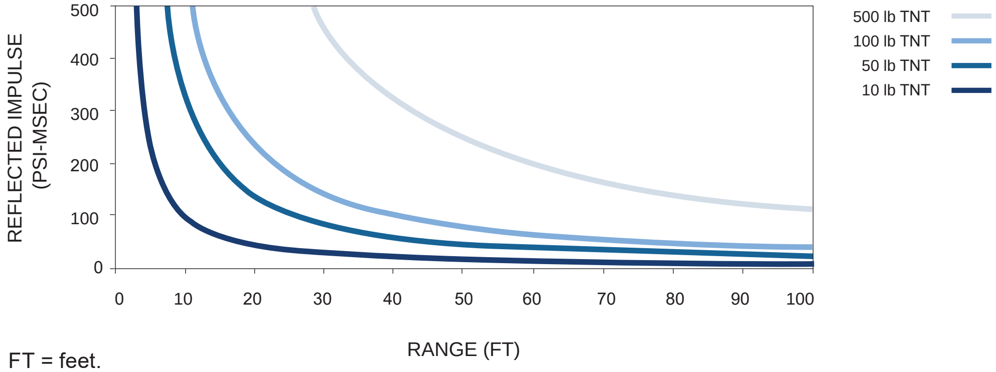


Figure 4.2 Peak Pressure Decay with Distance



FT = feet.

psi = pounds per square inch.

msec = millisecond.

Figure 4.3 Impulse Decay with Distance

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 under Site Security, below).

4. Parking Security

a. Public parking shall not be allowed within or beneath the courthouse.

b. Public parking must have a minimum 25′ setback from the courthouse, unless otherwise determined by the risk assessment.

c. Secure parking in surface lots shall be fenced, visually screened, and separated from public circulation pathways and parking.

d. For secure parking in surface lots not contiguous with the court building, provide a continuous path of travel to the secure entry to the courthouse. This exterior walkway is considered a part of the court building private circulation system (see chapter 2, Courthouse Organization). The secure parking area and path of travel shall be screened from view by the public or in-custody defendants; such screen fence or wall shall deter scaling and climbing and be a minimum of 8′ tall as modified by site conditions (e.g., adjacent slope, nearby equipment) or the project risk assessment.

e. Place all onsite (unsecured) 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.

f. Minimize and control the number of vehicular access points into secure parking areas and sally ports.

g. Exterior secure and service parking areas adjacent to the courthouse, as well as interior secure parking areas, require operable barriers at entries.

h. Colocate loading dock and parking garage entries.

i. Provide a minimum 6″ of nonstructural architectural finish around all columns in or adjacent to interior secure parking.

j. 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 if 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 sally ports.

5. Site Security

a. Employ CPTED principles.

b. Place any trash receptacles or public mailboxes outside the building setback distance.

c. Illuminate site perimeters, walkways, and drives.

d. Ensure that trees at partial or full projected growth do not impede lighting and security cameras throughout the site.

e. Restrict heights of landscaping to maintain natural surveillance. As a goal, avoid landscaping that will allow for concealment of packages 12″ tall within the building setback distance.

f. Protect utilities (gas, power, telephone) at entrance to the site through burial or concrete encasement.

g. 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 (stationary) 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 Standard F2656. A passive vehicle threat may be deterred using curbs, No Parking signs, striping, and the like. A moving vehicle threat must be stopped at the minimum required setback distance using an antiram barrier. The designers 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, sally ports, and underground parking.

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

6. Building Layout

The building plan shall minimize vulnerabilities through appropriate space planning and adjacencies.

a. Locate lobbies and delivery areas outside the main building footprint or in an exterior bay, when possible, and away from densely occupied spaces and critical facilities.

b. 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.

c. Provide natural or constructed surveillance for building access points.

d. Protect buildings from vehicular threats. Public parking is not allowed within or directly adjacent to the building.

e. Separate high-risk areas—including an unscreened lobby, loading docks, mailrooms, vehicle sally ports, and secure parking garages—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 locate occupied areas within 25′ of high-risk areas.

f. Locate emergency generators at least 50′ from the primary electrical source.

g. Colocate the loading dock and mailroom toward the building exterior.

h. Locate all emergency egress away from high-risk areas. Provide redundant emergency egress exits, but do not cluster routes.

i. Stack critical areas and supporting utilities.

j. Provide ductile materials in emergency egress pathways to minimize debris.

7. Courtrooms, Judge's Chamber, and Jury Deliberation Rooms

a. For courtrooms, provide bullet-resistant panels within the podium and bench for judge, court security officer (CSO), clerk, and witness stand (see 4.J, Bullet-Resistant Glazing and Panels).

b. 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.

c. Where exterior windows are provided, provide ballistic glazing as determined by the risk assessment (see section 4.J).

8. Public Transaction Counters

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

9. Lobby and Waiting Areas

a. 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.

b. Eliminate trash, mail receptacles, or other areas of concealment in the unscreened lobby areas.

Lobby Considerations

- 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 Design Requirements

- Debris-mitigating materials
- Ductile systems
- Standoff to critical building elements
- Forced-entry protection
- Bullet resistance

Performance-Based Design Requirements

- Apply when specified by risk assessment.
- Use blast-resistant façade.
- Harden critical building elements.
- Protect occupied space and critical systems from high-risk areas.

c. Staffing level for screening is a primary consideration in lobby screening design. The screening configuration needs to optimize throughput with the level of staffing to be provided.

d. 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.

e. Design lobby for increased levels of security; this design may include additional screening areas or restriction of openings into secure areas.

f. Provide physical barriers and indirect circulation between not secure and secure space to minimize cross contamination of screened and unscreened persons and the introduction of harmful agents or weapons.

g. Provide a minimum 6" nonstructural architectural finish around all columns in or adjacent to the loading dock and mailroom.

h. 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.

10. Evidence and Exhibit Storage Rooms

a. Locate evidence and exhibit storage rooms in private circulation areas.

b. Exhibit storage rooms shall have full-height partitions and hard ceilings and be secured using keyed locks.

c. Evidence rooms should have dual authentication card readers with PINs, and evidence room doors should have video surveillance.

11. Loading Dock and Mailroom

a. Control access to loading dock area by means of operable barriers at entries.

b. Where feasible, place loading docks outside the main structure or in the exterior bay and the mailroom in the exterior bay, and provide a means for venting gas pressures that may result from an internal detonation. If not possible, alternatives should be considered, such as screening incoming packages and mailing via the lobby or at a remote facility. Locate critical and occupied space at least 25′ away from the loading dock and mailroom.

c. Provide a minimum 6″ architectural cover around all columns in or adjacent to the loading dock, shipping/receiving area, and mailroom.

d. If explosive screening is provided and a package threat is specified by the risk assessment, harden interior walls around the loading dock, shipping and 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,

Protective Structural Design

- Prescriptive threat-independent approach
- Redundant and ductile structural systems
- Resistance for disproportionate and progressive collapse
- Ductile detailing and failure modes

Courtroom doors

Refer to Litigation Area under 5.D, Courtroom Components, for a discussion of security measures.

shipping and receiving areas, and mailroom and the floors above and below them 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.

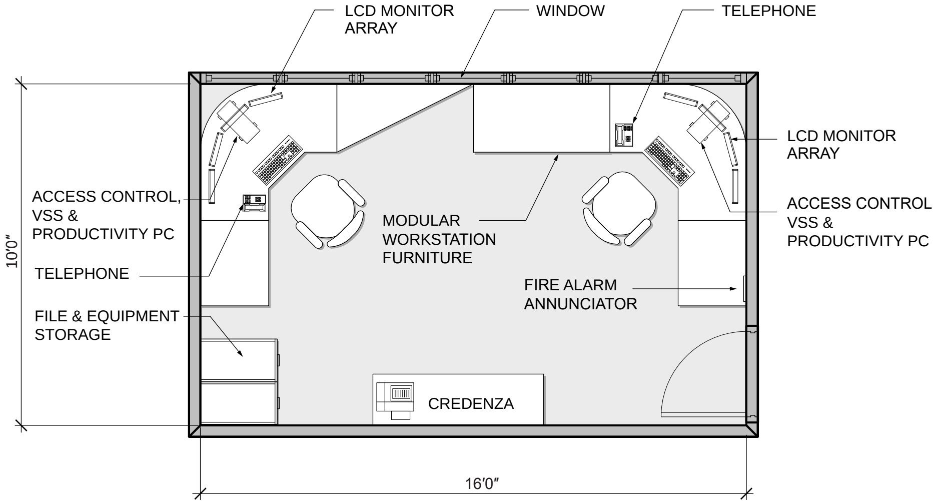
12. Building Security Operations Center (SOC)

a. Locate the security operations center (SOC) to allow visual monitoring of the entrance screening area with a direct line of sight and to allow monitoring and operation of electronic security systems. Refer to figure 4.4. This space is not required in small court facilities.

b. Fire command centers, required with high-rise life-safety systems, shall remain separate from the security operations center.

c. If the SOC has a window overlooking the main entrance, weapons screening, and/or entrance queuing, ballistic glazing is required as determined by the risk assessment (see section 4.J). Glazing must use mirror tint or other means of obscuring vision into the SOC.

d. The walls should have bullet-resistant paneling.



VSS = video surveillance system.

PC = personal computer.

LCD = liquid crystal display.

Figure 4.4 Plan of Security Operations Center

13. Building Envelope

a. 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 minimum prescriptive requirements must be provided on all projects.

b. The risk assessment will specify whether a performance-based design approach is also required, in which case an unscreened exterior vehicle threat may be specified. If a performance-based approach to building hardening is required, the exterior façade systems constituting the building envelope shall resist the actual blast loads on the façade calculated for the specified unscreened exterior vehicle threat, up to a maximum air-blast design load of 4 pounds per square inch (psi) peak pressure and 28 psi-msec impulse.

13.1 Minimum Prescriptive Requirements

a. Glass: The innermost pane of all exterior glass shall be laminated. Alternatively, the glass makeup (i.e., both inner and outer lights of insulated glass unit) may be panes of monolithic fully tempered glass. If monolithic fully tempered glass is to be used in lieu of laminated glass, then the only requirement is that the entire makeup be composed of fully tempered glass.

b. Windows: Operable windows are not permitted.

c. Doors: Lock and monitor all unscreened perimeter doors.

d. Fenestration: Limit building envelope fenestration at critical areas such as courtrooms, chambers, and jury deliberation rooms, especially at the first level.

e. Building exterior: Minimize blast effects by using convex shapes (toward exterior) and limited reentrant corners.

f. Bullet-resistant glazing: Provide bullet-resistant exterior glazing in judicial chambers and courtrooms, to the extent required by the risk assessment and available line of sight from surrounding street and nearby buildings. See section 4.J.

g. Openings' security: Provide forced-entry protection at the first floor. Forced-entry rating shall satisfy ASTM Standards F588 for windows, F476 for swinging doors, and F842 for sliding doors, as specified by the risk assessment, including required resistance grade.

h. Walls: Use ductile systems that will minimize flying debris entering occupied spaces.

13.2 Performance Requirements

a. Glass: Design exterior glass to achieve a blast hazard rating of Low as defined by ASTM Standard 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.

b. Window mullions, frames, and anchorage: Design frames and anchorage to resist the calculated blast load intensity. Provide calculations or explosive testing results of identical systems to demonstrate that the façade components can resist the specified tributary blast loads without failure, including the dismemberment or premature ejection of the glass panels. The allowable rotation of mullion ends in response to the specified blast loading shall be a maximum of 3 degrees (L/40 maximum deflection). Design components using allowable stresses equal to the yield strength of their respective materials. 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 must be provided from the glass to the primary structure.

c. Doors: The operable door portion 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.

d. 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 Technical Report* (PDC-TR), Revision 1 (Jan. 7, 2008), for appropriate response limits.

4.F STRUCTURAL SYSTEMS

1. Protective Structural Design

Protective structural design enables building occupants to evacuate the building safely and rapidly during an emergency, especially if part of the building is subject to a blast or otherwise damaged or destroyed. 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.

a. 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. Because 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.

b. 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 a 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.

2. Guidelines for Improved Structural Performance

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

a. Avoid overhangs with occupied space above.

b. Provide redundancy and alternative load paths to mitigate blast loads.

c. Minimize horizontal and vertical structural irregularities.

d. Prevent a 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.

e. 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.

f. 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 UFC 4-023-03, *Design of Buildings to Resist Progressive Collapse*. Columns spaced closer than 30 percent of the largest bay dimension are to be removed in the same alternate-path analysis.

g. 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 a medium level of protection as described in PDC-TR 06-08 Rev. 1, Single Degree of Freedom Structural Response Limits for Antiterrorism Design.

h. 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.

i. Ductile detailing is required for primary structural member connections.

j. 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.

k. Structural columns in high-risk areas must be designed to resist the specified explosive, as per the risk assessment, located 3′ away.

l. 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.

m. 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 communication 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.

a. Locate critical utilities as far as possible from high-risk areas. Do not install utilities within 25′ of public parking areas, an unscreened lobby, loading docks, and mailrooms. Stack critical areas and their supporting utilities.

b. Locate power supply transformers and emergency generators away from high-risk areas—below grade, where possible, for best protection. If exterior transformers are required, locate them in an enclosure or fenced area with security locks, emergency lighting, and alarms. Locate properly vented emergency generators at least 50′ from the primary electrical source. Buildings should not intake exhaust fumes from generators. If emergency generators are located adjacent to high-risk areas, harden the intermediate floor and wall systems.

c. Avoid routing critical utilities next to parking areas. If this cannot be avoided, encase them in concrete.

d. 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.

Refer to table 4.2 for security requirements by area and space type and the Judicial Council's *Security Systems Design Criteria Guide* for specific information regarding security systems requirements.

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

e. Protect critical utilities, including service entrances.

f. Locate main and backup systems as far apart from each other as possible, a minimum of 50′.

g. If feasible, isolate the mailroom heating, ventilation, and air-conditioning (HVAC) zone to prevent circulation into the main building. Provide a system to purge mailroom in case of biochemical contamination.

h. 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.

i. Ensure adequate HVAC for heating load in detention control during unoccupied building mode.

4.H ELECTRONIC SECURITY PLANNING CRITERIA

Best practices for electronic security planning 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.

Detailed product requirements and information are contained in the Judicial Council's *Security Systems Design Criteria Guide*, which is shared with the design team at the start of a new courthouse project.

1. Site Security

a. Use vehicle entry and exit gates and gate barrier arms at secure driveway entrances and exits.

b. Provide video surveillance of all secure driveway areas and general coverage of public circulation areas. Coordinate with landscape design to ensure that camera sightlines are unobstructed. Refer to chapter 3, Site Design.

c. At secure driveway entry vehicle gates, provide pedestals that accommodate the vehicle heights anticipated. Pedestal heads must support a card reader and, where applicable, camera and intercom station. Where in-custody transport vehicles share use of the secure driveway, pedestal heads must also support a detention intercom substation.

d. 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 or similar device.

e. Provide alarm monitoring and video surveillance of pedestrian gates.

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

2. Building Envelope

a. Provide video surveillance of building exterior.

b. Provide video surveillance, door position monitoring, and local alarm sounders at all operable building entry and exit points.

c. Control after-hours access through designated perimeter doors with card readers. Provide, at perimeter doors, the minimum number of card readers that will facilitate operations.

d. Provide intrusion alarms to monitor perimeter doors and sensitive areas after hours as required by the risk assessment.

3. Lobby, Circulation, and Waiting Areas

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

b. Provide barrier turnstiles at exit lanes in line with the screening lanes to restrict access to the secure area from the exit lane, while maintaining throughput to satisfy exiting requirements.

c. Provide video surveillance of lobby, circulation, and waiting areas.

d. Provide alarm monitoring, local alarms, and video surveillance at doors separating not secure 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.

e. Doors that are used strictly for emergency egress purposes and that separate areas with differing security levels shall have video surveillance, be monitored for alarms, and have local alarm sounders.

4. Private Circulation and Waiting Areas

a. 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.

b. Emergency egress doors separating areas with differing security levels shall have video surveillance, alarm monitoring, and local alarm sounders.

c. Exiting should always be from a higher security area to a lower security area. The public should not exit through a private corridor, except in cases of emergency.

5. Courtrooms

a. Provide silent duress alarm buttons for judge, CSO, and clerk positions.

b. Provide video surveillance of the courtroom, including well area, public seating, and, where applicable, door-to-court holding.

c. Control the public entry door into the courtroom using a card reader with integral keypad. Presentation of a card at the reader will momentarily unlock 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 court is in session or lock the door to secure the courtroom when not in session. Refer to 5.D, Courtroom Components, for more information on courtroom doors.

d. Card access control from the courtroom to the private corridor at the witness stand or jury egress door is discouraged; however, it may be allowed on a case-by-case basis. Card access control of the judge's door behind the bench is not allowed.

6. Chambers

a. Provide silent duress alarm buttons at the judges' desks.

b. Provide secure access at judges' chambers doors to limit entry to authorized personnel.

Security Electrical Systems

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

7. 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.

8. Public Transaction Counters

a. Each public transaction counter position shall have a duress alarm button.

b. Provide overall video surveillance of the public queuing and walk-up areas. If cameras are located behind the transaction counters, they should capture images of customers only, not staff.

c. Provide an active full-duplex audio communication system at outdoor and unsecured public transaction counters. The communication system must have an on/off switch allowing staff to enable or disable communications.

9. Family Court Services Mediator Offices

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

10. Child Waiting

a. Provide silent duress alarm buttons and video surveillance inside child waiting areas. Camera coverage should include interior and exterior corridors by the child waiting area door in addition to the main child waiting area.

b. 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 the child waiting area without permission. The staff person shall have the ability to arm and disarm local alarm annunciation as needed.

11. Current Case File Storage Areas

a. Provide silent duress alarm buttons at staffed positions in public records viewing areas.

b. Where public records rooms are not staffed, provide remote door release from secure staffed positions that are within view of the door.

c. Provide video surveillance of all public viewing areas to create a record of files in custody of the public.

12. Evidence and Exhibit Storage Rooms

a. 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.

b. Provide video surveillance and recording of all who enter and exit the evidence storage room.

13. Loading Dock, Receiving, and Mailroom

a. Use card readers at key operational doors to facilitate loading dock and mailroom operations.

b. Provide video surveillance of loading dock and receiving areas, and monitor doors for intrusion.

c. 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.

d. Where required by the risk assessment, provide package weapons scanner in the mailroom. Where a package weapons scanner is not required by the risk assessment and not provided, all incoming packages delivered shall go through lobby security screening or another package screening process consistent with the court security operations plan.

14. Security Operations Center

a. The building SOC may duplicate functions of or combine functions with the detention/holding control room. Chapter 8, In-Custody Defendant Receiving, Holding, and Transport, describes systems that may require backup operation in the SOC and provides information about detention and holding control rooms.

b. Detention cameras monitored outside the detention area must not be viewable by the public at any time.

c. Use modular workstation furniture in the SOC that is ergonomic and does not obstruct visibility of the lobby and screening area.

d. 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 affects security of the facility. Refer to chapter 20, Fire Protection Criteria, for specific fire alarm system criteria.

15. Security Equipment Location

a. Locate electronic security headend equipment—including computers, storage, interface equipment, and the like—in the building main distribution frame (MDF) room.

b. Locate monitoring and control computers, monitors, annunciators, and related equipment in the security operations center or other designated area if an SOC is not required.

c. House security headend equipment in MDF or intermediate distribution frame (IDF) rooms 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, Network and Communication Systems, for specific telecommunications criteria.

d. Electronic security system headend equipment must be network based and be provided with network connectivity and an uninterruptible power source.

e. Point-to-point wiring is permitted in MDF and IDF rooms and from MDF or IDF rooms to field devices located on the same floor.

f. Communication between floors must be over the court network using a virtual local area network. Point-to-point wiring between floors is not permitted.

g. Detail detention equipment and monitor layout and equipment arms for organized and efficient layout.

Security Electrical Systems

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

4.I 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 features described below.

1. 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.

a. Provide monitoring and control of the secure driveway vehicle gates and doors, vehicle gate barrier arms, building perimeter protection, and separation between public, private, detention, and other critical areas.

b. 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. 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.

c. When armed, doors, hatches, and other operable access points shall be monitored for forced entry.

d. Monitor all card access controlled doors for forced door and propped door alarms.

e. Monitoring and administration of the system shall be via client computers located in the SOC.

f. 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.

g. Coordinate security system (SS) plans with door schedule and hardware specifications for door position switches and card readers.

h. Confirm top or bottom orientation and voltage for door operators.

2. Video Surveillance

a. Provide an Internet Protocol (IP)-based video surveillance system utilizing networked cameras, video servers, storage, and workstations. Coaxial cable is not acceptable, except in certain elevator applications. Refer to chapter 17, Network and Communication Systems, for network cable criteria.

b. 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 and seven days of data retention. Exterior cameras must have day and night capability to provide a usable image in low-light conditions.

c. Cameras may be powered via Power over Ethernet or by Class 2 camera power supplies, provided they have a separate circuit breaker or fuse-protected output for each camera.

d. 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.

e. 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, In-Custody Defendant Receiving, Holding, and Transport, for detention control system requirements.

f. Clarify security camera structural backing requirements. Coordinate camera locations with exterior wall assemblies. Confirm that all exterior penetrations are weatherproofed. Review camera orientation virtually with court security provider. Confirm stair devices with Office of the State Fire Marshal. Recommend not installing cameras in security ceilings.

3. Duress Alarm

a. Provide a wireless duress alarm system consisting of a controller, repeaters for larger facilities, and wireless duress buttons.

b. 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.

c. 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.

4. Intrusion Detection

a. 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.

b. 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.

c. 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.

5. 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. Exit lanes shall have an 8′ tall glass wall for visual surveillance.

6. Weapons Screening

a. Provide X-ray scanners and Americans with Disabilities Act (ADA) compliant magnetometers in the lobby to screen persons and belongings for weapons before entering secure space.

b. Design screening lanes to provide ample space for equipment, conveyers and tables, and clearance for ADA-compliant magnetometers.

7. Secure Driveway and Parking Controls

a. Provide vehicle gates and gate barrier arms at secure driveways and at secure parking entrances to restrict public access.

b. Provide vehicle gates and gate barrier arms at secure parking areas to restrict access from secure driveways.

c. Ensure that vehicles cannot become trapped between gates, overhead doors, and gate barrier arms under any circumstances.

8. Cable Routing

a. Route all security cabling in metallic conduit or raceway where cabling is run in walls and above hard ceilings. Above accessible ceilings, use cable tray where provided and J hooks elsewhere.

b. Provide back boxes suitable for all field devices and terminations.

c. Refer to chapter 15, Electrical Criteria, for specific conduit criteria.

d. Refer to chapter 17, Network and Communication Systems, for specific network cable requirements.

e. Installation of ceiling access doors in the detention cell ceilings is prohibited.

4.J BULLET-RESISTANT GLAZING AND PANELS

1. 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: Underwriters Laboratories' UL 752 Level 3, three shots or greater, as stipulated by risk assessment.

2. Clerk/Public Transaction Counter

a. For counter outside the 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.

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

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

3. Judge/Clerk/Witness Courtroom Bench

For judge's bench, witness station and courtroom clerk's work area, provide the following:

- 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 Notes

M: Compliance Mandatory

RA: As Determined by Risk Assessment

SR: Strongly Recommended

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 4.E, Physical Security Planning Criteria	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 minimum 6″ nonstructural architectural finish around interior columns in secure parking areas.	M
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
Courtrooms	
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 secure 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 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 up to height and/or story specified in RA.	M
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
Executive/Administrative Offices	
Provide silent duress alarm buttons	M
Family Court Services 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 and Waiting Area	
Provide only one public entrance.	M
Eliminate potential areas of concealment in 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 secure areas of building.	M
Physically isolate unscreened lobby area.	M
Provide video surveillance of lobby and secure public circulation areas of building.	M
Provide minimum 6″ nonstructural architectural finish 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 continues on next page

Table 4.1 Notes

M: Compliance Mandatory

RA: As Determined by Risk Assessment

SR: Strongly Recommended

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 personal identification number (PIN).	RA
Provide remote door unlock.	RA
Evidence and 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 and 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″ nonstructural architectural finish around interior columns.	M
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 and mailroom, or harden enclosure for package threat (charge weight to be specified by RA).	RA
Harden interior structure in loading dock and mailroom for package threat (charge weight to be specified by RA).	RA
Provide package scanner in mailroom.	RA
Security Operations Center	
Use modular workstation furniture where an SOC is provided.	M
Provide SOC to operate and monitor electronic security systems.	RA
Duplicate functions of in-custody detention control room.	RA
Building Envelope	
Exterior doors shall be locked after hours.	M
Minimize or eliminate operable windows.	M
Limit windows at critical areas.	M
Provide laminated or tempered glass for debris mitigation.	M
Provide forced entry protection at the first floor (forced-entry rating to be specified by RA).	M
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-, bullet-, or forced entry–resistant façade to meet performance requirements.	RA

Table 4.1 continues on next page

Table 4.1 Security Standards *continued*

	COMPLIANCE
Structural Systems	
Design structures greater than two stories tall to resist progressive collapse using the alternate path method.	M
Fully grout and reinforce exterior concrete masonry unit walls as well as those around high-risk areas with an identified explosive threat, with connections designed to allow full development of capacity at the supports.	M
Minimize floor-to-floor heights.	SR
Minimize column bay spacing.	SR
Avoid overhangs with occupied space above.	SR
Limit or avoid large transfer girders.	SR
Provide redundancy and alternative load paths.	SR
Use ductile structural systems.	SR
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, and 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 and 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
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

D: Discretionary

MEP = mechanical, electrical, and plumbing

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	R1	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				R1		R1								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 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
Interior Public Circulation																		
Public Queuing Area						R												
Weapons Screening Station						R	R	R	R	R								
Information Kiosk or Counter						R				R								
Courtroom Public Waiting Area						R												
Interior Private Circulation																		
Public to Private Area Doors	R			R	R	R												
Court Set																		
Courtroom Entry Door		R		R		R												
Courtroom Jury Door	R1			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

D: Discretionary

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	D			D						R								
Court Reporter's Room	D			D														
Jury Deliberation Room	D			D						R								
Entry Vestibule		R		R		R												
Law Enforcement Waiting Area																		
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 Area	R1			R1		R				R1								
Training Room																		
Active Records Storage	R			R														
Inactive Records Storage	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
Private Office																		
Executive/Director										R1								
Mediator										R1								
Family Law/Self-Help Center																		
Waiting Area						R												
Reception/Sign-in						R												
Orientation Room	R1			R1														
Workshop	R1			R1														
Mediation Room										R								
Child Waiting Area	R			R		R				R								
Alternative Dispute Resolution																		
Reception/Waiting Area										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 Notes

R: Required

R1: Required as Applicable

D: Discretionary

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												
Mailroom						R	R1			R								
Maintenance Shop	R			R														
Furniture/Equipment Storage	R1			R1														
Information Systems 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												

DIVISION ONE: DESIGN CRITERIA

5 COURT SET

Governor George Deukmejian Courthouse
Long Beach, CA
AECOM

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.

REFER TO CHAPTER 22, CATALOG OF COURTROOM LAYOUTS FOR CALIFORNIA TRIAL COURTS, FOR APPLICATION IN THE DESIGN OF ALL FULLY OR PARTIALLY STATE-FUNDED NEW COURTHOUSES TO BE USED BY THE TRIAL COURTS.

THE COURTHOUSES ARE PRESUMPTIVELY REQUIRED TO USE TEMPLATES FOR LAYOUTS OF MULTIPURPOSE COURTROOMS AND HOLDING CORE.

THE EXAMPLES ARE INCLUDED AS REFERENCE ONLY, TO BE USED IN LIEU OF MOCKUPS.

A courtroom millwork fit-and-finish mockup is required before beginning casework manufacturing, to ensure that sightlines and both functional and accessibility requirements are satisfied. Height requirements should be reflected in the mockup.

For technical requirements, refer to chapter 15, Electrical Criteria; chapter 17, Network and Communication Systems; and chapter 18, Audiovisual Systems.

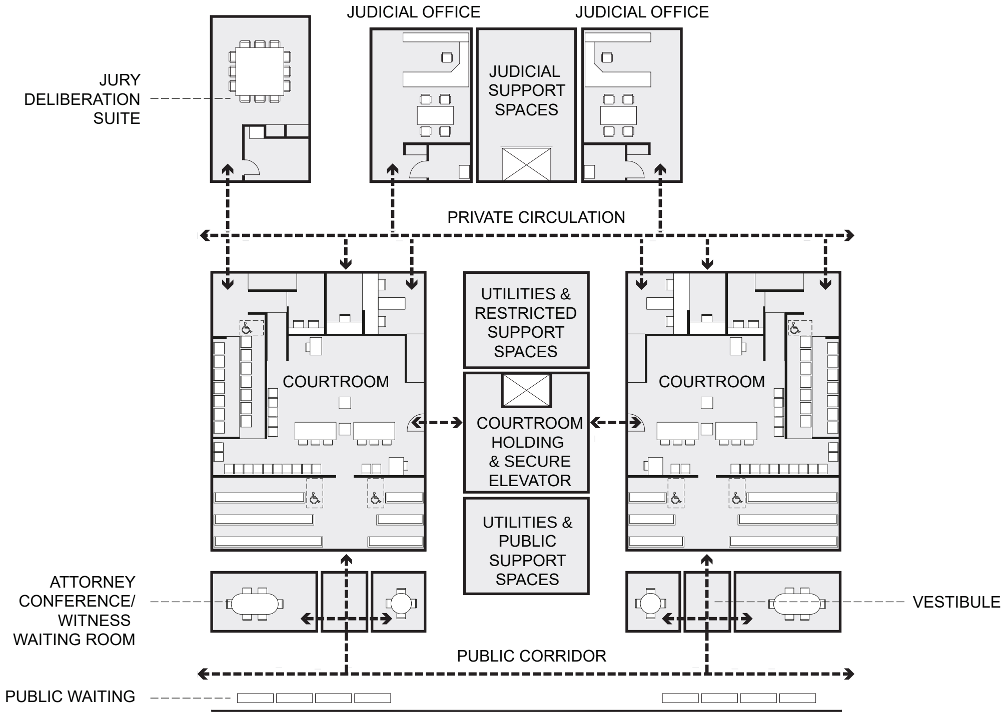
The court set includes courtrooms, judicial offices (subsequently referred to as chambers), chambers support space, jury deliberation rooms, witness waiting, attorney conference rooms, evidence storage, and equipment storage. A private corridor, with staff elevator and stairs, connects the chambers suites with staff offices and secure parking (see figure 5.1). Emergency egress for the private corridor should be separate from egress for 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 secure, 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 clerk, court reporter, and attorneys;
- Protect witnesses and jurors from intimidation;
- Provide reasonable confidentiality for attorneys, defendants, litigants, and judicial officers;



Note: For illustration only. Refer to chapter 22, Catalog of Courtroom Layouts for California Trial Courts, for courtroom template plans.

Figure 5.1 Illustration of Typical Courtroom Floor Organization

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

5.B COURTROOM

1. Basic Courtroom Types

These Facilities Standards recognize two types of courtrooms, multipurpose courtrooms and specialty courtrooms.

1.1 Multipurpose Courtrooms

The multipurpose courtroom is the typical trial courtroom in California, capable of accommodating every kind of court proceeding. It is sized and configured to support a variety of proceedings in different case types, including the array of criminal and civil pretrial calendars and proceedings, jury trials, and court trials. The use of multipurpose courtrooms maximizes a court's capacity to accommodate its overall courtroom workload and to adjust its processes and calendar design, which are necessary because subject-matter caseloads change over time and changes in law place new demands on trial courts.

1.2 Specialty Courtrooms

Specially designed and sized courtrooms may be required in light of population size, caseload volumes, courthouse scale, and other considerations unique to a specific project. Specialty courtrooms can include multiple jury courtrooms, high-volume criminal arraignment/pretrial courtrooms equipped with secure high-volume in-custody docks (located adjacent to court holding facilities), high-volume traffic courtrooms, juvenile delinquency and dependency courtrooms, and mental health courtrooms, among others. Specialty courtrooms are by their nature not as flexible as multipurpose courtrooms for use in a variety of different case types and proceedings. Accordingly, specialty courtrooms should be considered only when the multipurpose courtroom cannot effectively and safely be used.

2. Initial Design Considerations

Chapter 22, Catalog of Courtroom Layouts for California Trial Courts, is a collection of approved templates of multipurpose courtrooms that were developed based on—and tested against—designs used in constructed courthouse projects. These templates offer optimal sightlines throughout the courtroom, the capability to accommodate multiparty cases, additional space for chairs in front of the gallery, sufficient work area for two clerks, sufficient space in the witness box for an interpreter, sufficient working space for the bench officer, ease of access to the jury box, inclusion of an array of courtroom security solutions, adequate size and proportion of all working areas, adequate gallery size, the most effective and efficient overall use of space including a rectangular footprint, the positioning of counsel tables to ensure privacy from juror chair sightlines, and the highest-quality approaches to the various design considerations articulated in the balance of this chapter.

Chapter 22 also includes examples of courtroom floor plans of constructed California courthouses. The examples are similar to the template layouts and are included to enable design teams to compare design floor plans with built courtrooms and, if necessary, visit the courtrooms in lieu of constructing courtroom mockups. These floor plans include multipurpose and specialty courtroom designs.

The Catalog of Courtroom Layouts does not contain *templates* for specialty courtrooms.

For the number of courtroom requirements in a project, the program team and court should clearly identify any specialty courtroom needs during the programming phase because later identification in the design process can lead to compromised solutions.

THE PROPOSED INCLUSION OF MULTIPURPOSE COURTROOMS FOR A NEW CONSTRUCTION PROJECT THAT DOES NOT ADOPT APPROVED TEMPLATES FROM CHAPTER 22, CATALOG OF COURTROOM LAYOUTS FOR CALIFORNIA TRIAL COURTS, WILL BE PRESUMED TO BE UNSUPPORTABLE AND—ABSENT A SHOWING THAT OVERCOMES THE PRESUMPTION—WILL BE DISALLOWED.

The proposed inclusion of multipurpose courtrooms for a new construction project that does not adopt approved templates from chapter 22, Catalog of Courtroom Layouts for California Trial Courts, will be presumed to be unsupportable and—absent a showing that overcomes the presumption—will be disallowed.

3. 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.

4. Courtroom Adjacencies

a. 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 initially only for civil proceedings and do not require access to court floor holding facilities. In the initial construction, however, provisions must be included for future construction of secure holding directly adjacent to the courtroom.

b. Locate courtrooms for easy access from judicial chambers. Judicial chambers and related support spaces shall be adjacent to the private corridor, providing judges and staff quick courtroom access.

c. Courtrooms may be assigned to an individual judge. Where courtrooms are not dedicated for use by one bench officer, chambers can be remote from the courtroom.

d. 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.

5. Corner Bench or Center Bench Layouts

California courtrooms may use either a corner bench or a 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

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

5.C COURTROOM ACCESSIBILITY

1. Floor Levels

Because floor levels of courtroom components vary, maintaining sightlines among all components while providing full accessibility shall be a priority.

a. 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 "height above floor" specifications discussed in table 5.1. Separate paths of travel for persons with disabilities shall be avoided.

b. The judge's circulation path must never be in front of the bench.

2. Floor Level Changes

Level changes of floors can be achieved in a variety of ways.

a. 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.

Table 5.1 Court Component Information

ELEMENT OR WORKSTATION	FURNITURE / CASEWORK WIDTH	DEPTH	HEIGHT ABOVE FLOOR	NUMBER OF OCCUPANTS	AREA SF
Judge	6′–7′	24″ MAX	+15″–18″	1	64–80
Courtroom Clerk	10′	24″–27″	+0″–14″	1–2	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″	14	144
			(2nd tier) 6″–14″		
Counsel Tables	7′–10′	3′–4′	+0″	3 ea.	90–110
Lectern	38″	2′	+0″	0	

Note: Heights of judge, clerk, and witness stand must be in strict relation—judge highest; clerk within 12″ of judge; and witness stand at least 6″ lower than judge. The number of litigants at the tables can be more if size and configuration permits.

N/A = not applicable.
SF = square feet.

b. 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, the Judicial Council does not allow motorized lifts because of operation and serviceability concerns, except in retrofit situations where space is too limited to accommodate ramps. The approach to use motorized lifts should be avoided in new construction.

c. 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.

d. A courtroom millwork fit-and-finish mockup is required before beginning casework manufacturing, to ensure that sightlines and both functional and accessibility requirements are satisfied. Height requirements should be reflected in the mockup.

5.D COURTROOM COMPONENTS

The following design criteria shall apply to courtroom components.

1. Judge's Bench

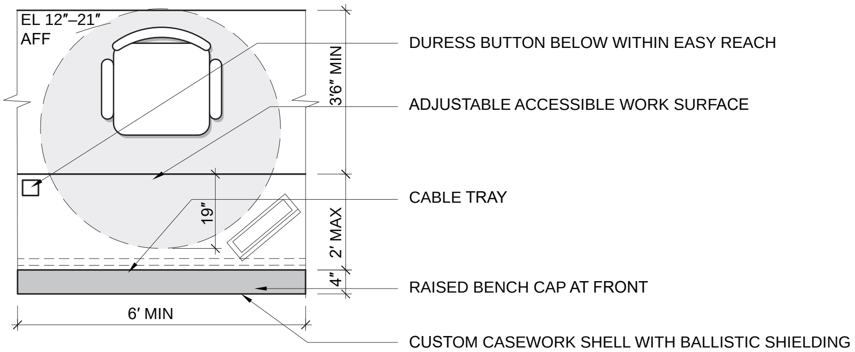
The size, location, height, area, and design of the bench reinforce the role of the judge as the administrator of justice and as the principal controller of order in the courtroom. Design the bench to be the focal point of the courtroom without favoring any one party.

a. Design the bench size and height to be proportionate to the courtroom and to ensure an unobstructed view of and 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 depends on the actual height of the judge's platform above the well. The attorney's view of the judge's desktop needs to be considered if the judge's platform height is lower as a result of ramping and accessibility issues.

b. Provide a work surface 72″ to 84″ wide by a recommended 24″ deep 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. The work surface at the judge's bench is not meant for sit-stand configuration but may be adjustable to be higher or lower than the standard work surface height for a comfortable seated position. If the work surface needs to be higher than the in-built 3″ privacy screen, a modesty panel may be attached to the table. Provide 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.

c. Between the judge's area and the witness box, a fixed barrier of sufficient width and height to prevent a witness from reaching the judge while maintaining sightlines is required. The judge's exit route should be away from the witness.

d. Provide a minimum of 3′6″ between the edge of the judge's desk and the wall behind. This space 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, courtroom clerk, and court reporter.



EL = elevation.
AFF = above finished floor.
MIN = minimum.

Figure 5.2 Judge's Bench Plan

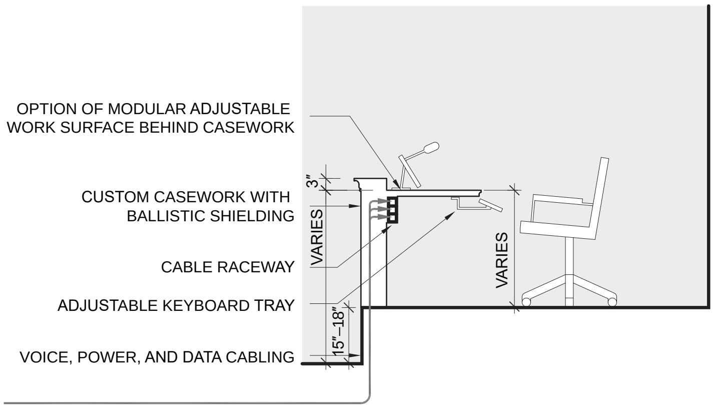


Figure 5.3 Judge's Bench Section

e. 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 Underwriters Laboratories' UL 752 Level 3. Provide accessible under-desktop cable raceways to accommodate voice, data, video, power, and courtroom technology cabling.

f. 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.

g. Provide areas for computer equipment, a printer, storage, a telephone, and outlets for data transmission. The bench requires a microphone with a mute button and may include the courtroom audio controls. Refer to chapter 16, Lighting Criteria, and chapter 18, Audiovisual Systems.

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

2. 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 of the courtroom as the CSO and near a doorway to the private corridor. Access may be provided directly from clerk's station to courtroom well.

a. The clerk's workstation requires a work surface that is 120″ wide by 24″ to 27″ deep 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. 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.

b. Because the clerk's station is the primary work area, design the clerk's station like 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 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. Because this work area is used for all office functions, such as typing and writing, this area must meet all requirements for ergonomic office workspaces.

c. 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, video, power, and audiovisual cabling.

d. 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 the printer located adjacent to their work surfaces, whereas others prefer it located behind their workstations 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.

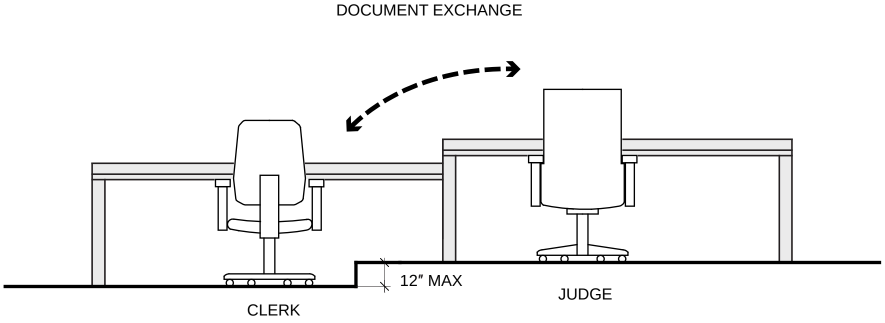


Figure 5.4 Bench and Clerk Elevation

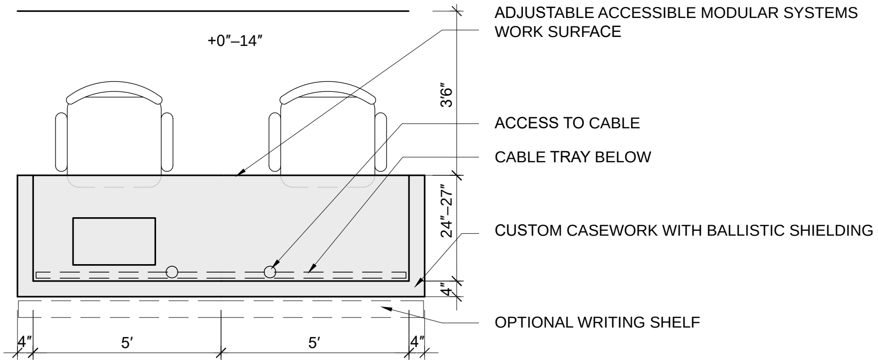


Figure 5.5 Clerk Station Plan

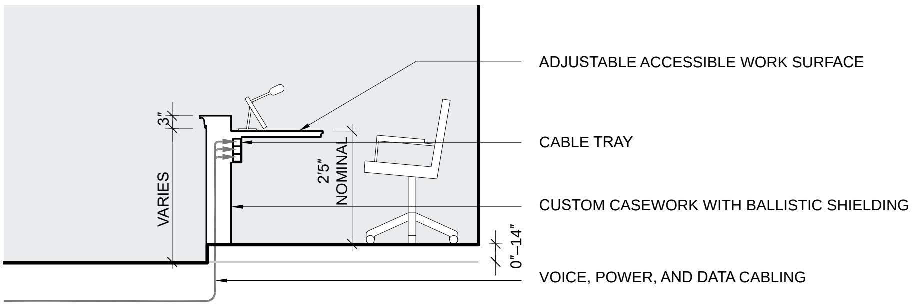


Figure 5.6 Clerk Station Section

3. Witness Box

a. The witness box shall be located between the judge and the jury and in such a way that the witness's face is clearly visible to the judge, jury, court clerks, court reporter, and counsel tables.

b. 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, except in certain buildings, where it shall be fixed. Refer to figures 5.7 and 5.8.

c. Design the witness box to maximize visibility between the jury and the witness.

d. 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 and a wheelchair turning circle to permit forward entry and exit.

e. Witness boxes typically have a work surface for reference material, and an expert witness may have a computer for use during testimony. Line the wall behind the paneling of the witness box with bullet-resistant material that meets the criteria of UL 752 Level 3, similar to the judge's bench.

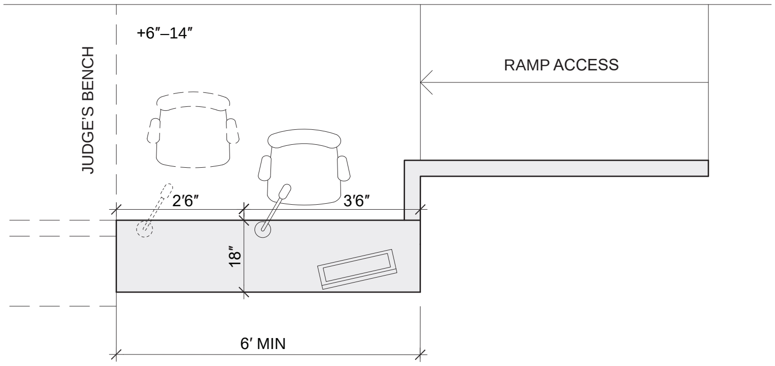


Figure 5.7 Witness Box Plan

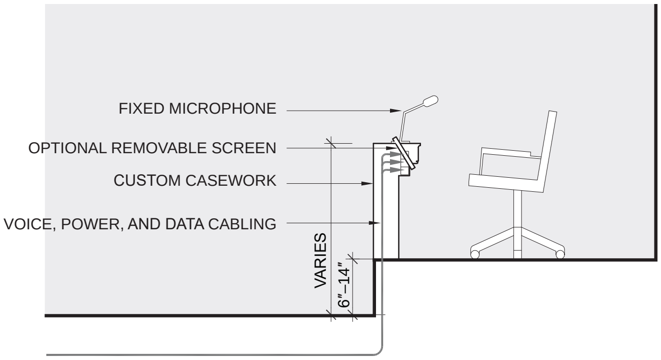


Figure 5.8 Witness Box Section

4. Court Reporter's Area

The court reporter provides verbatim recording of all court proceedings.

a. Locate the court reporter's area so that anything said by participants can be heard by the court reporter, and ensure sightlines to the judge, witness, and attorneys.

b. 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.

c. The workstation shall be cable ready for in-courtroom headphone audio output and computer-assisted real-time transcription. Provide concealed, accessible raceways to incorporate data, power, and audiovisual cabling.

5. Jury Box

a. Provide clear sightlines from each juror to the witness, attorneys, judge, courtroom clerk, and evidence displays. 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.

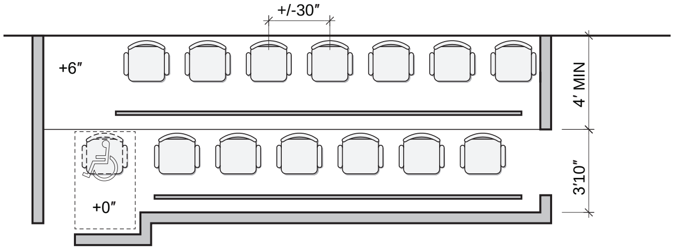


Figure 5.9 Jury Box Plan

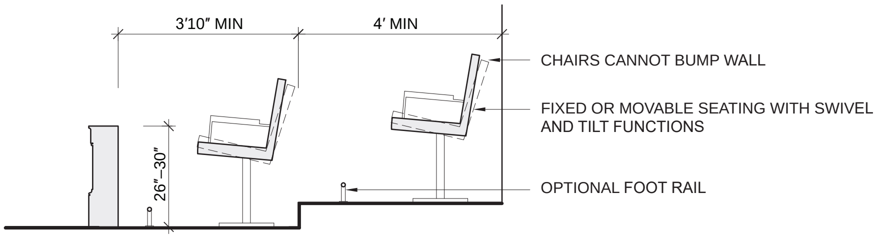


Figure 5.10 Jury Box Section

b. 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. When locating accessible seating space, provide sightlines equivalent to sightlines for 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.

c. 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.

d. 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. If required by court, provide writing surfaces that are integral to the jury chairs. Provide a front modesty panel between 26″ and 33″ in height 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 or jurors' heads 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.

e. High-security courtrooms may incorporate additional elements, such as glass panels, to secure the safety of the jury, 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.

6. 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.

a. Counsel tables: Locate counsel tables in the courtroom so that attorneys can be seen and heard by other attorneys, the judge, the witness, the courtroom clerk, 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 have a table box for data, video, and power. Separate grommets in the tables shall be provided for the two microphones. Tables shall include a modesty panel to conceal defendant restraint devices. Provide a floor-attached U-bolt for the defense table. 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.

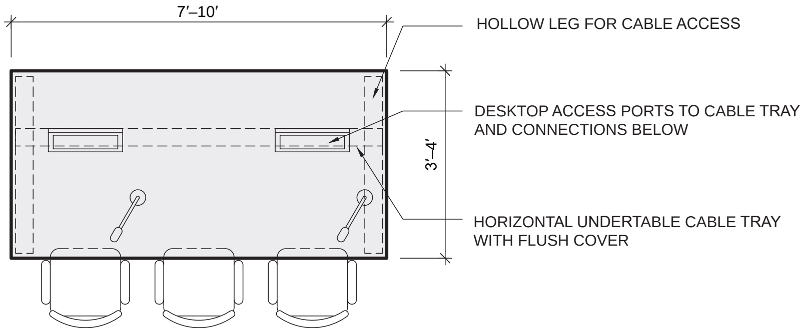


Figure 5.11 Counsel Table

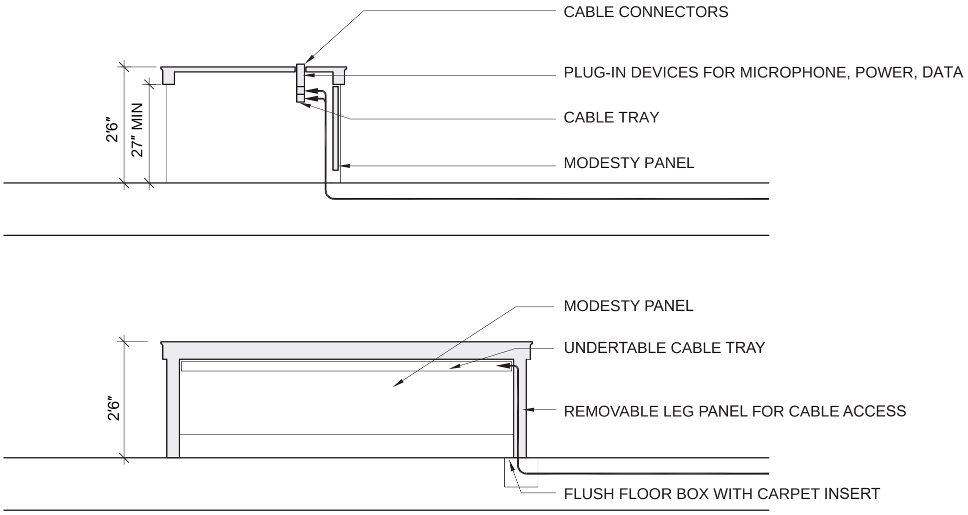


Figure 5.12 Counsel Table Section

b. Lectern: A movable, height-adjustable, universally accessible lectern may be provided that may be shared between courtrooms and located within reasonable proximity to the counsel tables. The lectern shall be floor supported (not tabletop mounted). Provide a shelf and a gooseneck with a clip for a wireless microphone.

c. Digital evidence presentation system placed between the two counsel tables: The system can be a cart shared between courtrooms or installed as a fixed shelf. It can contain a document camera and/or a Blu-ray player. Provide a recessed floor box with outlets for data, video, and power.

d. 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 restricted corridor, or some combination of the two. 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 1010 for "delayed egress locks" are satisfied. This solution needs to be approved by the authority having jurisdiction, including the 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 Group A occupancy require the specific approval from the State Fire Marshal for using delayed egress locks as an alternative means of code compliance.

7. Exhibit Display Area

Provide space for exhibit display and a large ceiling-mounted projection screen or wall-mounted monitor, located to be clearly visible to all court participants. (See chapter 18, Audiovisual Systems, for screen size standards.)

8. Court Security Officer (CSO) Station

Locate the CSO's station within the litigation area to the rear of the well 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.

a. Provide the CSO station with a small work surface, modesty panel, and 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.

b. Incorporate bullet-resistant material into the paneling of the CSO station, and include a silent duress alarm system in the workstation design.

9. 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 separation element, commonly called the "rail," may be millwork or predesigned and manufactured and shall have a clear opening at least 44″ wide.

10. Spectator Area

A multipurpose courtroom has seating in the spectator area for the majority of the jury panel. The number of seats shall be planned to accommodate voir dire panels for jury selection through a combination of seats behind the rail, movable chairs inside the litigation area, and the jury box seating. See figures 5.20 and 5.21, at the end of this chapter.

a. Bench seating is to be provided in lieu of 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 shall be provided. Benches shall be anchored to the floor but removable for relocation. Individual theater-style seating system is not permitted. See figure 5.13.

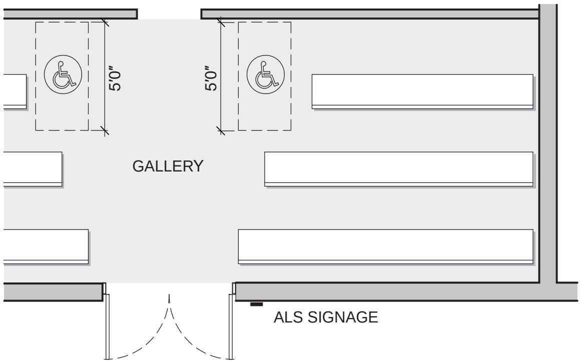
b. Provide wheelchair spaces, companion seating, and semiambulatory seating in ratios required by law. Refer to figure 5.13.

c. In multipurpose courtrooms, accessible seating can be located in one area. In large courtrooms that are wider than a typical multipurpose courtroom, accessible seating areas shall be provided in several locations to equalize sightline advantages. A wide central aisle allows flexibility for persons with disabilities.

d. A companion seat must be located adjacent to the wheelchair space. The wheelchair space must align with the companion seat. Refer to figure 5.14.

e. Provide space in front of and behind the wheelchair space such that the spectator using a wheelchair or mobility device can roll forward or backward to allow other spectators to exit a row. The wheelchair or mobility device cannot permanently block exit from an aisle.

f. Temporary seating, or a fold-down seat, may be placed in wheelchair spaces when not occupied, but is not a preferred option because of the logistics of how the temporary seats are removed when the space is needed for a wheelchair.



ALS = assistive listening system.

Figure 5.13 Bench-Type Spectator Seating

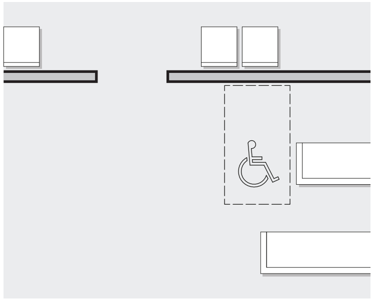


Figure 5.14 Companion Seating Adjacency

11. 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 (doors from the public corridor into the vestibule are typically solid). The outside doors from the corridor to the vestibule shall be lockable for security. It is preferable not to have exit devices, latches, or astragals on the doors from the courtroom to the vestibule due to noise considerations. If the attorney-witness conference rooms are needed while the courtroom is dark or locked, the vestibule may be unlocked to provide access. Flexibility in the locking system may be provided on a project-by-project basis.

For high-profile cases, court security staff may provide additional security screening at the courtroom entrance. Consider providing electrical outlets close to the courtroom entries to allow supplemental screening equipment to be plugged in.

12. Exhibit Storage

Provide a secure room or closet for storage of exhibits. 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 exhibit storage are recommended to prevent a borrowed access card from allowing access. Wall construction around exhibit storage should be secure and continuous from slab to slab to prevent access from above the ceiling.

13. Evidence Storage

Posttrial evidence storage should be provided in a secure central location adjacent to clerks' secure offices. Refer to the requirements for records storage in chapter 6, Jury Facilities and Court Administration.

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 than the courtroom well to reduce the ramping requirements within the courtroom.

1. Chambers

Chambers are the personal office and conference areas in which the judges conduct legal research and case study, and hold meetings with attorneys or judicial personnel.

a. Because each judge requires a quiet, distraction-free work environment in which to perform these tasks, separate chambers shall be provided for each judge.

b. 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.

c. The chambers shall be designed with a private restroom.

d. Provide adequate sound control between the chambers and the staff and reception areas to reduce sound transmission during sensitive conference sessions.

e. Provide natural lighting to the chambers. Refer to figure 5.15.

f. 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 5.16.

2. Support Staff Workstations, Reception, and Waiting Areas

The judicial office may be adjacent to and entered through an anteroom that contains space for floating courtroom clerks and 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.

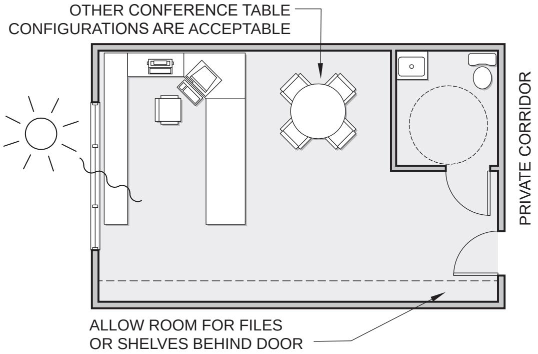


Figure 5.15 Judge's Chamber Plan

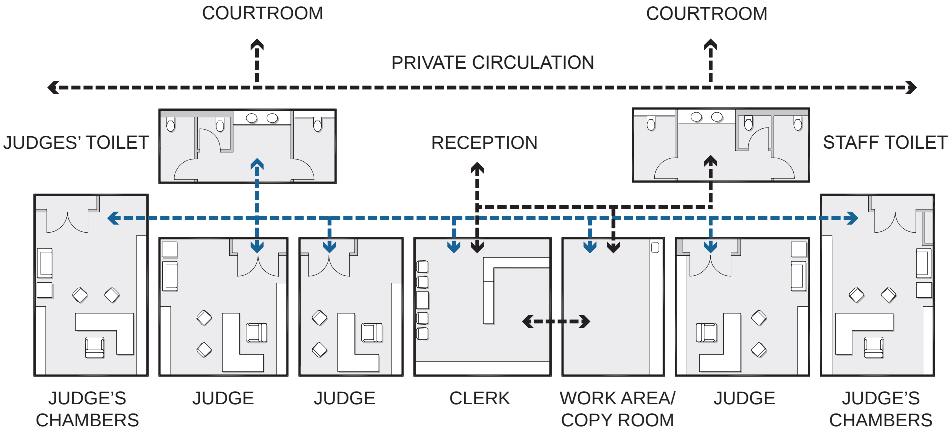


Figure 5.16 Clustered Chamber Layout

3. 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.

4. 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. Locate the work area on the private corridor on the same floor as the courtrooms, on nearby courtroom floors, or on a court administration floor. Provide an area for locked transcript storage and general office supplies inside or adjacent to the court reporter's work area. Provide a shared counter space to assemble transcripts; provide cubicles with higher divider walls for regular work.

5. Conference Room

A conference room may be provided for judges as defined in the project program. This area may 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. A designated law library is not permitted.

6. 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.

7. 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 5.17–5.19.

a. Provide not more than one juror deliberation room for every two courtrooms, and consider one deliberation room for every three courtrooms. The ratio may be verified by a study, during programming, of the recent data on the number of jury deliberations at a particular court; however, more than one jury deliberation room per two courtrooms must be approved by the Judicial Council. For efficiency and flexibility, some jury rooms can be initially assigned for other courtroom support functions in the program but must be convertible to jury rooms without remodeling.

b. 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.

c. The jury deliberation room shall comfortably accommodate 12 jurors and allow use of charts, mounted exhibits, and video monitors for evidence.

d. Provide one accessible toilet room positioned so that the door opens from a vestibule. Orient the toilet room door for sound attenuation and to provide reasonable privacy to the toilet room.

e. Provide a counter with lower cabinet and space for a water bottle filling station.

f. Provide space for coat storage, which can be either a coat rack or a built-in closet space.

g. The room shall have natural light; ensure that windows do not allow jurors to communicate with people outside the court facility.

h. Jury deliberation rooms shall be designed in a flexible manner so that they can easily be converted into a chambers to accommodate assigned judges.

8. Attorney Interview/Witness Waiting Rooms

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

a. Provide two attorney interview rooms for every courtroom. In larger court facilities, the ratio of interview rooms may be reduced. One room may be eliminated to add spectator seating.

b. 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.

c. The court security officers should have the ability to control from the courtroom both sides of the secure interview room.

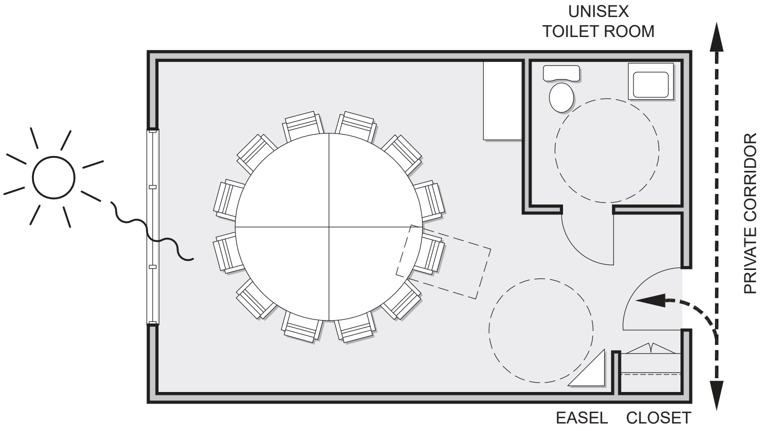


Figure 5.17 Jury Deliberation Room 400 SF

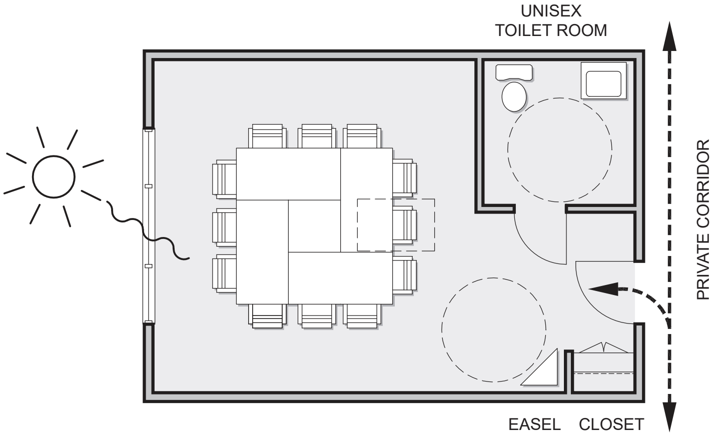


Figure 5.18 Jury Deliberation Room 345 SF

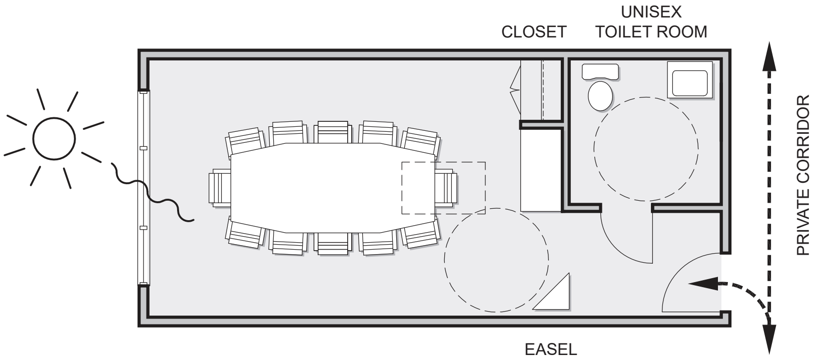


Figure 5.19 Jury Deliberation Room 300 SF

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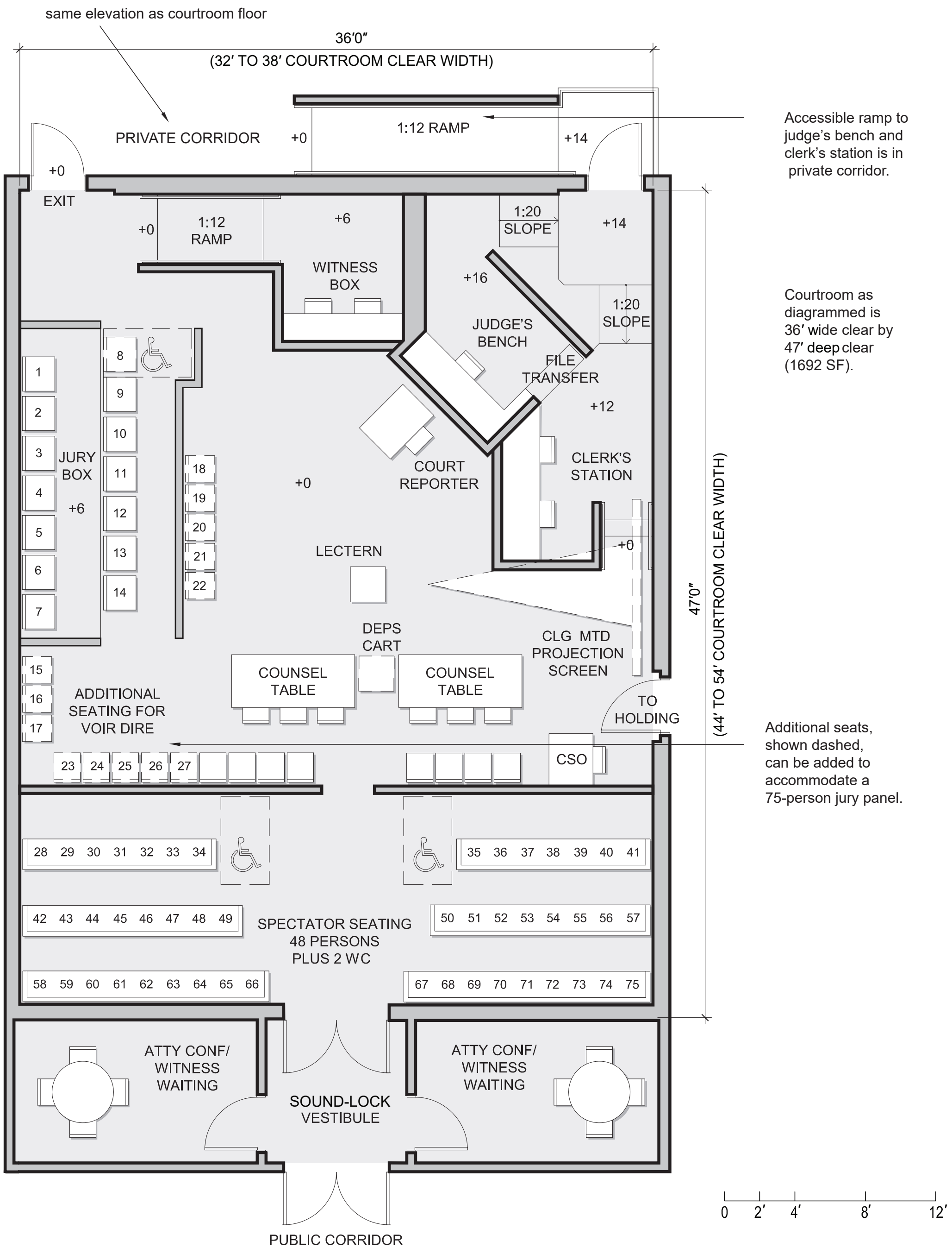
Figure 5.20 Variations

- 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 5.22 and 5.23 for seating layout in large courtrooms.

Figure 5.21 Variations

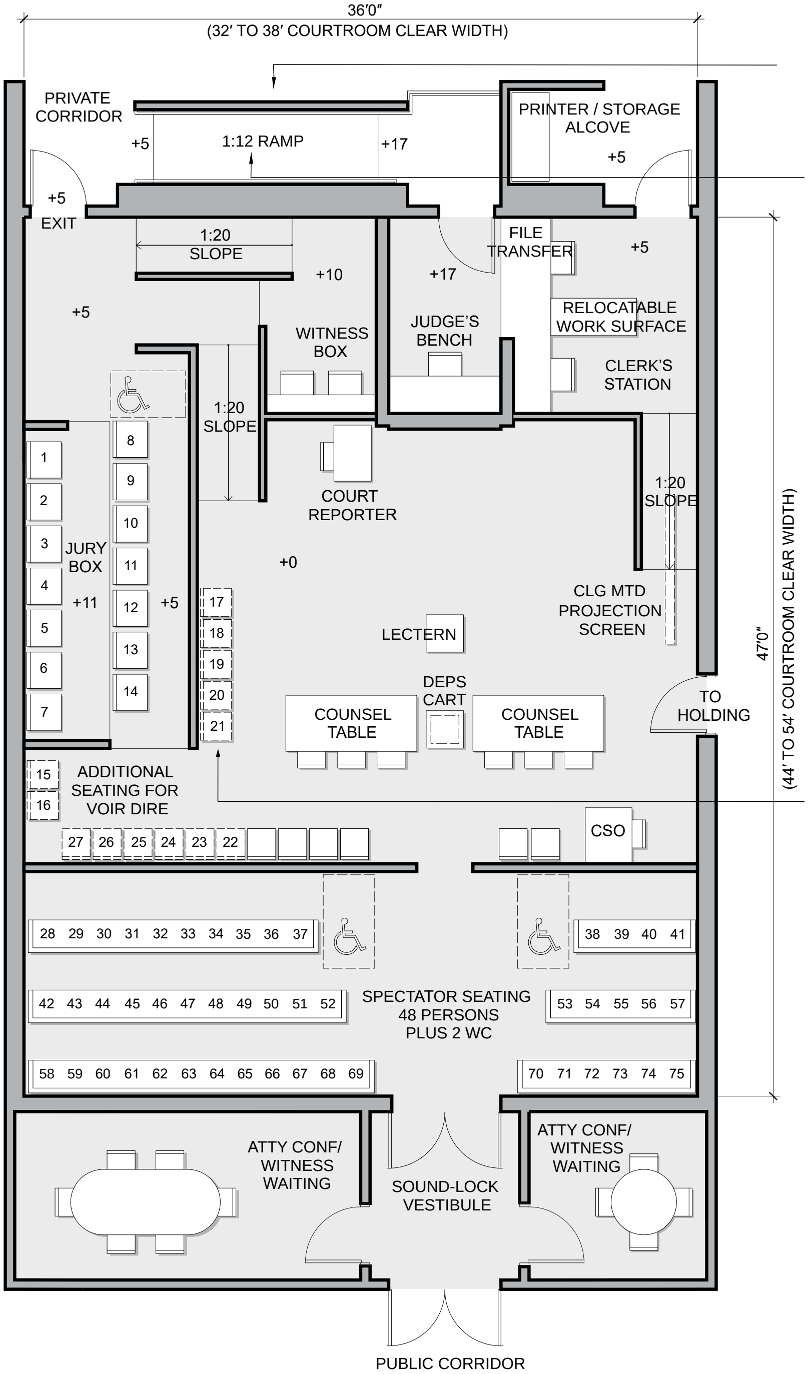
- Ramping requirements will increase for judge's bench and clerk's station if private corridor is at the same floor elevation as the courtroom floor.
- Refer to spectator seating layout shown in figures 5.22 and 5.23 for seating layout in large courtrooms.



DEPS = digital evidence presentation system.
CLG MTD = ceiling mounted.
WC = wheelchairs.
ATTY CONF = attorney conference room.

Note: For illustration of courtroom components only. Refer to chapter 22, Catalog of Courtroom Layouts for California Trial Courts, for courtroom template plans.

Figure 5.20 Multipurpose Courtroom (Corner Bench, Seating for Jury Panel)



Private corridor is at elevation 5′ above courtroom floor

Accessible ramp to judge's bench is in private corridor.

Courtroom as diagrammed is 36′ wide clear by 47′ deep clear (1692 SF).

Additional seats, shown dashed, can be added to accommodate a 75-person jury panel.

Note: For illustration of courtroom components only. Refer to chapter 22, Catalog of Courtroom Layouts for California Trial Courts, courtroom template plans.

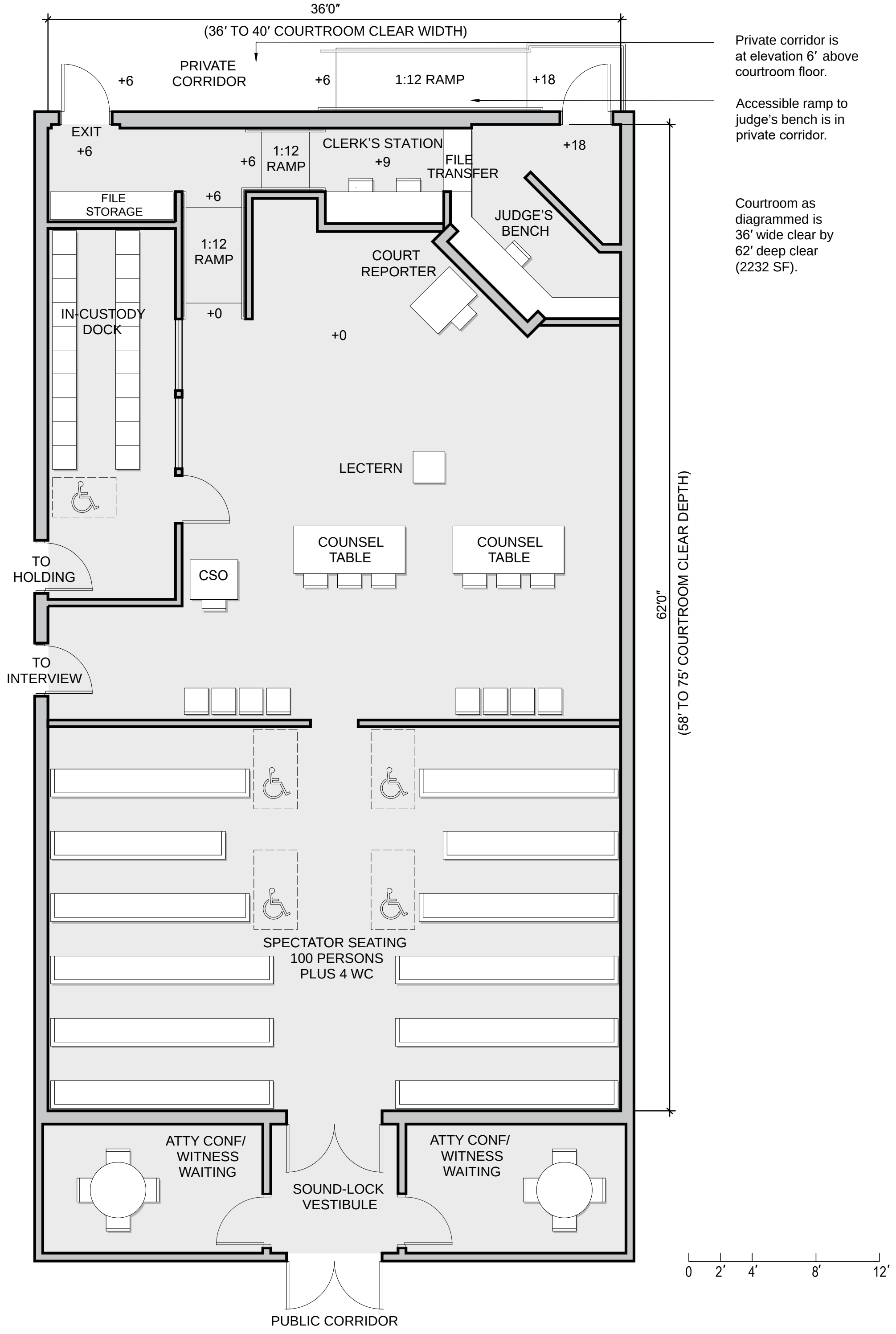
Figure 5.21 Multipurpose Courtroom (Central Bench—Asymmetrical)

Figure 5.22 Variations

- 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.
- In-custody dock may alternatively be located outside of courtroom perimeter in holding area.

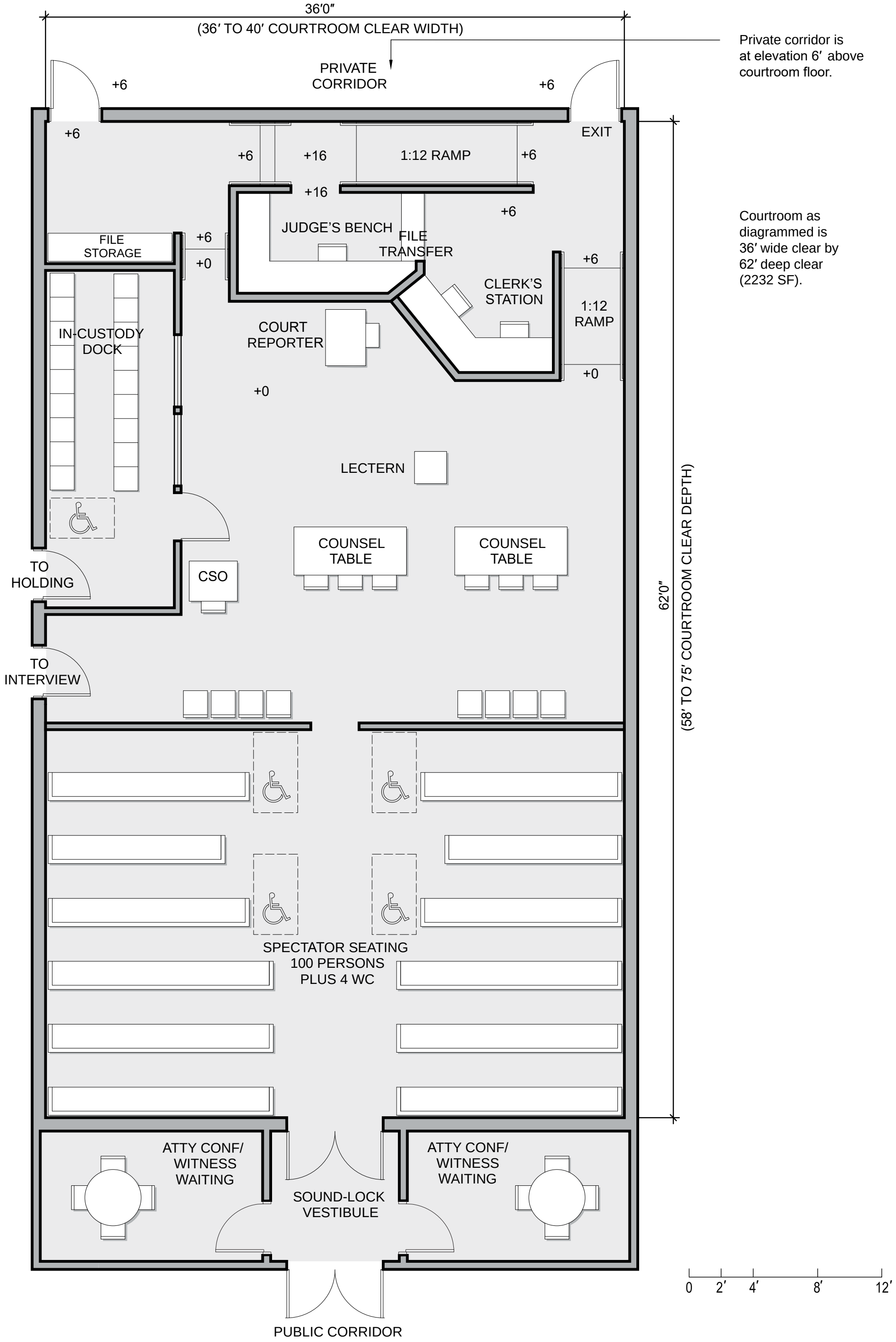
Figure 5.23 Variations

- 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.
- In-custody dock may alternatively be located outside of courtroom perimeter in holding area.



Note: For illustration of courtroom components only.

Figure 5.22 Arraignment Courtroom (Corner Bench)



Private corridor is at elevation 6′ above courtroom floor.

Courtroom as diagrammed is 36′ wide clear by 62′ deep clear (2232 SF).

Note: For illustration of courtroom components only.

Figure 5.23 Arraignment Courtroom (Central Bench)

DIVISION ONE: DESIGN CRITERIA

6

JURY FACILITIES AND COURT ADMINISTRATION

San Bernardino Justice Center
San Bernardino, CA
Skidmore, Owings & Merrill LLP

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Jury Assembly Spaces

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

6.A JURY FACILITIES OBJECTIVES

Jury duty is a public service obligation. For many citizens, jury duty is their 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.

a. Plan and design the jury assembly rooms to be comfortable, efficient, and safe.

b. Locate, size, and configure the spaces appropriately to facilitate use by potential jurors.

c. Ensure that all jury assembly areas can be monitored by jury staff.

d. Because technology and new operational models will continue to affect jury call and associated space needs, jury assembly spaces should be designed to consider future changes, such as online jury summons processes, that will reduce or eliminate the need for such large spaces. Jury assembly rooms should be designed to allow for easy conversion to other uses.

6.B JURY ASSEMBLY SPACES

1. General Requirements

The jury assembly area is a high-volume public access function and should be located on the building's entry floor or lower floor.

a. All prospective and selected jurors must enter through a screening station. The entrance to the jury area must be easy to locate upon entering the courthouse and easily accessible from public corridors.

b. Jury staff shall be able to control the entry into the jury assembly area.

c. Ensure that traffic to the jury assembly room does not 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.

d. Protect the assembly area from exterior viewing.

2. Components

The jury assembly area consists of several unique components, described below.

2.1. Entry Queuing Area

a. 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.

b. The queuing area can be colocated within a lobby, waiting area, or building circulation. The queuing area should be within the jury assembly room to prevent contact with defendants, family members of defendants, and witnesses.

2.2 Reception, Check-In, and Registration

a. 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 the peak volume of anticipated jurors expected at sign-in times. Self-check-in kiosks may be considered in this location.

b. Provide standard clerical support workstations (refer to table 2.2).

2.3. Jury Assembly Room and Information Presentation Area

a. Sufficient seating shall be provided for all prospective jurors. Provide movable grouped seating and lounge seating with power supply. 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.

b. 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 electronic devices. See figure 6.1.

Figure 6.1 Seating and Work Areas in Jury Assembly Room, Superior Court of Tulare County, Porterville

c. Jury assembly rooms may serve as multipurpose community rooms during business hours or off-hours. Therefore, the design of the jury assembly area should permit partitioning the assembly area from the rest of the courthouse functions during off-hours. The Judicial Council Facilities Services office shall be consulted for off-hours requests.

d. Jury assembly rooms in courthouses without dedicated training rooms shall be designed and constructed to the same standards as training rooms to enable them to be used for training and other collaborative activities with full multimedia capabilities. This design includes the use of nonfixed, easily removable seating to allow for flexible room setups. In addition, these rooms should be designed to allow use for training sessions without disturbing jury services staff.

e. Restroom facilities should be located within or close to the jury assembly room.

f. Provide a movable lectern for juror orientation and infrastructure for wireless or cell phone access.

g. 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. See chapter 17, Network and Communication Systems, and chapter 18, Audiovisual Systems, for technical requirements.

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

2.4 Forms Counter

Provide counters for filling out forms. A reasonable proportion of the counter space shall be designed for accessibility by people in wheelchairs.

2.5 Coffee and Snack Area

a. 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 commensurately.

b. 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 need to be accessible to nonjurors.

2.6 Jury Staff Area

In cases where jury staff screen jurors, an adjoining space may be necessary for the jury coordinator or for staff consultation. In larger courthouses, space for additional support staff not located in the jury reception area may be required.

a. The size of the support space area will be proportionate to the size of the court facility.

b. The jury office will be readily accessible to the reception counter.

c. Provide sufficient space for storage of jury records and files. See figure 6.2.

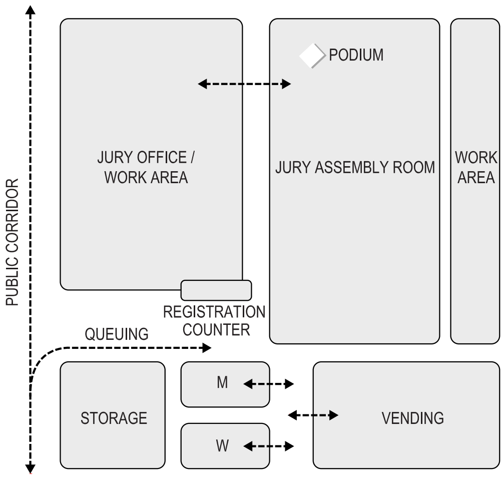


Figure 6.2 Jury Assembly Suite Adjacency Diagram

2.7 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.

2.8 Call Center

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

6.C OBJECTIVES OF THE CLERK'S OFFICE

The trial court's administrative organization combines the traditional public and case management functions of the clerk with the financial and administrative services of a modern business. Clerk responsibilities include case filing and tracking, records administration, calendar management, fines and fees collection, and sharing public information. Business services may include human resources, budget management, and information services activities; statistical reporting; and purchasing.

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.

a. Colocate functions of the clerk's office (CO) 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 CO to private and public corridors, allowing controlled access to judicial officers, courtroom personnel, attorneys, and the general public.

b. The appearance of the CO shall be consistent with the rest of the courthouse. The public side of the counter area must have 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 clerk's office shall be an open-office environment with modular furniture appropriate for a public agency.

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

d. 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 television cameras at the public counter area. At transaction windows that are not accessed through the 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. CO staff access shall be restricted by use of key cards or other devices.

6.D CLERK'S OFFICE SPACES

The clerk's office area consists of the following spaces. See figure 6.3 for a typical layout.

1. Public Counter and Counter Workstation

a. 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. Size the pass-through window to prevent physical intrusion.

b. Locate one or more universally accessible counters closest to the entrance. Such counters must have the ability to accommodate wheelchair users on each side. Two counter workstation design options are available:

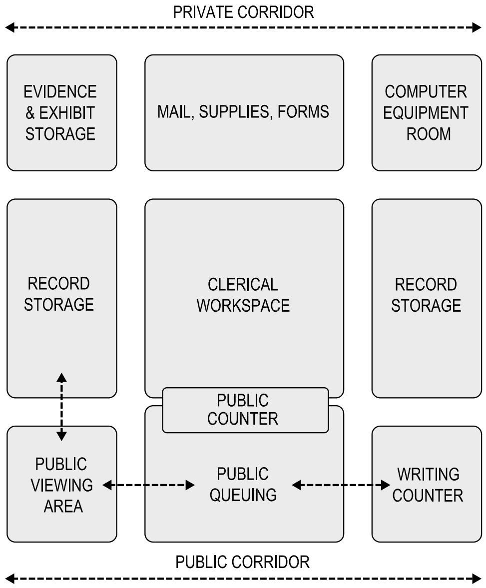


Figure 6.3 Clerk's Adjacency Diagram

- 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 12″–18″ depth. A raised solid barrier between openings should screen the view of computer and desktop items. The divider 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 people in wheelchairs. Sightlines and sound levels when speaking must be considered in this model. For longer transactions, movable seating may be provided for the public; the public may stand for short transactions.

c. Staff assignments to counter workstations may be to permanent, rotating, or walk-up counters. A *permanent* counter means the that 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* counters require that counter staff have dedicated workstations elsewhere.

d. Each counter position will include the counter, staff workspace on the private side, and a standing area on the public side.

e. Workstations shall accommodate communication and electronic 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 a credit card swipe machine, a printer, a cash drawer, and cameras. Locations shall facilitate communication and passage of documents between clerks and the public. The credit card swipe machine shall be attached to the public side of the counter.

f. Provide a silent duress alarm at each clerk counter position.

g. See chapter 16, Lighting Criteria, for lighting suggestions.

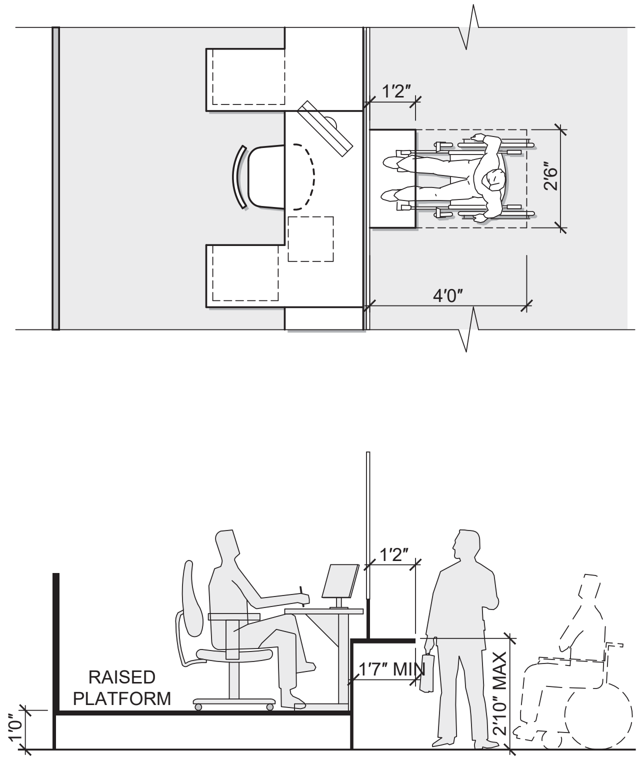


Figure 6.4 Transaction Height Counter

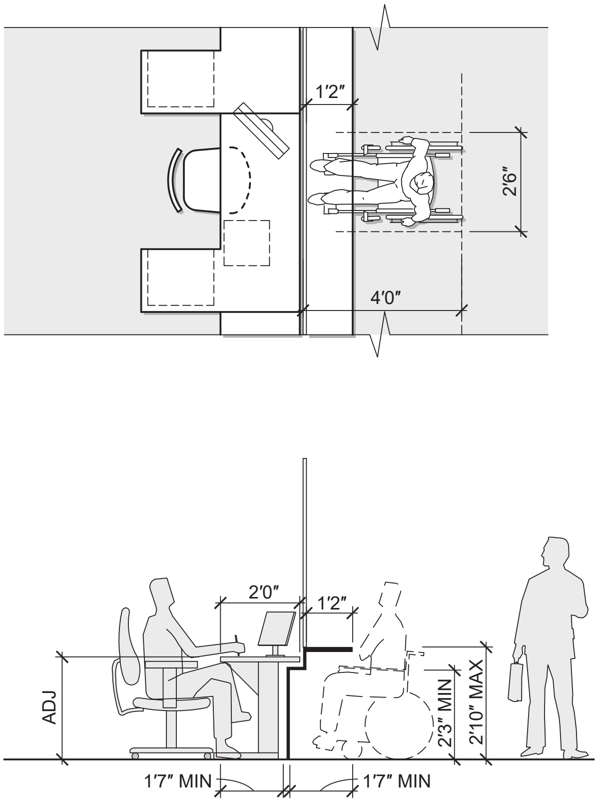


Figure 6.5 Universal Height Counter

h. 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.

i. Providing security with glass barriers is the preferred method to create a layer of separation between staff and the public.

j. Provide voice transmission through 1-1/4″ vertical slots or grills on either side of the window. Provide a pass-through tray.

k. Amplified acoustic systems should be avoided to prevent a loud lobby environment. The lobby shall be designed with acoustic finishes for sound absorption. An amplification system may be considered on a case-by-case basis depending on the acoustic quality of the space and ambient noise.

l. 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 in use, provide adequate seating for the waiting public.

m. 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 for protection from wind, sun, and rain and shall have an exterior-grade vandal-proof credit card swipe machine on the public side of the counter.

n. Locate and design drop boxes for convenient public use. Locate drop boxes within the courthouse public spaces. Review location and design of all drop boxes regarding safety and security issues.

o. Provide a counter for information and payment transactions for the revenue and collections office.

2. Records Viewing

a. Provide an area adjacent to the public service counter for public viewing of records. This area must be secure and visible to staff at all times to prevent tampering with or theft of records. Records viewing sequence and operation should be clearly incorporated in the design.

b. Space for self-service duplication equipment in the public area may be provided on the request of the court. Establish a reasonable ratio of public computers to the number of counter stations.

6.E COURT EXECUTIVE OFFICER'S AREA

Office needs for the court executive officer's area include an office for the court executive officer (CEO), a reception area, offices for support staff to the CEO, a conference room close to the CEO office, workstations for staff, and space for files and office equipment. A separate restroom for the CEO is not required. The CEO area can be separate from the main clerk's office and is often located on an upper level in multilevel courthouses or adjacent to the presiding judge's chambers.

1. Offices and Workstations

a. Workstations and office furniture shall be modular to enable complete ergonomic and expansion flexibility. Provide medium workstations with overhead storage. Low partitions, at a height of 42″, 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.

b. See workstation size standards in table 2.2 in chapter 2, Courthouse Organization, and planning criteria below for each respective court division per its office area requirements.

c. Provide space for:

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

2. Information Technology (IT)

Information technology administration functions 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.

a. Provide an IT workroom and storage space with a 32″ counter on two sides.

b. Provide a 14″ shelf 21″ above the counter. This casework shall be plastic laminate finish.

c. Above the counters, provide a continuous plugmold electrical unit. See chapter 17, Network and Communication Systems, for more information.

3. 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.

4. Revenue and Collections

The revenue and collections office area requires standard workstations.

a. Provide a public reception area and counter space for information and payment transactions.

b. Provide counter workstation positions and space for files and office equipment.

c. Provide space for multiple file cabinets for records and files.

d. Consider providing separate storage with restricted access and a security camera for safety.

5. Human Resources

The human resources office area requires standard to large workstations.

a. Provide space for multiple file cabinets for records and files and a conference space within or adjacent to the workstations.

b. Provide duress buttons at public counters and at any staff work area used for employee termination.

c. Provide acoustical separation of any public space and staff areas where confidential telephone and personal conversations occur.

6. Records Storage

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 onsite. A destruction program, if available, can help control growth of records storage.

a. The design shall take into account the extent to which the court has transitioned from paper files to electronic files, since this has a big impact on space needs. This analysis shall be done during the Programming phase.

b. Records must be maintained, pulled on request, routed, and interfiled.

c. Provide space for 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″.

d. See chapter 16, Lighting Criteria, for lighting suggestions.

e. Posttrial exhibit storage should be provided in a secure central location adjacent to secure clerks' offices.

7. Active Records Storage

a. Active records must be easily accessible from the clerk's office work areas and in a secure location. Functional requirements and policies of each courthouse will influence the location of the active file storage area; the ground floor is preferred because of structural load issues.

b. Verify the functional and space requirements for active record storage to provide sufficient space. Include adequate workspace adjacent to the file storage equipment.

c. 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. Motorized systems are preferred, but manual systems may be acceptable for infrequently accessed high-density files. Design with some fixed aisles so several aisles can stay open for staff access. Specify record storage seven shelves high.

d. A locking feature may be used to secure confidential files.

8. Inactive Records Storage

If inactive files are stored onsite, 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.

a. Older inactive records should be stored offsite to economize on use of courthouse space.

b. Warehouse shelving is recommended for files that have been transferred to storage boxes.

c. Protect the file storage medium against deterioration or damage from flooding or moisture.

9. Conference and Training Rooms

a. Provide conference rooms that allow judges, court managers, and staff to gather regularly for bench meetings, education and training, and administrative meetings. The three conference room sizes listed in table 2.2 do not preclude larger conference rooms in large court buildings or combining of multiple rooms with folding walls.

b. Provide small conference rooms adjacent to workstation areas. Sharing of conference and training rooms between departments is encouraged.

c. Provide a training room, located for easy accessibility by staff. Design the room 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.

d. Training rooms shall be located in private circulation areas. One entrance to a training 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.

e. To determine the size of a training room, the following guidelines should be used:

- Computer training layout: 35–40 square feet (SF) per person
- Hollow square layout: 30 SF per person
- Classroom-style layout: 20–22 SF per person
- Theater-style layout: 10–12 SF per person

f. In addition to the recommendations 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, frequency of such events, and availability of space to accommodate these types of events;
- Average number of attendees for regularly offered training courses and meetings, and frequency of these types of trainings and meetings;
- Anticipated demand for technical training; and
- Ratio of open office space to private offices to help determine the demand for private meeting spaces.

10. Mail Center

Provide an area for intake, sorting, and distribution of mail. See chapter 4, Courthouse Security, for main room physical security design standards. Large facilities may require an additional area for mechanical and electrical components to support heating, ventilation, and air-conditioning (HVAC) biofiltration systems.

11. Other Support Areas

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

a. Provide printer/copier areas to accommodate high-volume copying. They shall 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.

b. Provide an area with adequate shelving and work areas for storing office supplies.

c. 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.

d. Provide a staff break room with a sink, disposal, and casework. Employees shall provide appliances.

e. Provide an employee lactation room in close proximity to employee workstations as required by California and federal laws and the California Building Code. The lactation room shall include a sink, space for a refrigerator, and easily accessible power outlets. The number of lactation rooms in the building shall be based on the number of employees as outlined in California and federal law.

12. Equipment Storage

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

DIVISION ONE: DESIGN CRITERIA

7 SPECIAL SERVICES

County of Santa Clara Family Justice Center
San Jose, CA
Zimmer Gunsal Frasca LLP

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 *Statewide Action Plan for Serving Self-Represented Litigants.*

FCS = Family Court Services

ADR = alternative dispute resolution

Family law facilitators, self-help centers, Family Court Services (FCS), juvenile dependency mediation, child waiting, and alternative dispute resolution (ADR) programs promote the effectiveness and efficiency of certain types of court cases. Through the use of these services, the litigant has better information, issues are settled more frequently, court appearances are minimized, and paperwork is reduced.

Related justice agencies (i.e., district attorney, public defender, probation, Child Protective Services) have significant business each day within the trial court. Temporary spaces for related justice agencies may be considered.

7.A OBJECTIVES

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

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

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 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*, prepared by the Task Force on Self-Represented Litigants and approved by the Judicial Council in 2004, attorney-supervised, staffed self-help centers are recommended for every court. Figure 7.1 shows the variety of case types that are self-represented by litigants.

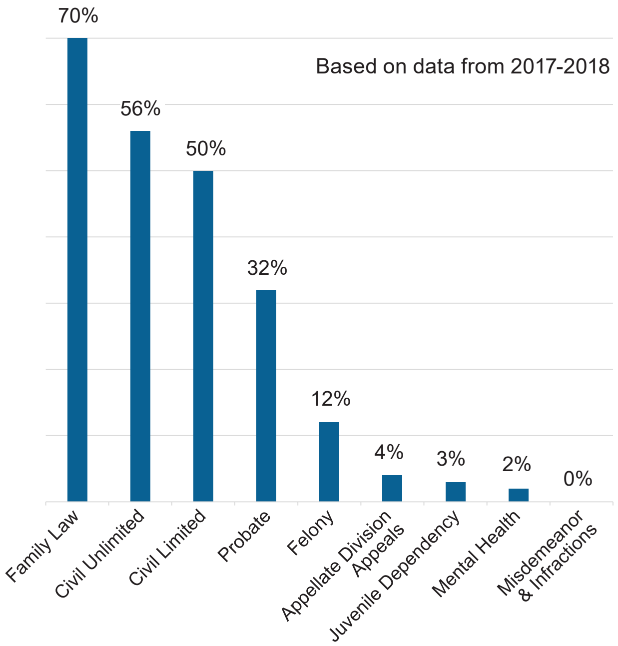


Figure 7.1 Self-Represented Litigants' Needs (by Case Type)

Family law facilitators and self-help centers provide assistance and practical information about court procedures for self-represented litigants using the court. Locate self-help centers near the clerks' offices, easily accessible from a public corridor. See figure 7.2.

Figure 7.2 Self-Help Center, the Robert M. Falasco Justice Center, Superior Court of Merced County, Los Banos

1. Reception, Waiting, and Triage Areas

a. Provide public waiting areas 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.

b. Furnishing and equipment needs include small tables that can be reconfigured for classes, for filling out forms or for conferencing; computer terminals located against the wall; and brochure racks, shelving, storage, video monitors, and a photocopier.

c. Provide staff workspace with file storage, work counters, and equipment. Public counters and reception areas may be integrated into the work areas.

d. Provide a duress alarm at counters.

2. Workshop Rooms

a. 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 forms. See chapter 16, Lighting Criteria; chapter 17, Network and Communication Systems; and chapter 18, Audiovisual Systems, for technical requirements.

b. In jurisdictions with at least one full-time facilitator, provide at least one conference room for services to be provided by volunteer attorneys, paralegals, and other staff supervised by the attorney facilitator or self-help center attorney's office.

c. 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.

d. Provide a duress alarm in offices and at counters.

3. Small Courthouse Model

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

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 Standards of Judicial Administration, standard 10.24

4. Information Shared Outside Courtroom

Provide a brochure rack and video feed outside the family courtrooms to instruct users on courtroom procedures.

7.C FAMILY COURT SERVICES

1. Requirements

Courts are required to set contested child custody and visitation issues for mediation. Family Court Services provides 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 325 et seq., and other safety-related issues affecting any party or child named in the proceedings. Rule 5.215 of the California Rules 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, 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 have alternative access for domestic violence victims who are participating in mediation.

2. Facilities

Family Court Services consists of the following areas:

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

For sizes, refer to table 2.2 in chapter 2, Courthouse Organization.

2.1 Mediator Offices

a. 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.

b. Provide sidelights at office doors.

c. Provide acoustical treatment of office walls and doors.

d. Provide a duress alarm in each office, because of the potential for physical confrontation.

2.2 Reception and Waiting Areas

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

b. Provide a vision panel at the suite entry door.

c. In large jurisdictions, provide a reception counter and sign-in area, with a counter position.

d. Provide duress alarms in support staff areas and at counters.

e. Provide an area for copy and fax machines adjacent to clerical staff and mediators.

f. Provide space for FCS files and records adjacent to clerical staff.

g. Provide a reception area with sufficient space to accommodate mandatory screening, intake, and differential assessment. Private space should be available to allow for safe consultations with vulnerable parties, such as victims of violence.

h. 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.

2.3 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 also be used for additional waiting and conferencing.

2.4 Mediation Room

a. 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.

b. Provide acoustical treatment of office walls and doors, because of the confidential and sometimes vocal exchanges associated with these discussions.

c. Provide a duress alarm.

d. Provide video cameras to allow remote observation of proceedings.

2.5 Conference and Training Room

In jurisdictions with more than eight FCS mediators, provide a conference and training room of a size proportionate to the number of mediators. The room must accommodate reference books and related materials needed by mediators to conduct their business. One room may be used for mediation, orientation, conferences, and training. See chapter 16, Lighting Criteria, and chapter 18, Audiovisual Systems, for audiovisual requirements. Provide a duress alarm.

2.6 Children's Waiting Area (Optional)

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 7.3 and refer to 7.D, Child Waiting Room (Optional), for standards for this area.

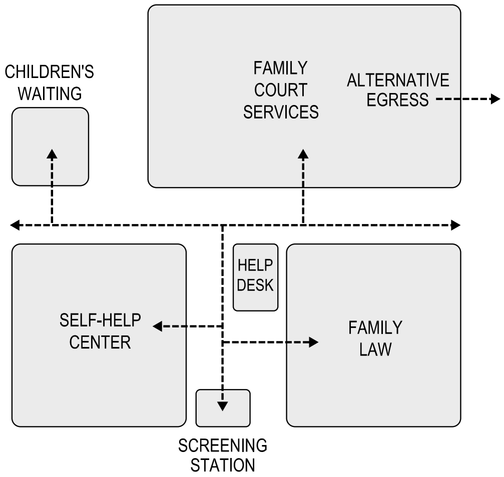


Figure 7.3 Special Services Adjacency Diagram

2.7 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 the security staff is stationed at FCS, provide a post with workstation and security equipment.

2.8 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 ROOM (OPTIONAL)

In all court facilities, endeavor to provide a safe place for children to play—including a child waiting room—while their parents conduct their court business.

a. Provide an area of 120 net square feet (NSF) for two or three children, increasing the 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.

b. Provide a check-in workstation with a duress alarm and a view of the entire room, to allow supervision by one staff person; design must facilitate safe check-in and checkout of children. Include file storage for administrative records, forms, and brochures.

c. Do not allow outside visual access or windows; the public shall not be able to look into the room.

d. The children must be in a controlled situation. Access doors shall be locked with a remote buzzer operated from the check-in workstation.

e. Provide one or two restrooms, one with a changing table.

f. Provide a second door into a secure corridor. Small facilities can use a multipurpose room.

g. Provide space for child-sized tables, chairs, couch, and floor games, and storage space for toys and games.

h. Provide space for information racks about community resources for service referrals and other resources (housing, health care, childcare, literacy, and education).

i. Provide a quiet room with a sink, locking cupboards, a refrigerator, and a microwave.

7.E ALTERNATIVE DISPUTE RESOLUTION

Alternative dispute resolution 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.

1. Mediation and Settlement Conferences

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, jury deliberation room, or conference area. Court-sponsored mediation, such as in small claims and unlawful detainer cases, may be provided in court facilities.

Provide space for civil case settlement conferences and mediation 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. Space for these functions may include reception and waiting areas.

2. Reception and Waiting

If required by the program, 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

1. Guidelines

a. 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.

b. 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.

2. Examples of Room Use

Representative uses of multipurpose rooms include:

- Related justice agency drop-in offices: Rooms suitable for installation of modular workstations, for staff use to prepare and read court papers, make telephone calls, and conduct other court-related activities.
- Onsite 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.
- Volunteer coordinator's office: In larger counties with comprehensive or centralized volunteer programs, a coordinator's office. May be located on a semiprivate corridor. Volunteers may also be located within specific court departments.
- Law enforcement waiting: A waiting area that must be located off public corridors near courtrooms and may be provided in criminal, traffic, and juvenile courts in which law enforcement officers may wait before court appearances and during court recesses. Access to the law enforcement waiting area must be secure and from the public corridor. Provide couch, chairs, lounge seating, and a table.
- Victim waiting: A waiting area 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: A waiting area located off public corridors near courtrooms. Provide bullpen with lockers, carrels, tables, manager's office, shared phones, secure storage, and a telecommunications device for the deaf (TDD).
- Blood draw/DNA swab room: A room at family court with a chair and locked cabinet.
- Fingerprinting: An area adjacent to criminal court, with a secure door. Provide a pass-through to the family law clerk's area. Provide a desk and a camera area to take headshot photos.
- Government attorneys conference room: A large conference room with computers and printers available to calculate child support and print out agreements. Local child support agencies often meet with litigants before and during the high volume of child support calendars to try to reach stipulations.
- Paralegal office: A drop-in center to assist families with child support issues, requiring room for a desk, file storage, and three or four guest chairs.
- Social services resource room: A room located near courtrooms so that litigants who are referred to social services can get immediate assistance for problems such as substance abuse.

DIVISION ONE: DESIGN CRITERIA

8

IN-CUSTODY DEFENDANT RECEIVING, HOLDING, AND TRANSPORT

Sutter County Superior Courthouse
Yuba City, CA
RossDrulisCusenbery Architecture

Important Terms

Circulation: Public, Private, Detention

Control Rooms: For more information, see 4.H.14, Security Operations Center, and 8.D.4, Detention Control Room.

Detention and *holding* are used interchangeably in this chapter.

This standalone chapter addresses the requirements for all in-custody areas and 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 Detention 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 them. Therefore, trial courthouse design and construction must provide accommodation for those defendants who are 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 requirement may amount to a few holding cells and a secure corridor to the courtrooms. In larger criminal court facilities, it 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 objectives are to provide a safe and secure environment for the transport and accommodation of in-custody defendants while in the courthouse; 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.

a. The Judicial Council is responsible for funding the security staff to supervise courthouse holding areas. Therefore, every design solution must optimize operational and staffing efficiencies.

b. Although 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 Board of State and Community Corrections (BSCC). The design and the Operational Program Statement are developed together and influence one another.

c. All in-custody areas shall comply with detention standards subject to BSCC inspection and certification under California Code of Regulations, title 15. Detention area design shall provide safety of in-custody defendants, sheriffs, and others and be consistent with the sheriff's Operational Program Statement.

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 the court security officer (CSO) 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 based on a number of factors, such as the inmate's being a danger to others or requiring protection from others. Separate holding areas are typically preferred in maintaining the separation of males and females in custody.

1. Sight and Sound Separation

Under some circumstances, juveniles in custody 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 Statement must demonstrate a good-faith effort to maintain the required separation through the course of foreseeable circumstances.

Several design features are inherent with accomplishing proper sound and sight separation.

a. Central holding must have separate areas for juveniles and adults. It is not enough to have separate cells accessed from the same corridor.

b. Access to adult and juvenile holding areas from the vehicular sally port should be separate. A single, centrally controlled pedestrian sally port does not violate this principle, but to circulate juveniles or adults through the other’s holding area to reach their own is unacceptable.

c. Detention control coordinates use of in-custody elevators and shared detention corridors such that either group can be reliably cleared before use by the other.

2. Acoustics Management

The information contained in this chapter is intended to provide each architectural and 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 regulations of the Board of State and Community Corrections, found in titles 15 and 24 of the California Code of Regulations. The design of all in-custody areas must adhere to requirements prescribed in titles 15 and 24 of the California Code of Regulations.

a. 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-custody defendants and staff.

b. 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.

8.C FUNCTIONAL OVERVIEW

The business of the courts includes motions, hearings, and trials involving in-custody defendants. Courthouses do not include provisions for booking in-custody defendants because this procedure typically occurs at a different detention facility before transporting the defendant to the courthouse. Therefore, 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-custody defendants overnight; they are present in the courthouse only during the normal hours of operation for the court.

Important Term

Sally port: A secure, controlled entryway.

Important Design Elements

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

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 sally ports, to holding areas and the courtroom—using dedicated circulation to avoid cross-circulation with judges, staff, and the public.

1. Defendant Arrival

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

In-custody defendants proceed to the central holding area (directly from the pedestrian sally port or through secure circulation), where paper check, pat search, and/or staging may occur before they are placed in a holding cell.

2. Holding

a. Provide both individual and group holding cells 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.

b. 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 because volume and physical proximity may allow for in-custody defendants to be moved directly from the sally port 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-custody defendants daily, and to manage their movement from central holding to the courtroom holding cells distributed on the courtroom floors.

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

d. Larger facilities may have courtrooms that are dedicated to special dockets, such as arraignment, felony disposition, drug court, pretrial 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. Although 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 shall include individual holding cells, noncontact interview booths, sound-lock vestibules into each courtroom, and a dedicated secure elevator stop, if applicable.

e. 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.

f. For courts that have high-volume in-custody access and have rapid case turnover, such as arraignment court, consider locating larger holding areas adjacent to the courtroom, or locate the courtroom adjacent to central holding, thereby eliminating the intermediate step of dedicated courtroom holding altogether. If 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.

g. At the conclusion of the courtroom proceeding, in-custody defendants 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

1. 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 and out of in-custody areas. An access control point (sally port) 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; security bars at any vertical and/or horizontal penetrations 5″ or larger in any direction; and sally ports at all access points.

2. Vehicle Sally Port

Vehicular access to the courthouse proper is via an enclosed vehicle sally port. A “drive-through” vehicle sally port is preferred, but not all sites and building configurations will be able to accommodate one. The optimal configuration must be determined on a project-by-project basis. (See figure 8.1.)

a. In all cases, the vehicle sally port must be of secure construction and must minimize views into and out of the vehicle sally port area.

b. The vehicle sally port must 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.

c. Provide a secure access gate at the entry point, a second egress gate, and a personnel gate. The vehicle sally port gates shall be interlocking and able to be electronically monitored and controlled at the detention control room. The primary means of communication and 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 and doors shall be detention grade and must be sized (width and height) to accommodate the largest transport vehicle expected (car, van, or bus).

d. The vehicle sally port must provide adequate space for the temporary parking of transport vehicles for the loading and unloading of in-custody defendants. The number and type of transport vehicles to be accommodated in the vehicle sally port will vary by project. For example, courthouses that are adjoined to the primary detention facility by tunnel or secure 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 sally port may require parking for several large-capacity vehicles, vans, and cars.

The functions of the detention control room and security operations center may be combined in small court facilities, depending 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.

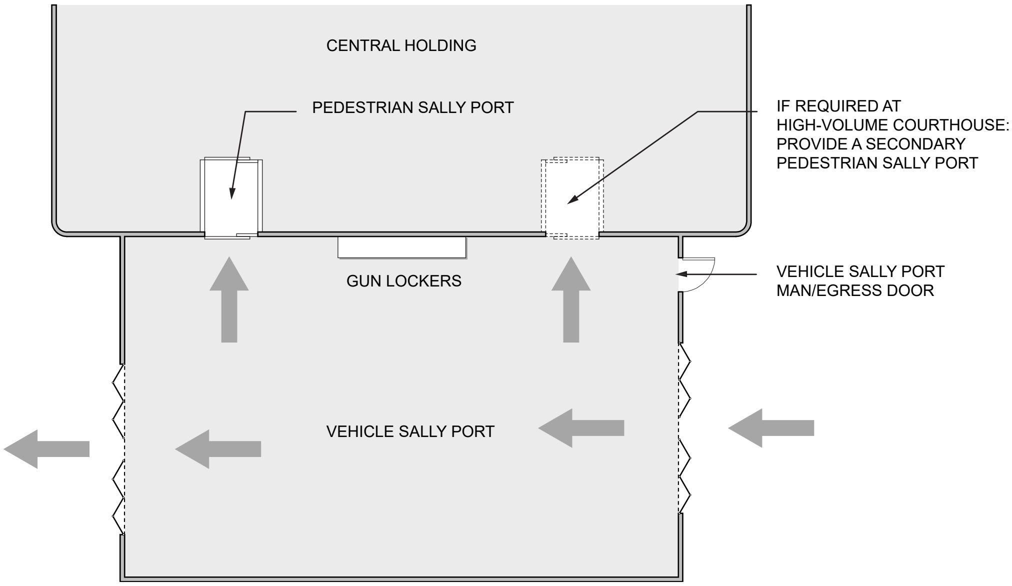


Figure 8.1 Vehicle Sally Port

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

f. Sight and sound separation of adult and juvenile in-custody defendants must be maintained at the point of reception in the vehicle sally port and into the building via the secure pedestrian sally port. This separation can be accomplished with a single pedestrian sally port. If required at a high-volume courthouse, provide a secondary pedestrian sally port dedicated to the movement of females and/or juveniles.

3. Pedestrian Sally Port

In-custody defendants are off-loaded from the transport vehicle in the vehicle sally port and escorted into the secure area of the courthouse via a pedestrian sally port. A pedestrian sally port is also required at all points of entry or egress into and out of the secure perimeter of the in-custody holding and transport areas. The pedestrian sally port provides control of movement to and from adjoining areas and prevents infiltration to these areas by unauthorized persons—or escape of in-custody defendants.

a. The pedestrian sally port should have a minimum width of 8′ determined by the custody agency's standard operating procedures regarding the maximum number of inmates allowed in one movement.

b. The doors at each end of the pedestrian sally port are interlocked, meaning that one door must be in the locked position before the other can be opened. Pedestrian sally port 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 sally port entry and within by the security staff.

c. Pedestrian sally ports must meet secure perimeter construction requirements.

4. Detention Control Room

The detention control room is responsible for all circulation in and out of the secure perimeter of the secure transport and holding areas, detention circulation corridors for moving in-custody defendants to and from courtroom holding areas, and elevators dedicated to in-custody movement. (See figure 8.2.) Detention control will control and monitor doors and locking devices, video surveillance systems, the 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 within the in-custody holding and transport areas for doors that are equipped with card access devices.

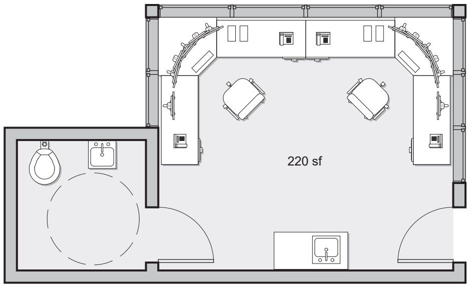


Figure 8.2 Detention Control Room

a. 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.

b. In courthouses with a segregated holding area for juveniles, a separate control station may be required for the juvenile section because juveniles are typically monitored and handled by probation officers, who are different personnel from the sheriff's department personnel who control the adult in-custody populations. This control station may be a desk with a control panel in the control room for probation officers to operate doors remotely within the juvenile area. In some cases, the local sheriff and probation departments may request that probation officers have a completely separate control room for the juvenile area.

c. 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.

d. 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, depending 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. If a single central control room services the entire courthouse, the control room shall be located outside the secure perimeter of the in-custody holding areas.

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

f. 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 and be unobstructed by security equipment configurations.

g. The detention control room environment must reduce stress and fatigue, as well as

A sally port is required at any penetration allowing access in or out of the secure perimeter and shall be controlled by detention control.

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.

h. 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.

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

5. Central Holding

In-custody defendants are detained in a secure central holding area pending transport to the courtroom floor. Both individual and group holding cells are provided in this area, allowing for separation of juveniles and separation by gender. Several factors influence the number of central holding cells required. Where the courthouse is connected to a jail, for example, in-custody defendants can be escorted to the court more frequently and in smaller groups. The number of vehicular court transports—morning and afternoon runs or once a day—can also reduce the amount of central holding space required, which is some of the costliest construction in the building. (See figures 8.3–8.5.)

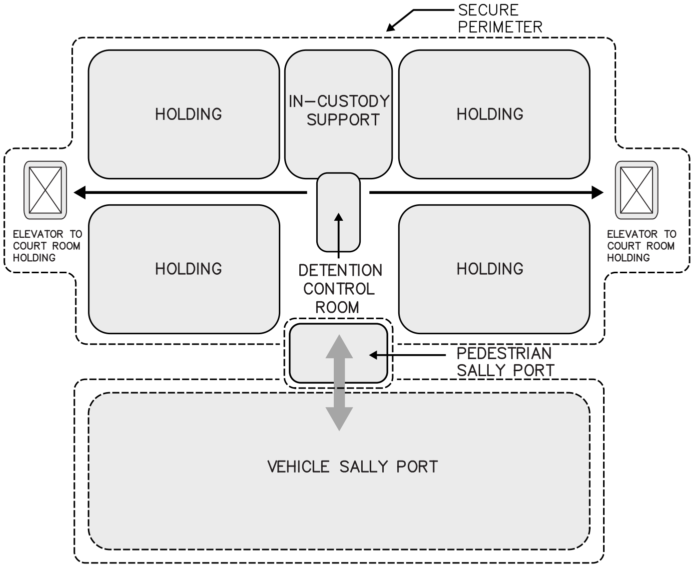


Figure 8.3 Central Holding

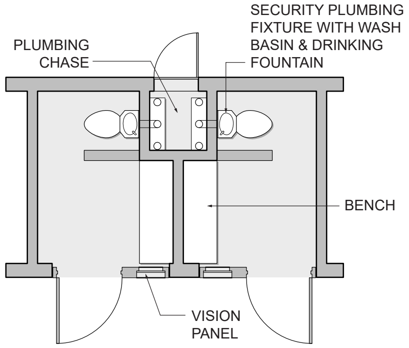


Figure 8.4 Single Holding Cells

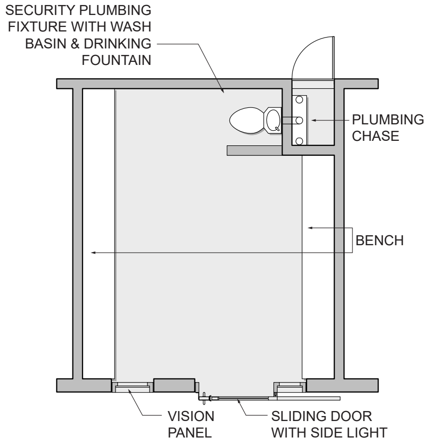


Figure 8.5 Group Holding Cell

a. 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.

b. Central holding is operational during daytime hours only, with no overnight use of the holding cells. Still, all cells must comply with the requirements of California Code of Regulations, titles 15 and 24, for temporary holding facilities. Therefore, they must:

- Contain a minimum of 10 square feet (SF) of floor area per inmate;
- Be limited to no more than 16 inmates;
- Be no smaller than 40 SF;
- Have a clear ceiling height of 8′ or more;
- Contain seating to accommodate all inmates;
- Contain a toilet, wash basin, and drinking fountain; and
- Be equipped with an audio monitoring system.

c. 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. Confirm requirements for mirrors in detention cells, including the accessible cells.

d. 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.

e. BSCC requirements state that toilet areas shall allow modesty for inmates with staff being able to visually supervise. Toilets should be positioned in cells to allow for surveillance by staff while still providing modesty for the occupants. If supervision is supplemented by video surveillance in the cell area, cameras should be positioned or digitally obscured to allow for privacy of the toilet component.

f. Sight and sound separation between adults and juveniles in central holding requires separate areas. It is not enough to have separate cells accessed from the same corridor.

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

Note 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.

6. Detention Circulation and Elevators

a. 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 sally port is required at any penetration allowing access in or out of the secure perimeter and shall be controlled by detention control.

b. In courthouses with multiple multistory court sets per floor and/or where central holding is not colocated on a court's floor, a dedicated detention circulation path is required to transport in-custody defendants from the central holding area to in-custody elevators serving the courtroom holding areas. Detention corridors shall be 6′–8′ wide (refer to chapter 2, Courthouse Organization) and shall minimize turns to facilitate direct line of sight and avoid blind spots created by protrusions. All secure circulation corridors on courtroom floors between courtrooms shall be built to detention-grade standards. The secure corridors in central holding shall have detention-grade floors and walls, but acoustical ceiling tiles or gypsum board ceilings are an acceptable alternative.

c. 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 a 4,000-pound-capacity cab with a minimum clear inside dimension of 5′8″ × 7′1″. Alternative-capacity cabs and cab dimensions may be appropriate for certain courthouses, depending on the size of the courthouse, the number of holding cores, and the Operational Program Statement for the specific courthouse.

7. 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. In-custody defendants enter the interview room from the secure side (within the secure perimeter), and attorneys enter from the public circulation or a courtroom. (See figure 8.6.)

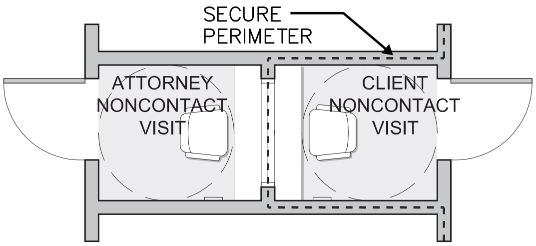


Figure 8.6 Attorney-Client Interview Rooms

Figure 8.7 Attorney-Client Interview Room Window

a. 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 defendant and the attorney must meet secure perimeter construction requirements. The two parties view each other via a glazed opening per guidelines outlined in chapter 25, Attorney-Client Interview Room Guidelines. (See figure 8.7.)

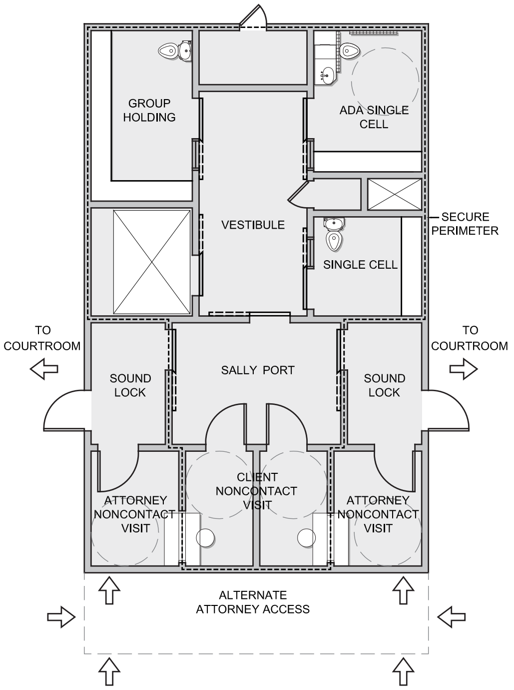
b. Communication shall be facilitated by passive design, without using handsets or amplification devices. Fixed writing surfaces and/or a pass-through window may be provided upon court request.

c. Attorney interview rooms should be sized for wheelchair movement on both the attorney and in-custody sides and have a detention-grade movable plastic chair for the in-custody defendant. In-custody defendants 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.

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

e. Because attorney-client interview rooms are adjacent to courtroom holding areas, in-custody access is from the courtroom holding circulation area, and attorney access is from public circulation or from the courtroom itself, provide a sound-lock vestibule or barriers to both sides for acoustical separation. Determining the location of attorney entrances is based on local court preferences and security staff efficiencies. (See figure 8.8.)

f. 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 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.



ADA = Americans with Disabilities Act.

Figure 8.8 Courtroom Holding

8. Courtroom Holding

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

Technical Criteria

- Construction/Finishes
- Detention Doors
- Detention Hollow Metal Frames
- Miscellaneous Detention Equipment
- Security Glazing
- Light Fixtures
- Plumbing Fixtures
- Sprinkler Heads
- Mechanical Grilles
- Security Sealants
- Tamper-Proof Metal Fasteners
- Detention Toilet Accessories
- Detention Door Signage

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

b. A sound-lock vestibule acts as a sound buffer between the courtroom and the holding area and screens views from the courtroom into the holding area. In addition, the sound-lock serves as a sally port for managing controlled movement between the two areas. The door inside the courtroom leading to the courtroom holding shall be designed to match the courtroom decor and is operated by the bailiff. Therefore, it does not typically require detention-grade hardware. The inner door leading to the holding area is detention grade and is operated from the detention control room.

c. The courtroom holding cells shall:

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

d. Cells shall have glazed cell fronts to manage sound from within the cells and to maximize supervision of in-custody defendants 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 defendant from barricading the door. Provide a minimum of one accessible cell per courtroom holding area. All holding cells have penal-grade plumbing fixtures.

e. In-custody defendants 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.

f. Measures shall be taken to manage sound reverberation within the courtroom holding core as well as prevent 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.

9. 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.

a. Sheriff Lockers: Confirm locker sizes and types with the sheriff for storage requirements. Confirm locking mechanisms for the sheriff lockers.

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

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

d. Lunch Storage: Provide the ability to store lunches for in-custody defendants 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 depends on the size of the court facility.

e. Staff Break Room: Locate the staff break room immediately outside the secure perimeter with other security functions. The break room does not require detention-grade finishes or equipment. It should accommodate storage and provide space for vending machines, a coffee machine, a refrigerator, and a table and chairs. The size of and need for a staff break room depends on the size of the court facility.

f. 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.

g. 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 Building Code's storage space requirement for personal and institutional clothing because institutional clothing is issued at a different facility.

8.E TECHNICAL CRITERIA

1. General Information

The purpose of this 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.

a. Each secure holding area with multiple rooms, whether central or adjacent to the courtroom, requires a secure perimeter of an approved system constructed to the underside of the structure, with a limited number of 8″ × 8″ or larger penetrations and equipped with security locks and vestibules.

b. All rooms must have a minimum clear ceiling height of 8′ 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.

2. Construction and Finishes

2.1 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.

2.2 Concrete Floor Finishes

a. Sealed concrete floor finish shall consist 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.

b. Polished concrete floor finish shall consist of a combination of diamond grinding and polishing using a chemical hardener and 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, sally ports, and staging areas.

c. An epoxy resinous floor system shall consist 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, sally ports, and staging areas.

2.3 Wall Construction

a. Wall construction of 8″ concrete masonry units grouted solid with 3,000 pounds per square inch (psi) grout, including vertical and horizontal reinforcing to the underside of structure, shall be used at all central, courtroom holding, and detention control room secure perimeter walls.

b. A wall system with 8″ or 6″ concrete masonry units grouted solid with 3,000 psi grout and vertical reinforcing to a height of 10′ above the finished floor and extended to the underside of structure with 3-5/8″ 20-gauge metal studs at 16″ on center with secure metal lath and 5/8″ high-impact Type X gypsum board on both sides of the metal studs shall be used inside the security perimeter at walls that are required to extend to the underside of structure, such as rated corridor walls.

c. A wall system with 8″ or 6″ concrete masonry units grouted solid with vertical reinforcing to a height determined by the designers and generally extended a minimum of 8″ above the finished ceiling shall be used inside the security perimeter at walls 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.

d. Precast concrete wall panels with thicknesses based on the level of security can be used for walls both forming and inside the security perimeter.

e. A metal wall panel detention system has a typical panel thickness of 2″ with 10-gauge faceplates 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.

f. Do not use detention panels for rated walls. Only use concrete masonry unit (CMU) for detention-rated walls. Develop or specify grouting installation procedures for CMU detention-rated walls. Do not locate equipment that requires access above detention cells.

2.4 Wall Finishes

a. A fiber-reinforced epoxy abrasion-resistant coating system consists of a surface preparation followed by a prime coat, body coat, and final coat. This finish system shall be used in all holding cells and inmate-attorney interview rooms. This finish can also be used in circulation areas.

b. Epoxy paint system is a low-VOC (volatile organic compound) product consisting of a block filler and two topcoats. This finish shall be used as an 8″ high base at all latex enamel-painted walls and can be used at all circulation walls.

c. A latex enamel paint system is a low-VOC product consisting of a block filler and two topcoats. This finish shall be used at all circulation areas and all non-inmate-accessible areas.

d. A stainless steel finish shall be used on all inmate elevator cab walls.

2.5 Ceiling Construction

a. A system of secure cement plaster with expanded metal lath consisting of a flat diamond mesh, 1/2″ number 16 lath, on a grid system is painted in the field and shall be used at areas such as janitor closets and staff toilet rooms.

b. A system of precast concrete with all ceiling joints grouted solid is painted in the field and can be used at all areas except where acoustic ceilings are required.

c. 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 1-1/2″ 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 requires final painting in the field. This system shall be used at all holding cell and inmate-attorney visiting areas.

d. An acoustic panel deck consisting of a one-piece galvannealed steel plate with 5/32″ diameter perforated holes is typically 14 gauge with a heavy-duty steel frame. Antimicrobial and sound-deadening insulation is installed on top of the panels. The system comes with a durable powder coat finish and shall be used at all circulation areas.

e. An 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. This system comes with a primer and is painted in the field with two topcoats of a low-VOC latex enamel paint.

f. An acoustical ceiling tile of either 2′ × 2′ or 2′ × 4′ on a suspension grid with hanger wires comes with a factory finish and can be used in non-inmate-accessible areas. This system can also be used in inmate circulation areas where the ceiling height is greater than 10′ and hold-down clips are provided.

g. A system of 5/8″ high-impact gypsum board on a suspension grid with hanger wires is painted in the field and shall be used in non-inmate-accessible areas such as staff toilets and janitor closets.

h. Stainless steel is a factory finish and shall be used in inmate elevators.

i. Exposed construction would have no finish and could be used in a mechanical or electrical-type room.

3. Detention Doors

3.1 Detention Swing Doors

See table 8.1 for locations and type.

a. Fabricate detention hollow metal doors from 12-gauge galvannealed steel face sheets spot-welded to the internal core construction.

b. 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 no seams are visible. All metal doors shall have a flush top and bottom edge channel and shall be welded to the closing channel.

Table 8.1 Technical Matrix

	Single Holding Cell	Group Holding cell	Holding Control Room	Inmate Circulation	Inmate Sally Port	Pedestrian Sally Port	Vehicle Sally Port	Sally Port 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 at 8.E.6.2, Security Glazing Types)					•				•	•	•	
Laminated polycarbonate glazing manufactured (requirements at 8.E.6.2, Security Glazing Types)	•	•		•			•	•				•
Glass-clad polycarbonate with tinting film for one-way vision			•									
Benches												
Detention Benches (requirements at 8.E.4.2, Detention Benches)	•	•			•			•			•	
Detention Equipment												
Paper pass (requirements at 8.E.5.1, Detention Equipment Types)			•									
Gun locker (requirements at 8.E.5.1, Detention Equipment Types)												•
Pistol Lockers					•	•	•	•				

c. Provide cuff passes at the edge of all cell doors and at the door on the inmate side of attorney-client interview rooms.

d. The door finish shall match the wall finish on that side of the door.

e. All cell doors must swing out of all cells and attorney visiting rooms.

3.2 Detention Sliding Doors

See table 8.1 for locations and type.

a. Provide sliding detention door device assemblies, including locking device, receiver, overhead door hanger, bottom door guide, lock column, and enclosure as a complete assembly.

b. Provide cuff passes at the edge of all cell doors.

c. The door finish shall match the wall finish on that side of the door.

Detention swing and sliding door types include:

- Detention hollow metal flush door with or without cuff pass;
- Detention hollow metal half-glass door with or without cuff pass; and
- Detention hollow metal vision-panel door with or without view shutter.

3.3 Detention Electric Locks

a. For swinging cell doors, electrical operation, maximum security:

- Lock is frame-mounted 115 volts of alternating current (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;
- Galvanized case at exterior installations shall be provided; and
- A key cylinder extension for locks keyed both sides or keyed stop side shall be provided.

b. For circulation swing doors, motor operation, maximum security:

- Lock is frame-mounted 115VAC, 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; and
- A key cylinder extension for locks keyed both sides or keyed stop side shall be provided.

3.4 Detention Mechanical Locks

a. For detention access panels and cuff passes—mechanical operation:

- Lock is a door-mounted deadbolt;

- Bolt is retracted manually by paracentric (lever tumbler; mogul-pin tumbler) key on outside only;
- Door strike shall be provided; and
- Hollow metal lock mounting, escutcheon, and security screws shall be provided.

b. For swinging doors—mechanical operation:

- Lock is a door-mounted, paracentric key deadlocking latch bolt with three hardened steel pins;
- Bolt is retracted manually by paracentric key on outside and/or inside;
- Hollow metal lock mounting, escutcheon, and security screws shall be supplied;
- Door strike shall be provided; and
- Galvanized case and cylinder shields at exterior installations shall be provided.

3.5 Electromechanical-Locking, Electromechanical-Door-Movement, Sliding Door Device Assemblies

a. These assemblies are operated from a 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.

b. 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.

c. The electric key switch is operated by paracentric key and shall provide electric control of detention sliding door operation at door location, where indicated.

3.6 Detention Door Hardware

The hardware listed below is the minimum requirement for detention doors; additional hardware may be required.

a. Detention hinges shall be cast stainless steel leaves with integral security studs, nonremovable stainless steel pins, stainless steel ball bearings, three knuckle with hospital tips.

b. Concealed door closers shall have full hydraulic, rack-and-pinion action with high-strength cast iron cylinder.

c. 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.

d. Keeper switches shall be a mortise installation with limit-monitoring switch housed in the door frame. All manual locks shall use keeper switches.

e. Push plates shall be 3/16″ thick stainless steel 32″ wide × 16″ high with 7/8″ lip projection at bottom. Attach with stainless steel security rivets.

f. Pull-loops shall be cast bronze satin chrome plated with a dimension of 8-3/4″ long × 12″ clearance.

g. Pull-flush shall be cast bronze satin chrome plated with a dimension of 4″ wide × 5″ high × 1″ deep.

h. Doorstops shall be black silicone rubber 2″ diameter, mounted on a 5/8″ × 2-1/2″ steel shank for permanent attachment in grout-filled masonry or concrete.

i. Door cuff passes shall be 16″ long × 5″ high with 10 Series lock and continuous hinge. Cuff passes to be flush with the door face.

j. For cylinders, keys, and keying, the detention locks shall 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 die stamped for identification. For all individual key designations, three keys each shall be provided. For each master key designation, four keys each shall be provided.

4. Detention Hollow Metal Frames

a. Fabricate frames from 12-gauge steel, with mitered corners continuously welded through head inside corner and miter ground smooth.

b. The manufacturer shall provide all frames with approved jamb anchors, floor knees, plaster boxes, removable angle spreaders, and door silencers.

c. 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.

4.1 Detention Hollow Metal Frame Types

Detention hollow metal frame types include:

- Controlled swing/slider door with or without sidelight;
- Noncontrolled door with or without sidelight;
- Borrowed light frame; and
- Control room borrowed light frame.

4.2 Detention Benches

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

b. The metal bench can be part of the metal wall panel detention system and should be constructed to meet the wall panel requirements. The bench should come primed and need its final painting to be done in the field.

c. The concrete top with masonry base shall be constructed out of a minimum 4″ thick concrete and minimum 6″ concrete masonry unit base grouted solid and reinforced. The concrete top shall be finished with sealer/hardener, and the finish of the masonry base shall match the wall finish surface.

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

5. Miscellaneous Detention Equipment

5.1 Detention Equipment Types

a. Paper pass shall be provided with a built-in bottom made from stainless steel. The size will be 16″ long × 10″ wide × 2″ high × 1-1/2″ deep. It shall have a factory finish.

b. Pistol lockers shall be made up of six compartment lockers with 3/16″ shell and doors. Compartments shall be lined with 1/8″ felt with swing-out compartment doors on continuous hinges. Provide each compartment with snap locks, each compartment individually keyed and master keyed. The unit comes primed and will require final painting in the field.

c. A gun locker with a 3/16″ shell and doors shall be provided in the armory and shall be capable of holding a minimum of six rifle-type weapons. The compartment shall have a felt lining and a secure door that is keyed. The unit comes primed or with a factory finish. Confirm gun locker location, size, and quantity, and provide details for backing and surrounding finish trim, if recessed.

5.2 Detention Access Panels

a. Fire-rated detention access panels are 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.

b. Nonrated detention access panels are to have a 3″ × 2″ × 3/16″ steel angle frame with 1″ × 1″ × 1/8″ angle stops on three sides. Door construction is to be 3/16″ steel with 1-1/4″ flange on all four sides. Equip each panel with two hinges. The panels come primed and will require a final field painting.

c. Provide safety chain on swing-down ceiling-type detention access panels.

d. Do not locate detention access panels in holding cells or other areas where inmates may be left alone.

6. Security Glazing

6.1 Security Glazing Locations

Locations for security glazing shall include:

- Detention doors;
- Detention glazed frame;
- Control room;
- Attorney-client interview; and
- Court dock area.

6.2 Security Glazing Types

a. Glass-clad polycarbonate glazing shall be manufactured to comply with the following requirements (see table 8.1 for locations and type):

  - 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.
- Tinting film at control rooms.

b. Laminated polycarbonate glazing shall be 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.

7. Security Light Fixture Types

a. Maximum-security light fixtures 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 shall be located at all cells, all attorney interview rooms, and the court dock area.

b. Medium-security light fixtures 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 shall be located at all inmate circulation areas and other areas where inmates have access.

c. 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.

8. Security Plumbing Fixture Types

a. A standard rear-wall–mounted chase-accessible unit shall be installed at all inmate areas where an accessible unit is not required. The unit shall be constructed out of a 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 a secure plumbing chase inaccessible to in-custody defendants but readily serviceable by a technician from outside the cell.

b. An accessible rear-wall-mounted chase-accessible unit shall be installed at all inmate areas where an accessible unit is required. The unit shall be constructed out of a 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 a secure plumbing chase inaccessible to in-custody defendants but readily serviceable by a technician from outside the cell.

c. In medium or large court buildings, provide a sewage grinder system to all waste lines that connect to detention toilet fixtures. This system is typically located outside the building perimeter.

d. 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.

e. Provide floor drains in all holding areas per the plumbing code, with detention drain covers and fasteners. If possible, also locate floor drains in inmate cells.

9. Security Sprinkler Head Types

a. Provide detention-grade, ceiling-mounted sprinkler heads in all inmate-accessible areas. Sprinkler heads must meet Compliance Services and Assessments, LLC (CSA) standards for suicide prevention and be located a minimum of 8′ above the finish floor. The sprinkler heads come with a factory finish. Tyco sprinkler heads shall be the basis of design and pricing, with smooth underside and no protruding elements.

b. Provide non-detention-type sprinkler heads in all areas where inmates have no access, such as administration areas.

10. Security Mechanical Grille Types

a. Use wall- and ceiling-mounted grilles in all inmate-accessible areas. Provide a risk-resistant grille with a nonvision core consisting of a 3/16″ faceplate with louvers, vertical mullions, sleeve, and four-sided mounting frame. The grilles come with a factory finish.

b. Provide non-detention-type grilles in all areas where inmates have no access, such as administration areas.

c. Provide detention duct bars at all openings larger than 5″ × 5″. Duct bars are to be tool-resistant 7/8″ diameter steel bars spaced so that no opening is bigger than 5″ in diameter.

d. Provide security bars at all openings and/or penetrations of secure perimeter envelope larger than 5″ × 5″. Security bars are to be tool-resistant 7/8″ diameter steel bars spaced so that no opening is bigger than 5″ in diameter.

11. Security Sealant Types

For more information on sealants, see table 8.2.

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

b. 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.

12. Tamper-Proof Metal Fasteners

a. Use Torx-head (star design with center pin) security fasteners. Finish shall match that specified of the item anchored.

b. Fabricate removable tamper-proof fasteners to allow removal only by tools produced by the fastener manufacturer or another licensed fabricator specifically for individual tamper-proof fastener design. Limit size and shape variations such that no more than six tools are required for each type of tamper-proof fastener used on project.

c. Provide at all central and court holding areas where inmates have access.

Table 8.2 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.
SGF = security epoxy resin gap filler.
N/A = not applicable.

13. Detention Toilet Accessories

a. Use grab bars with underslung plate to prevent suicides.

b. Provide a recessed toilet paper holder, if it is not part of the toilet fixture.

c. Use a detention mirror with embedded mounting plate.

  - Mirror frame dimension shall be 12-1/2″ × 16-1/2″, fabricated from 16-gauge mild steel. The 5/16″ × 1″ mirror frame is to be chrome plated. Mirror opening shall be 10-1/2″ × 14-1/2″, and mirror shall be made of 20-gauge stainless steel polished for high reflectivity.
  - Embedded mounting plate is to be constructed of 1/4″ plate steel with two 11-gauge × 3″ wide bent steel anchors with minimum 1″ bend. Embedded plate shall be drilled and tapped for security fasteners.
  - For accessible mirrors, use either two mirrors or one longer mirror for both applications.

14. Detention Door Signage

a. Provide low- or no-VOC paint, exterior alkyd gloss enamel on interior and exterior ferrous surfaces.

b. Provide 6″ high numbers on the face of all controlled and monitored doors within the central and court-secure perimeters.

c. 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

1. 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 alternative 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-custody defendants awaiting trial. See table 8.3.

Table 8.3 Electronic Detention Control Requirements

	Locking—Local	Locking—Remote	Door Interlock	Cameras	Video Recording	Audio Monitoring	Audio Communication	Call Button	Monitoring and Control	Card Access	Card and PIN Access	Gate Control	Duress Buttons
Secure Driveway				R	R		R			R		R	
Sally Port—Vehicle	R		R	R	R	R	R		R				R1
Sally Port—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				R1
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				R1
Armory	R			R	R						R		
Holding Control	R		R1						R	R			R1
Auxiliary Control				M	M								
Remote Holding Control		R1							R	R			

R = required.

R1 = required as applicable.

P = partial requirement.

D = discretionary.

M = monitoring only.

C = control.

2. Transport Driveway

a. Transport vehicles delivering in-custody defendants access the vehicle sally port through a secure driveway. Provide sliding or swinging gates and barrier arm gates to control secure driveway access and egress. Provide for remote control of gates from the DCR or from a card reader located at the secure driveway.

b. Provide sensors and programming used during vehicle gate entry and exit sequences to detect vehicles and prevent them from being stranded or trapped between vehicle control points. Sensors employed include in-ground vehicle detector loops, photoelectric beams, and leading-edge gate and barrier arm sensors.

3. Transport Driveway Entry

When a transport vehicle approaches the secure driveway, the driver communicates with the DCR either from the vehicle or from a pedestal-mounted intercom to request access. Alternatively, the driver may use a card reader for automated entry. A vehicle detection loop shall be provided to detect vehicles, enable the gate card reader, and call up adjacent surveillance cameras. Entrance gate card readers are otherwise deactivated. Vehicle pedestals shall be 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 touchscreen computer. When the DCR grants secure driveway access, the entrance gate and barrier arm open and the transport vehicle enters. The barrier arm and entrance gate close immediately after the transport vehicle has cleared its respective safety sensors and entered the secure driveway.

4. Transport Driveway Exit

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

5. Vehicle Sally Port

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

6. Vehicle Sally Port Entry

a. The transport driver communicates with the DCR to request entry on approach to the vehicle sally port. An in-ground vehicle detection loop shall be located at the sally port entrance to detect vehicles and call up and display an entry surveillance camera in the DCR. The DCR operator may manually call up vehicle sally port cameras via the DCS.

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

c. *Open*, *stop*, and *close* manual override door controls shall be provided in a locked and monitored enclosure at the sally port door. The *open* function opens the door, the *stop* function stops the door in its current position, and the *close* function closes the door.

7. Vehicle Sally Port Exit

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

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

b. *Open*, *stop*, and *close* manual override door controls shall be provided in a locked and monitored enclosure at the sally port door. The *open* function opens the door, the *stop* function stops the door in its current position, and the *close* function closes the door.

8. Pedestrian Sally Port

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

9. Central Holding Door Operation

Central holding door types include corridor doors and holding cell doors, either swinging or sliding, as defined in 8.E, Technical Criteria.

9.1 Door Operation Process

a. When an officer communicates with the DCR by intercom requesting central holding door access, a graphic of the door shall be automatically displayed on the DCS touchscreen display, and the door surveillance camera shall be automatically displayed on a video monitor.

b. When an officer communicates with the DCR by other means, the DCR operator selects the appropriate graphic map icon from the DCS touchscreen, which shall display a graphic map of the door location on the touchscreen and the relevant surveillance camera feed on a video monitor.

c. The DCR monitors central holding surveillance cameras and doors and controls central holding doors from a DCS touchscreen computer. When central holding door access is requested, the door shall be able to be 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.

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

a. When the DCS is in night mode, central holding perimeter doors may be controlled by card readers to facilitate cleaning, maintenance, and inspection. Provide card reader control 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.

b. In DCS day mode, the holding area perimeter door shall be locked and closed. In this mode, the DCS shall reject unlock signals from the access control system.

c. For DCS night mode, the entry and exit sequence of operation shall function as follows:

- 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 the *closed* door status and rearms door and lock position sensors.

10. 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 touchscreen computer.

a. When a CSO requests in-custody transport to a courtroom, the in-custody shall be transported to the court holding vestibule in the secure elevator.

b. When a CSO communicates by intercom, a graphic of the court holding vestibule shall be automatically displayed on the DCS touchscreen display, and a vestibule surveillance camera feed shall be automatically displayed on a video monitor.

c. When a CSO communicates by other means, the DCR operator selects an appropriate graphic from the DCS touchscreen, which shall display a graphic map of the vestibule on the touchscreen and a vestibule surveillance camera feed on a video monitor.

d. When the DCS confirms that all court holding vestibule doors are secure, the secure elevator door may be opened through the DCS touchscreen. If any holding vestibule door is not secure, the secure elevator door shall not be able to be opened from the DCS. When the DCR confirms that other court holding vestibule doors are secure, the cell door may be opened through the DCS touchscreen. If other holding vestibule doors are unsecured, the cell door may not be opened.

e. When the DCR confirms that other court holding vestibule doors are secure, the courtroom sound lock door may be opened from the DCS touchscreen display.

f. If other holding vestibule doors are unsecured, 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.

11. 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 or her cell. These doors are monitored and controlled as a central holding door. The CSO should have the ability to control both sides of the secure interview room at the courtroom.

12. Secure Circulation and Elevators

a. Secure elevators are controlled from DCS touchscreen computers. The DCS monitors elevator door and floor status and controls floor selection and door operation. The DCS touchscreen shall incorporate a virtual elevator return panel that displays elevator location and status and duplicates the elevator return panel controls in each cab.

b. When an officer communicates with the DCR by intercom requesting secure elevator access, a graphic map of the elevator floor and virtual return panel shall be automatically displayed on the DCS touchscreen computer, and the elevator surveillance camera feed shall be automatically displayed on a video monitor.

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

d. 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 unsecured, the elevator door shall not be able to be opened. Secure elevator doors must not automatically open upon arrival to a floor.

e. When in-custody passengers enter the elevator, the DCR operator closes the elevator door and selects a destination floor from the DCS touchscreen computer. The touchscreen shall display the elevator location while in transit.

f. When the elevator arrives at the selected floor, the touchscreen and surveillance camera displays shall be automatically updated to view the selected floor.

g. 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 unsecured, the elevator door shall not be able to be opened until secure. After all persons have exited, the elevator door is closed from the DCS.

13. Holding Control

13.1 DCS Workstations

a. Locate multiple DCS workstation positions at the DCR for redundancy. DCS workstation positions include a modular workstation desk, DCS touchscreen and video surveillance system computers, video surveillance system monitors, and an intercom master station.

b. The workstation positions must also support control room equipment required by other sections of the Facilities Standards.

13.2 Unified Control

a. DCS computers shall be capable of controlling all holding areas to eliminate operational conflicts between workstations.

b. DCS computers shall be capable of providing unified control when independent control is not required.

13.3 Independent Control

A dedicated juvenile holding DCS computer shall be provided at facilities requiring independent juvenile holding area control. Provide a fully functional designated juvenile DCS touchscreen computer capable of providing unified control, with operational control limited to the juvenile holding area.

13.4 Day and Night Mode

a. For day mode, when the DCS locks all holding area doors, limit holding area access only through the DCS touchscreen control or with a key.

b. For night mode, provide an interface between the access control system and the DCS to control select central holding perimeter doors and holding area doors by card reader. The system shall allow DCS to unlock designated holding area interior doors to facilitate cleaning, maintenance, and inspection.

13.5 Detention Office Monitoring

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

13.6 Fail-Over Holding Control

a. In larger facilities, you may be required to provide additional fail-over DCS control stations at alternative locations, such as an SOC, to ensure holding area control redundancy and continuity if DCS operation is not possible from the DCR.

b. Locate fail-over equipment to maintain and ensure holding area privacy and in areas where public viewing of detention surveillance cameras is not possible.

14. Operational Descriptions and Installation Criteria

14.1 DCS Core Equipment

a. Provide core DCS equipment, including file server, central processing unit, touchscreen interfaced computers, PLCs, intercom exchange, intercom master stations and substations, and a distributed antenna system for two-way radio communication.

b. Provide DCS network communications that utilize a converged building Transmission Control Protocol (TCP)/Internet Protocol (IP) network including virtual local area networks to provide secure DCS communications.

c. The PLC and intercom servers, integrated with the court facility video surveillance system (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.

d. DCS integration with the video surveillance system shall provide automated camera call-up and display based on DCS commands, intercom substation calls, and holding area alarms.

e. 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.

f. Rack-mount the DCS file server and intercom exchange server in an MDF or IDF room on the same floor as the DCR.

14.2 DCS Programmable Logic Controller

a. Programmable logic controller shall be provided via standardized PLCs. PLCs are the only acceptable means of providing DCS monitoring and control of detention doors. PLCs shall be tailored to each facility's size and unique requirements. PLCs interface all DCS system inputs and outputs for operator control from DCS touchscreen computers.

b. For local PLCs, the central holding area PLC equipment shall 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.

c. For remote PLCs, 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.

d. For 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.

e. For 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.

14.3 DCS Touchscreen Interface

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

14.4 DCS Door Monitoring

a. Provide holding area door latch monitor switches to confirm that doors are latched.

b. Provide holding area door position monitoring with triple-bias high-security detention-grade magnetic door position switches.

c. Provide commercial-grade surface-mounted position switches to monitor vehicle door position.

d. Provide commercial-grade surface-mounted position switches to monitor vehicle gate position .

e. 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.

14.5 DCS Lock Control

a. Provide PLC outputs that control DCS locks at sally ports, central holding, secure circulation, and courtroom holding areas.

b. PLC outputs switching 120VAC locks shall be National Electrical Code 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.

c. Shield and isolate all connections to ensure a “finger safe” maintenance environment.

14.6 DCS Video Surveillance System

a. Include in the DCS video surveillance system client computers, monitors, and cameras as an extension of the court facility VSS. Refer to chapter 4, Courthouse Security, for specific information regarding the court facility VSS.

b. 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.

c. 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.

d. 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. Large-format monitors mounted on walls are also acceptable.

e. The VSS system must provide camera call-up at DCR touchscreen computers using a graphic icon for each camera.

14.7 DCS IP-based Intercom System

a. Include in the intercom system a rack-mounted intercom exchange and modular expansion chassis equipment rack mounted in an MDF or IDF room on the same level as the DCR.

b. The intercom substations shall use Power over Ethernet network connections from MDF and IDF rooms to each intercom field device.

c. The intercom system shall provide call initiation from the DCS touchscreen computers, master stations, and substations for two-way voice communications between master stations and substations.

d. The intercom system shall provide monitoring of substations from DCS touchscreen computers and master stations.

e. The intercom system shall provide notification of call button activation at master stations and DCS touchscreen computers.

f. The intercom system shall provide annunciation of substation calls at DCR touchscreen displays with a graphic icon and audible notification. Intercom substation calls may be placed from the DCR touchscreen computer by selecting a graphic substation icon on the touchscreen.

g. The intercom system shall interface with VSS for automatic display of cameras viewing the calling substation each time a call is initiated from that substation.

h. In sally port, central holding, secure circulation, and courtroom holding area intercom substations, incorporate one-touch push-button operation, vandal-resistant construction, and integral tamper alarms.

i. Locate sally port, central holding, secure circulation, and courtroom holding area detention door intercom substations preferably in the detention door frames.

j. Locate intercom master stations adjacent to DCR touchscreen monitor at DCR modular workstation furniture, and incorporate an alphanumeric display and programmable push-button keypad.

14.8 DCS Workstations

a. Modular or systems furniture shall be provided at DCS workstation locations that are secure or located in a DCR. Workstation monitors shall be uniform in size and specification and located on a monitor tree.

b. Detention-grade furniture shall be provided at DCS workstation locations that are unsecured or located within a detention area. Equipment and desk accessories shall be minimized and shall be securely attached to the furniture.

c. Project requirements should include early and periodic review of the detention furniture with BSCC. Moveable, temporary, or breakable furniture (e.g., plastic chairs) that can be tampered with, thrown, or broken for use as a weapon or provide a risk of ligature is subject to BSCC inspection and approval. Furniture mockup is recommended.

15. Infrastructure Wire and Cable

a. 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.

b. All TCP/IP network cabling and connectivity shall be in accordance with chapter 17, Network and Communication Systems, and chapter 18, Audiovisual Systems.

c. For point-to-point cabling:

- Low-voltage power cabling shall be two-conductor, 18 American Wire Gauge (AWG), stranded and unshielded. Typical applications include 24-volt direct current lock power.
- Alarm point cabling will be one twisted pair, 18 AWG, stranded and unshielded. Typical applications include door contacts and latch monitoring.

d. VSS Cameras

- Interior IP camera cabling shall be in accordance with chapter 17, Network and Communication Systems, and chapter 18, Audiovisual Systems.
- Analog cameras shall use unshielded twisted pair (UTP) interfaces to transmit camera and control signals over a network cabling infrastructure.
- Secure elevator cameras shall utilize converters for IP cameras to transmit camera signals via coax or twisted pair within the traveler cable.
- Exterior camera signal cabling shall be fiber optic unless the routed distance is within the maximum length allowed in chapter 17, Network and Communication Systems, for copper cable.

16. Infrastructure Power

a. Normal power shall be provided for DCS components with a low-voltage power supply incorporating a battery backup power source.

b. For detailed uninterruptible power supply (UPS) requirements, see chapter 15, Electrical Criteria.

DIVISION ONE: DESIGN CRITERIA

9

PUBLIC SPACES

San Diego Central Courthouse
San Diego, CA
Skidmore, Owings & Merrill LLP

©BRUCE DAMONTE

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, Including Security Station and Information Counter
- Courtroom Public Waiting Areas

9.A OBJECTIVES

Planning and design of public spaces are critical to the successful operation of a courthouse. Public spaces should 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 convey the importance and authority of the courts.

Strategically placed, clear, and legible graphics and signage—visible on 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.

a. Provide a single primary entry with universal access.

b. Provide an attractive and user-friendly environment as a first impression to court visitors and staff.

c. Design the entrance to accommodate peak-hour lines of prospective jurors and courthouse visitors through the entrance and entrance doors.

d. Because lines may extend out the entrance door, provide outside protection from inclement weather, including sun, wind, and rain. Some climates may require a vestibule. Refer to chapter 11, Architectural Criteria.

e. 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 when needed but are a universally accessible solution.

9.C PUBLIC LOBBY

1. Lobby Requirements

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.

a. Provide a public lobby sized for a queuing area sufficient to accommodate the volume of people entering the courthouse and weapons screening stations. Give attention to integrating the security screening stations into the lobby design to avoid the appearance of an intrusion or afterthought.

b. Provide security cameras throughout public areas, with special emphasis on weapons screening to record the public entering the facility and receiving their belongings once they have gone through weapons screening.

c. Provide clear signage and graphics immediately upon arrival in the courthouse public lobby. Many courthouse visitors will require directions to courtrooms or hearing rooms.

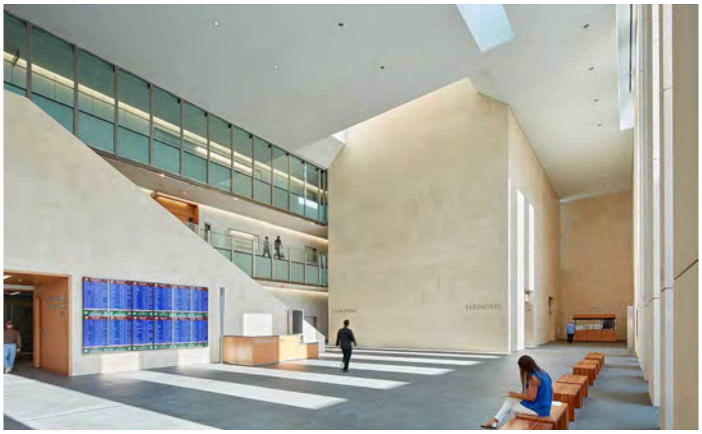


Figure 9.1 Public Lobby, San Diego Central Courthouse, San Diego

d. Provide large, easily readable court calendar monitors. Areas where courtroom assignments are posted must be accessible without impeding the security screening process or blocking public circulation paths.

e. Provide climate and glare control for building management staff.

2. Security Screening Station

a. Building users and staff shall enter the facility through a public entry screening station. See figure 9.2. Screening of the public occurs in the building lobby. 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, for example, during high-volume jury return flow.

Figure 9.2 Screening Station, Sutter County Superior Courthouse, Yuba City

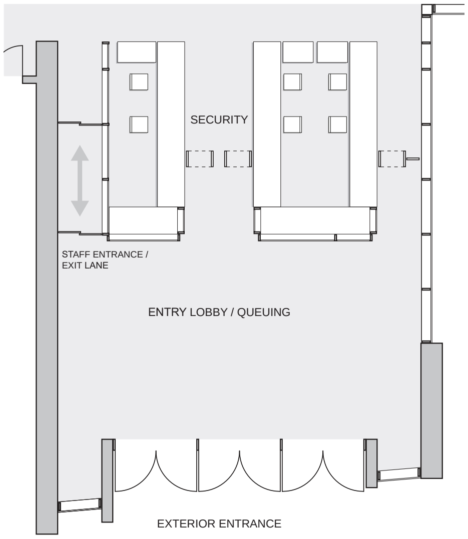


Figure 9.3 Screening Station Diagram

b. 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 is recommended to be at least 20 linear feet.

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.

- A magnetometer, or metal detector, through which visitors pass for detection of metal objects. The opening shall be 32″ clear to accommodate wheelchairs or mobility devices.
- An x-ray scanner for screening contents of visitor briefcases, handbags, and personal possessions, paired with sufficient project-specific roller-table assemblies for the input and output of packages.
- Where multiple screening lines are required, a ratio of one magnetometer per pair of package screening units (1:2), 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.

c. 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.

d. The accessible path of travel shall include the lobby security screening area. Wheelchair users shall not travel a separate and nonequivalent path through the screening process area. Persons with disabilities shall pass through a magnetometer, along with the general population. Space must be provided to allow bypass of the magnetometer for people with implanted medical devices that may be affected by magnetic fields.

e. In some cases, it may be necessary to provide gun lockers for law enforcement officers entering the facility, consistent with local security procedures.

f. 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 with audiovisual alarms or electronic turnstiles may be used to deter entry of individuals through the exit lanes.

g. Locate staff-only entrances or exits at a staffed security screening station only, to avoid compromising overall building security and increasing security costs.

3. Information Counter

a. A clearly identified information display screen with an optional desk space shall be used to provide direction and basic information to individuals unfamiliar with the court facility or court system. The desk shall be provided if the court plans to have reception staff in the lobby. Refer to figure 9.4. The information screen 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 screen shall display the courthouse map and court calendar.

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

Figure 9.4 Information Display Screens Beyond Information Desk, B.F. Sisk Courthouse, Fresno

c. If a kiosk is used, it may be an automated system with touchscreen 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.D COURTROOM PUBLIC WAITING AREAS

a. 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. Provide natural light in waiting areas when possible.

b. 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.

c. Waiting areas shall be proportional to the population served. Family law, arraignment, traffic, and juvenile courts require larger public waiting areas.

DIVISION ONE:
DESIGN CRITERIA

1 General Principles
2 Courthouse Organization
3 Site Design
4 Courthouse Security
5 Court Set
6 Jury Facilities and Court Administration
7 Special Services
8 In-Custody Defendant Receiving, Holding, and Transport
9 PUBLIC SPACES
9.A Objectives
9.B Primary Building Entrance
9.C Public Lobby
9.D Courtroom Public Waiting Areas
10 Building Support Services

DIVISION ONE: DESIGN CRITERIA

10 BUILDING SUPPORT SERVICES

Superior Court of California, Mono County
Mammoth Lakes, CA
Mark Cavagnero Associates

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 Facilities Services building operations staff.

10.A JANITOR CLOSETS

Provide janitor closets on each floor of the court building, except in small facilities or on floors with limited occupied spaces. Include a service sink, tool racks, water-tight wall covering with high-impact resistance, and wall-mounted shelving. All janitor closets should be separately ventilated and exhausted, negatively pressurized to adjacent spaces. Access to janitor closets may be from within public restrooms, but this is not the preference.

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

10.B LOADING DOCK

a. Large facilities require a raised loading dock to accommodate delivery, trash, and recycling trucks, as determined by the program. Some facilities may use an on-grade loading area equipped with a motorized platform dock lift. Large interstate trailer rigs need not be accommodated in the loading dock, but a staging area shall be provided so that all deliveries can be scanned or examined before entering the building.

b. The building location within the site circulation system 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.

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

d. Provide closed-circuit television to monitor the driveway, loading dock, loading dock apron, and exterior staging area. Provide a 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.

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

f. 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.

   - 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.

10.C NEWS MEDIA FUNCTIONS

If requested by the court, the courthouse must accommodate the media, inside and outside the facility. For technical requirements, refer to chapter 17, Network and Communication Systems, and chapter 18, Audiovisual Systems.

1. Interior Media Area

If requested by the court, provide an interior space for use by news media personnel, 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 news media room may be multipurpose, but must be available for the news media in courthouses, especially during high-profile cases.

2. Exterior Media Area

If requested by the court, 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 mail and packages through the public entry, where an x-ray machine may scan them. A large facility may require a dedicated room for receiving and opening mail, with x-ray package screening and 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. Also, provide a lunchroom for custodial workers.

10.F STORAGE

In medium and large facilities, provide a furniture storage area near the freight elevator. Provide shelving for attic stock. Building supplies and materials, such as carpet, shall be stored there. Locate this storage area adjacent to the maintenance shop and office.

Refer to chapter 17, Network and Communication Systems, for information on telecommunications and server equipment rooms.

Refer to chapter 20, Fire Protection Criteria.

10.G MECHANICAL EQUIPMENT ENCLOSURES

a. 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. Penthouses are preferred, but not required, depending on the size and type of equipment. If a penthouse is not provided, exterior-grade equipment and visual screens shall be provided.

b. 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. The stair shall be wide enough to afford access for maintenance personnel carrying hand tools or small parts. Ladders shall not be employed to provide access to equipment enclosures.

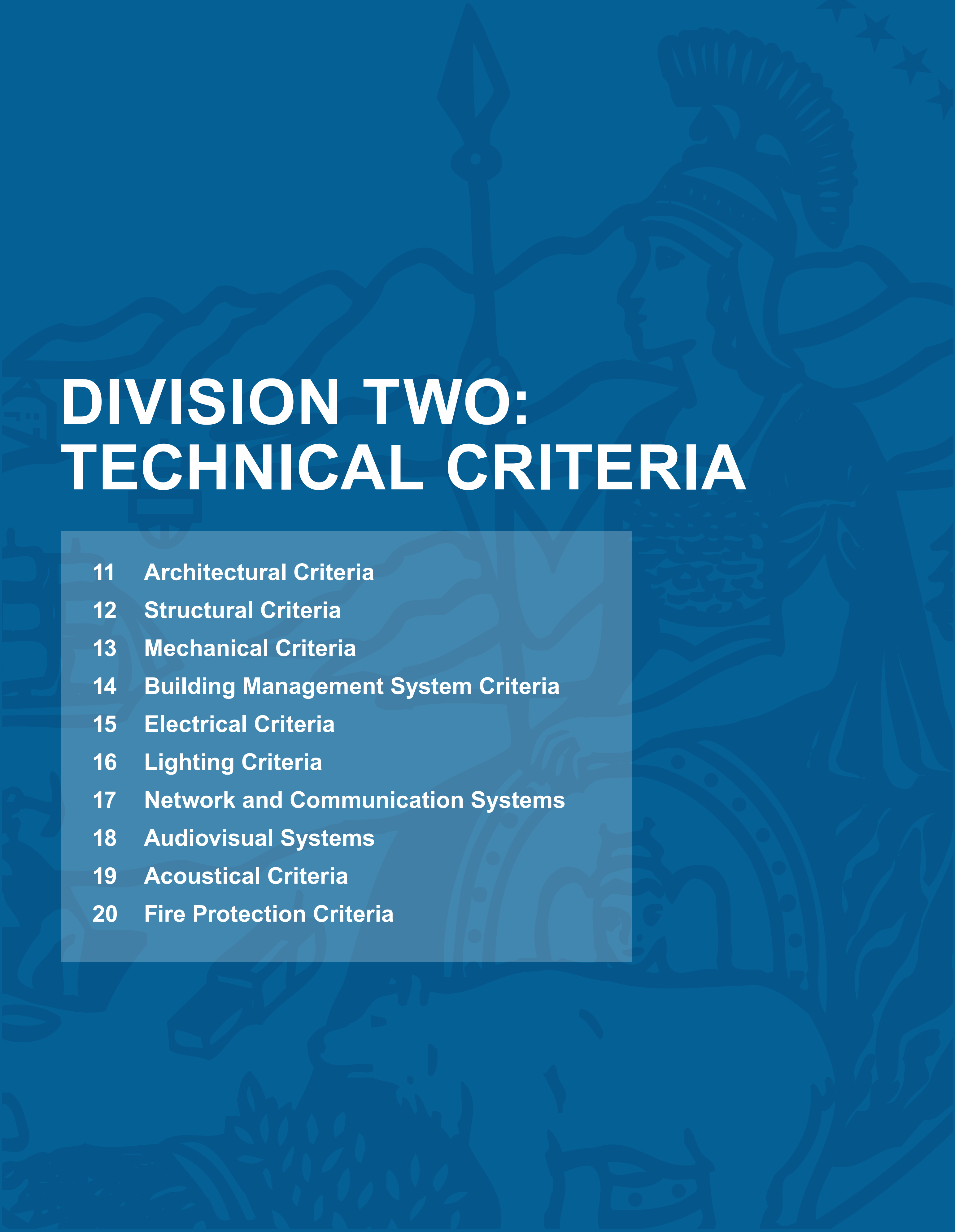
c. Air-handling unit outside-air intakes, relief air, and exhaust air shall be ducted directly to the outside of the roof equipment enclosure. Toilet (or other product-conveying) exhaust fans should not be located within the roof equipment enclosure.

d. Cooling towers and emergency generator sets (see 15.C, Emergency and Standby Power Systems) are generally exempt from the above enclosure standard, if the equipment is in the building or vault. Equipment that needs to be located outside shall be screened, but not enclosed, per above. That equipment includes:

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

10.H FIRE ALARM AND EMERGENCY COMMUNICATION SYSTEM CONTROL ROOM

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 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 authorities having jurisdiction (fire department) and be approved by the Judicial Council. The room must be a minimum of 100 square feet, with a minimum dimension of 8′.



DIVISION TWO: TECHNICAL CRITERIA

DIVISION TWO: TECHNICAL CRITERIA

11 ARCHITECTURAL CRITERIA

San Bernardino Justice Center
San Bernardino, CA
Skidmore, Owings & Merrill LLP

Courthouses are public buildings emblematic of our judicial system. As such, they should use architectural elements and materials that are dignified, yet practical, and durable enough to withstand sustained public use.

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: functional usefulness, physical durability, maintainability, accessibility, sustainability, and energy efficiency.

11.B ARCHITECTURAL CRITERIA

California court facilities shall use practical and durable materials and finishes in all elements, and exhibit consistency in the design and use of materials throughout. The performance of architectural elements shall be consistent with the functional lifetime defined in chapter 21, Life Cycle Cost Analysis, and the selection of elements, systems, or materials shall be consistent with the construction budget and the imperative to control overall maintenance and operation costs of the building over its lifetime. Minimize variation in the number of materials used in a building.

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.

1. Building Enclosure Commissioning (BECx)

a. The purpose of BECx shall be to ensure integrity of four critical barrier systems of the building envelope: water, thermal, vapor, and air barriers. Avoid using one barrier to serve for all four barrier systems, so that over time a failure of one system will not compromise all four systems.

b. A commissioning authority or agent (CxA) shall be responsible for BECx plan development, thorough review of progressive design drawings and specifications, review of building envelope value engineering efforts, inspections and testing during the construction phase, and one-year warranty review.

c. The standard for BECx shall be ASTM E2813, Standard Practice for Building Enclosure Commissioning. The standard test for air infiltration shall be ASTM E3158, Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building, or ASTM E779-19, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization. In addition, the CxA shall specify as appropriate other standards for shop and/or field-testing of building envelope systems.

2. 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, the plaza, and entrances and to determine 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. The recommendations 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.

3. Exterior Building Walls

The exterior wall design shall present a consistent image, character, and permanence. 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 as defined in table 1.1. The use of anti-graffiti coatings is encouraged at locations vulnerable to graffiti and where suitable for the substrate.

3.1 Moisture and Damp Proofing

a. 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.

b. Specifications shall include a section for moisture mitigation before flooring installation, if required based on relative humidity (RH) testing. All new interior concrete substrates shall be tested per the current edition of the ASTM F2170 test method using in situ probes as a means of conducting relative humidity testing of the concrete slabs.

If the RH test results indicate a saturated slab condition, only a two-component resin-based membrane-forming moisture mitigation system that meets the full intent of the current edition of ASTM F3010 shall be allowed. The product requirements shall have a vapor permeance no greater than 0.1 grain per hour per square foot per inch of mercury (0.1 grain/hour/ft^2/inch Hg) (perm) when the product is tested in accordance with ASTM E96 when applied at the recommended thickness designated by its manufacturer.

3.2 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. By 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.

a. Contemporary surface barrier walls shall have the redundancy features of a drainage plane wall and shall not rely solely on the surface material or coatings, as well as sealant joints, to keep water at the exterior. Typical exterior materials include aluminum and glass curtain wall systems, ceramic tile, brick, precast concrete panels, concrete masonry units, composite metal panels, and cement plaster. Weather enclosure performance can be problematic with contemporary barrier walls designed with the exterior surface as the single water-resistant barrier, because of their reliance on superior construction craftsmanship to maintain a consistently watertight surface. Because the consequences of leakage through the exterior of court buildings are unacceptable, surface barrier walls shall be designed with a second line of protection against water penetration (i.e., sheet flashing or other weather-resistive barrier (WRB)) 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.

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

- Exterior veneer and seals, which shed most water and protect the WRB from sun and excessive water exposure.
- Air space, which separates the inner and outer walls and provides a drainage pathway and drying of veneer anchors and weather barriers.
- Sheet flashing or other WRB, which is 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, which 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.

3.3 Exterior Cladding Systems

Life cycle cost analysis shall be used to determine the cladding system for the exterior façade of a courthouse building. Precast concrete panels and curtain walls are generally acceptable cladding systems for high-rise buildings. For low-rise structures, cement plaster and tilt-up concrete are acceptable construction systems. The system selection shall be predicated on maintainability, durability, and efficiency.

Careful attention shall be paid to the design of the cladding system when cement plaster is used. Cement plaster exterior walls shall function as modified drainage plane walls. 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 Judicial Council approval.

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.

3.4 Flashing

Concealed flashing systems that cannot be easily replaced shall be durable and made of stainless steel, copper, or other metal not subject to corrosion. Flashing systems consistent in material, detail, scale, and quality with the facility design shall be provided. If flashings are exposed, they shall be designed using noncorrosive materials that are consistent 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).

3.5 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 the expansion joints to be minimally visible and watertight. Joint cover assemblies shall meet all code requirements for impact, loading, and fire protection.

3.6 Windows and Doors

a. The best-proven institutional-grade window systems shall be provided. Glazed entry systems shall be constructed of 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.

b. 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.

c. Public entrances require doors that are easy to operate and securely latch 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 to address site environmental conditions and to maintain interior comfort and cleanliness.

d. 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 for service and staff doors and frames. Hardware on exterior doors shall be stainless steel.

3.7 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.

3.8 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.

3.9 Exterior Stairs and Ramps

a. 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.

b. Provide skate stoppers on ramps and benches to discourage skateboarding on the site. Identify exterior concrete items such as skate stoppers and shotcrete finishes, where appropriate, on the plans and specifications.

3.10 Walk-Off Mats and/or Grilles

Walk-off mat or grille systems are required to improve indoor air quality through the reduction of dirt and dust tracked into the building and of 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 removable grilles to allow for cleaning of the catch basin. Minimum dimensions of walk-off mats and/or grilles shall be the width of the doorway and 10′ total in length in the direction of travel, which can be split between the interior and exterior sides of the doors. The design should follow the American National Standards Institute/National Floor Safety Institute B101.6 Standard Guide for Commercial Entrance Matting in Reducing Slips, Trips and Falls.

3.11 Exterior Flagpoles

Provide two flagpoles, to accommodate a State of California flag and a U.S. flag, near the courthouse public entrance. One pole must provide for two flags to be flown at the same time (the Prisoner of War flag is required to be flown on certain dates).

So that the flag may be displayed at all times, it shall be properly illuminated during the hours of darkness.

3.12 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.

4. Roofs

4.1 Low-Slope Roofing System

a. The roof shall be weathertight 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 the California Building Code. Low-sloped roofs shall provide a minimum slope in accordance with the manufacturer’s warranty for the specified roof system, but a slope of 1/4″ per foot is the minimum required 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.

b. Provide a continuous-membrane roofing and flashing system with compatible components that will not permit the passage of liquid and will withstand—without failure—wind loads, building movement, flotation loads, thermally induced movement, and exposure to weather. The selected roofing system should have a manufacturer's warranty for a minimum period of 30 years. Fully adhered ASTM D6754 single-ply roofing is an acceptable system for low-slope roofs.

c. The roof membrane will be replaced occasionally over the lifespan 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.

d. Extreme low-odor, low volatile organic compound, fluid-applied systems are encouraged for roof upgrades on existing facilities. A 20-year warranty is required for whichever system is chosen. If restoration is not possible, default to roof replacement with the ASTM D6754 single-ply roofing.

e. 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.

f. Provide additional protection at walking surfaces for rooftop service routes.

4.2 Rooftop Equipment

Rooftop equipment shall be kept to a minimum. Locate equipment in rooftop penthouses (preferred) 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 shall be located on the roof, and a point of entry into the building and a distribution pathway to a central intermediate distribution frame shall be considered when establishing a roof location for this equipment. Refer to chapter 15, Electrical Criteria, for additional requirements.

4.3 Roof Access

Provide an interior permanent dedicated industrial stair (not a ship's 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. Rooftop access shall be drawn early in design for early installation.

Balance the need for security with the need for 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.

5. Building Maintenance

All roofs that will have regular maintenance, or on which exterior maintenance equipment will operate, shall have around the entire perimeter parapets or guardrails that comply with the building code.

All elevated areas without parapets or guardrails shall have safety anchorages (a secure point of attachment that complies with the California Building Code, for lifelines, lanyards, or other fall-protection deceleration devices) within 6′ of the edge. Exterior balconies are not permitted.

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

5.1 Window Washing and Façade Access Equipment

a. Design the building exterior to accommodate safe and cost-effective exterior maintenance procedures. Building maintenance operations include, but are not limited to, window cleaning, caulking, metal polishing, reglazing, and general maintenance on building surfaces. Buildings exceeding 130 feet in height are required by code to have an in-place window washing system permanently mounted on the building. 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 cost-effective system in accordance with the building's design and the frequency of the exterior maintenance schedule.

b. 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 exterior 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 or transferred between the roof-mounted davits. For low-rise buildings, provide a clear path at ground level for motorized articulated lifts to reach all exterior windows. California regulations applicable to façade access equipment can be found in California Code of Regulations, title 8, article 5 (Window Cleaning), section 3281 et seq., and article 6 (Powered Platforms and Equipment for Building Maintenance), section 3292 et seq.

5.2 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. The design shall inhibit bird species known to nest in the underside of overhangs and soffits.

11.D BUILDING ELEMENTS: INTERIOR CONSTRUCTION

1. Interior Building

1.1 Daylighting

Provide natural light to all primary public waiting areas and the main lobby. Plan and design interior spaces to allow glare-free natural light at work areas wherever possible. 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.

1.2 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.

1.3 Floor-to-Floor Heights

The standard floor-to-floor, or slab-to-slab, dimension for multistory courthouses shall be 14′ to 16′. Refer to 2.C, Area and Volume Definitions, for requirements for relative building volume.

1.4 Plenum Spaces

a. Provide space above all finished ceiling areas for the heating, ventilation, and air-conditioning (HVAC) supply and return distribution; electrical distribution; mechanical equipment; fire sprinkler systems; voice, data, and low-voltage cables; and other devices. Size plenum spaces to allow for future modification of these systems.

b. 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.

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

1.5 Interior Partitions

a. The minimum standard for steel studs in multilayered gypsum wallboard assemblies is 20 gauge, unless a lighter gauge is required for acoustical reasons.

b. Comply with the manufacturer’s recommended criteria for deflection and span with interior pressure loading based on tested industry standards.

c. Provide fire- and smoke-rated interior partitions, where required, in accordance with accepted industry-standard tested assemblies and approved manufacturers’ designs for assemblies satisfying the test criteria.

d. 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.

e. Provide corner guards, where required.

f. Refer to chapter 19, Acoustical Criteria, for additional partition requirements.

1.6 Ceilings

Ceilings shall be designed for optimal visual, lighting, and acoustic performance. Refer to chapters 16, Lighting Criteria, and 19, Acoustical Criteria. Custom ceilings are not permitted. Ceilings throughout the courthouse shall be specified off-the-shelf for easy replacement and maintenance. Integrate required technical features with the use of ceiling soffits, coffers, and materials to accommodate acoustic materials, lighting, sprinklers, speakers, cameras, projectors, and projection screens.

Integrated Interior Design

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

Design ceilings of chambers, offices, and conference rooms to integrate acoustic panels, lighting, and HVAC supply and return grilles.

1.7 Public and Private Toilet Rooms

a. Public toilet rooms are heavily used and require durable, washable, and easily maintained materials and finishes. To avoid flooding, all toilet rooms should have floors sloped to a drain with primer. Minimum finishes and features include:

- Coved ceramic tile floors;
- Glazed ceramic tile wall surfaces up to a minimum 4′ wainscot height (consider full-height tile on walls);
- Solid-surface countertops;
- Undercounter-mounted lavatories;
- Stainless steel or monolithic plastic floor-mounted and braced institutional-quality toilet stall dividers and doors, and wall-hung urinal screens;
- Institutional-quality toilet fixtures and stainless steel toilet accessories;
- Wall-mounted mirrors behind the lavatory tops;
- A diaper-changing table in each restroom; and
- Semigloss-painted washable wall and ceiling surfaces.

Solid surface is an acceptable finish for countertops, but materials requiring a multitude of joints (e.g., ceramic tile) are not, because of the ongoing maintenance implications of cleaning surfaces with joints. Dark-colored grout and caulking shall be used for maintainability.

b. Avoid combo units for the toilet seat cover, tissue, and receptacle because they may affect the Americans with Disabilities Act (ADA) required grab bar clearance. Provide toilet accessories in a noncorrosive, durable material (such as stainless steel) that are readily serviceable and consistent with the building design.

c. For high-volume public restroom entries, consider the use of doorless vestibules with integrated sound and visual screening.

d. Provide one shower and 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.

1.8 Elevators

a. Vertical transportation strategy depends on project requirements and design parameters. 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). Staff elevators shall have an average interval of less than 30 seconds (wait time of 18–20 seconds), public elevators shall have an average interval of less than 40 seconds (wait time of 24–26 seconds), and both elevator groups shall have a handling capacity of 15 percent of the building population to be 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.

b. 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 or 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. Elevators for in-custody defendants may require an independent control system if their operation is remotely controlled from the central holding control room.

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

d. Braille lettering and audio signals shall be provided at elevators and where required by code. 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; this may be the service elevator cab. A typical car interior ceiling height is 9′ to 10′.

e. The following criteria shall be met by the design firm:

- Confirm if 1″ mesh and ladders are required in elevator pits.
- Confirm if separation is required for in-custody elevators.
- Coordinate duress button with judges' elevators during design and construction.
- Do not run any foreign services (that do not serve the elevators) through the elevator machine room.
- Coordinate card access with elevator stops and interior, and define function and operation.

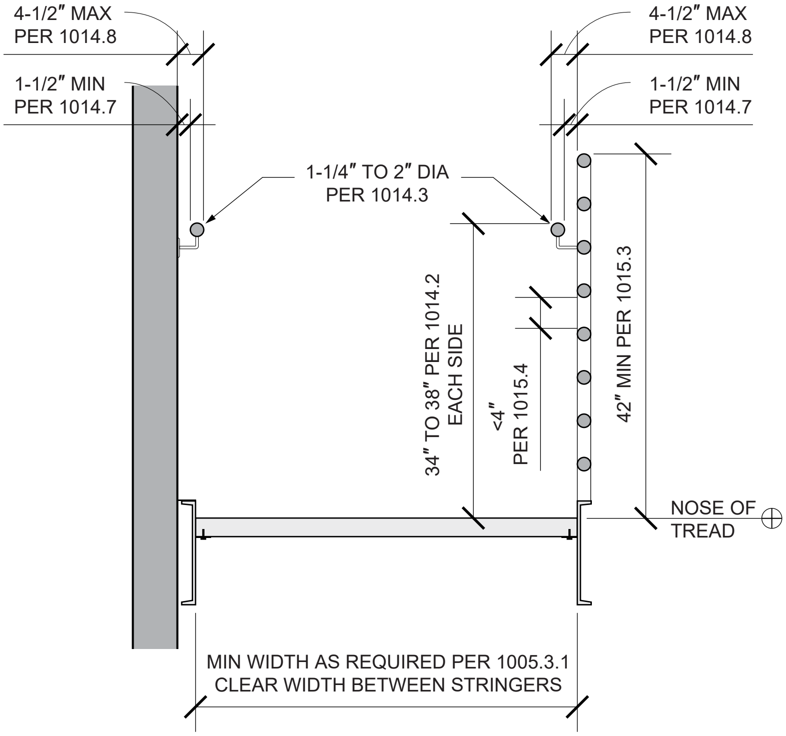
1.9 Stairs

a. 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.

b. Required exit stairs may be designed to encourage use by staff for normal circulation, with materials and finishes similar to those in the private corridors and introduction of natural lighting, when appropriate.

c. Provide a public connecting stair to access high-volume public uses (such as public counters and self-help center) 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. Preengineered steel stair and railing systems are acceptable for exit and communicating stairs (not for high-volume public stairs). Stair treads and intermediate landings shall either be pan-type and 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.

d. All staircases shall meet the California Building Code requirements. The required egress width for stairways shall be measured as shown in figure 11.1.



DIA = diameter.

Note: Code citations refer to sections of the California Building Code.

Figure 11.1 Egress Width Measurement Method

1.10 Doors Frames and Hardware

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

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

c. Provide flush solid core doors for typical interior conditions, where allowed by fire codes. Door construction shall meet or exceed Architectural Woodwork Institute (AWI) premium grade for courtrooms; custom grade for chambers, courtroom 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.

d. All hardware provided shall be institutional grade. Pins and hinges on all doors located on corridors, lobbies, and other public spaces shall be installed on the secure side of the door or shall be fixed. Latches 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.

1.11 Courtroom Platforms

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

1.12 Flooring

a. Subfloors: New and existing concrete subfloors must meet the requirements of ASTM F710, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

b. Carpet: Consistent with the expected functional lifetime, select carpet that is durable and low maintenance. Carpet must be eligible for recycling by the supplying mill or fiber producer to an existing operational third-party certified recycling center. Specify carpet appropriate to the traffic expected in the space. Carpet tiles should be a minimum standard size of 24″ square and a maximum of 36″ square.

The minimum specification basis of carpet and carpet tile design is as follows:

- Fiber/Yarn: 100 percent Antron Lumena solution-dyed type 6,6 nylon.
- Construction: Tufted, level or multilevel loop pile, cut and loop, or tip shear, as long as product passes minimum Texture Appearance Retention Rating (TARR) of 4 out of 5 on the TARR scale.
- Pile Weight: Minimum 16 ounces per square yard.

If ambient noise is a concern, consider a cushion-backed carpet tile. When higher acoustical values are required in a space, specify carpet that will adequately perform a dual role of a floor covering and a versatile acoustic aid. Products must meet the Carpet and Rug Institute standards for indoor air quality. Carpet on ramps or courtroom platforms shall meet wheelchair access requirements.

c. Impervious Flooring: Public corridors and lobbies that carry significant foot traffic and provide major circulation pathways throughout the building shall have extremely durable, slip-resistant materials that require low maintenance. Life cycle cost analysis shall be used to determine material options, such as terrazzo and manufactured tile.

1.13 Window Coverings

a. Provide window coverings appropriate for visual screening and glare control 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.

b. Consider the method of operation for window coverings in terms of its appropriateness for the function of a space. Manually operated shades may be provided for private offices and open office work areas, but not public corridors and lobbies. In public areas, motorized shades are permitted. Synchronized, motorized shades are not permitted.

c. Consider the exterior image of the building when selecting the color and materials of window coverings, to provide an image consistent with interior and exterior design intent.

2. 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, and data systems and the capacities must be designed to ensure compatibility with MSF design requirements.

2.1 High-Density Files

Where required, provide a mobile high-density filing system. Locate the system on the ground floor or an adequately reinforced floor structure, near the public office 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 the Judicial Council to allow access to multiple rows of files. Provide a locking feature for confidential files. Specify seven-shelf-high cars. The filing system shall be accessible to persons with disabilities and shall be coordinated with structural slab depressions so that the base of the filing system is flush with adjacent finished floor elevation. Use of a motorized system may be acceptable for infrequently accessed files.

2.2 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″ in diameter. Choose the material to avoid glare on the seal. The appearance and location must reflect the dignity of the court.

2.3 Flagpoles

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

3. Interior Finishes and Materials

The Facilities Standards specify four levels of interior architectural finishes corresponding to a 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 designers 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. These finishes 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.

4. Architectural Woodwork for Courtrooms

4.1 Veneer Panels and Casework

a. Provide hardwood veneer panels with solid hardwood trim and edge banding, with shop-applied stain, and finish with three coats of transparent sealer per AWI premium-grade requirements. Wood from a certified sustainable source is preferred. A solid wood base to match courtroom panels or a metal base may be used in public spaces and chambers.

b. Courtroom built-in components may include the 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 an accessible lectern. (Note that the bench seating, counsel tables, and lectern may be standard modular furniture customized to match the courtroom finish.) Modular furniture with a built-in pony wall may be permitted at the discretion of the Judicial Council.

c. All courtroom desktop work surfaces, whether modular or custom-built, shall be wood or solid surface.

4.2 Cabinets and Casework

Provide (at a 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. Signage is particularly important in courthouses that house multiple court functions or a high volume of court users.

1. General Requirements

a. 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 and 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 graphical information—especially information that changes frequently—offer an orderly and flexible solution for the changing needs of certain spaces.

Table 11.1 Notes

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

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

Signage

Grouping too many signs in one place (e.g., at entries, in lobbies, and in corridors) is unsightly, may confuse first-time visitors, and may decrease the dignity of the facility.

Maintain brief, clear, and polite messages in signage.

Table 11.1 Finish Matrix

	FLOOR						WALLS						CEILING					METAL	
	Premium Carpet	Manufactured Tile or Terrazzo	Midgrade Carpet	Ceramic Tile	Vinyl Composition Tile (VCT)/ Linoleum	Sealed Concrete	Paneling (Wood Veneer)	Premium Acoustic Wall Panels	Ceramic Tile	Painted Gypsum Board	Premium Base (Metal)	Rubber Base	Architectural Soffits	Premium Acoustic Panels	Midgrade Acoustic Panels	Painted Gypsum Board	Exposed Structure	Premium Clear-Coated Metal	Painted Metal or Stainless Steel
Level I																			
Courtroom* †	•	•	•				•	•	•	•	•		•	•		•		•	•
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					•	•						•					•		

b. All signage must meet the requirements of the Americans with Disabilities Act and the most recently adopted provisions of the California Building Code regarding accessibility. As appropriate for community needs, courthouse signage should be accessible in English and in other common languages (e.g., Spanish) to direct persons who come to court and are limited English proficient (LEP). The Judicial Council has developed a report on various wayfinding strategies for both static and electronic signage to assist LEP users. The report was developed with the National Center for State Courts and compiles best practices from around the state in courthouse design and in the use of signage and wayfinding strategies to enhance access for LEP court users. The report also makes specific recommendations regarding the incorporation of language access considerations in courthouse design and the use of technology to augment the court's ability to provide information in multiple languages. An ongoing language access signage and technology grant program is also available to trial courts that are interested in obtaining funding to support their courthouse signage and/or technology initiatives.

c. Ideally, signs should use pictograms to establish consistency across all courts. English should be used for basic information and instructions and prominent multilingual posting of public notices and informational court materials. A discussion should take place early on with the court and the Judicial Council team to determine if multilingual signs are appropriate.

d. All signage shall be designed and placed to discourage vandalism and thievery. Signs shall not be easily removable in public areas.

e. Number rooms logically and consecutively to enable court users, including 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 or Department 4. Room numbering from floor to floor shall be consistent. Assign room numbers early in design and obtain the court's approval.

f. Position room label signage at doorways, where court users, including sight-impaired persons, expect to find information. Locate signage of building management rooms, which are not accessible to the public, in different areas than accessibility signage. For example, locate electrical closet room numbers above the door, rather than to the side.

2. Signage Specifics

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

2.1 Building Entry

a. 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.

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

c. The signs at entry must include state or superior court seal (only one required), 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.

2.2 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 desk. 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.

2.3 Court Calendar Postings

Provide digital monitors to display the court calendar in the public lobby after screening. Calendar information may also 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.

2.4 Public Notice Boards

A consistent, controlled system of 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.

2.5 Courtroom Entry Signage

All signs outside courtroom doors shall be of uniform appearance and integrated with calendar information displays. The courtroom numbering system may be displayed at the top or side of the entry door and in the largest font size possible. ADA requirements shall also be met. Architects and engineers shall consider displaying the names of the judges as part of the electronic display. All other signage will be posted in the electronic display below the judge’s name, 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. The designer shall work with court representatives to minimize signage.

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

- “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”

2.6 Courtroom Signage

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

Examples of court-specific signage include the following:

- “No Communication With Inmates” (posted on the dock inside the courtroom facing the audience or in an area seen by the public after they are in audience seating)
- Jury seat numbering

- Courtroom conduct
- Typical questions for jurors

The Judicial Council's *Courthouse Naming Policy* (effective May 11, 2009, and revised April 25, 2014) affects signage, including naming of court buildings. Regardless of whether an individual's name is used, the building identification sign shall include "Superior Court of California, County of [County]."

2.7 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.

Visible "No Smoking" signs must be provided to alert the public not to smoke within 20′ of an entrance.

DIVISION TWO: TECHNICAL CRITERIA

12 STRUCTURAL CRITERIA

County of Santa Clara Family Justice Center
San Jose, CA
Zimmer Gunsal Frasca LLP

Structural design goals for new trial court 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 Judicial Council 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 Judicial Council buildings.

12.A OBJECTIVES

1. Strength and Serviceability

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

2. Adaptability

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

3. Performance in Rare Events

Most Judicial Council 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, fire, extreme snow and rain, flood, and seismic activity, and the possibility the building will not be available for reoccupancy for an extended length of time.

Except as noted below, the “A” chapter amendments to the California Building Code by the Division of the State Architect—Structural Safety (DSA-SS) and the Office of Statewide Health Planning and Development (OSHPD) do not apply to Judicial Council projects.

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 California Building Code (CBC). 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.

Structural components, systems, and methods of design not specifically recognized by the CBC are permitted under approved requests for alternative means of compliance. Criteria for such components or systems shall be reviewed by one or more peer reviewers acceptable to the Judicial Council and shall be submitted to the council for approval in accordance with provisions established by the CBC.

12.C CRITERIA FOR SERVICE LOADS

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

1. Gravity Loads

Court facilities shall be designed for the live loads established by the CBC. Live loads shall be based on the use and room occupancy of the building area under consideration and shall consider movable partitions in open office locations.

Superimposed dead loads shall include, but are not limited to, mechanical, electrical, plumbing, and fire-protection equipment and distribution systems; ceilings and suspended soffits; raised floors, ramps, platform assemblies, built-in partitions, finishes, and cladding; and telecom, audiovisual, and fire alarm equipment and distribution systems.

2. High-Density Files

Areas that support high-density files shall be designed for a 250-pounds-per-square-foot live load.

3. 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 recommended criteria in table 12.1 are based on the dynamic response of floor systems to walking excitation. The acceleration limits are based on American Institute of Steel Construction (AISC) *Design Guide 11*. 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.

4. Floor Vibration: Equipment

Vibration from 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 the structure requires nothing special to minimize vibrations from sources other than footfall.

Table 12.1 Human Comfort Performance Levels

Floor Vibration Acceptance Criteria (AISC) 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 Use and Occupancy	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:

$$\frac{a_p}{g} = \frac{P_o \exp(-.35 f_n)}{\beta W}$$

P_0 = Constant force representing the excitation, pounds.

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.

Life cycle cost analysis (LCCA) is a useful indicator in evaluating total ownership cost of design alternatives over a 25-year-or-greater useful life of the facility and identifies cost alternatives. See 1.A, Functional Usefulness, Physical Durability, and Maintainability, for more information.

ASCE = American Society of Civil Engineers

NSC = nonstructural seismic coordinator

12.D CRITERIA FOR RARE LOADS

1. Earthquake

Seismic performance of all new Judicial Council facilities is intended to be higher than that of buildings designed in accordance with prescriptive code provisions. This performance will be achieved through design and quality assurance.

The Judicial Council may designate specific buildings to be designed for enhanced seismic performance. *Enhanced seismic performance* refers to controlling earthquake damage to a building in order to limit the expected loss of use of the building after the earthquake.

2. Risk Category

The CBC requires all buildings and structures to be assigned to a risk category, ranging from I (low hazard to human life, unoccupied structures) to IV (buildings and other structures that are deemed essential and must remain operational). Risk category is used to determine importance factors (as defined in the CBC) for amplifying loads and enhancing seismic responses; ensuring that ductile, lateral force-resisting systems are used in areas of high seismicity; and controlling building deformations in relation to buildings' and structures' uses and risk to human life and safety.

All new court facilities will be assigned to Risk Category III unless an alternative risk category is established for the project.

3. Normal Seismic Performance: Structural Components

Normal structural seismic performance objectives must be met by thorough conformance with the principles and provisions of the CBC using either mapped seismic acceleration parameters or site-specific seismic ground motions.

4. Normal Seismic Performance: Nonstructural Components

a. Acceptable performance of nonstructural components and systems shall be achieved by implementing CBC requirements during the design and construction phases.

b. For nonstructural components, the design team is encouraged to specify preapproved standards such as:

- DSA Interpretation of Regulations (IR) 25-2.13, for metal suspension systems for lay-in panel ceilings;
- DSA IR 25-3.13, for suspended gypsum board ceilings; and
- OSHPD Preapproved Details.

5. Enhanced Seismic Performance: Structural Components

When enhanced seismic performance is required by the Judicial Council, the structural engineer shall develop detailed seismic design criteria to meet the seismic performance goals established by the Judicial Council. Analysis and design methods shall explicitly account for nonlinear behavior of the designated lateral force-resisting system's members and connectors using procedures such as the nonlinear static procedure or the nonlinear dynamic procedure stated in American Society of Civil Engineers' Standard ASCE 41.

c. Seismically isolated systems and damping systems may be used to provide enhanced seismic performance.

d. The Judicial Council will review and approve the enhanced seismic performance design criteria and may appoint an independent peer review team to evaluate the proposed criteria and analysis methods.

6. Enhanced Seismic Performance: Nonstructural Components

When enhanced seismic performance is required by the Judicial Council, the amendments to the CBC by the DSA-SS that pertain to nonstructural components shall be adhered to.

The design team is encouraged to use and specify preapproved standards.

7. Nonstructural Seismic Coordinator (NSC)

For all projects, the project's registered design professional in responsible charge shall act as the nonstructural seismic coordinator. The NSC shall establish and coordinate design criteria and performance specifications for nonstructural components during the design phase. In addition, the NSC shall identify equipment critical to continued building function and occupancy, as specified by the CBC and the Judicial Council, and shall assist the Judicial Council to determine requirements for prequalification of such equipment.

During the construction phase, the NSC shall coordinate delegated design teams and review deferred approval submittals before submission to the authority having jurisdiction. The NSC shall be the project architect or project structural engineer, or may be an independent registered design professional retained by the registered design professional in responsible charge.

8. Blast

See chapter 4, Courthouse Security, for blast criteria.

9. Wind

Wind design shall be in accordance with the CBC, unless otherwise specified by the Judicial Council. Because of enhanced performance objectives or siting conditions, the Judicial Council may select certain buildings for site-specific wind studies. Such an 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 the CBC.

10. Flood, Snow, and Rain

Parameters for design for flood, snow, and rain loading shall be in accordance with requirements of the local jurisdiction in which the court facility is to be constructed.

12.E LIFE CYCLE COST ANALYSIS

1. Objectives

Selection of building components, materials, and structural systems must take into account 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). The Judicial Council will consider analysis estimates in determining acceptability of design alternatives along with other factors. Refer to chapter 1, General Principles, for overall project life cycle cost analysis objectives and methodologies.

2. Methodologies and Standards

a. The LCCA methodology (refer to chapter 21, Life Cycle Cost Analysis) 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 the total cost of ownership 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.

b. 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.

c. Selection of LCCA programs and tools shall be reviewed with the Judicial Council before implementation.

3. Seismic Hazard Risk Assessment

a. In estimating losses from expected earthquakes, the LCCA shall be based on probabilistic performance-based seismic hazard risk assessments. The LCCA should consider losses resulting from the following:

- Structural damage
- Nonstructural damage
- Damage to building contents
- Disruption of building functions (loss of use)
- Long-term environmental impacts

b. Estimates of the total cost of ownership and benefit-cost ratios may be used 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 costs in evaluating design options in the LCCA. Comparative results should be used to evaluate overall cost impacts and architectural tradeoffs resulting in consideration of various structural system configurations and options. These options may include comparisons such as normal versus enhanced seismic performance objectives, use of moment frames versus braced frames, impact of column size on floor plan and program, impact of beam depth on typical floor-to-floor height, and steel versus concrete construction alternatives. See 1.A, Functional Usefulness, Physical Durability, and Maintainability, for more information on life cycle cost analysis.

4. Environmental Impacts

Sustainable design strategies (see 1.D, Sustainable Design) 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.

12.F QUALITY ASSURANCE

a. The registered design professional in responsible charge shall prepare a statement of special inspection that complies with the provisions of the CBC. This statement shall be inclusive, covering all special inspections and tests—both structural and nonstructural—required for the project.

b. Structural observation for seismic resistance is required for all new court facilities. The registered design professional in responsible charge shall prepare a schedule identifying the phases of construction to be observed.

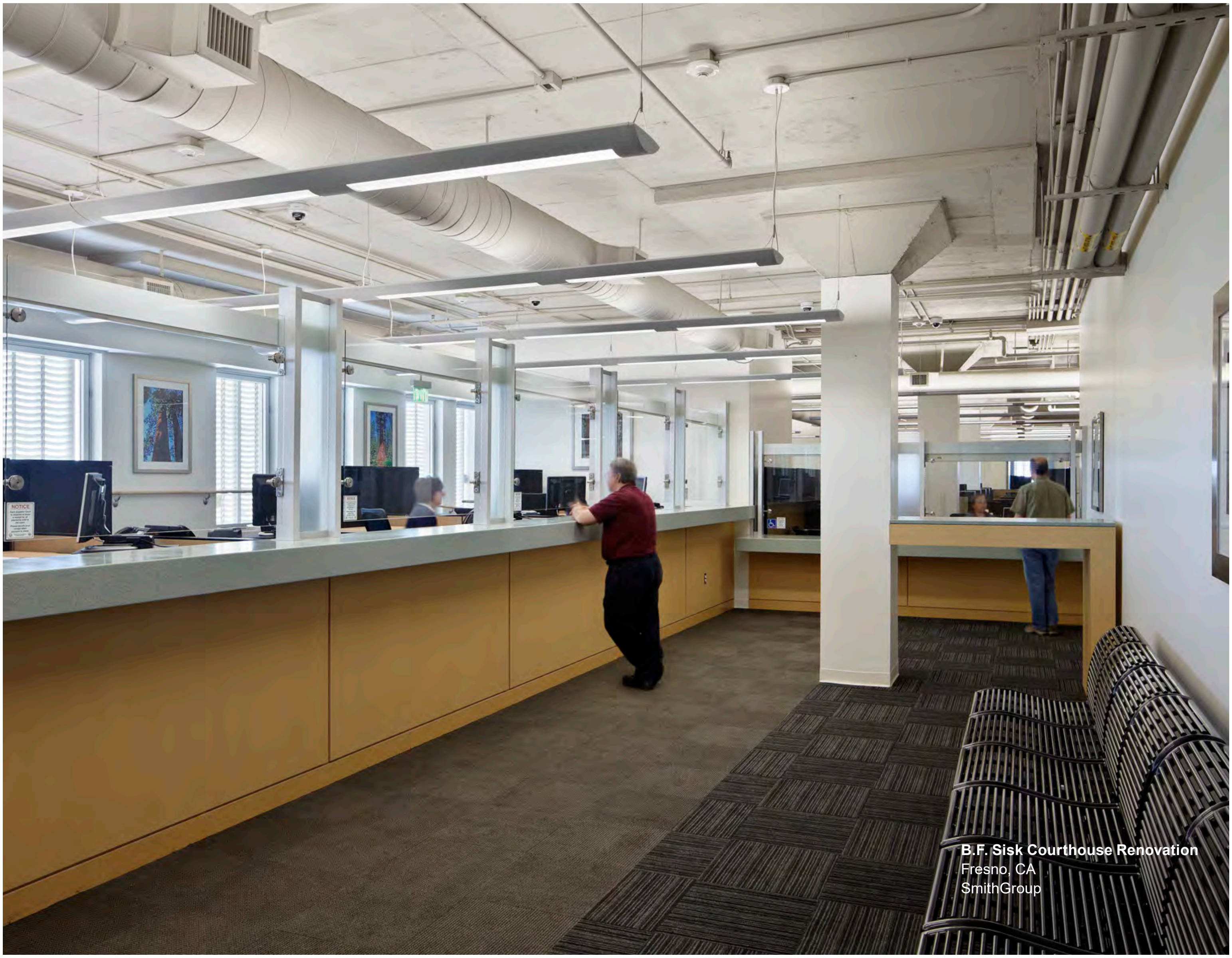
c. When required by the building standards in special wind regions with high winds (threshold is $V = 130$ mph in 2019 CBC), structural observation for wind resistance will be required. The registered design professional in responsible charge shall prepare a schedule identifying the phases of construction to be observed.

12.G FIRE-RESISTIVE RATINGS OF STRUCTURAL ELEMENTS

The architect, fire-protection consultants, and structural engineer shall coordinate to clearly identify the fire-resistive ratings of all structural elements required to have a rating by the current California Building Code, volume 2, part 1, chapters 6 and 7.

DIVISION TWO: TECHNICAL CRITERIA

13 MECHANICAL CRITERIA



B.F. Sisk Courthouse Renovation
Fresno, CA
SmithGroup

This chapter identifies the program and criteria for heating, ventilation, and air-conditioning (HVAC), plumbing, and piping systems.

Maintainability and reliability are essential requirements of the Judicial Council for facility operations.

13.A OBJECTIVES

The conservation of energy and natural resources shall be weighed against the initial construction cost and future operating cost when incorporating the mechanical concepts into the design to ensure that the project's goals focus on the total life cycle operating costs of the facility. Design mechanical systems to meet building performance objectives, including sustainability and energy conservation, maintenance and reliability, and flexibility for changes.

1. 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.

2. Sustainability and Energy Conservation

The design of mechanical systems shall combine with other component designs to produce a building that meets the project's programmed sustainability and energy-efficiency goals, as referenced in chapter 1, General Principles.

3. Maintenance and Reliability

Maintainability and reliability are essential requirements of the Judicial Council in facility operations. The design and installation of all mechanical equipment shall provide sufficient clearance to allow easy maintainability, including space for removal and replacement of filters in ceiling equipment, boilers, chillers, cooling towers, pumps, motors, building automation controllers, fire and life-safety dampers, and air-handling equipment. Systems shall have reliability over the functional lifespans listed in chapter 21, Life Cycle Cost Analysis.

4. Flexibility for Change

Design systems to provide optimum flexibility in scheduling the use of all principal spaces in the court building.

5. 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. Unless otherwise noted, standby units shall be sized at 50 percent capacity in multiples of two and shall be configured for automatic lead/lag operation. 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 main distribution frame (MDF) room (specifically for medium and large courthouse projects), consider using coolant distribution units that are server-rack mounted. Doing so will reduce the physical size of an airside cooling solution, which will also reduce impact on the environment—acoustic impact, congestion above ceiling, and valuable floor space for floor-mounted computer room air-conditioning units—outside the room.

6. Rational Analysis

A rational analysis shall be performed and a report prepared to establish minimum requirements for the design, installation, and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. The report, and associated design, complying with the California Building Code, shall be submitted with the construction documents to the authority having jurisdiction.

13.B HVAC CRITERIA

1. Indoor Design Conditions

See table 13.1 for requirements.

2. Temperature Control Zone

Target the interior temperature control zone size to avoid exceeding 1,500 gross square feet for open areas, or a maximum of three 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, child waiting area, and equipment rooms. Provide a zone map for review by the Judicial Council before any associated heating, ventilation, and air-conditioning (HVAC) design.

3. Air Distribution

3.1 System Requirements

a. Based on size and complexity of the building, air distribution systems consist of air-handling units (AHUs) or built-up central air-handling systems, with the decision based on the life cycle cost analysis (LCCA) and whole-building cost analysis.

b. AHUs provide flexible zone control through use of multiple smaller units. AHU casing construction details are included in tables 13.3 and 13.4, at the end of this chapter. Central systems will incorporate components similar in quality to those in tables 13.3 and 13.4.

c. Design air ventilation rates shall comply with the latest adopted version of ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality. Thermal comfort conditions shall comply with the latest version of ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy. Demand control ventilation using carbon dioxide (CO_2) sensors per occupancy zone shall be applied appropriately as defined by the building code occupancy classification per individual programmed space.

d. Demand ventilation controls shall maintain CO_2 concentrations less than or equal to 600 parts per million plus the outdoor air CO_2 concentration in all rooms with CO_2 sensors.

e. Variable air volume (VAV) terminal boxes shall be Air-Conditioning, Heating, and Refrigeration Institute’s AHRI Standard 880 certified.

f. The VAV terminal boxes selected shall be pressure-independent units. VAV terminal boxes and their associated building management system (BMS) controllers shall be located in an accessible manner for replacement and maintenance. VAV terminal boxes shall incorporate Belimo or approved equal direct digital control actuator, including a five-year warranty.

g. 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.

h. Ensure that the Air Diffusion Performance Index 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.

Important References

ASHRAE Standards 55, 62.1, and 90.1

EISA = Energy Independence and Security Act of 2007

NEC = National Electrical Code

NEMA = National Electrical Manufacturers Association

NFPA = National Fire Protection Association

SMACNA = Sheet Metal and Air Conditioning Contractors' National Association

Table 13.1 Indoor Design Conditions

ROOM TYPE	HEATING DESIGN TEMP	COOLING DESIGN TEMP	DESIGN OCCUPANT DENSITY	DESIGN POWER DENSITY
Lobby	72°F	75°F	Per CA Mech. Code	W/SF
Conference Rooms	72°F	75°F	Per CA Mech. Code	2.0 W/SF
Offices	72°F	75°F	Per CA Mech. Code	1.2 W/SF
Break Rooms	72°F	75°F	Per CA Mech. Code	1.5 W/SF
Waiting Rooms	72°F	75°F	20 SF/person	1.5 W/SF
Public Gallery/Passage	72°F	75°F	50 SF/person	0.5 W/SF
Public Toilet Rooms*	72°F	75°F	Indirect Thru Exhaust Makeup	0.5 W/SF
Holding Cell/Room*	72°F	75°F	Per CA Mech. Code	0.5 W/SF
Transformer/ Switchgear Room	N/A	95°F	N/A (normally unoccupied)	Project Specific
IDF Rooms	N/A	75°F	N/A (normally unoccupied)	Project Specific
MDF Room	N/A	75°F	N/A (normally unoccupied)	Project Specific
UPS Room	77°F	77°F	N/A (normally unoccupied)	Project Specific
Janitor Closets*	N/A	75°F	Indirect Thru Exhaust Makeup	N/A
Copy Rooms	72°F	75°F	Indirect Thru Exhaust Makeup	Project Specific
Kitchens	72°F	75°F	Per CA Mech. Code	2.5 W/SF
Coffee Stations	72°F	75°F	Per CA Mech. Code	1.5 W/SF
Storage (<150 SF)	N/A	N/A	N/A	N/A
Storage (≥150 SF)	N/A	N/A	150 SF/person	N/A
Courtroom	72°F	75°F	Per CA Mech. Code	0.5 W/SF
Jury Services	72°F	75°F	20 SF/person	1.0 W/SF
Jury Deliberation Rooms	72°F	75°F	20 SF/person	2.0 W/SF
Judicial Chambers	72°F	75°F	150 SF/person	1.2 W/SF

Notes:

This table lists initial suggested values only—actual values to be verified by design team. Suggestions do not override code requirements.

Suggestions are intended for preliminary HVAC analysis only and may differ from those used by other design disciplines.
Suggestions are independent of task lights and audio/visual loads.

* 100% outside air; once-through air only.

W/SF = watts per square foot.

IDF = intermediate distribution frame.

UPS = uninterruptible power supply.

Table 13.2 Maximum Allowable Duct Velocities

NOISE CRITERIA	MAXIMUM ALLOWABLE DUCT VELOCITY (FPM)	
	MAIN	BRANCH
20	1,000	500
25	1,000	800
30	1,300	1,100
35	1,500	1,200
40	1,800	1,400

fpm = feet per minute.

i. All motors shall be National Electric Manufacturers Association (NEMA) premium efficiency and meet or exceed Energy Independence and Security Act of 2007 (EISA) energy-efficiency requirements for each motor type. All motors larger than 0.5 horsepower (HP) shall incorporate polyphase configuration. All motors 0.5 HP and smaller shall be single-phase electronically commutated motors. All motors that are operated with variable-speed drives shall be provided with inverter-duty motors with Class F insulation per the National Electrical Code (NEC) and the National Fire Protection Association (NFPA). Provide motor shaft grounding ring assemblies on all pumps with variable-frequency drives (VFDs).

j. Ductwork construction shall comply with Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) duct construction standards and shall be installed per the SMACNA duct cleanliness standard for new construction. The ductwork shall meet the acoustical requirements outlined in table 13.2 per maximum allowable duct velocities.

k. Leakage testing shall be performed on all ductwork constructed greater than 3″ pressure class in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* and all ductwork associated with the smoke control system (if applicable). Use minimum SMACNA seal class A for all ductwork. SMACNA leakage class for 2″ and less shall be 16 for rectangular and 8 for round ductwork. SMACNA leakage class for 3″ and higher shall be 4 for rectangular and 2 for round ductwork.

l. Fabricate ductwork from galvanized steel and/or aluminum sheet metal, depending on applications. Use low volatile organic compound duct sealant with Environmental Protection Agency listings. A factory-made Underwriters Laboratories' UL Class 1 listed acoustical flex duct may be used for low-pressure ductwork connected to air devices and shall be installed in accordance with the SMACNA HVAC Duct Construction Standards: Metal and Flexible.

m. For plenum and ducted returns, no more than 1,000 cubic feet per minute (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. All ductwork shall be insulated per the California Energy Code.

Important References

ASHRAE Handbook—Fundamentals

The climate zone at the project location, as assigned by the California Energy Commission's California Building Climate Zones, should be the basis for all calculations, as defined in the California Code of Regulations, title 24.

For information on life cycle cost analysis, see chapter 1, General Principles.

3.2 Building Pressurization

Design the 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, building entrances, and public lobbies are to maintain positive pressure relative to the outdoors. Building pressurization shall meet the requirements of the latest version of the *ASHRAE Handbook—Fundamentals.*

3.3 Air Intake and Exhaust

The placement, location, and quantity of outside air must comply with California Code of Regulations, title 24; ASHRAE Standard 62.1, Ventilation for Acceptable Indoor Air Quality; and the building security requirements. For security requirements, see chapter 4, Courthouse Security, and 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 with American National Standards Institute and Air Movement and Control Association ANSI/AMCA Standard 500-L.

4. Internal Heat Gains

a. Refer to table 13.1 for target values unless noted otherwise.

b. 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 manufacturer-provided data, if available, or the latest edition of the *ASHRAE Handbook—Fundamentals.*

c. Refer to electrical documents for the design lighting power density to be included in the associated HVAC load calculations.

5. Diversity

The designer should consider diversity, matched to the specific project and based on individual consideration. Diversity is defined as the probability that an internal gain will be active at the time of peak building load. Although the Judicial Council cannot suggest specific diversity criteria for the coincidence of weather (design cooling days), occupancy, court operation, judges' chambers, lighting, and other functions within the building, several general ideas are suggested.

a. Diversity at the AHU (system) level is appropriate and should be taken to prevent unneeded (wasted) capacity.

b. This diversity should not be taken at the zone level.

c. Greater diversity should be considered at the central plant or with applications of district energy.

d. All lighting will not be energized at the same times throughout the entire building. At least 10 percent of the lights can be assumed to be off on a system basis. Advanced lighting controls, when used, can generate even more significant savings.

e. Court operation and occupancy will vary significantly through a month and a week. The impact of varied occupancy should be considered based on past operational performance and project team judgment.

f. Judicial chambers will likely be generally occupied, yet conference functions that support the chambers will generally share occupancy. An office occupant may also be a conference participant, so avoid double counting.

g. Simultaneous operation of all these individual diversified operations should also be considered (further combined diversity).

6. Air-Conditioning Cooling Systems

6.1 Chilled Water Systems

a. 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 LCCA, use high-efficiency chillers that do not exceed 0.55 kilowatt (kw)/ton and 0.35 nonstandard part load value (NPLV). Chiller refrigerant leak detection systems shall be connected to the BMS with remote alarms.

b. The cooling system shall consist of two chillers sized at 60 percent each of the design load. All chillers in a facility shall use the same nonproprietary refrigerant and shall avoid use of refrigerants that do not comply with California Air Resources Board initiatives and regulations. Chillers shall be equipped with variable-frequency drives to achieve the peak load efficiency and NPLV available when deemed appropriate based on the California Energy Commission's California Building Climate Zones as defined in California Code of Regulations, title 24. The design chilled water temperature difference (delta T) across the chillers' evaporators shall be at least 15 degrees Fahrenheit (°F). Variable supply air set point control shall be applied to reduce loads and increase the efficiency of the chiller plant.

c. 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 as needed to maintain incoming condenser water temperature within the chiller manufacturer's minimum requirement.

d. Multiple cell cooling towers and isolated basins are required. The number of cells and associated capacity 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. Provide basket strainers on piping. Cooling towers shall have ladders and platforms for inspections and replacement of components. Provide stainless steel components to reduce life cycle cost based on local water quality.

e. Cooling tower sizing shall be on a life cycle basis, taking into consideration operational energy and water consumption rather than first cost. Cooling tower controls shall include a pH (acidity) and conductivity controller connected to the water treatment system by adding chemicals that regulate the pH in the system to prevent corrosion and scaling and to facilitate water conservation through increased cycles of concentration. Flow meters connected to the BMS control system must be specified on makeup and blowdown water lines.

f. Pumps shall be of a centrifugal type and shall generally be selected to operate at 1,750 revolutions per minute (rpm). Both partial and full load must fall on stable areas of the pump curve. The number of primary chilled water and condenser water pumps shall be equal to the number of chillers, and a separate

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 described in *ASHRAE Handbook—HVAC Applications*.

pump shall be designed for each condenser water circuit. The specified pump motors shall not overload throughout the entire range of the pump curve. The pump associated with each individual cooling tower and chiller group shall be arranged with piping, valves, and controls to allow for independent, parallel operation of each chiller–cooling tower group.

g. All motors shall be NEMA premium efficiency and meet or exceed EISA energy-efficiency requirements for each motor type. All motors that are operated with variable-speed drives shall be provided with inverter-duty motors with Class F insulation per NEC and NFPA. Provide motor shaft grounding ring assemblies on all pumps with VFDs.

6.2 Direct Expansion Systems

Direct expansion (DX) evaporators with condensing units are not allowed unless, in the schematic design phase, the chilled water system application does not have a favorable life cycle cost or 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.

6.3 Alternative Systems

Alternative solutions may be provided that meet the requirements and the associated energy goals of the current California Building Code. Neither active nor passive radiant chilled beams, panels, or sails are permitted.

7. Heating Systems

7.1 Requirements per Heating System

a. 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 equipment being served. The temperature drop for terminal unit heating coils shall be 30°F–40°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′ of head loss per 100′ of pipe, whichever pipe size is larger, and not less than 4′ per second.

All boilers for hydronic water heating applications shall be condensing type, with the 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 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.

b. 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.

c. Fin-tube heating systems: When fin-tube radiation is used, the design shall incorporate individual zone thermostatic control capable of connecting to a self-contained microprocessor and an HVAC building control system.

d. 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 perimeter air distribution systems to eliminate the need for reheat.

e. 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.

f. Alternative systems: Other systems may be considered that meet current code and the energy goals of California Building Code.

7.2 General Requirements

a. The Judicial Council requires low-temperature hot water heating systems, with the lowest working pressure suitable for the system and a maximum temperature limitation of 93.3 degrees Celsius (°C) (200°F).

b. When steam is furnished to the building, it must be converted to hot water with a heat exchanger in the mechanical room near the entrance into the building. Steam heating is discouraged inside the building, other than the conversion of steam to hot water in the mechanical room. The designer must investigate the use of district steam condensate for preheating domestic hot water.

c. Hot water and chilled water air systems must use a four-pipe main distribution system. Dual temperature piping systems are not permitted.

d. Pipes operating at a temperature below ambient must be insulated with closed-cell insulation with all joints sealed and having a system permeance of ≤0.02 perms. Insulation shall be closed-cell, cellular glass, covered with a continuous vapor retarder with a permeance of <0.02 perms. All insulation and vapor retarder materials must meet the appropriate American Society for Testing and Materials (ASTM) material standard for that type.

8. Vibration and Acoustical Isolation

a. Mechanical room isolation: Acoustical isolation floors shall be considered for major mechanical rooms located in penthouses or at intermediate levels of mid-rise construction.

b. Shaft requirements: 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 it enters 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.

c. Isolators: Isolators shall be specified by type and deflection, not by isolation efficiency. Specifications shall be worded so that isolation performance becomes the responsibility of the equipment supplier.

d. Vibration control: Concrete inertia bases shall be delineated for reciprocating equipment and all pumps, unless equipment is installed on slab on grade.

e. Ductwork: The design shall delineate the methods to reduce fan-generated noise immediately outside any mechanical room. 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.

f. Piping hangers and isolation: The design shall analyze the need for isolation hangers for piping to address acoustical and expansion concerns. Piping hangers and supports shall be designed in accordance with the applicable codes.

g. 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 using sound attenuators. 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 in applications with accessibility problems and only on approval of the Judicial Council.

h. 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. All exposed edges shall be sealed with sealant approved per NFPA 90A.

13.C HUMIDIFICATION AND WATER TREATMENT

1. Humidifiers and Direct Evaporative Coolers

Courthouse spaces shall not be humidified unless 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. To avoid the potential for oversaturation and condensation at low load, the total humidification load shall be divided among 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. The water quality shall be tested to confirm if additional water treatment schemes should be incorporated into the project to reduce maintenance. 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.

2. Relative Humidity Controls Criteria

a. 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.

b. 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 whether visible or concealed.

3. Water Treatment

a. A water treatment specialist must design the water treatment for closed and open hydronic systems with consideration of the operational and maintenance needs of all system equipment, including such components as boilers, chillers, cooling towers, other heat exchangers, pumps, and piping. The design must address biological growth, dissolved solids and scaling, and corrosion protection. Before design of the water treatment system, confirm pH, alkalinity, total dissolved solids, iron content, soluble copper, aerobic plate, and *Legionella* treatment requirements with the Judicial Council.

b. As part of the water treatment plan, specify coupon racks or an equivalent electronic monitoring system for corrosion in condenser water loops, heating hot water loops, and the building main chilled water loop. The type and manufacturer of the proposed coupon racks to be installed shall be approved by the Judicial Council. The minimum quantity of coupons and frequency of inspections shall be described in the water treatment plan.

c. Laboratory analysis of coupons shall be no less frequent than quarterly for major systems (e.g., primary building condenser and chilled water loops, as opposed to specialized systems serving limited areas) and annually for other systems. At a minimum, two coupon racks shall be installed for each loop and used to monitor mild steel and copper. Molybdenum shall not be used in Judicial Council buildings.

d. 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 Handbook—HVAC Applications*. The use of nonchemical water treatment is not permitted.

13.D MECHANICAL REQUIREMENTS FOR SPECIFIC SPACES

1. General Requirements

a. For security equipment, see chapter 4, Courthouse Security. For telecommunications equipment rooms, see chapter 17, Network and Communication Systems.

b. The HVAC system serving detention areas shall be connected to the building generator, where provided. Holding areas shall be negatively pressurized with regard to adjacent spaces and exhausted directly outdoors.

c. Mechanical system diffusers and grilles in public and staff areas must be secure from tampering, particularly in areas that provide some degree of seclusion and privacy (restrooms, attorney-client visitation rooms, etc.). Maximum-security detention-type grilles, secured with tamper-proof fasteners, must be provided at all areas accessible to prisoners.

d. If required by the risk assessment, mailrooms shall be provided with once-through air that is 100 percent exhausted from the facility. Mailrooms shall be maintained under a negative-pressure condition relative to surrounding spaces.

e. Water lines shall not be located directly above motor control centers, panels, or disconnect switches, as required by code. The mechanical rooms shall have sloped floors with floor drains in proximity to the equipment served.

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.

f. No water lines are permitted in the ceiling 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.

g. For elevator machine rooms, a cooling or ventilating system must be provided to maintain elevator machine room temperature as required by geographical location.

h. For emergency generator rooms, the environmental systems shall meet the requirements of NFPA 110 (Standard for Emergency and Standby Power Systems) and the combustion air requirements of the equipment to remove heat gain from equipment operation. The air supply and exhaust shall be located so that air does not get contaminated. Refer to chapter 15, Electrical Criteria, for generator requirements.

i. For UPS-designated battery rooms, design space to accommodate battery and exhaust requirements per code.

j. 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 sally ports shall be ventilated to prevent buildup of engine exhaust fumes and transferring of fumes into the building. Sally ports shall be equipped with ventilation fans controlled by a carbon monoxide detection and control system to automatically purge the sally port 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.

k. Toilets with multiple fixtures and public toilets shall have dedicated exhaust systems.

l. Janitor and housekeeping closets shall maintain negative pressure in the rooms relative to the surrounding spaces.

m. All copy areas shall have a localized exhaust adjacent to high-volume reproduction machinery and shall be negative in pressure to the surrounding areas.

2. Criteria for Mechanical Spaces

Service access shall be provided for equipment per manufacturer's recommendations. 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.

Specifically regarding housekeeping pads, they shall be at least 6″ wider on all sides than the equipment they support and a minimum height of 3-1/2″ 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

1. Pump Systems and Hydronic Heating Water

a. 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 a standby pump and shall be configured for automatic lead/lag operation.

b. Each boiler shall be provided with a control and piping arrangement that protects the boiler from thermal shock.

c. Hydronic hot water space heating pumps shall be selected to operate at 1,750 rpm.

d. Variable-volume pumping systems shall be provided for all secondary piping systems with pump horsepower greater than 5 HP.

e. Air separators and vents must be provided on hot water systems to remove accumulated air within the system. Automatic bleed valves shall be used only in accessible spaces in mechanical rooms where they can be observed by maintenance personnel, and they must be piped directly to open drains.

f. Manual bleed valves shall be used at terminal units and coils. Likewise, system drains shall be provided at the main system low points of the heating system and at each heating coil.

2. Piping Systems

All piping systems shall be designed and sized in accordance with the *ASHRAE Handbook—Fundamentals* and the *ASHRAE Handbook—HVAC Systems and Equipment*. Materials acceptable for piping systems are black steel and copper. No polyvinyl chloride (PVC), cross-linked polyethylene (PEX), or other types of plastic pipe are permitted within the building. Low-loss design principles shall be followed.

3. Piping Accessories

3.1 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.

3.2 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.

Gas piping and sprinkler lines must be identified as prescribed by the fire code.

4. 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.

4.1 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 as required by code. The irrigation systems must be submetered 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 the plumbing code. A triplex booster pumping system (sized at 50%/50%/50%) shall be used if the water pressure is inadequate to provide sufficient pressure at the most remote and/or highest fixture. The water pressure at the fixture shall be in accordance with the plumbing code.

4.2 Hot Water Service

Heaters using 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 HVAC energy provisions. Domestic hot water supply shall be generated at 140°F and shall be capable of providing 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 generators is permitted for isolated or incidental use at terminal fixtures and single-accommodation toilet rooms.

5. Sanitary Waste and Vent Systems

5.1 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 or heavy-duty no-hub joints and fittings. Coordinate drain size with fire protection design (chapter 20, Fire Protection Criteria) so full-flow drainage is provided.

5.2 Floor Drains

Floor drains shall be provided in all toilet rooms, mechanical equipment rooms, locations where condensate from equipment collects, and parking garages and ramps. Condensate piping shall be routed as required by the plumbing code. See 8.E, Technical Criteria, for more information regarding floor drains in holding areas. In general, floor drains shall have a cast iron body type with 6″ diameter stainless steel strainers for public toilets, kitchen areas, and other public areas. Provide vandal-proof fasteners for floor drains where there is public access. 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. An automatic trap primer system shall be provided for P traps, as required by the California Plumbing Code. Power for trap primers shall include a disconnect switch. Trap guards that are International Association of Plumbing and Mechanical Officials listed per the plumbing code are also an acceptable means for trap protection.

5.3 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. Floor drains or trench drains in garage locations are to discharge into sand/oil interceptors, as required by the plumbing code.

5.4 Automatic Sewage Ejectors

Sewage ejectors shall be used only where gravity drainage is not possible. If sewage ejectors are required, only the lowest floors of the building shall be connected to them; 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.

5.5 Rainwater Drainage System

Pipes and fittings shall be in compliance with local codes and sized based on local rainfall intensity. Roof drains shall be cast iron body type with high dome grates and membrane clamping rings that are manufactured as part of the assembly. 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.

5.6 Plumbing Fixtures

All plumbing fixtures and faucets shall be water-efficient, commercial-grade type, similar to hotel-type fixtures. Provide automatic flush valves for urinals and water closets and automatic faucets in public toilet rooms. Sensors shall be self-powered hydroelectric type or have minimum three-year battery operation life. For detention fixtures, see chapter 8, In-Custody Defendant Receiving, Holding, and Transport.

5.7 Leak Detection System

A leak detection system shall be considered for the plumbing and hydronic systems based on available technology and cost-effectiveness.

6. Fuel Piping

6.1 Natural and Propane Gas Systems

a. Service entrance: 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 gas pipe enters the building. 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.

b. Gas shall not be piped through confined spaces, such as trenches or unventilated shafts. All spaces containing equipment such as gas-fired boilers, chillers, and generators shall be ventilated. Vertical shafts carrying gas piping shall be ventilated. Gas meters shall be located in enclosed rooms that comply with local utility regulations.

6.2 Fuel Oil Systems

a. 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.

b. No underground fuel oil storage tanks shall be installed in a courthouse

All insulation shall comply with fire and smoke hazard ratings indicated by ASTM Standard E84, the NFPA, and UL. Accessories such as adhesives, mastics, cements, and tapes shall have the same or better component ratings.

facility. Aboveground storage tanks shall be installed at ground level or higher whenever possible. The location of the storage tank's fuel delivery port shall provide a safe, protected location for fuel delivery vehicles to park and exit. The parking and work area for fuel deliveries shall have a concrete surface.

c. The fuel storage capacity of each generator system shall be determined by the emergency response plan requirements. Coordinate the fuel storage capacities with the requirements described in chapter 15, Electrical Criteria. 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 and UL listings for double containment tanks.

13.F INSULATION

1. 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 the California Building 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 exposed piping up to 8′ shall have PVC jacketing. All insulated piping exposed to the weather shall be protected with aluminum jacketing and seams sealed.

2. Duct Insulation

All duct insulation materials used as internal insulation exposed to the airstream shall be in accordance with UL 181 or ASTM C1071 erosion tests. The materials shall not promote or support the growth of fungi or bacteria. All exposed, externally insulated ductwork shall have sealed jacketing equal to Alumaguard. All concealed, externally insulated ductwork shall have foil face jacketing. All supply air ducts must be insulated, in accordance with the California Building 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 the California Building 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 or loss on a recirculating or heat-recovery system. All equipment, heat exchangers, converters, and pumps shall be insulated as required by the California Building Code.

3. Equipment Insulation

All equipment—including air-handling units, chilled and hot water pumps, and heat exchangers—must be insulated in accordance with the California Building Code. All exposed pumps in unconditioned spaces shall have jacketing.

4. Thermal Pipe Insulation for Plumbing Systems

Insulate all sanitary sewer vents terminating through the roof, if outdoor conditions justify, to prevent condensation from forming. Include a vapor barrier jacket on this insulation. All domestic water piping shall be insulated in accordance with the California Building Code. All cold water and storm water piping exposed in plenums or above ceilings shall be insulated, as required, to prevent condensation.

13.G THERMOMETERS AND GAUGES

Major mechanical equipment shall be provided with instrumentation that includes Instrument Society of America (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 flows of less than 10 gallons per minute, provide permanent provisions for use of portable instruments to check temperatures and pressures.
- Differential static pressure gauge assemblies shall be placed across filters in air-handling units.

1. Airflow Measuring Devices

Airflow measuring grids are required for all outside air systems. Airflow measuring grids must be sized to give accurate readings at minimum flow.

2. Water Flow Measuring Devices

Water flow or energy measuring devices shall be required for each chilled water refrigeration machine, hot water boiler, and pump, as well as 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 BMS. Water flow and airflow measuring devices shall confirm or validate the energy code and ASHRAE Standard 90.1 requirements.

Btu = British thermal unit

Cal/OSHA = Division of Occupational Safety and Health

CSA = Canadian Standards Association.

dBA = decibels

EMT = electrical metallic tubing

EPDM = ethylene propylene diene monomer

fmp = feet per minute

ft² = square feet

hr = hour

ID = inside diameter

MERV = minimum efficiency reporting value

TBD = to be determined

TEFC = totally enclosed, fan cooled

VFD = variable-frequency drive

VSD = variable-speed drive

WC = water column

Table 13.3 AHU Matrix (Airflow Ranges >4,000 to <10,000 cfm)

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Prefilters	ASHRAE 52.2, rigid filters, 25%–30% rated > MERV 8, low-pressure drop, rated at 500 fpm: 0.08″ WC clean, 1.0″ WC dirty, >150 grams minimum dirt holding capacity
Outside Air Makeup Dampers	Low-leakage control dampers
Preheat Coils (optional; to be determined [TBD])	Copper tube / copper fins; >0.049″/0.010″ >6 fins/inch
Preheat Coil Drain Pan (optional; TBD)	Stainless steel 304, double sloped—no-standing-water design, >1/4″/ft minimum slope, 16-gauge construction or approved equal
Steam Humidifier Section (optional; TBD)	Stainless steel 304 grid type (DriSteem, UltraSorb, or approved equal)
Supply and/or Return Fan Systems	TBD by engineer
Supply Fan Motors: Inverter Duty Motors	Provide motor shaft grounding ring assemblies for motors; this requirement is to increase the service life of the motor-associated VFDs
Supply Fan Type	Aluminum airfoil type—continuous welded scroll section, no bolts or screws protruding into the air stream
Fan Wheel Protection	Cal/OSHA General Industrial Safety Orders, California Code of Regulations, title 8, section 3995 et seq. (Article 41, Prime Movers and Machinery)
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 five-year warranty motorized damper motor
Cooling Coils (10 fins maximum)	Aluminum fins, coastal locations copper tube/copper fins: ≥5/8″ diameter, 0.030″/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, 18-gauge construction, double-sloped—no-standing-water design, >1/5″/foot 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 closed-cell gasket edge with permanently attached 316 stainless steel hinged or locking clips that interlock with filter header, <5% bypass leakage at 2″ of static pressure
Postfilter Frames	No-bypass-air leakage filter framing system or approved equal: extruded aluminum or formed stainless steel, powder-coated painted finish, two-stage neoprene gasket edge seals, tongue and groove, knife-edge, frame-to-filter mating joint, stainless steel mechanical clamping holding device
Prefilter Media Gaskets	Closed-cell neoprene or EPDM gasket, bonded to filter track header

Table 13.3 continues on next page

Table 13.3 AHU Matrix (Airflow Ranges >4,000 to <10,000 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 that internal insulation meets or exceeds a 0.0769 $Btu/hr/ft^2/F$; double-walled, thermal break construction with closed-cell polyurethane foam or mineral wool insulation and no exterior and interior caulked seams
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 200-pound single-point load over 1 square foot 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) (1,200–1,800 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 Standard 52.2, high-capacity, low-pressure drop, 100% synthetic, UL 900 Class 2, rigid, extended-surface, pleated (0.24″ initial) or pocket (0.21″ initial), nonmetallic component filter units (24″ × 24″/24″ × 12″ sizes), >80%–85%, MERV 13, rated at 500 fpm, >1070 grams minimum dirt holding capacity, totally incineratable or approved equal
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	≤1.5% of total design air flow
Smoke Detector	UL/CSA-listed (low-velocity type 200–650 fpm)
AHU Test Ports	1/2″ ID port with threaded cap for each access door
AHU Variable-Speed Drive (VSD) Inverter	Any of the following: Yaskawa, Danfoss, or ABB only with integral bypass 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 continues on next page

Table 13.3 AHU Matrix (Airflow Ranges >4,000 to <10,000 cfm) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
AHU Airfoil Dampers	Low-leakage type with shaft seals
AHU Coil Piping	Gasketed casing penetrations with identification 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 A-weighted decibels (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-coded and numbered wiring between electrical components for testing and factory commissioning
Factory Acceptance Testing and Precommissioning Documentation Reports	1. Design airflow leak test ≤1.0 percent and sound test 2. Three-hour VFD ramp test
Warranty	18 months from date of shipment from factory; 12 months from startup; 8 months from completion of onsite acceptance testing
Factory Cleaning and 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

Notes:

Btu = British thermal unit.

Cal/OSHA = Division of Occupational Safety and Health.

CSA = Canadian Standards Association.

dBA = decibels.

EMT = electrical metallic tubing.

EPDM = ethylene propylene diene monomer.

fmp = feet per minute.

ft² = square feet.

hr = hour.

ID = inside diameter.

MERV = minimum efficiency reporting value.

TBD = to be determined.

TEFC = totally enclosed, fan cooled.

VFD = variable-frequency drive.

VSD = variable-speed drive.

WC = water column.

Table 13.4 AHU Matrix (Airflow Ranges 10,000 to 60,000 cfm)

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Prefilters	ASHRAE 52.2, rigid filters, 25%–30% rated >MERV 8, low-pressure drop: rated at 500 fpm: 0.08″ WC clean, 1.0″ WC dirty, >150 grams minimum dirt holding capacity
Outside Air Makeup Dampers	Low-leakage, thermal break, insulated control dampers
Preheat Coils (optional; TBD)	Copper tube / copper fins; > 0.042″/0.08″ ≥ 6 fins/inch
Preheat Coil Drain Pan (optional; TBD)	Stainless steel 304, double-sloped, no-standing-water design, >1/4″/foot minimum slope, 18-gauge construction or approved equal
Steam Humidifier Section (optional; TBD)	Stainless steel 304 grid type (DriSteem, 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 per Cal/OSHA General Industrial Safety Orders, California Code of Regulations, title 8, section 3995 et seq. (Article 41, Prime Movers and Machinery)
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 five-year warranty motorized damper motor
Cooling Coils (10 fins maximum)	Aluminum fins, coastal locations 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, >1/4″/foot 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 interlock with filter header, <3% bypass leakage at 2″ of static pressure
Postfilter Frames	No bypass air leakage filter framing system or approved equal: extruded aluminum or formed stainless steel, powder-coated painted finish, two-stage neoprene gasket edge seals, tongue and groove knife-edge interface, frame-to-filter mating joint, stainless steel mechanical filter to frame clamping device
Prefilter Media Gaskets	Closed-cell neoprene or EPDM gasket, bonded to 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 0.0769 Btu/hr/ft²/F; thermal-break construction with closed-cell polyurethane foam or mineral wool insulation and no exterior and interior caulked seams

Table 13.4 continues on next page

Table 13.4 AHU Matrix (Airflow Ranges 10,000 to 60,000 cfm) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
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 200-pound single-point load over 1 square foot 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) (1,200–1,800 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, low-pressure drop, 100% synthetic, UL 900 Class 2, rigid, extended surface, pleated (0.24″ initial) or pocket (0.21″ initial), nonmetallic component filter units (24″ × 24″/24″ × 12″ sizes) > 80%–85%, MERV 13, rated at 500 fpm, > 1070 grams minimum dirt holding capacity, totally incineratable or approved equal
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	≤ 1.0% of total design air flow
Smoke Detector	UL/CSA-listed (low-velocity type 200–650 fpm)
AHU Test Ports	1/2″ ID port with threaded cap for each access door
AHU VSD Inverter	Any of the following: Yaskawa, Danfoss, or ABB only with integral bypass 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
AHU Airfoil Dampers	Low-leakage type with shaft seals
AHU Coil Piping	Gasketed casing penetrations with identification 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

Table 13.4 continues on next page

Table 13.4 AHU Matrix (Airflow Ranges 10,000 to 60,000 cfm) *continued*

AHU COMPONENT ITEMS	MINIMUM REQUIREMENTS
Electrical Safety	Manual disconnect and emergency stop button per NEC
Electrical Controls	Install all designated interconnection color-coded and numbered wiring between electrical components for testing and factory commissioning
Factory Acceptance Testing and Precommissioning Documentation Reports	1. Design airflow leak test ≤ 1.0 percent and sound test 2. Three-hour VFD ramp test
Warranty	18 months from date of shipment from factory; 12 months from startup; 8 months from completion of onsite acceptance testing
Factory Cleaning and 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

DIVISION TWO: TECHNICAL CRITERIA

14 BUILDING SYSTEM MANAGEMENT CRITERIA

Superior Court of California, San Joaquin County
Stockton, CA
NBBJ

The criteria as outlined in this chapter shall be used in designing and selecting the building management system.

See chapter 17, Network and Communication Systems, for requirements to develop a technology program for each court building project.

The building management system device protocols and software will provide the following functions:

- Data collection
- Data archiving
- Data trending
- Calendar scheduling
- Programming and adjustment of system-functional set points
- Automatic and manual control of addressable field devices
- Access to building system flow diagrams, with navigation using graphical user interface (GUI)
- Energy management monitoring and curtailment
- Password reset
- Alarm-level notification

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 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, ventilation, and air-conditioning (HVAC) systems by a building management system (BMS), commonly referred to as a building automation system;
- Lighting, including exterior lights;
- Security (including detention locking system and duress alarms);
- Audiovisual (including closed-circuit television); and
- Court communication systems (wireless local area network, wireless cellphones, sheriff/police/fire, satellite/cable TV, telephone, broadcast, etc.).

Refer to chapter 17, Network and Communication Systems, which discusses integrated network architecture to provide a common backbone platform for the integration of multiple systems.

The means and content of information to be reported remotely shall be discussed with the Judicial Council and the project team.

14.B BUILDING MANAGEMENT SYSTEM

1. General Requirements

a. The BMS 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.

b. 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.

c. The BMS depends on local area support. Consult with the Judicial Council before determining the allowable manufacturers for each project site.

2. Minimum BMS Requirements

a. The facility local area network and device level network shall be based on industry-standard open platforms and use commonly available operation, management, and application software. All software packages and databases shall be licensed to the Judicial Council of California to allow unrestricted maintenance and operation of the BMS.

b. All products shall have a BTL (BACnet Testing Laboratories) mark certifying that the product was independently tested by a third-party testing facility and complied with Building Automation and Control Network (BACnet) conformance requirements.

c. Except for field-mounted instrumentation and devices, all BMS components shall be installed in field panels also known as temperature control panels (TCPs). Panels and enclosures shall be located only within mechanical rooms or at approved locations.

d. Power supply sources of 120 volts of alternating current shall be provided to all BMS field panel locations. The selection of normal power supply or standby power supply facilities shall be based on project- and application-specific requirements. In general, BMS panels monitoring designated building-critical alarm points shall be provided with standby power supplies. Where no standby power is available in the building, the tie-in panel shall be provided with uninterruptible power supply equipment.

e. The BMS shall incorporate hardware and software resources sufficient to meet the functional requirements of the specifications.

f. BMS installation shall use standardized iconography as part of the graphical user interface (GUI). These graphical icons shall be based on the type of equipment, must be approved by the Judicial Council at the time of system design, and shall include the following at a minimum:

  - Equipment pictorial diagrams of network component devices
  - Interactive, color-coordinated 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, such as HVAC, plumbing, heating, utilities generation, electrical, lighting, daylight harvesting, alternative energy generation, and waste processing
  - Network component device fault detection and diagnosis system data and alarm collection
  - Energy and utility consumption data collection
  - Environmental data collection
  - Optional wireless communication of disparate and nondisparate systems
  - Optional seismic response data collection

g. The BMS 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). The installation of a central processing station shall depend on building size, and this requirement shall be determined by the Judicial Council before the design proceeds.

h. The failure of a TCP shall not affect the operation of other operating TCPs. Where information in the failed TCP is used by other TCPs, the unavailability of the information shall be alarmed, and alternative control strategies shall be automatically initiated. All required logic programming and point database facilities associated with an individual system shall reside in the same TCP to which the system input/output points are terminated.

i. All nonproprietary energy management software and firmware shall be resident in field hardware and shall not depend 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.

j. The control system design shall include a cabling network that complies with Telecommunications Industry Association's TIA-862, Structured Cabling Infrastructure Standard for Intelligent Building Systems. The LAN shall be Institute of Electrical and Electronics Engineers' IEEE 802.3 Standard for Ethernet over fiber or Category 6 cable with switches and routers that support 1000BASE-T gigabit Ethernet throughput.

DIVISION TWO:
TECHNICAL CRITERIA

11 Architectural Criteria
12 Structural Criteria
13 Mechanical Criteria
14 BUILDING MANAGEMENT SYSTEM CRITERIA
14.A Objectives
14.B Building Management System
14.C Level of Integration
14.D Energy Conservation Design
14.E Design Features
15 Electrical Criteria
16 Lighting Criteria
17 Network and Communication Systems
18 Audiovisual Systems
19 Acoustical Criteria
20 Fire Protection Criteria

   k. A remote or local user, with proper username and password, shall have access to monitor or control the BMS functions via a graphical interface. Native internet browser-based user interfaces must be HTML (hypertext markup language) compliant and not require plug-ins (thin clients). The system shall be capable of supporting an unlimited number of clients using a standard Web browser.

14.C LEVEL OF INTEGRATION

a. The building management system shall not control the fire alarm, security, lighting, or court business systems. These systems shall have independent control panels and network interfaces. The BMS shall, however, be able to monitor the status of these systems in order to prompt emergency operating modes of the HVAC system.

b. 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.

c. The programming of the control system shall be performed from the facility operation center or remotely via a Web browser. Provide a field processing unit or Web server to access the system via a Web browser. Both require a password for access, and the latter shall have firewall protection.

d. Ensure that installed BMSs comply with American Society of Heating, Refrigerating and Air-Conditioning Engineers' ASHRAE Standard 135, Addendum bj, introducing BACnet/SC (Secure Connect), and the National Institute of Standards and Technology (NIST) Cybersecurity Framework.

e. The system must include the ability to log data created by user-selectable features.

f. The BMS shall have at least 25 percent spare memory capacity for future expansion.

g. All new systems shall be native protocol neutral and shall use no gateways for communication with controllers.

14.D ENERGY CONSERVATION DESIGN

ASHRAE Guideline 36, High-Performance Sequences of Operation for HVAC Systems, shall be considered when developing the sequence of operations. The HVAC control algorithms shall include optimized start/stop for equipment and shall be in accordance with the project's associated energy goals and the current California Energy Code, at a minimum.

1. Energy Measurement Instrumentation

The HVAC building control system shall have the capability to perform automatic measurement of energy consumption and to monitor performance. The BMS shall have demand-response capabilities as stipulated by the California Building Code and discussed below.

   a. Automatically adjust temperature set point by ±4 degrees Fahrenheit in noncritical zones from a central point.

   b. Return the system to its original state following a demand-response event.

   c. Provide an adjustable rate of change, and provide three operating states: Automated Demand Shed, Manual, and Disabled.

   d. Through zone-level sequences of operations, exclude courtrooms, holding cells, and judges' chambers from being affected during demand-response events.

2. Analytics

Analytics are an important element in managing the efficiency of building systems. Therefore, the following are required as part of the BMS.

a. Electrical values such as volt (V), ampere (A), kilowatt (kW), kilovolt-ampere (kVA), kilovolt-ampere reactive (kVAR), kilowatt-hour (kWh), petafarad, kilovolt-ampere reactive hour (kVARh), and frequency shall be monitored.

b. Mechanical values such as chilled water flow and pressure, hot water flow and pressure, equipment status, and equipment capacity shall be monitored, measured, and stored.

c. All control points monitored and controlled via the system shall be archived in the local microprocessor controllers and set up to frequently be archived into the central processing station for indefinite historic data retrieval, with points naming conventions that incorporate Project Haystack data tagging (as incorporated at time of writing in proposed ASHRAE Standard 223P, Designation and Classification of Semantic Tags for Building Data).

d. The collection of data shall be maintained, for trending indefinitely, locally on the central control system.

e. 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.

f. Provide trending of all points at 15-minute intervals.

g. Trended points shall be exported in a comma-separated values formatted text file and written to a shared drive at 15-minute intervals.

14.E DESIGN FEATURES

Specific control features and points will be dictated by project-specific design requirements.

a. The following general features shall be considered:

- Direct digital control drill down to zone level
- Intelligence at zone-level closed-loop controls
- Fault detection and diagnostics over and above the requirements for economizers set forth in the California Building Code
- Cascading closed loop for sequencing to minimize heating and cooling
- Cascading control loop (valve control for heating)
- Variable air volume (VAV) zone cascading control (no overlapping of heating and cooling)
- Air-handling unit controls (cascading set point reset per ASHRAE Standard 55, where applicable)

b. The following features pertaining to demand base reset control shall be considered:

- Supply temperature
- Supply pressure
- Building pressure

- Minimum outside air supply
- Reduction of supply air from VAV systems to meet (but not exceed) ventilation air levels

c. Regarding outside air control methods, accurate direct measurement (such as differential pressure or flow cross) at outside air damper/plenum assembly shall be provided.

d. Regarding CO_2 demand control, use of occupancy sensors to index occupied and unoccupied conditions shall be provided.

DIVISION TWO: TECHNICAL CRITERIA

15 ELECTRICAL CRITERIA

North Butte County Courthouse
Chico, CA
TSK Architects

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's 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

a. Designers shall use these criteria to develop the building's electrical power systems and emergency and standby electrical power systems, including emergency generator and uninterruptible power supply (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 on sound engineering principles, applicable building codes, and field experience. For renovation projects, at the schematic design phase, the designer shall identify a specific list of standards deviations that are proposed based on the existing system configurations and the extent of renovations included in the project.

b. These criteria set the minimum acceptable requirements for design and installation of electrical power systems. Although new technologies or alternative arrangements may be used, they shall not lower the level of safety prescribed by these criteria and the applicable state building codes.

c. 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 satisfy the applicable building codes.

d. The designer shall coordinate the requirements and configuration of the utility supply connections with the Judicial Council and the utility service providers to determine voltage, service redundancy, and other facility service criteria.

15.B ELECTRICAL CRITERIA

1. 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 minimum load power densities provided in the table. The lighting power densities shall not exceed the current California Energy Code.

a. Regarding 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.

b. The spare positions shall be complete, with full-length bus and hardware for future breaker installation. The designer shall demonstrate at the turnover of 100 percent of the construction documents that the required spare capacity and spaces have been preserved. The spare capacity shall also be provided at each of the following system elements:

- Distribution transformers
- Distribution bus risers
- Distribution feeders and breakers

c. 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 amps and

Table 15.1 Minimum Load Power Requirements

AREA	LIGHTING (VA/SF)	RECEPTACLES (VA/SF)
Courtrooms	0.9	2.0
Holding Detention	0.9	2.0
Offices	0.5	3.0
Conference Rooms	0.7	2.0
Public Circulation	0.5	0.5
Toilet Rooms/Locker Rooms	0.4	0.5
Storage/File Rooms	0.4	0.5
Loading	0.5	1.0
Kitchens (grab-and-go)	0.9	10.0
Dining	0.4	0.5
Main Distribution Frame (MDF) Rooms	0.4	100.0
Intermediate Distribution Frame (IDF) Rooms	0.4	75.0
Support/Back of House	0.4	0.5
Parking	0.25	0.1
Judge’s Chambers	0.6	2.0
Motorized File	0.4	20.0
Security Operations Center	0.6	50.0
Jury Deliberation Rooms	0.65	2.0

VA/SF = volt-ampere per square foot.

Table 15.2 Spare Capacity Requirements

EQUIPMENT	SPARE LOAD CAPACITY	BREAKER SPARES	BREAKER SPACES
Main Switchboards	15%		25%
Distribution Panelboards & Motor Control Centers	15%		25%
Panelboards	20%	10%	15%

higher, include floor space for one additional switchboard section. All switchboards shall have full-sized horizontal bussing to allow for additional sections to be added.

d. Where panelboards are mounted recessed flush in a wall, maintain fire integrity of the wall. Provide one empty 3/4″ electrical metallic tubing (EMT) conduit stubbed up into nearest accessible ceiling location for every three spare or space positions.

e. The distribution transformers feeding receptacle power for office areas shall be K-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 150 percent rated ampacity of the phase conductor.

f. Full-sized neutral conductors shall be used throughout the project for three-phase (3 PH), four-wire (4W) service, power, and lighting feeders.

g. True root-mean-square meters shall be used wherever meters are specified on switchgear and distribution boards.

h. Separate electrical panels and metering may be required for noncourt occupancies in the facility, including but not limited to rooftop communication systems. Review with the Judicial Council to establish specific project requirements. Provide meters for each load group and floor, including, at a minimum:

- Total electrical consumption (Main);
- Exterior lighting;
- Interior lighting on a per-floor basis;
- Receptacle loads on a per-floor basis;
- Vertical transportation;
- Heating, ventilation, and air-conditioning (HVAC) equipment;
- Plumbing equipment; and
- Information technology (IT) rooms.

i. 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 the Judicial Council.

j. Fire-rated poke-through floor outlets may be used only where ceilings below are accessible and the occupancies below are not compromised by the installation of conduit in the ceiling space. Where poke-through outlets are used, minimize conduits and cables in the ceiling space below by using the nearest partition to return the conduits and cables to the ceiling of the floor supplied. In-slab floor boxes may be used for limited areas where interior layouts are not subject to change, such as main lobbies, courtrooms, weapons-screening areas, large training rooms, or other similar locations.

k. 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.

l. Switchboards, distribution panels, transformers, disconnects, and branch circuit panelboards throughout the building shall be of commercial grade and manufactured by one manufacturer.

m. All panelboards shall include door-in-door trim and copper bus. All outdoor equipment enclosures shall be National Electrical Manufacturers Association (NEMA) 3R or 4X, depending on the application.

n. All electric motors above 1/2 horsepower shall be three-phase, where available. This requirement shall be coordinated across the project with other disciplines.

o. Regarding wiring devices, all power receptacles and switches for general-purpose circuits shall be NEMA specification grade, manufactured by one manufacturer, and rated for specific environment and application. Outlets served from an emergency or standby power system shall be red.

p. All floor- or pad-mounted equipment such as motor control centers and transformers shall be provided with aluminum bus. Indoor equipment shall be installed on a minimum 4″ high concrete housekeeping pad; outdoor locations shall be installed on a minimum 6″ housekeeping pad. Confirm pad requirements with serving utility company.

q. The design shall include equal distribution of load on each phase for the feeders, balanced within 15 percent between phases, documented with submission of 100 percent of the construction documents.

r. The criteria for the systems named in the following chapters of the Facilities Standards are specified in those chapters.

  - Chapter 4, Courthouse Security
  - Chapter 13, Mechanical Criteria
  - Chapter 16, Lighting Criteria
  - Chapter 17, Network and Communication Systems
  - Chapter 18, Audiovisual Systems
  - Chapter 20, Fire Protection Criteria

2. Harmonics

The engineer shall provide a study to determine the level of harmonics and account for the harmonics in the design of transformers, feeders, and branch circuits. Consideration shall be given to computer and/or digital equipment, variable-frequency drives, and elevators.

3. Conductors

The following types of conductors shall be specified based on each one’s application.

a. All wire, cable, and equipment shall be new.

b. All wire #8 and larger shall be stranded copper or aluminum.

c. All wire #10 and smaller shall be solid copper.

d. All wire and cable for secondary power distribution shall be 600-volt insulated THHN (thermoplastic high-heat-resistant nylon-coated) or THWN (thermoplastic heat- and water-resistant nylon-coated) for #8 and smaller. THWN, THHN, and XHHW (cross-linked polyethylene, high-heat resistance, water resistance) should be used for #6 and larger and for wet, underground, and exterior locations. RHH (rubber-insulated, high-heat resistant) or THHN 90 degrees Celsius standard should be used for fixture wire and circuit runs within fixtures.

e. All wire shall be color-coded throughout. The system conductors shall be identified as to phase connections by means of color-impregnated insulation.

f. Power and lighting branch circuits shall be specified not less than #12 AWG (American Wire Gauge).

g. Signal and control circuits shall be specified not less than #14 AWG.

h. The cabling for fire alarm, security, telecommunications, and audiovisual (AV) systems shall be specified in accordance with the respective section requirements.

i. Specify that the cable ducts for power are not shared with data and communication systems.

j. All bus ducts shall be aluminum.

4. Conduits

The following shall be specified as a minimum requirement for conduits.

a. Minimum acceptable EMT conduit size shall be 3/4″ diameter, except for short runs to a single outlet and for single fixtures, which may be 1/2″.

b. For indoor locations subject to physical damage, use rigid steel or intermediate metal conduit with zinc coating inside and out with hot-dipped galvanizing and conforming to American National Standards Institute’s ANSI C80.1 and Underwriters Laboratories (UL). Couplings and unions shall be electroplated steel, threaded type.

c. For interior spaces in dry locations, use cold-rolled steel EMT tubing with enamel coating inside and zinc coating outside and galvanized steel fittings. Steel-armored metal-clad (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 home runs.

d. Underground electrical service and underground distribution shall be polyvinyl chloride (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.

e. In wet and outdoor locations, specify cadmium-plated cast malleable iron liquid-tight fittings with insulated throat.

f. 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.

5. Quality Assurance

a. All materials, devices, and equipment shall be commercial grade, new, and UL listed.

b. The electrical system design shall be in conformance with the applicable codes and standards and the requirements of these criteria.

c. Certain material, equipment, apparatus, or other products may be specified by manufacturer’s brand name, type, or catalog number. In such cases, the designated product shall meet the established standards for quality, style, utility, and performance.

d. The main switchboard, distribution panels, transformers, disconnects, and branch circuit panelboards shall be manufactured to commercial-grade specifications by a manufacturer with a minimum of 10 years' experience in the manufacture of such equipment.

6. Electric Distribution Studies

In addition to the electrical load and short circuit studies required by the codes, each project shall include electrical coordination and arc flash risk analysis studies to confirm compliance with codes and building operational requirements.

7. Identification

The 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 junction boxes using industry-standard materials and methods.

Electrical light fixtures and convenience outlets on emergency power circuits shall be identified with a system of unique identification. The identification tags shall be applied on location and be easily identifiable and uniformly applied throughout the building. Receptacles shall be labeled with panel and circuit number.

8. 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.

9. Power Distribution System

a. For new facilities, a three-phase, four-wire power service shall be delivered to the building via utility transformers that are located in a vault or pad mounted. The voltage shall be 277/480 volts (V) or 120/208V, depending on square footage and equipment needs. The location of the transformer shall be properly coordinated with the local utility company. The designer shall coordinate with the utility company on proper sizing of the service based on load calculations and including 15 percent spare capacity for future growth.

b. Branch circuit panelboards will be located throughout the facility. The panels will be fed from breakers in the main switchboard or from distribution panelboards. Dry-type step-down transformers will be provided where required, which will in turn feed 120/208V 3 PH 4W distribution-type panelboards or distribution panels. Provide K-rated transformers as required. 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 or 208V 3 PH from the new main switchboards and distribution boards.

c. Lighting fixtures will be connected to 20 amp, single-pole circuit breakers in lighting branch circuit panelboards.

d. Convenience and special power receptacles will be provided as required throughout the facility. Convenience receptacles and miscellaneous loads will be connected to 120/208V 3 PH 4W branch circuit panelboards.

e. 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.

f. 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.

g. For surge protective devices, a transient voltage surge suppressor (TVSS) will be provided at the main switchboard. 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 and all emergency equipment per California Electrical Code (CEC) article 700.

10. Grounding System

a. A complete grounding system shall be provided per National Fire Protection Association (NFPA) 70 (National Electrical Code) and the California Electrical Code. The electrical system shall be grounded to a common building grounding system, which uses grounding to building steel, building cold-water pipes, and concrete-encased electrode. Grounding to cold-water pipes shall be only 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.

b. 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.

c. Provide a copper main ground bus in the main switchboard room and connect to the building grounding electrode system. Provide a grounding riser in the building with a 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.

d. Telecommunications equipment rooms shall be grounded per the requirements of chapter 17, Network and Communication Systems. The telecommunications grounding system shall be connected to the main ground bus.

e. For existing buildings, the grounding shall tie back to the nearest building grounding electrode system, including the building steel and building cold-water pipes.

f. Specify grounding grid for raised-floor computer rooms. Within the room, bond all metallic pipes, conduits, and steel equipment housings to the grounding grid.

g. Each project shall be evaluated for the requirements of a lightning protection system. The risk assessment shall follow NFPA 780, Annex L.

15.C EMERGENCY AND STANDBY POWER SYSTEMS

1. General Requirements

a. The need for and capacity of the emergency and standby power system shall be carefully evaluated, based on the code requirements, project size, and location. The purpose of an emergency and standby power system is to provide safe evacuation of the court building and to allow for the orderly shutdown of building systems as required by the California Building Code (CBC). Emergency and standby power will not be provided for any other purpose without prior approval of the Judicial Council. 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, but only with prior approval of the Judicial Council.

b. Each project shall undergo an evaluation 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.
- Fuel storage capacity to meet code requirements and site accessibility for refueling.
- Statement of the impacts of utility power loss.
- Identification of the specific systems and loads for support, and categorization by requirements (code, function, etc.). Include backup time required for fuel/battery design.
- Review of appropriate generator or battery systems that best meet code requirements.

c. Electrical generators to supply emergency power and standby power are to be provided only where the electrical loads can be demonstrated to be best accommodated by a generator set and as required by code. Factors to be considered include locations with a history of significant outage occurrences or sustained periods of power interruptions. The duration of emergency power supply shall be determined by the building and fire codes. 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.

2. Emergency Generators

2.1 Requirements Based on California Electrical Code

a. The following requirements shall be considered as minimum criteria. In all cases, the requirements of the code and the authority having jurisdiction, including but not limited to the Office of the State Fire Marshal, shall govern the system provisions.

b. On projects where it is determined that an emergency generator is required to serve the courthouse buildings, the loads identified in items 1 and 2 below and any other code requirements will be designed to be supported by that generator. Per the CEC, the emergency/standby system includes three branches: code-required emergency loads, legally required standby, and optional standby (noncode emergency loads). Provide a minimum of three automatic transfer switches, one for each branch. The breaker serving the automatic transfer switches on the emergency and/or standby side shall be in separate vertical sections, per the CEC. The distribution for these branches shall be separate, as well. Loads shall be segregated as follows:

Emergency Systems: Systems that are legally required for automatic illumination or power for safe exiting and panic control in buildings essential for safety to human life (as defined by CEC article 700, California Fire Code [CFC] chapter 12, NFPA 110, and NFPA 111), such as:

- Fire pumps
- Egress path lighting and exit signs
- Fire alarm and life-safety systems (including emergency voice alarms)
- Doors and locks for cells

Legally Required Standby Systems: Systems that are required to avoid interruptions to fire-fighting operations (as defined by CEC article 701, CFC chapter 12, NFPA 110, and NFPA 111) or other systems that ensure safety or facilitate rescue, such as:

- Elevator systems (if elevators are required to be on the generator)
    - Elevators
    - Elevator machine room ventilation
    - Elevator cab lighting
    - Elevator hoistway lighting
    - Elevator recall power
- Communication systems
- Security systems
- Emergency responder radio coverage
- Horizontal sliding doors, if part of egress path
- The smoke control system, including all fans and motors associated with the system

Optional Standby Systems: Systems intended to supply power where life safety does not depend on the performance of the system (as defined by CEC article 702), provided only with prior approval by the Judicial Council.

2.2 General Requirements for Emergency Generators

Early in the project, the design team shall define what building systems have emergency and standby power and monitor any changes that would increase the size of the emergency and standby power system. Other important considerations and directives follow.

a. Check generator fuel storage amounts and occupancy classifications against California Fire Code, California Building Code, NFPA 30, NFPA 37, and NFPA 110.

b. Identify the minimum and maximum size of the fuel tank. Include the setback requirements per NFPA 30.

c. No foreign systems should be installed in generator room per NFPA 110.

d. Combustion air and cooling intake should not be installed through rated partitions.

e. Address temperature exhaust running through load bank. Address general cooling—and heating, if required—of the generator room.

f. Confirm that flue is installed in rated shaft. Confirm three-hour rated enclosure, including deck, per NFPA 37.

g. Confirm access for installation and maintenance. Confirm that the Emergency Power Off switch is located outside generator room.

h. Recommend placing generator in an acoustically designed exterior enclosure.

i. Provide connection from the generator to the fire alarm system for monitoring.

j. Provide connection from the generator to the building management system (BMS) for monitoring, per 15.C.4, Building Management System Interface.

2.3 Detailed Requirements for Emergency Generators

For projects where an emergency generator is provided, the following requirements shall be met.

a. The automatic emergency power system shall consist of a 120/208V or 277/480V 3 PH 4W generator set, water-cooled radiator type. The engine generator set shall be located indoors, or at grade. Exterior generator sets shall be provided with a lock-secured, alarmed, weatherproof, sound-attenuating enclosure to meet the acoustical requirements of the site.

b. Provide fuel vent calculations per NFPA 30 and exhaust vent calculations per the California Mechanical Code (CMC).

c. Exterior enclosures shall be secure under lock and have emergency power service and emergency lighting. Provide excess buffer space around main electrical gear from building components to allow a flexible installation, and provide adequate space for future replacements and maintenance. Provide phone data lines for remote metering and a status panel for remote locations.

d. Automatic transfer switches shall be provided. Provide open transition between normal and emergency positions, or as directed by the local utility provider.

e. Fuel sources shall be evaluated based on all pertinent criteria. If a diesel engine is selected, it shall be provided with an integral base-mounted day tank. The following other possible fuel sources shall be considered:

  - Dual fuel with a natural gas connection and a local liquid propane gas tank.
  - Bi-fuel generator using diesel for starting and then running on natural gas.

f. Specify engine-mounted critical-type exhaust muffler and double contained integral-type fuel oil day tank with fuel-leak detection system.

g. Diesel generator exhaust shall be carefully located to prevent entry of fumes into building HVAC system and building openings, per CMC.

h. Provide a load bank for the generator sized for 30 percent of generator capacity. The load bank may be shared with a centralized UPS, provided that the load bank is stationary (not generator mounted).

i. Fuel oil storage tank shall be above grade, with proper filling and monitoring systems. The day tank shall be of the manufacturer's standard size, based on the generator capacity. Installation of a fuel-leak detection system is required.

j. Emergency generator shall be located a minimum of 50′ away from primary electrical source.

k. The following areas in the building shall have emergency and/or standby lighting on the emergency and/or standby power source, as a minimum (refer to the CBC, CEC, and CFC):

  - Detention areas, custody areas, and sally port
  - Exit signage
  - Exit corridors and stairwells

- Assembly rooms, such as courtrooms
- IT/AV equipment rooms (MDF, IDF, etc.)
- Generator, electrical, mechanical, and elevator equipment rooms, and exterior generator enclosures
- Security and detention control equipment locations (security operations center, detention control room)

l. Emergency and/or standby power shall be provided for holding areas in accordance with California Building Code.

2.4 Spare Capacity

All electrical panels fed from emergency and/or standby sources shall be adequately sized to power the building emergency and standby loads, in addition to providing the spare capacity listed in table 15.2.

2.5 Temporary Generator

Per the California Electrical Code, when a building is provided with a permanently installed emergency generator, a connection for a temporary generator with capacity to support emergency loads is required. This requirement allows permanent generators to be taken offline for maintenance without disruption to the power supply. The temporary generator connection point shall be increased in capacity to provide for normal building operations per the following requirements. The system shall also incorporate load shed so that nonemergency loads can be shed, if necessary.

a. The temporary generator connection shall be large enough to distribute power sufficient for normal building operations.

b. Electrical distribution shall be increased to allow for the temporary generator to connect to the main switchboard via a manual transfer switch, interlocked breaker, or automatic transfer switch, as directed by the Judicial Council Facility Operations.

3. Uninterruptible Power Supply

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. The areas served by the UPS shall include, but are not limited to:

- Security operations center, main and secondary equipment locations, including cameras and communication systems;
- Computer servers (MDF, IDF, BMS); and
- Telephone switches.

UPS shall not be connected to generator power. Following are the detailed requirements for UPS, when provided.

a. Any UPSs shall be provided per NFPA 111.

b. UPSs shall be small, localized, rack-mounted units to serve individual racks or equipment. In a larger facility, one or more centralized UPSs may be appropriate. During the project's schematic design phase, a review shall be provided of the projected UPS loads along with their locations and supporting functions to determine the optimal

UPS system solution for the facility. In the study, the required battery backup time shall be confirmed, taking into consideration outage scenarios and the availability of onsite generators.

c. The design team shall define early in the project what is included in the UPS and control the scope creep; identify amperage, voltage, and run time of the UPS; and confirm who is responsible for design and construction of the UPS in the contract.

d. UPS for the data processing equipment shall include rectifier/battery charger, solid-state inverter, static bypass transfer switch, maintenance-free batteries sized for 90 minutes, and synchronized circuitry. External maintenance bypass switches shall be provided.

e. Coordination shall be included for the UPS and generator systems to address capacity and compatibility and code requirements.

f. 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.

4. Building Management System Interface

a. Coordinate with the BMS to control, monitor, alarm, and data log the following electrical power information at a minimum:

- Building normal and emergency power consumption and demand.
- Load types by system.

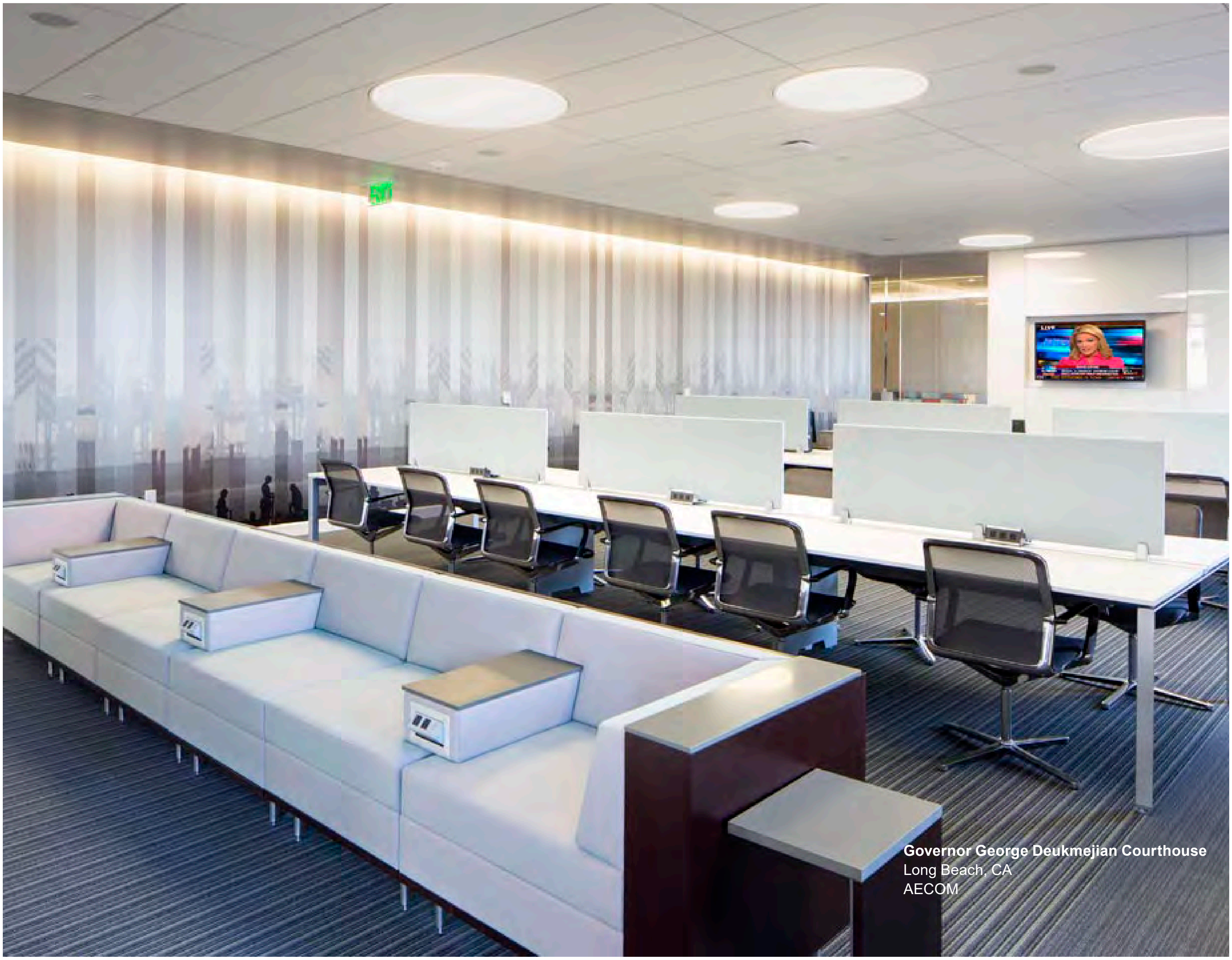
b. Coordinate with the BMS to provide system monitoring for the following electrical systems:

- Emergency generator alarms, including but not limited to engine-trouble, low-fuel, fuel-leak, low-voltage, and loss-of-phase alarms.
- UPS alarms, including but not limited to load-on-battery, load-on-bypass, high-temperature, and UPS emergency-power-off alarms.
- Fire alarms, including supervisory and trouble signals.

c. Coordinate with the BMS to provide an interface for lighting controls, including interior and exterior lighting.

DIVISION TWO: TECHNICAL CRITERIA

16 LIGHTING CRITERIA



Governor George Deukmejian Courthouse
Long Beach, CA
AECOM

Designers are encouraged to minimize types of light fixtures and replacement bulbs.

This chapter defines the general and technical criteria for lighting systems and encompasses recommendations for best practices, energy efficiency, sustainability, and creation of 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 modern and appropriate technology. Daylight in occupied spaces is desirable but must be carefully controlled to avoid glare and minimize heat gain. In security-sensitive spaces, minimize views into the space from outside the building. Direct sunlight penetration into functional court spaces shall be avoided to prevent high light and shadow contrast and glare.

16.B LIGHTING CRITERIA

1. General

a. Refer to tables 16.1 and 16.2 for recommended illuminance levels.

b. Lighting designs shall meet the power density requirements of the current California Energy Code (Cal. Code Regs., tit. 24, pt. 6).

c. Lighting-level calculations (for normal and emergency settings) shall be provided by the designer at the end of the design development phase. Calculations shall include all interior spaces and all exterior areas within the project boundaries.

2. Reflectance Values

Indirect or direct and indirect lighting systems shall be the preferred system. The reflectance of surrounding surfaces greatly affects the quality of the lighting system and energy-efficiency levels. Surrounding surface reflectance values shall comply with criteria noted in table 16.3.

3. Light Engine Performance Requirements

Refer to table 16.4 for lighting systems light-emitting diode (LED) performance requirements.

4. Light Engine Selection

a. Lighting systems shall be primarily solid-state lighting, such as LED lamps, to maximize energy efficiency and minimize maintenance.

b. Preference should be given to LED fixtures with replaceable drivers, to aid long-term maintenance and serviceability.

c. Maintenance of such systems shall be discussed during the design process to ensure longevity of the installed system.

d. Renovated facilities shall develop a plan to phase out and upgrade current mercury-containing fluorescent lamps to LED technology.

e. Fluorescent, incandescent, halogen, induction, and high- and low-pressure sodium sources shall not be used unless required by local or city ordinances. Mercury vapor sources shall not be used.

f. Design lighting and controls to accommodate videoconferencing where programmed in courtrooms, conference rooms, chambers, or mediation areas.

Table 16.1 Recommended Interior Illuminance Levels

SPACE DESCRIPTION[*]	RECOMMENDED HORIZONTAL ILLUMINATION LEVEL (FC)[†]	RECOMMENDED VERTICAL ILLUMINATION LEVEL (FC)[‡]	OTHER CONSIDERATIONS
Courtrooms			
Judge’s Bench	45–55	19	Additional task lighting may be desirable from ceiling.
Clerk’s Desk	45–55	19	Additional task lighting may be desirable from ceiling.
Spectator Seating	15–25	5	
Litigant’s Table	45–55	19	Additional task lighting may be desirable from ceiling.
Podium	45–55	19	Additional adjustable task lighting is recommended.
Witness Chair	30–40	14	
Offices			
Intensive VDT use offices	30–40	—	Additional task lighting may be desirable.
Intermittent VDT use offices	45–55	—	Additional task lighting may be desirable.
Other Areas			
Conference Rooms	30–40	7–28	
Jury Assembly Areas	10–30	5–19	Provide multiple levels of light for various room functions.
Waiting Areas/Lounges/ Cafés	10	—	
High-Density Files	—	7–19	Provide vertical illumination to within 30″ of the floor.
Public and Private Circulation	15–20	—	
Staff Circulation	5–10	—	
Public Lobbies	15–20	—	
Holding Areas	25–35	5–9	
Restrooms	10–20	3–19	
Mechanical/Plumbing Rooms	10	—	
Electrical/Audiovisual (AV)/ Telecom Rooms	50	—	

* For areas not listed, refer to the latest edition of the Illuminating Engineering Society (IES) *Lighting Handbook* for light-level guidelines. Because the IES *Lighting Handbook* may be updated periodically, if the latest edition recommends light levels other than what are suggested in these standards, designers shall notify the Judicial Council for review and approval of proposed target light levels per project.

† FC = foot-candles. Value ranges are for average general illumination at work-plane height, unless noted otherwise. Task illumination requirements are higher.

‡ Value ranges are for average illumination at facial height, unless otherwise noted.

VDT = visual display terminal.

Table 16.2 Recommended Exterior Illuminance Levels

SPACE DESCRIPTION*	RECOMMENDED MINIMUM HORIZONTAL ILLUMINATION LEVEL (FC)†	RECOMMENDED MINIMUM VERTICAL ILLUMINATION LEVEL (FC)‡	OTHER CONSIDERATIONS
Parking Areas			
Parking Garage—General	1.0	0.5	
Parking Garage—Ramps	1.0	0.5	Daytime minimum horizontal is 2.0 FC. Daytime minimum vertical is 1.0 FC.
Parking Garage—Entrance	1.0	0.5	Daytime minimum horizontal is 50 FC. Daytime minimum vertical is 25 FC. Daytime light level may include daylight.
Parking Garage—Stairways	2.0	1.0	
Open Parking Lots	0.5 (asphalt) 1.0 (concrete)	0.25	Provide 15:1 maximum-to-minimum uniformity ratio.

Other Exterior Areas			
Active Building Entries	5.0 Average	3.0	
Inactive Building Entries	3.0 Average	3.0	
Pedestrian Pathways	1.0	0.3–0.65	
Stairways	1.0	0.3–0.60	

* For areas not listed, refer to the latest edition of the Illuminating Engineering Society (IES) *Lighting Handbook* for light-level guidelines. Because the IES *Lighting Handbook* may be updated periodically, if the latest edition recommends light levels other than what are suggested in these standards, designers shall notify the Judicial Council for review and approval of proposed target light levels per project.

† Value ranges are for average general illumination at work-plane height, unless noted otherwise. All exterior target light levels are to be determined per project based on security equipment, local ordinances (if any), and emergency egress requirements.

‡ 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	Reflectance shall be approximately 20%.

Table 16.4 Lighting Systems LED Performance Requirements

	INTERIOR	EXTERIOR
Fidelity Index (R_f)	>78	>70
Gamut Index (R_g)	$92 > R_g > 118$	$89 > R_g > 100$
Minimum Fidelity Red (R9) Value	30	20
Minimum Efficacy	75 lumens per watt	100 lumens per watt
Minimum L70 Lifetime (extrapolated)	80,000 hours	100,000 hours
MacAdam Ellipse	Maximum three-step MacAdam ellipse variation throughout listed life (L70).	Maximum four-step MacAdam ellipse variation throughout listed life (L70).
Legacy Color Rendering Index (CRI); Minimum Average CRI Value (R_a)	80	70

Each project design team shall develop a luminaire specification that uses the least number of types 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.

g. Illuminated exit signs shall utilize LED lamp technology and shall use less than 5 watts of electricity.

5. Luminaire Selection

Custom-designed luminaires are not permitted. Luminaires shall be selected off-the-shelf on the basis of maintaining a 25-year life cycle with the facility. Luminaires shall be evaluated on the basis of effectiveness and long-term life cycle costs, especially for characteristics and components that ensure longevity and quality, not just lowest first costs.

6. Visual Criteria

Luminaires shall be selected and located to minimize direct or reflected glare. When multiple luminaires are specified, the specifier shall ensure that the luminaires meet equivalent performance standards.

7. Energy-Efficiency Criteria

The most efficient luminaires that provide visual comfort necessary for the activity shall be used. Refer to l.D, Sustainable Design, for additional information.

8. Maintenance Criteria

Lighting maintenance (including but not limited to component replacement) 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 luminaire assemblies for driver and array replacement (do not use or locate luminaires such that they require special lifts or overly specialized equipment to access them);
- Removable shielding devices with cables or chains to hold the device to the luminaire during relamping; and
- LED fixtures that have a replaceable driver, when that option is available.

16.C LIGHTING STRATEGIES

The following requirements address various spaces in and around the facility.

1. Exterior Lighting

The primary purpose of exterior lighting is to provide safety and security for those entering and exiting the building outside of daylight hours.

a. Exterior lighting shall be compatible with security cameras used on the site. Typically, a uniformity ratio of 4:1 shall be achieved, with well-shielded luminaires out of view of cameras. Lighting levels do not need to be high if the light source is of good color quality, uniformity is high, and glare is minimized.

b. Lighting levels shall be determined for each project based on camera technology and local site requirements. (See table 16.2, Recommended Exterior Illuminance Levels.)

c. Exterior lighting shall not contribute to light pollution or trespass by emitting light beyond the property. Minimize glare and unwanted light for neighbors. The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for Building Design and Construction (Sustainable Sites credit category: Light Pollution Reduction) shall be used as a guideline for developing the exterior lighting plan, as shall the code-required light pollution reduction measures in the California Green Building

Standards Code (CALGreen; Cal. Code Regs., tit. 24, pt. 11). Designers should consider specifying LED light fixtures compliant with the International Dark-Sky Association requirements—specifically, a correlated color temperature of 3,000 kelvin.

d. Outdoor lighting shall have photo sensors or an astronomical time clock for control. Exterior luminaires should be specified to minimize the opportunity for vandalism. For example, in-grade landscape lighting with vandal-resistant hardware is preferred over above-grade adjustable landscape accent lights.

e. Light bollards are not recommended because of potential damage and maintenance issues.

f. Light fixtures shall be provided for all flagpoles.

g. Designers shall use LED sources in parking lot luminaires.

h. Exterior lighting levels shall be reduced rather than turned off during nighttime hours of inactive periods in compliance with CALGreen. Lighting required for emergency lighting or nighttime security shall be exempt.

2. Security Lighting

a. 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. Color rendition for security needs shall be improved by specifying LED fixtures that have been successfully evaluated to have as a minimum fidelity index and skin fidelity index of at least 90, as tested by the methodology defined in American National Standards Institute and Illuminating Engineering Society's ANSI/IES TM-30-18, *IES Method for Evaluating Light Source Color Rendition*.

b. In larger facilities with a centralized lighting control system, provide means within the security operations center to manually override the reduced level of exterior lighting for security purposes.

c. Provide a comprehensive nighttime security lighting scheme—to be discussed with the Judicial Council's Emergency Planning and Security Coordination unit and coordinated with the architectural design team—to satisfy both security needs and the architectural design intent establishing the nighttime civic presence of the facility.

3. Emergency Lighting

a. To maximize energy savings, designers may consider providing means to turn off emergency lighting after hours via Underwriters Laboratories' UL 924–listed bypass relay or similar means, while still allowing the emergency lighting to activate during loss of normal power. Coordinate after-hours switching with Judicial Council security requirements.

b. Provide integral battery packs or connection to an uninterruptible power source for select lights in the vicinity of the generator, within the generator enclosure. Provide emergency lighting as required in chapter 15, Electrical Criteria.

c. Coordinate all emergency egress lighting with current State Fire Marshal requirements. Comply with NFPA (National Fire Protection Association) 101, Life Safety Code, for illumination in stairwells.

d. Locate the Federal Aviation Administration (FAA) lighting controls status panel in a 24/7 area. Plan for temporary FAA lighting and permitting when the building tops out. Confirm grounding and lightning protection. Confirm that FAA lighting is on emergency power.

4. Courtroom Lighting

a. Facial feature modeling is very important in the courtroom, except in the spectator area. Therefore:

- Use a combination of direct and indirect lighting;
- Avoid harsh shadows, whether from electric light or daylight;
- Minimize direct and reflected glare; and
- Avoid trendy fixtures or materials; instead, use durable luminaires.

b. Audiovisual (AV) presentations are common in courtrooms. Lighting must be flexible enough to allow for dimmed ambient light levels, with sufficient light for note taking. Lighting directly in front of a projection or video display shall be capable of being switched off for evidence display. For courtrooms with flat-screen monitors, ensure that light sources do not obscure the screen image. Provide multiple levels of switched and continuous dimming in all courtrooms. Do not combine lighting scene controls with AV system controls.

c. Diffused daylight (without direct sunlight penetration) is desirable but may not be possible in all spaces. Where daylight is available, provide mechanical shading devices capable of darkening but not blacking out the room. Because a direct view into the courtroom is a security concern, provide daylight by clerestories or skylights only, or provide fixed louvers or baffles that prevent unwanted angles of view from exterior locations. Do not use diffusing glass below 8′ above finished floor for any glazing that can receive direct sunlight during any hours of courtroom occupancy. All exterior glazing into a courtroom is generally required to be bullet resistant for security, so daylight into courtrooms should be carefully evaluated against project budget constraints. Where daylight is unavailable, supplement general illumination with other wall lighting such as wall washers or sconces.

5. Lighting for General Open Areas and Private Offices

Office ceilings shall be suitable for indirect lighting or both direct and indirect lighting. As with other spaces, minimizing glare and maximizing luminaire efficiency are key considerations. Where the California Energy Code requires additional controls for daylight zones, dimming is preferred to multilevel switching or stepped dimming.

6. Lighting of Judges’ Chambers

Judges’ chambers have the same general illumination requirements as other offices. The chambers typically have several task areas. Provide supplementary dimmable overhead task lighting at the conference table.

7. Lobby Lighting

Lobby shape, size, and finishes vary at each facility. Select the most efficient source with good shielding to reduce glare. Luminaires shall be located at a reasonable height for easy maintenance, without the need to use scissor lifts.

8. Circulation Lighting

Circulation areas shall have even, diffuse illumination for wayfinding. Luminaire selection and location shall be coordinated with directional signage. Limited accent lighting may be used to assist in wayfinding.

Exit-stair lighting shall incorporate the use of luminaires with integral ultrasonic occupancy sensors for energy savings. Each project shall verify with the California State Fire Marshal the specific control scheme acceptable with regard to egress illumination.

9. Holding Area Lighting

For holding areas, select security-rated luminaires 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.)

10. High-Density File Lighting

Each row of file stacks shall have illumination from luminaires designed to provide high levels of uniform vertical illumination in a narrow space.

11. 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, from luminaires, reflections that can reduce visibility and the ability to view facial expressions and intent. Minimize reflections by limiting light output to horizontal work surfaces and using luminaires with a low surface brightness. A glass or acrylic barrier that is intersected by an 18″ or greater soffit at the ceiling will help reduce reflections. Lighting layouts that are identical on both sides of the glazed material can also minimize reflections. Indirect or direct and indirect lighting shall be avoided under these conditions, because the bright ceiling will be a source of reflected glare in the clear security barrier.

12. Restroom Lighting

Lighting at mirrors shall be sufficient to see without creating facial shadows. Select lighting positions in front of the user, such as cove lighting, sconces, or over-mirror lighting. 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.)

13. Service Area Lighting

Lighting for electrical and mechanical rooms, main distribution frame rooms, intermediate distribution frame rooms, janitor closets, and related areas shall consist of LED striplights with drop lenses, providing at least 5 percent up-light. Bare diode striplights shall not be used.

14. 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.

16.D LIGHTING CONTROLS

1. General

a. Lighting controls shall meet the requirements of the California Energy Code (Cal. Code Regs., tit. 24, pt. 6). Courtrooms typically have multiple zones of control. Use 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 wall box switches or 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.

b. Integrated AV/lighting touchscreen controls shall not be used. Wall-mounted lighting control modules shall be provided. AV and lighting controls shall be designed to function independently. Where provided, a graphical user interface (GUI) shall be dedicated to the audiovisual system only. The GUI shall not be used to control any other system, such as the lighting system or the building management system (BMS).

c. Courtrooms, jury assembly rooms, large training rooms, and the security operations center shall have dimmable lighting unless otherwise directed by the Judicial Council.

d. Occupancy controls that provide vacancy sensing are required in most spaces such that lights within a space are turned on manually and then turned off automatically when the room is vacant.

e. 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.

f. Interface between the centralized lighting control system and the BMS is required. See chapter 14, Building Management System Criteria, for more information.

2. Daylighting

a. Daylight-responsive (daylight-harvesting) controls shall meet the minimum criteria established by the California Energy Code (Cal. Code Regs., tit. 24, pt. 6).

b. In spaces with natural light, luminaires located in the daylighted area shall be zoned separately from other luminaires.

c. Unless it can be demonstrated that daylight illumination is insufficient between the vernal equinox (typically March 20) and the autumnal equinox (typically September 22 or 23), provide daylight harvesting controls. All luminaires connected to the daylight harvesting system shall use continuous dimming drivers.

d. Low-end trim for dimming shall be between 1 and 10 percent; daylighting systems shall not turn luminaires completely off.

e. Photosensors shall be filtered or calibrated to respond only to light in the visual range (no ultraviolet or infrared light) 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 measured light level. For example, if the electric lights alone provide 30 foot-candles (FC), the luminaires shall not start to dim until the combined daylight and electric light reach or exceed 45 FC (30 × 1.5).

3. 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 control 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 of their products.

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, photocells, photosensors, and dimming systems that provide proper controls. Basic services shall include staff training for systems operation and troubleshooting.

DIVISION TWO: TECHNICAL CRITERIA

17 NETWORK AND COMMUNICATION SYSTEMS

Superior Court of California, Yolo County
Woodland, CA

Effective technology systems are essential for daily courthouse operations. A technology program is required to be developed along with the architectural program. The designers, Judicial Council, and court advisory team shall determine what is to be provided throughout the court building.

17.A GENERAL OVERVIEW

1. Introduction

This chapter covers the requirements for network communication system and other communication systems within courthouse buildings. Simply defined, a network communication system is the convergence of building technologies over a network architecture and shared physical layer that support the transport of Internet Protocol (IP)-based communications signals. This best practice has been made possible by ever-increasing bandwidths and numerous refinements in networking transmission techniques, allowing information to be transported using Ethernet interfaces and IP-based technologies.

The purpose of the network communications technology design is to provide a basis for the development of a structured cabling infrastructure that supports a physically converged, logically segregated IP network solution. Implementing a converged network solution offers several identifiable benefits. Commercial benefits include a 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, environmental benefits result from the reduction in materials and the need for building utility support, such as power and cooling.

A technology program is required to be developed along with the architectural program. The technology program shall be predicated on 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 communication system, a converged IP network, and the structured cabling system.

This chapter contains standards, criteria, and recommendations related to the following:

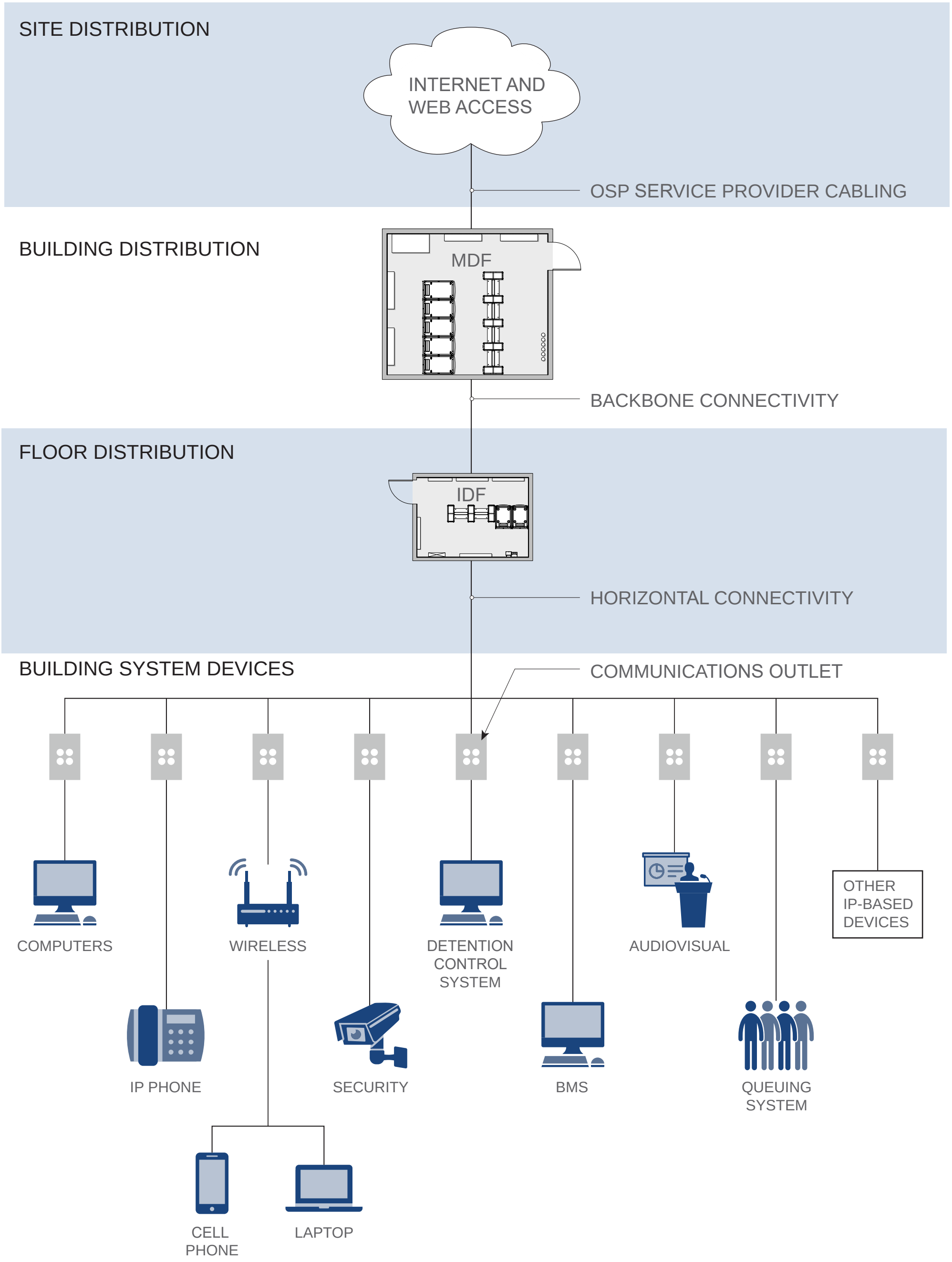
- Communications rooms, including architectural, electrical, mechanical, grounding, and bonding guidelines required to support infrastructure and equipment deployment.
- Distribution pathways to support the intrabuilding infrastructure.
- Communications backbone and horizontal connectivity distribution and the performance rating of the cable used to support the building utility services throughout the facility.
- Administration and verification with identification and testing of the communications infrastructure and system components.

2. 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.

3. Network Architecture

The Judicial Council standard is for all IP traffic to traverse a single integrated physical network that is segmented into multiple subnetworks. Network segmentation can be accomplished in various ways; the specific design for each courthouse shall be predicated on the extent and complexity of the technology embedded in a new court building. Figure 17.1 provides a high-level view of the physical architecture of a typical courthouse network, including telecommunications rooms, backbone and horizontal structured cabling, and end-point devices. Though not intended to convey each component or the logical network design, this illustration should give the reader a visual reference of the components and how they interconnect.



MDF = main distribution frame.
IDF = intermediate distribution frame.
BMS = building management system.

Figure 17.1 Layout Diagram of Structured Cabling Topology That Includes Building Systems

See chapter 23, Integrated Network Architecture, for the integrated network architecture diagram that illustrates the expected intelligent building systems under the unified communication system.

17.B MINIMUM POINT OF ENTRY (MPOE)

1. Telecommunications and Server Equipment Room

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

2. Service Entrance Facilities

2.1 General Guidelines

a. 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.

b. 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 frame. Doing so minimizes the need to develop a separate, dedicated space.

c. The entrance facility size and type 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 × 12″ deep floor-to-ceiling space should be allocated on one accessible wall to support up to six conduits.

2.2 Design Criteria

a. 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.

b. Provide adequate overhead space for conduit pathways that either enter the room from outside the building or extend connections to the main communications space within the building.

c. To accommodate cable pulling and apparatus, adequate clearance shall be provided in front of the wall where the conduits terminate.

d. Vertical cable runway sections shall be used to route cables from the floor and ceiling conduit penetrations to the overhead cable runway.

3. Main Distribution Frame

This section refers to the MDF as a single space for 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 communication system control devices. In simple terms, the MDF room will function as the

Alternative Considerations

Colocating an IDF inside the MDF is an acceptable design practice.

For larger buildings that contain data centers, dual service entrance facilities shall be included to house multiple service provider termination components and equipment. All service entrance facilities should adhere to the requirements set out by the service providers. The physical entrance doors to these spaces shall be from within the building, with no doors opening directly to the exterior.

Related Reading

Chapter 20, Fire Protection Criteria, for fire suppression requirements main hub, or headend, within each courthouse facility. The MDF room size is determined by the amount of headend equipment in a particular court building. See table 17.1 for MDF space considerations.

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 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 Information Technology 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′ wide × 5′ deep)
Electrical Distribution Panel	Wall
Entrance Facility Conduits	Floor and Wall
Expansion Capability	25% Future Rack Space

OSP/ISP = outside plant/inside plant.
DAS = distributed antenna system.

3.1 General Guidelines

a. Provide a minimum of one MDF room per courthouse building, located on a lower floor, with an accessible pathway to the loading dock or freight elevator. The MDF shall not be located on any building exterior walls or below the flood level.

b. 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, for a smaller courthouse facility, a typical MDF layout that provides space for five equipment cabinets and four relay racks. The cold aisle is lined with the front sides of the server racks housing the cold air intakes, and hot aisles are where the hot air exhausts are located. The cold aisle should face the air-conditioning supply ducts, and hot aisles should face air-conditioning return ducts. Minimum clearances are indicated because they are critical to the functionality of all unified communications rooms and should be factored into the layout.

Important References

An example of "active electronics" would be an information technology (IT) network switch used to connect local area network (LAN) 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.

EIA/ECA = Electronic Industries Alliance Standards

ANSI = American National Standards Institute

TIA = Telecommunications Industry Association

IEC = International Electrotechnical Commission

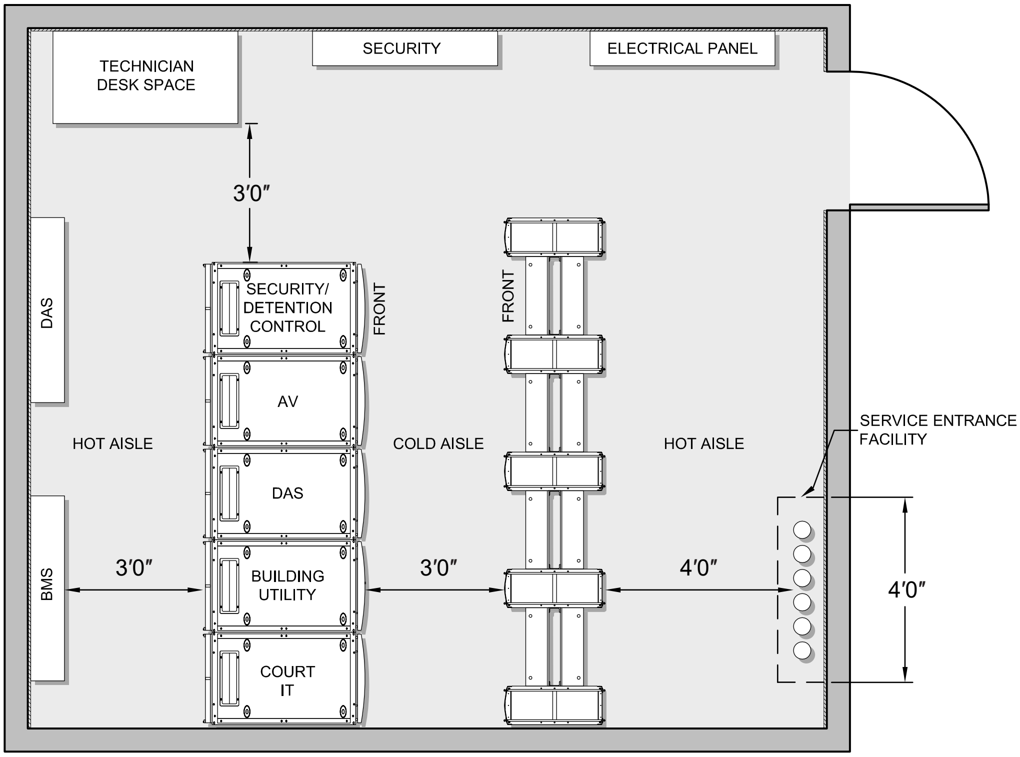


Figure 17.2 Typical Smaller Courthouse MDF Layout

3.2 Design Criteria

a. Cabinets and relay racks shall be EIA/ECA-310, ANSI/TIA-569, or IEC 60297-3-100 compliant with a standard height of 42U (rack units).

b. No restrooms, janitor closets, or piping with running water shall be located immediately above, next to, or in the MDF.

c. Internal wall surfaces should be covered with 3/4″ fire-rated plywood. Sealed concrete is an acceptable finish on floors.

d. Vertical cable runway sections should be used to route cables from the floor and ceiling conduit penetrations to the overhead cable runway.

e. Outward swinging doors shall be provided and fitted with both a key and a card lock; the minimum door size should be 42″ wide × 90″ high.

f. Floor loading should be factored at 200 pounds per square foot and confirmed on a case-by-case basis.

g. A minimum of one relay rack should be reserved for the consolidation of service provider, county, and court wide area network (WAN) edge active equipment devices.

h. At a minimum, use 10″ × 17-1/2″ double-sided vertical cable management between racks.

i. Relay racks used for the termination of structured cabling should reserve 50 percent of the available rack unit space for active electronics.

j. All equipment racks and cabinets shall be installed in compliance with California Building Code (CBC) seismic standards.

k. Obtain typical power draw and National Electrical Manufacturers Association (NEMA) plug type for switches and UPS units. Include 208-volt outlets in the MDF/IDF (intermediate distribution frame) with 30 amp receptacles.

l. Develop the port count matrix early. Early involvement of the applicable provider is recommended.

m. Calculate the heat load of IDF/MDF for heating, ventilation, and air-conditioning (HVAC).

n. Ensure the court data racks are next to the provider's data racks in an appropriately sized IT room.

o. Provide a room-ready checklist in contract documents.

4. Intermediate Distribution Frame

An 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.

4.1 General Guidelines

a. IDF spaces should be dedicated to communication systems and audiovisual equipment use, centrally located on every floor, and stacked vertically through the building to enable efficient pathway and cabling distribution within each serving zone.

b. IDF serving zones must allow for each 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 SF or the interior building space plan restricts the size of a single IDF, limiting the available space for equipment.

c. Typically, IDF room size recommendations are derived from square footages, factoring one outlet per typical 100 SF 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.

d. Table 17.2 outlines the systems and typical mounting locations that should be considered when developing the IDF size and interior design.

e. 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 audiovisual (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.

4.2 Design Criteria

a. Cabinets and relay racks shall be EIA/ECA-310 or IEC 60297-3-100 compliant with a standard height of 42U.

b. No restrooms, janitor closets, or piping with running water shall be located immediately above, next to, or in the IDF.

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

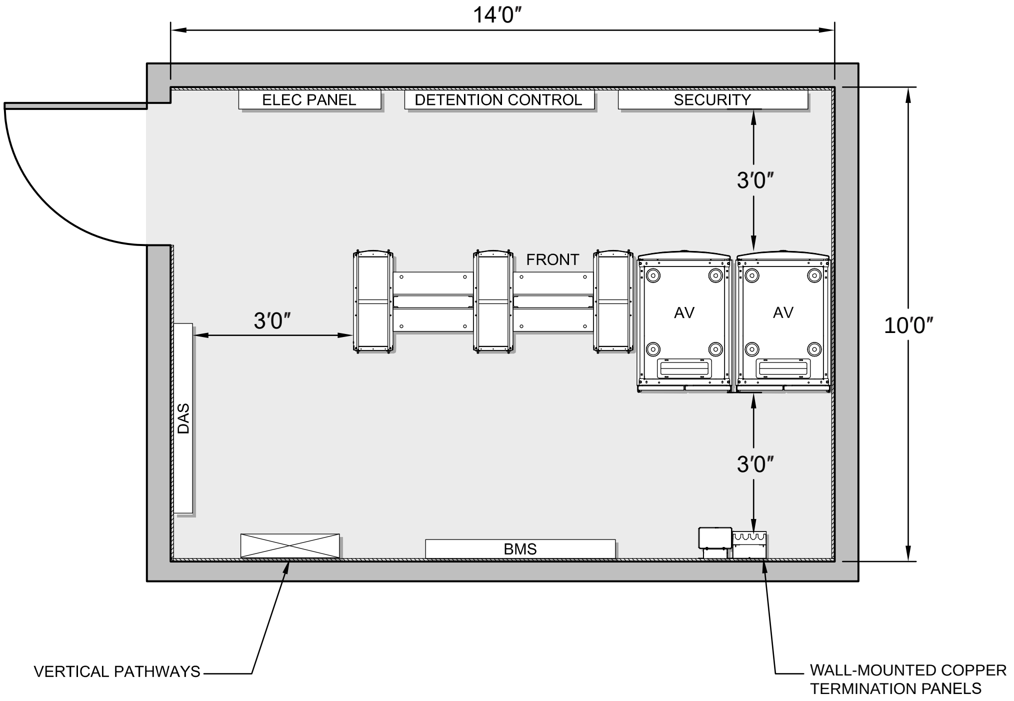


Figure 17.3 IDF Serving Two Courtrooms

c. Internal wall surfaces should be covered with 3/4″ fire-rated plywood.

d. Sealed concrete is an acceptable finish on floors, and a finished ceiling should not be provided.

e. Vertical cable runway sections shall be used to route cables from the floor and ceiling penetrations to the overhead cable runway grid.

f. A single outward swinging door should be provided and fitted with both a key and a card lock; minimum door size is 42″ wide × 90″ high.

g. Adequate space and clearance should be provided for vertical conduit pathways.

h. At a minimum, 10″ double-sided vertical cable management between racks should be used.

i. Relay racks used for the termination of structured cabling shall reserve 50 percent of the available rack unit space for active electronics.

j. Equipment racks shall reserve 25 percent of the available space for additional equipment.

k. All equipment racks and cabinets shall be installed in compliance with CBC seismic standards.

5. 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.

5.1 General Guidelines

a. The full complement of technology-related systems housed inside communications spaces should have adequate UPS power backup to support electrical interruptions for 90 minutes for non-life-safety equipment. The UPS shall not be connected to an emergency power system. 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.

b. For extended power outages, emergency generator power (if available) should be used to provide additional backup to the systems within the communications rooms that are supported by a local or centralized UPS.

c. 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. For detailed requirements of emergency and standby power systems, refer to chapter 15, Electrical Criteria.

5.2 Design Criteria

a. 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.

Coordinate with local service providers to determine specific pathway requirements or best practices.

Satellite pathway should be designed considering each courthouse facility's specific requirements.

Important References

ASHRAE Environmental Guidelines for Datacom Equipment

BICSI *Telecommunications Distribution Methods Manual* (latest edition) for separation information from electromagnetic interference sources and for pull-box sizing guidelines

Related Readings

Chapter 13, Mechanical Criteria

Chapter 15, Electrical Criteria

Chapter 16, Lighting Criteria

Chapter 20, Fire Protection Criteria

b. Provide a grounding circuit for communications equipment. Grounding and bonding should be provided for all equipment and racks. A grounding bus bar should be provided.

c. Provide, in aisleways parallel to rows of racks and cabinets, lighting that does not conflict with the cable management infrastructure inside the rooms.

d. Provide that lighting fixtures are not powered from the same distribution panel as are the room's power outlets.

6. Mechanical Systems

6.1 General Guidelines

a. Mechanical system cooling units shall be dedicated to the operation of the communications room they serve and be located inside the room. Multiple floors shall have discrete service—that is, not be ganged together—and capable of providing 24/7/365 operation, independent of the "base building" system. System selection shall be either packaged heat pumps (condenser water) or fan coils (chilled water), based on case-by-case project analysis. Supply and return ducting shall be directed at the respective cold and hot aisle layout within each communications room requiring cooling.

b. The units serving communications rooms shall be on emergency generator power (when available) to provide continuous cooling in case of a building power outage.

c. UPS backup power is not necessary for cooling units.

d. At a minimum, the mechanical systems shall be designed to meet the current American Society of Heating, Refrigerating and Air-Conditioning Engineers Technical Committee's ASHRAE TC 9.9 thermal guidelines for allowable temperature and humidity parameters. For reference, the TC9.9 ASHRAE standard provides the following system parameters:

- Low-end temperature: 64.4°F (Fahrenheit; supply air to equipment)
- High-end temperature: 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.

e. During preliminary building design, the estimated MDF room cooling load Btu/hr (British thermal units per hour) should be based on a minimum electrical load of 75 watts per square foot. In each IDF, the estimated cooling load (Btu/hr) should be based on a minimum electrical load of 65 watts per square foot. These load estimates should be developed further as the building design moves forward. The load shall be confirmed as equipment is determined and must meet or exceed the equipment manufacturer's requirements.

6.2 Design Criteria

a. Consideration of air-side free cooling should be made based on climatic conditions.

b. The mechanical systems shall report to the building management system (BMS), building engineers, and IT support personnel, triggering alarms when set parameters are exceeded.

c. In general, avoid routing plumbing or HVAC pipes (pressurized or unpressurized) to go through any communications space. Water-filled pipes shall route around communications rooms rather than through them, unless they serve components within the room, such as fire suppression systems.

d. When water-filled pipes travel within a communications room, pipe isolation and drain pans shall be provided.

e. Roof drains or other sources of water shall not be located above any communications rooms.

7. Grounding and Bonding

a. A uniform telecommunications grounding and bonding system shall be provided between all communications rooms in accordance with TIA/EIA 607-C telecommunications grounding and bonding standards and Building Industry Consulting Services International (BICSI) guidelines. The building-wide grounding system that provides each communications space with a dedicated grounding busbar shall comply with National Electrical Code (NEC).

b. Extended from the grounding busbar within each communications space, a common bonding network consisting of a series of insulated stranded conductors, no less than 6 AWG (American Wire Gauge), 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, communications equipment, protector blocks, cable runways, and communications conduits.

17.C DISTRIBUTION PATHWAYS

To meet the overall goal of physical convergence, communications pathways should be designed to support the distribution needs of all unified communication systems. Combining low-voltage cabling infrastructure in shared pathways provides a well-organized, functional approach to the distribution of connectivity, whether outside or inside a 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.

1. Outside Plant Pathways

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 handholes should be used to distribute connectivity in the OSP.

1.1 Dedicated MPOE Conduits
Pathways and pulling points shall be dedicated to incoming service provider networks and not shared with other technologies or utilities. Diverse paths into the building should be considered and coordinated with the service providers.

1.2 Service Entrance Conduit Quantities
The quantity of service entrance conduits should be based on the size of the facility, with a minimum of four 4″ conduits, the service provider circuits, and the level of

redundancy required. ANSI/NEC codes shall be used to determine quantities. Table 17.3 shall be used for general guidance. Entrance conduit routing should be developed with site utilities and local service providers to ensure that the property-line conduit termination points have been successfully coordinated.

Alternative Considerations

Large multifloor facilities may be better served using second-level backbone cabling distribution—that is, a central IDF serving as a termination point for backbone connectivity from other IDF spaces.

For each project, the designer shall consider all building utility systems and verify the need for horizontal optical fiber media.

Table 17.3 Guidelines for Service Entrance Conduit Quantities

NUMBER OF COURTROOMS	CONDUIT QUANTITY
1–6	4
7–19	6
20+	8

2. Inside Plant (ISP) Pathways

A well-designed ISP distribution system must allow for day-one capacity as well as the high likelihood of future modifications 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, including larger conduit pathways for backbone connectivity between communications rooms, smaller conduit pathways for horizontal connectivity extended to wall and floor communications outlets, and connectivity for devices using Power over Ethernet.

2.1 Backbone Distribution System

a. From the MPOE, 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.

b. The design of backbone pathways between communications rooms should factor together the many variables associated with connecting technology spaces. The standard practice is to provide conduit pathways between the main communications rooms. In cases where IDF rooms are stacked, locating pathways in the same place within each IDF is the preferred vertical distribution methodology. Provide a functional and flexible backbone pathway design—including access and clearance, appropriate bend radii, and pull boxes—to allow for the successful distribution of communications backbone cabling.

c. The number of conduits per pathway varies depending on the number of communications cables. Provide a minimum 25 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.

2.2 Rooftop Communications Systems

To facilitate future installation of rooftop communication systems, provide an electrical subpanel and submeter on the rooftop. Provide conduit pathways to the rooftop from the electrical room with pull rope (not pull string) to allow for cable runs to be added for future installations.

2.3 Horizontal Distribution System

a. Horizontal distribution pathways designed to accommodate low-voltage cabling systems can be grouped into two preferred methodologies: the primary conveyance system, which is a cable tray that extends above the main corridors from the serving communications room, and the secondary conveyance system, consisting of conduit pathways from the cable tray to the communications outlet location. Coordination of each communications outlet location throughout the facility is critical, especially within the courtroom.

b. Basket or solid-rail-style cable trays are required for courtroom buildings because of their elevated capacities, increased robustness, and accessory components used for separation of the non-IP cable bundles such as BMS, AV, and security cabling. Accessibility and clearance requirements should be coordinated so that the overall functionality of the conveyance system is enhanced. At a minimum, cable tray clearances of 12″ above, 24″ to one side, and 3″ clear vertical space above ceiling tiles and supports should be provided.

c. Conduit pathways used 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 1-1/4″. Wall-mounted electrical back boxes should have manufactured 1-1/4″ knockouts to accommodate the conduit.

d. To minimize the overall number of floor penetrations, combined power and communications floor boxes 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.

e. In addition to the conveyance systems, reenterable UL (Underwriters Laboratories)-rated fire-stop assemblies are required for through penetrations in all rated walls and floors. At a minimum, size the assembly considering UL and the manufacturer's allowable fill rate. Provide a minimum 25 percent for future growth when considering the total quantity of assemblies required.

2.4 Design Criteria

a. Install conduit runs in lieu of cable trays where access to the cable tray is restricted for more than 10′.

b. Locate conduit pull boxes in easily accessible locations.

c. Install ground distribution pathways according to telecommunications industry standards.

d. Insert conduit pull cords within the pathway to allow for future expansion.

e. Include the cable tray size, location, and mounting methods in the building information modeling.

f. Consider acoustical transfer of hard wall connection.

g. Coordinate rated wall penetrations.

h. Do not install cable trays above hard lids when possible.

i. Use basket-type trays in lieu of rail type.

j. Include seismic support for weight.

k. Include expansion percentage in specifications.

Important Reference

The communication system should comply with ANSI/TIA/EIA 606-A, Administration Standard for Commercial Telecommunications Infrastructure.

17.D BACKBONE CONNECTIVITY

As technology systems converge onto the IP network, efficiencies increase when a common backbone is used to distribute communications signals. Optical fiber cables shall be used as the primary backbone medium because they provide higher bandwidth and can extend greater distances than their copper counterpart. Multipair copper cabling has become the auxiliary backbone medium used to extend analog or non-IP signal technology.

Coordinate the backbone and horizontal connectivity needs for community antenna television (CATV) distribution on a case-by-case basis.

1. 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. Reference ANSI/TIA-568.3-D for fiber installation standards and the National Electrical Contractors Association and Fiber Optic Association's NECA/FOA-301.

1.1 Single Mode

For single-mode fiber, OS2 fiber is the recommended cable type. Backbone SMF cable should be capable of 40-gigabit Ethernet signal transmission to 10,000 meters in the 1,310 nanometer (nm) operating window. Maximum attenuation for an SMF cable shall be no greater than 0.7 decibel (dB) per kilometer (km) using 1,310 nm and 0.5 dB/km using 1,550 nm wavelengths, respectively. Fusion-spliced, factory-connectorized pigtails are the required termination practice for SMF cable. SMF cable between the MDF and each IDF shall have a minimum of 24 strands.

1.2 Laser Optimized Multimode

Laser-optimized multimode cables should be capable of 40-gigabit Ethernet signal transmission to 300 meters at 2,000 megahertz/km effective modal bandwidth. Maximum attenuation for LOMMF cable shall be no greater than 3.0 dB/km using 850 nm and 1.0 dB/km using 1,300 nm wavelengths, respectively. LOMMF cable between the MDF and each IDF shall have a minimum of 24 strands.

1.3 Cabling Criteria

a. Provide a flexible, spirally wrapped interlocking armor over an individual jacketed and tight buffered cable.

b. Terminate fiber cabling in fully enclosed fiber panels.

c. Provide 25 percent spare termination capacity in the panel.

d. Provide fiber connectors to be small-form-factor latched connector (LC) duplex.

e. Provide connectivity to be rated per the installation environment.

2. Multipair Copper

2.1 General Requirements

Multipair copper cable should extend from the MDF to each IDF room. Select a voice-grade Category 3 unshielded twisted pair (UTP) ARMM (abrasion resistant millimeters) cable. Use a minimum of 25 pairs.

2.2 Cabling Criteria

a. Terminate cabling onto a 110-type wall field.

b. Provide 25 percent spare termination capacity.

c. 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 various building system end devices that use the IP network. The transport medium most widely used 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) shall be included (when developing the technology program) to provide additional connectivity to court staff or court building users. An understanding of the connectivity requirements for each system should be realized at the earliest phases in the design process and include a site survey with heat maps to plan placement of WLAN access points to ensure even signal coverage and eliminate dead spots.

1. Four-Pair Copper

1.1 General Requirements

Provide an end-to-end solution based on ANSI/TIA-568.0-D or the highest performance standard ratified by ANSI/TIA/EIA for topologies, distances, installation, performance, and testing requirements for telecommunications structured cabling. The minimum standard for the horizontal permanent link cabling is Category 6A, otherwise known as augmented Category 6. A foil applied over unshielded twisted pairs 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.

1.2. Cabling Criteria

a. Each four-pair copper cable permanent link shall fall within the Ethernet distance limitation of 295′.

b. The complete cable plant shall meet ANSI/TIA-1152, Level IIIe performance requirements for Category 6A cabling.

c. In communications rooms, terminate the cabling in angled patch panels.

d. The end-to-end, four-pair copper connectivity solution shall use shielded components.

e. Connectivity shall be rated for the installation environment.

Related Requirements

Chapter 23, Integrated Network Architecture: LAN/WAN Diagram (Integrated Architecture Network Diagram)

Judicial Council LAN/WAN Architecture and Standards Document for IP network design principles and specific hardware elements

2. 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 preferred, subject to confirmation by the technology program. To achieve seamless 100 percent coverage, 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 wireless access points (WAPs). WAP placement shall be determined through independent analysis via specialized testing and survey techniques (such as heat map or site survey) and shall be developed alongside the active systems network architecture design.

3. Typical Outlet Configurations

Typical configurations can be applied to the quantity of cables per outlet and the location of outlets per room or device. This practice is utilized early in design, so that the designer can begin validating architectural space planning efforts and develop device outlet layouts that are consistent with previous court projects.

Shown in table 17.4 is a matrix of typical communications outlets expected in a courthouse facility. The matrix illustrates the typical quantity of horizontal four-pair copper cables for each communications outlet adjacent to the IP port activation strategy. The quantity of IP port activations is provided factoring the various building system devices that may be deployed.

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.

Figure 17.4 and figure 17.5 identify the typical wall, floor, and future outlet locations within a typical courtroom.

17.F ADMINISTRATION AND VERIFICATION

Administration and verification of the structured cabling system are critical to the efficient functioning of a new courthouse facility through the design phase, construction build-out, and technology systems implementation either day-one or during the lifespan of the building.

Well-documented design processes—where detailed product information, shop drawings, and as-built drawings are submitted by the installing contractor—are project requirements and shall be strictly enforced. Project documentation of this type shall be reviewed in detail for accuracy and completeness.

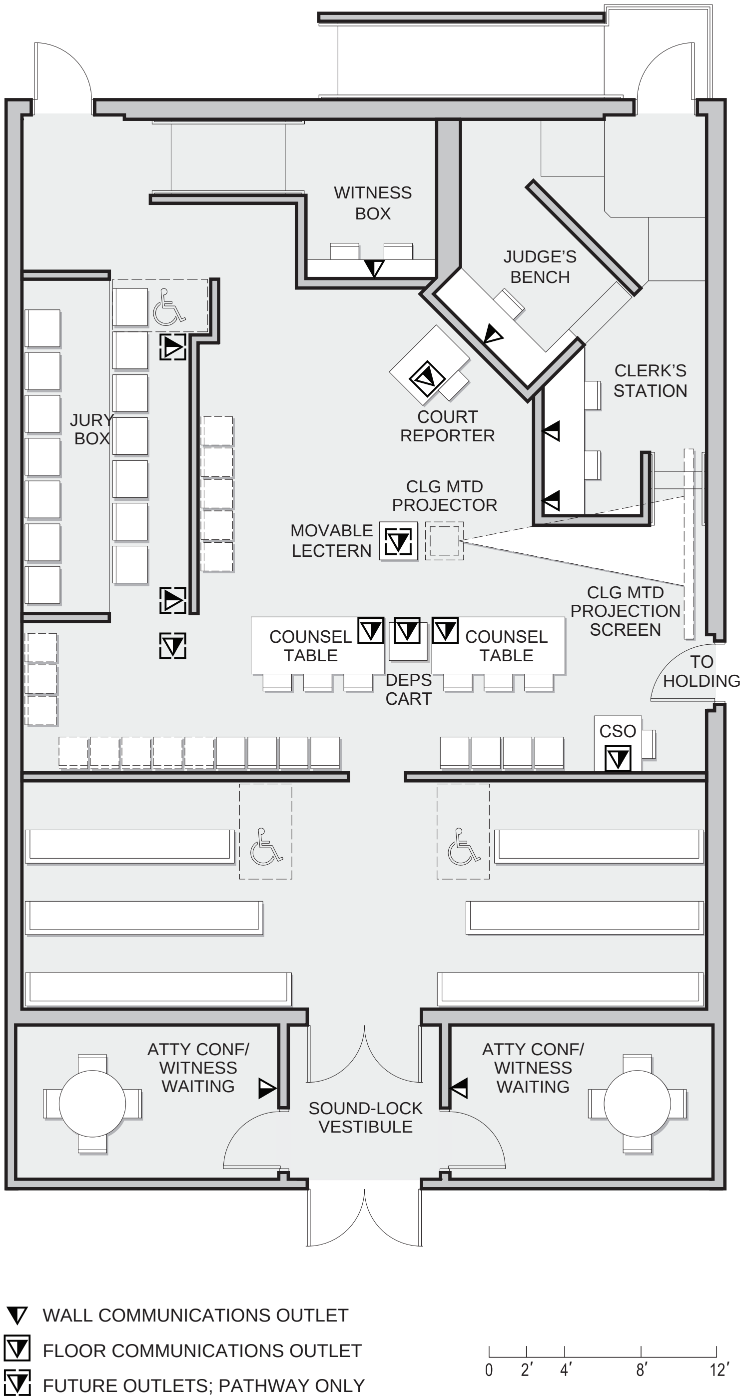
The structured cabling connectivity solution shall be certified by the component manufacturers and provided with an extended minimum warranty period of 25 years.

1. Identification and Labeling

An identification system that complies with ANSI/TIA-606-C shall be implemented to uniquely identify the network infrastructure, including devices and cabling, installed in the facility. Provide a unique and consistent alphanumeric identification system to form the basis for the development of a communications administration system database to be approved before final design.

Table 17.4 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
Wireless Local Area Network Access Point	2	2
Digital Display	2	1
Audiovisual Projector	2	2
Elevator Control	1 (per elevator)	0
Wall Phone	1	0
Audiovisual Control Panel	1	0
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	2
Witness Position	2	2
Counsel Table	2	2
Lectern	4	4
Interpreters	2	2



CLG MTD = ceiling mounted.
CSO = court security officer.

Figure 17.4 Multipurpose Courtroom With Corner Bench Showing Outlets

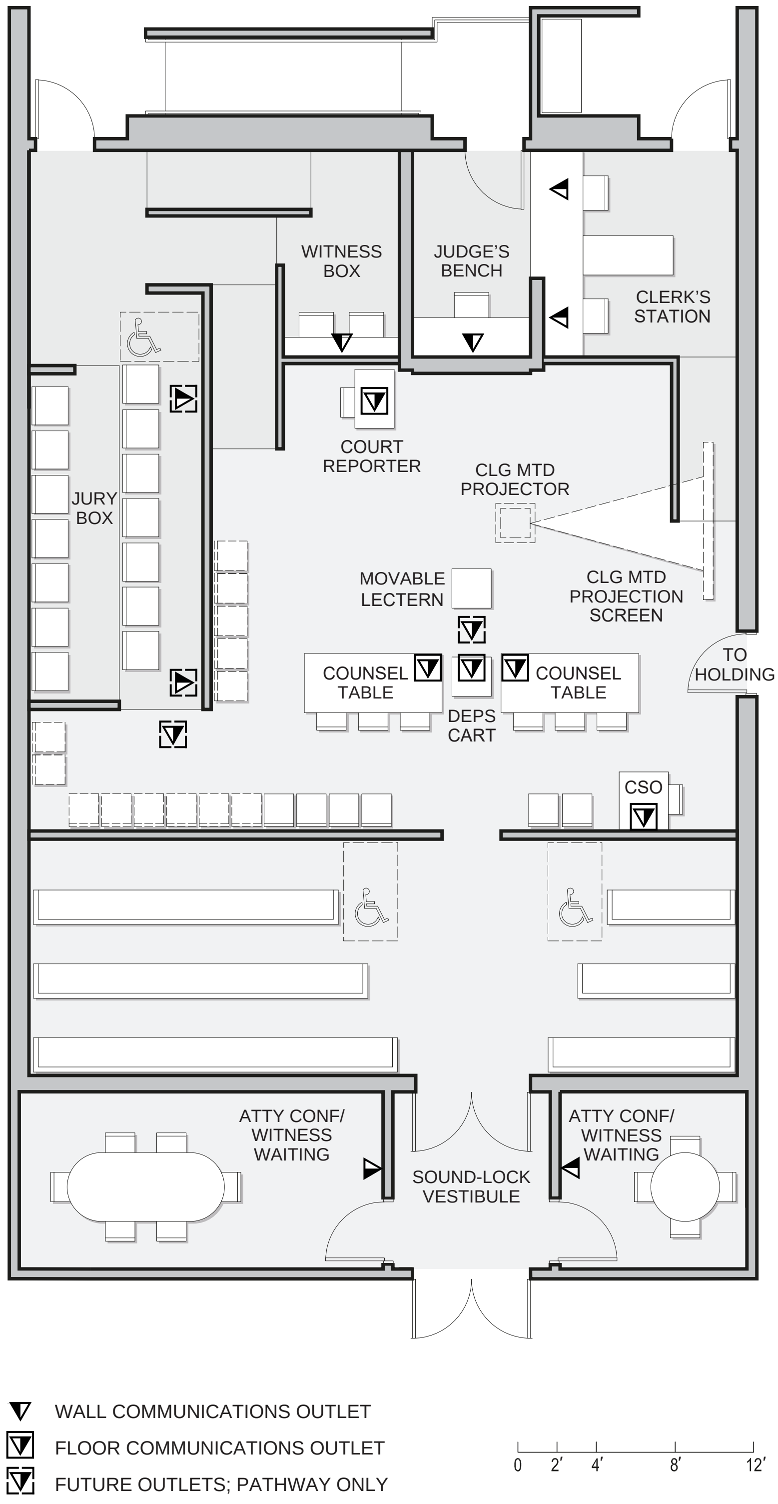


Figure 17.5 Multipurpose Courtroom With Center Bench Showing Outlets

2. 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 using, at a minimum, a level 4 testing device. For LOMMF cable, testing should be performed using fiber modules incorporating 850 nm vertical-cavity surface-emitting laser and 1,310 nm laser sources combined into a single output port. All testing should be performed in accordance with ANSI/TIA-1152 for copper testing and ANSI/TIA 568-C.0 and NECA/FOA-301 for fiber testing.

The test result documentation shall at a minimum contain testing, verification, and documentation of all performance specification parameters for the installed optical fiber and copper media. The documentation should be in both paper and electronic formats.

3. As-Built Documentation

As-built submittals should be developed in electronic format. At a minimum, the following documents should be provided (in addition to overall building as-built requirements):

- Project site plan of all OSP infrastructure with labeling and identification of each element
- Matrix of the communications cabling indicating type, location, splicing, physical routing, and quantities 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 identifiers for each cable
- Building floor plans showing communications outlet locations that indicate the quantity of active IP ports per location
- IP port activation matrix with per switch port to cable, to IP address, to virtual local area network (VLAN) identification
- Building floor plans showing distributed antenna system (DAS) locations
- Enlarged plans of the communications rooms
- Heat maps for WLAN placement, with access point locations
- Building floor plans showing routing of communications pathways and pull-box locations
- Building floor plans showing locations and types of UL fire-stop systems
- Communications interior cable plant test results
- Single-line diagrams of all components of the DAS, including infrastructure, connectivity, operating and safety devices, control panels, instrumentation, and annunciators

17.G NETWORK ARCHITECTURE

1. Design Principles

The converged IP network design's goal is to develop an intelligent, converged network that provides a responsive, effective, and supportive environment so the courts can achieve their communications network objectives.

A converged IP-based network provides an intelligent communications transport facility that is effective in increasing building performance, functionality, and environmental sustainability. Network convergence should allow the integration, automation, and optimization of all courthouse systems and equipment required to serve the building and its occupants.

Design principles that the integrated IP network should factor include, but are not limited to:

- Maximizing efficiency for occupants;
- Allowing effective resource management;
- Being responsive to user needs;
- The ability to adapt, integrate, and enhance new technologies;
- The ability to accommodate and react to organizational changes; and
- Ease of operation and maintenance.

2. Systems on the IP Network

The building systems communications goal is to employ IP devices so that they can be transported over the IP network. A converged IP network provides a single, logical transmission platform for all the IP devices within a facility.

The following courthouse technology systems are typically supported by the facility's converged IP network:

- 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 system
- Digital signage system
- Video and streaming media
- Audiovisual system
- Queuing system

- HVAC system
- Landscaping irrigation system
- Public address system

The technology program, which examines individual project needs and requirements, will determine which of the courthouse technology systems are needed and to what extent they will use the converged IP network.

3. IP Network Segregation

Table 17.5 documents the baseline network usage groups expected on the converged IP network that should be taken into account when designing IP network segregation (e.g., IP addressing and VLAN schemes).

4. Network Availability

a. The primary design considerations of a high-availability network begin with the accumulation of information related to strategic business and system functionality requirements. After the primary information has been gathered, recommendations to achieve the required availability should be developed considering the latest communications technologies and converged network design principles.

b. The following design parameters shall guide the design process through implementation, commissioning, and testing:

   - Scalability: Include switch port density in the LAN access and core/distribution layer, incoming service interface ports for WAN routers, and voice gateways.
   - Resiliency: Design the network with fault tolerance and/or fail-over capabilities to prevent system downtime resulting from 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: The relationship between network security and network availability is important. 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 where 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 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 should be the adoption of open architecture standards-based communications and networking models to allow interoperability between existing systems and future system enhancements.

Table 17.5 Network Segregation

SYSTEMS	SUBNET SEGREGATION	DEVICES
Data	Data (general user data traffic)	
	Data (printer)	
	Data (application server traffic)	
Voice	Voice over Internet Protocol (VoIP)	
	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
	SMS	Monitoring & Badge Workstations
	SMS	Access Control Servers
Security—DLCS	Detention Lock Control System (DLCS)	Intercom & Programmable Logic Controller
	DLCS	Monitoring Terminals
	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 Control & Monitoring	AV IP End Devices
	AV Control & Monitoring	AV Matrix
	Digital Signage, Queuing & Internet Protocol Television (IPTV)	Display Panels
	Digital Signage, Queuing & IPTV	Media Servers
Wireless LAN	WLAN Trusted	
	WLAN Guest	
	WLAN Controller	
LAN to LAN	Routing LAN Core to LAN Core	
WAN Edge	Routing Edge Public Subnets	
Extranet	Extranet Clients	
Intrusion Detection System	Intrusion Prevention System Monitoring	
DMZ	Demilitarized Zone (DMZ) Subnets	
FW to Core LAN	Routing Firewall (FW) to Core LAN	
Network Management	Network Management	

- 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.

Early determination and coordination of DAS requirements are required for MDF space planning and layout.

5. IP Network Hardware Design Elements

a. At the baseline level, the IP network hardware elements in table 17.6 shall be included in the design and integration of the converged IP network and WAN.

b. Determine the type and capacity of IP network hardware elements needed on a per-project basis because the size of facility and number of active IP ports will vary significantly between projects. At a minimum, provide 25 percent IP port and switching throughput expansion capability for all LAN core and LAN access switches.

c. 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 systems.

Table 17.6 IP Network Hardware Elements

WIDE AREA NETWORK	LOCAL AREA NETWORK
WAN Edge Routers or Switches	LAN Core Switches
Public Zone	LAN Access Switches
Firewalls	
Extranet Security Zone	
Demilitarized Zone	

17.H DISTRIBUTED ANTENNA SYSTEM

1. Objectives

A DAS is a network of spatially separated antenna nodes, connected via a transport medium, that provides radio and cellular wireless service throughout the facility. Because of the complexity of design factors related to developing an effective DAS, the extent of this system must be defined in the overall technology program.

A detailed court-by-court analysis is required for each facility to understand which service providers should be supported. In addition, coordination for the approval of interconnection to all the required service provider macro networks is necessary. This coordination effort will also need to be extended to public safety entities to accommodate the various frequencies that the DAS will support for emergency services and first responders.

2. Public Safety

At a minimum, the public safety entities that should be considered during the design phase are the sheriff/marshal, 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. The DAS should be flexible enough to allow for jurisdiction changes and for additional system frequencies.

3. Coverage Areas

Radio coverage is the primary concern, followed by cellular coverage for a courthouse building. Detention areas shall be provided with 100 percent radio coverage. Spaces including 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 should have a minimum of 99 percent radio coverage.

Other general building area coverage should be within the allowable tolerance set by the Judicial Council and should not fall below a minimum of 90 percent floor area radio coverage.

4. Space Requirements and Connectivity

If required, the DAS headend equipment, the base station, and other main components should be located within the MDF. If the MDF is used, then the space is required to be two-hour rated. There should be provisions within the MDF to support these components and space allocated for service-provider cabinets. Wall space should be dedicated within the MDF for DAS equipment panels and distribution equipment. All DAS equipment shall be placed in a NEMA 4 enclosure. Additionally, wall space in each IDF may need to be reserved to support DAS equipment and connectivity.

The DAS will use the building ISP fiber backbone. Any coaxial cable, splitters, or other DAS distribution media will need to be incorporated into the overall pathway and connectivity requirements. Where radio frequency-based technology requires the use of coaxial cable for horizontal connectivity, provide an RG-6 quad-shielded cable.

5. Power

The power requirements for the DAS shall follow the CBC requirements. The DAS radio and cellular base station and other headend equipment must remain operational during a power outage. Consideration should be given to UPS backup for DAS components. The source of uninterrupted power is project dependent and should be determined considering the independent needs of each courthouse facility. Refer to chapter 15, Electrical Criteria, for detailed power requirements.

DIVISION TWO: TECHNICAL CRITERIA

18 AUDIOVISUAL SYSTEMS

Superior Court of California, Madera County
Madera, CA
AC Martin

18.A AUDIOVISUAL DESIGN

Audiovisual (AV) systems are part of the technology program to be implemented in the planning of the courthouse as described in chapter 17, Network and Communication Systems.

The design shall provide an integrated, reliable, scalable, and sustainable audiovisual system to assist the courthouse with judicial proceedings and day-to-day administrative and training needs. Systems shall be easy to use and maintain, regardless of the size and location of the facility or the number of staff employed.

Coordinate with network and communication systems, 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 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.B AUDIOVISUAL CRITERIA

The following criteria shall be followed when designing the audiovisual systems.

1. Reliability and Serviceability

Systems with a high level of reliability and ease of maintenance shall be chosen by implementing industry standard technologies and installation practices, as well as using readily available components and materials. All equipment specified must be available from at least two vendors.

2. Integration

a. System components and infrastructure shall be fully integrated within the design of the courthouse. Equipment and cable management systems that allow for incorporation into the architectural elements, millwork, and furniture shall be selected. An effort shall be made to conceal equipment from plain sight.

b. Audiovisual systems shall be integrated with the telecommunications and information technology (IT) systems to gain efficiency within the building design. Whenever possible, AV and network spaces, pathways, components, and cabling shall be shared. Where applicable, the AV system shall also use the IT systems for the delivery and transmission of audio, video, and control signals.

c. All nonuser-interface AV equipment shall be installed in dedicated equipment cabinets located in the facilities main distribution frame (MDF) and intermediate distribution frame (IDF) locations. Only user essential equipment shall be installed in individual rooms. See chapter 17, Network and Communication Systems, for specific equipment criteria.

3. Scalability

A system that is nonproprietary, standards based, and scalable to allow for the future addition of components and functionality shall be chosen. The system components and technical infrastructure shall provide for a minimum of 15 percent expansion capability.

4. Sustainability

The designer shall provide a system designed to use 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. Whenever possible, the designer shall specify Energy Star–compliant components.

18.C TECHNICAL INFRASTRUCTURE

Figures 18.1 and 18.2 illustrates the distribution of technology elements in the courtroom. Wherever possible, colocate audiovisual services with the network infrastructure. See chapter 17, Network and Communication Systems, for coordination information.

1. Equipment Cabinets

Unless otherwise noted, all nonuser-interface AV components shall be installed in dedicated equipment cabinets located in the facility's MDF and IDF locations. If AV equipment is located in rooms other than IDF or MDF rooms (i.e., conference room credenzas), provisions must be made to supply adequate cooling air to keep the temperature below the manufacturer's rating, even when the building-wide air-conditioning system is turned off on nights and weekends. Equipment racks must include all cable management, electrical power distribution, blanks panels, vent panels, and the like. See chapter 17, Network and Communication Systems, for specific equipment cabinet size criteria.

2. Cable Pathways

Where industry best practice allows, the audiovisual cabling shall use the telecommunications pathway infrastructure. Careful planning and design shall be observed to avoid signal cross-contamination. Where Ethernet cable is used, no horizontal AV pathway initiated at the MDF or IDF shall exceed the distance limitation of 295′.

18.D AUDIOVISUAL SYSTEMS DESCRIPTIONS

1. Speech and Audio Reinforcement System

a. Wired microphones shall use shock and vibration isolation mounts, mute switches, and illuminated mute lights. Radio frequency (RF)-based wireless microphones shall use digital encryption.

b. When RF-based microphones are used, the designer shall conduct radio frequency sweep tests to ensure that correct allocation and sufficient bandwidth are available.

c. In courtroom applications, audio-processing systems with 4 or 8 recording outputs and 4 mix-minus speaker zone capabilities shall be provided. The systems shall also provide sound-masking capabilities, or pink noise, to impair the hearing of courtroom participants while confidential conversations are being held between an attorney and the judge at the judge's bench. The clerk's and court reporter's stations shall have mixed-audio output connections.

d. Speech and audio reinforcement systems design shall follow the current release of the design standards established by AVIXA A102.01:2017, Audio Coverage Uniformity in Listener Area.

2. Assistive Listening

An assistive listening system shall provide secure transmission of both speech and program audio to participants or members of the public. When evaluating the types of assistive listening systems in the design as well as the quantities of headsets, refer to sections 11B-219 and 11B-706 of title 24 of the California Code of Regulations to ensure adequate provisioning.

Refer to chapter 10, Building Support Services, for additional information.

MDFs and IDFs are integral parts of the audiovisual system's backbone. Close coordination with the network, mechanical, and electrical infrastructure systems is necessary to ensure successful audiovisual technology deployment. Refer to the corresponding chapters for more information.

Network 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 audiovisual systems is encouraged. Refer to chapter 17, Network and Communication Systems, and chapter 15, Electrical Criteria, for standards and procedures.

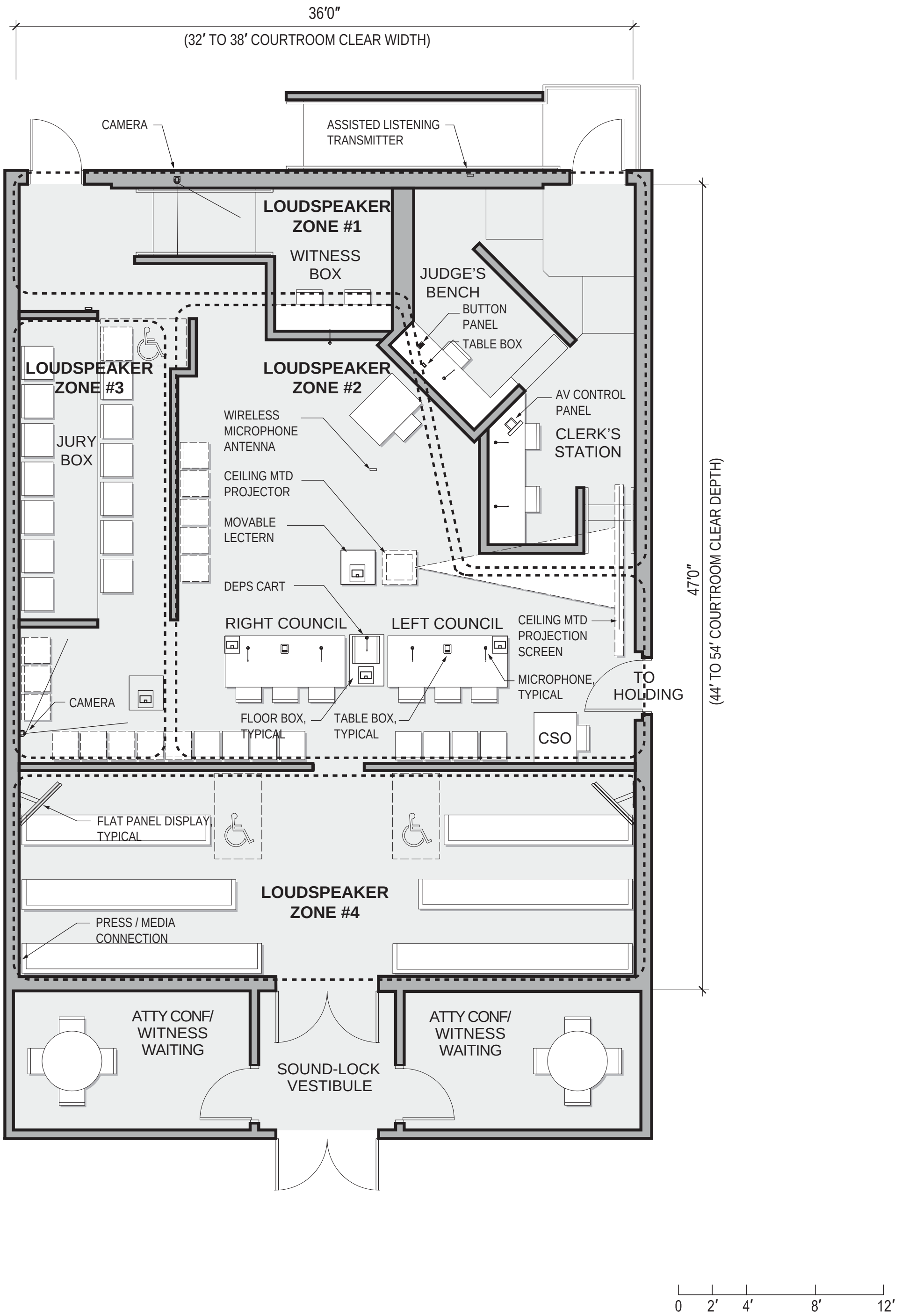


Figure 18.1 Typical Courtroom, Corner Bench—A/V Requirement

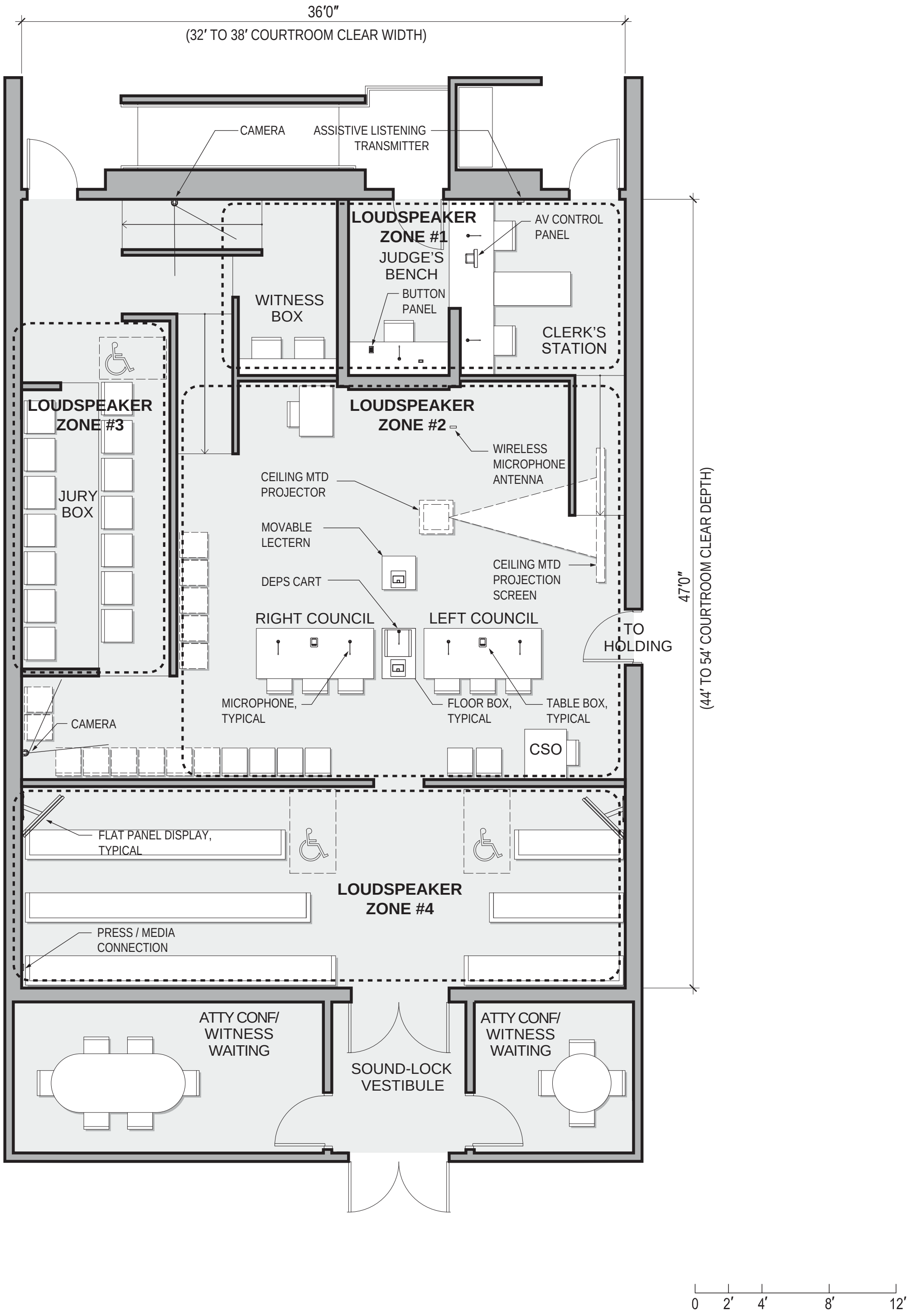


Figure 18.2 Typical Courtroom, Center Bench—A/V Requirement

3. Language Access

The language access system shall work in conjunction with alternate channels of the assistive listening system to provide for live translation to participants and audience members in courtrooms. Language access may be provided in other spaces as required on a per-project basis.

4. Video Display

Video display systems that will ensure that all participants can adequately view presented material on a common display shall be provided. The display can be either a projector with a motorized screen or a flat panel.

5. Digital Evidence Presentation System (DEPS)

The DEPS is an additional input to the courtroom video display. It is located between or in front of the attorney's tables, or in front or to the side of the courtroom clerk's desk. It is a neutral location for the display of evidence, which can be used by either attorney. Source content may include audio and video playback devices, laptops, and document cameras. The system may be portable or dedicated, depending on courthouse needs.

6. Videoconferencing and Arraignment

The videoconferencing systems in the courthouse enable real-time communication between two or more locations, including locations of remote language interpreters, conference rooms, training rooms, remote holding facilities, and remote witness locations. In courtroom applications, the cameras shall be positioned to provide a clear view of the judge, litigants, and their attorneys, but not of members of the jury.

The designer shall coordinate the data rates and transmission technology specific to the videoconferencing systems between the court and other key facilities that require connectivity. Special lighting considerations and room finishes are typically required in spaces where videoconferencing sessions are held. See chapter 16, Lighting Criteria.

7. Control System

a. Provide a control system for the management, monitoring, operation, and notification of local and facility-wide audiovisual equipment.

b. The control system shall be designed to use the network infrastructure for the distribution of commands and data.

c. Control systems provide simplified means of managing the functions of the audiovisual operations of the facility. All control system user-interface devices shall meet the requirements as stated in the Division of the State Architect (DSA) access compliance requirements of the California Building Code.

8. Control System Requirements

a. Before starting the design of the touch panel graphical user interface (GUI), obtain the template for a typical courtroom design from the Judicial Council.

b. Conduct a GUI coordination meeting with the court and the Judicial Council to determine if the court has a preferred approach, and select an approach.

c. Based on the selected approach, customize the design to conform to the requirements of this project, and submit a set of screen shots for the most complex courtroom design. Explain if a single button performs multiple functions (e.g., partition sensors, teleconference in progress, fire alarm signal, shared resources being used).

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.

Pink noise is the sound-masking criterion.

d. Once comments on the courtroom GUI have been incorporated, revise and resubmit the GUI to include the remaining spaces within the courthouse that use AV control systems.

e. Once the comments on the complete GUI design have been approved, write processor code to operate the GUI (but not the actual controlled devices). Load it into a processor on the internet, and submit the appropriate files necessary to simulate the actual operation of the touch panel on a computer using a mouse.

f. If the functioning GUI has been approved, proceed with the installation.

9. Touch Panel Design

a. See chapter 24, Graphical User Interface Template, for the touch panel template.

b. All panels are to have the time and date displayed in the same position on every page.

c. All pages are to have a title, indicating the piece of equipment and/or functionality being controlled.

d. Each individual room type shall be given the same user interface design and layout throughout the project, to the greatest extent practicable.

e. User interface design shall be as consistent as possible, taking into account the variations in system functionality from room type to room type, throughout the project.

f. Whenever the same button appears on more than one page, it must be in the same position on each page. This includes buttons that cause page-to-page flips.

g. Functions used during a general presentation shall be accessible with a minimal amount of button presses or page flips.

h. The sidebar and mute buttons from the judge's button panel shall also appear on every touch panel page.

i. Individual microphone volume controls should not be on the main control page but should be on a setup page, to reduce clutter.

j. Include the capability for automatically powering down all nonessential equipment supporting each individual room at a preset time (e.g., 6:00 p.m) each day. Provide that the time can be set by the user on the room page, with an override valid for one day and the automatic power down restarting the next day. Play an audible sound from the touch panel one minute before automatic power down occurs, and allow the operator to override this function.

10. Television (TV)

Infrastructure to feed TV signals to desired spaces within the courthouse shall be provided. TV is usually viewed in the jury assembly room, employee break rooms, and some conference rooms. If the court has a contract with cable or satellite TV companies, provide the cabling and infrastructure to support this service. If the court wishes to view free, over-the-air TV, provide a roof-mounted antenna and tuners at the desired locations.

11. Provisions for Video Remote Interpreting

Provide the infrastructure to support video remote interpreting in courtrooms from a portable cart. The purpose of this infrastructure is to allow a remote language interpreter to hear the courtroom proceedings—and to be heard—and to view any evidence presented. The optional cart will house one or more monitors, a camera, and videoconference hardware. Audio connections shall consist of a line-level output from the courtroom (i.e., microphones) and a line-level input to the courtroom audio system. A video output will duplicate the feed

An 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, Network and Communication Systems, for additional information.

See chapter 11, Architectural Criteria, for rooftop equipment information.

to the courtroom evidence display. This video output will connect to the videoconference hardware on the cart.

12. Digital Signage and 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, printing of queue tickets, sending of SMS (short message service) texts to court users' personal devices, and visual and audible announcements of the queuing process.

a. In the waiting area, provide a minimum of one video display and speaker that are visually accessible to the public. Signal transport and system requirements shall be coordinated during the design phase.

b. Video displays shall be integrated with the architecture of the building to allow for adequate technical infrastructure, cooling, ventilation, and future display hardware upgrades. See chapter 11, Architectural Criteria, for signage information. Digital signage systems may be interconnected to the court case management system and the CFM system to provide additional layers of information to the public specific to court proceedings, directories, and individual courtrooms.

18.E DESCRIPTION OF COURTHOUSE SPACES

1. Overview

Provide a turnkey audiovisual system—to include equipment and material, with associated labor, whether specifically mentioned herein or not—to ensure a complete working system that meets the needs of the court.

2. Typical Courtrooms

a. Provide a sound reinforcement system with 15″–18″ gooseneck microphones at the following locations.

  - Judge's bench (one), clerk's workstation (zero to two, at the discretion of the court), and attorney tables (two on each table) on movable bases with a mute button and a mute light. At the attorney's tables, cabling shall be through separate grommets, not through the cable box used for power, video, and data.
  - Witness station on a fixed threaded mount.

b. If a floor box is provided for a lectern or DEPS cart, provide a microphone on a fixed threaded mount. If the lectern does not have a dedicated location, provide a clip for a handheld microphone.

c. At the discretion of the court, provide a boundary microphone at the judge's location for use during a sidebar to record the sidebar and/or feed the court reporter's headphone jack.

d. Provide a minimum of one handheld wireless microphone for use by the jury and for general use by litigants and during voir dire. The antennas can be either remotely located in the courtroom or mounted on a receiver within the courtroom.

e. Provide a source of pink noise, enabled in all zones except the bench when the judge calls a sidebar. The court shall be able to set the volume as needed from the touch panel.

f. Provide ceiling loudspeakers configured as a mix-minus system. In a mix-minus system, audio from microphones in a zone is not reproduced through loudspeakers within that zone. The ceiling loudspeakers shall be zoned as follows:

- Jury (if the individual courtroom has a jury box)
- Gallery
- Bench
- Well

g. At the discretion of the court, provide loudspeakers in the holding cells with on-off control from the touch panel. If holding cells are shared between adjourning courtrooms, provide a system to select and route audio from either courtroom.

h. Provide a 4- or 8-channel audio feed for recording court proceedings. The actual recording equipment shall be provided by the court. At the discretion of the court, the feeds shall terminate at the equipment rack or be brought to the clerk's station within the courtroom. Provide audio input to allow recordings to be played back within the courtroom. At the discretion of the court, the channels shall be assigned to the following:

- Judge and clerk (with optional sidebar)
- Witness
- Plaintiff/prosecution, wireless microphone, telephone receive, videoconference receive
- Defense, lectern

i. Provide line-level monitor outputs for the clerk and court reporter.

j. Provide a two-channel ADA/CBC (Americans with Disabilities Act/California Building Code) compliant infrared assistive listening system used to meet ADA/CBC requirements (channel 1) and language translation (channel 2). At the discretion of the court, more than two channels may be specified if the court has a need for multiple languages translated simultaneously.

k. Provide a single-line teleconference system for making telephone calls using microphones (wired and wireless) and ceiling loudspeakers, with acoustic echo canceling on every microphone input. The output shall be selectable either to feed the ceiling speakers (default) or channel 2 of the assistive listening system for use when the language translator is remote. Depending on the courthouse system, the telephone system may be either analog or Voice over Internet Protocol (VoIP).

l. Provide a display for attorneys to display evidence and for judges to display jury instructions. All displays shall be placed so that the bottom of the image is a minimum of 48″ above the finished floor. They may be either video projectors (~6,000–8,000 lumens) or flat panel displays (98″ or larger). Display equipment shall have a minimum resolution of either 1,920 × 1,080 or 1,920 × 1,200 pixels. The projector shall be on a fixed mount on the courtroom ceiling with a lens selected to fill the projection screen. The screen shall be located opposite the jury. Provide appropriate power and data behind the screen for future installation of a flat panel display.

m. If a projector is used, provide an electrically operated projection screen with a contact closure interface, concealed in the ceiling when not in use, sized so that the height is one-sixth the distance to the back row of the jury. Match the aspect ratio to the projector.

n. Provide a multiformat routing switcher or network switch for source selection. In either case, the clerk or judge shall control access to the display.

o. Provide an additional display for the judge and/or clerk, if sightlines prevent the judge and/or clerk from seeing the display directly. It can be connected to a dedicated monitor or a spare HDMI (High-Definition Multimedia Interface) or DVI (Digital Visual Interface) (not DisplayPort) input on a computer monitor supplied by the court.

p. Provide access to the display from a computer on each counsel table and at the judge and clerk location. At the discretion of the court, provide access at the DEPS location.

q. Provide a table box at each attorney's table to accommodate the computer inputs, along with power and data. Cutouts in the millwork shall be coordinated with the furniture provider.

r. Provide only infrastructure to support a real-time transcription system between the court reporter and the judge, compatible with the systems used by the court.

s. Provide document cameras for deployment in any courtroom, a minimum of one per floor. They may be mounted on carts, for mobility.

t. Provide an AV control system with one 7″ desk-mounted wired touch panel (Power over Ethernet (PoE)) that can be connected via a network cable at either the judge, clerk, or (optionally) bailiff location.

u. Provide a button panel with a minimum of two buttons, permanently mounted at the judge's bench, to control, at a minimum, the sidebar function and audio/video mute.

v. Provide infrastructure for two gallery monitors, consisting of power and data connections plus empty conduits for future signal connections. If not used on day one, wall boxes shall be behind the wall coverings, if possible.

3. High-Profile Courtroom

a. Provide all the capabilities of the typical courtroom.

b. Provide two flat panel gallery monitors on articulated mounts.

c. Provide the capability for the judge to face forward during a videoconference rather than looking sideways at the projection screen, allowing the camera at the rear of the courtroom to pick up a full-face view of the judge, rather than a profile. It can be connected to a dedicated monitor or a spare HDMI or DVI (not DisplayPort) input on a computer monitor supplied by the court.

d. Provide an installed videoconference system with three high-definition PTZ (pan-tilt-zoom) cameras, located as follows:

- At the rear of the courtroom, pointed at the judge
- On the jury wall, pointed at the witness (so as not to pick up the jury)
- Behind the bench, pointed at the attorneys' tables

e. At the discretion of the court, provide audio and video feeds from the cameras or multimedia sources, plus a mix of the audio from within the courtroom to an alternative location within the courthouse for overflow capabilities. This signal shall use the

Internet Protocol network for data transport. This feed must be separately enabled both in the courtroom and at the alternative location for security reasons.

f. Provide a wall plate in the gallery on the same wall as is the jury for TV or radio stations feeding balanced analog audio (× 2) and 3G-SDI (serial digital interface) video (× 2) to a weatherproof media pedestal external to the building. Also include a balanced analog feed from the courtroom audio system and one 20 amp power circuit.

4. Courtrooms with Arraignment Dock

a. Provide all capabilities of a typical or high-profile courtroom but without any accommodations for a jury.

b. If the dock has floor-to-ceiling windows, provide a wall-mounted (not ceiling-mounted) tamper-resistant microphone, adjacent to or attached to the window overlooking the courtroom. If the dock does not have a full glass wall, no microphone may be needed, unless the voices of those in custody need to be recorded.

c. Provide ceiling loudspeakers with appropriate security hardware within the dock area.

d. Discuss with the court in detail the exact expected use of the dock, and provide equipment to meet the needs.

5. Jury Deliberation Rooms

On a per-project basis, the court may choose to use these spaces as conference or meeting rooms, and if they do, the minimum infrastructure requirements for these types of spaces shall also be included.

a. Provide a 75″ flat panel for displaying evidence.

b. Provide a floor box under the table for laptop inputs and a line-level output for the assistive listening system. This input will be used for connecting a laptop for displaying evidence saved electronically or for connecting a portable document camera.

c. Provide a table box to accommodate the computer input, along with power, data, and audio output to feed the assistive listening system. Cutouts in the millwork shall be provided by the furniture providers.

d. Provide a wall-mounted button panel for control of the AV system located at the video display.

e. Provide a portable ADA-compliant encrypted RF assistive listening system with a microphone for voice pickup and input for multimedia audio at the table surface.

6. 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. The public address system for emergency communication throughout the courthouse shall also serve the jury assembly areas. These areas may also be used by the court as multipurpose spaces for meetings, training, or multimedia presentations or for public events.

a. Provide a sound system with overhead loudspeakers for voice amplification, television viewing, multimedia presentations, and juror orientation.

b. Provide a 1080p resolution video projector (~5,000–8,000 lumens) on a fixed mount with a lens selected to fill the projection and/or television screens.

c. Provide an electrically operated projection screen, concealed in the ceiling when not in use, sized as large as possible, taking into consideration ceiling height and the requirement that the bottom of the image shall be 48″ above the floor. Match the aspect ratio to the projector.

d. Provide a wireless handheld or clip-on microphone for ad hoc presentations.

e. Provide a wired push-to-talk microphone for announcements.

f. Provide a Blu-ray player for juror orientation.

g. Provide a television tuner to entertain prospective jurors while they wait to be called. Depending on the data source of TV and desires of the individual court, this tuner may be owner furnished.

h. Provide an audio-only miniplug input for a background music source.

i. Provide a single-channel ADA-compliant assistive listening system used to meet ADA requirements.

j. Provide a computer input at the staff counter.

k. Provide a multiformat routing switcher or network switch for source selection.

l. At the discretion of the court, provide an input for the audio and video feed from the high-profile courtroom. This feed must be enabled separately in both the courtroom and the jury assembly room.

m. At the discretion of the court, provide a floor box for a lectern with laptop inputs along with a wired microphone input.

n. Provide an AV control system with one 7″ wired touch panel (PoE) that can be connected via a network cable at the staff counter to control all aspects of the audiovisual system.

7. Training Room

a. Provide a sound reinforcement system with overhead loudspeakers for voice amplification and multimedia presentations.

b. Provide one or more large flat panel displays, appropriately sized for the room.

c. Provide a single-channel ADA/CBC-compliant RF or infrared assistive listening system for use to meet these requirements.

d. Provide a floor box for a lectern or desk with laptop input.

e. At the discretion of the court, provide a wireless handheld or clip-on microphone system.

f. Provide a multiformat routing switcher or network switch for source selection. If feasible, combine this device with the audiovisual control system.

g. Provide one 7″ wall-mounted wired touch panel (PoE) to control all aspects of the audiovisual system.

8. Judicial Conference Room

a. Provide one or more large flat panel wall-mounted displays appropriately sized to the room, with separate side-mounted loudspeakers.

b. Provide a portable ADA/CBC-compliant encrypted RF assistive listening system with a microphone for voice pickup and input for multimedia audio at the desk surface.

c. Provide a floor box under the table with laptop inputs and a line-level output for the assistive listening system.

d. Provide a table box to accommodate the computer input, along with power, data, and audio output to feed the assistive listening system. Cutouts in the millwork shall be provided by the furniture provider.

e. Provide one 7″ desk-mounted wired touch panel (PoE) to control all aspects of the audiovisual system.

f. Provide a teleconference system for making telephone calls with acoustic echo canceling on every input using microphones installed in the table and ceiling loudspeakers. Depending on the courthouse system, the telephone system may be either analog or VoIP.

g. At the discretion of the court, provide an installed videoconference system.

9. Executive Conference Room

a. Provide a sound reinforcement system with overhead loudspeakers for voice amplification (depending on the size of the room) and multimedia presentations.

b. Provide one or more large flat panel wall-mounted displays with separate side-mounted loudspeakers.

c. Provide a portable ADA/CBC-compliant encrypted RF assistive listening system with a microphone for voice pickup and input for multimedia audio at the desk surface.

d. Provide a table box to accommodate input from a laptop, along with power and data. Cutouts in the millwork shall be provided by furniture providers.

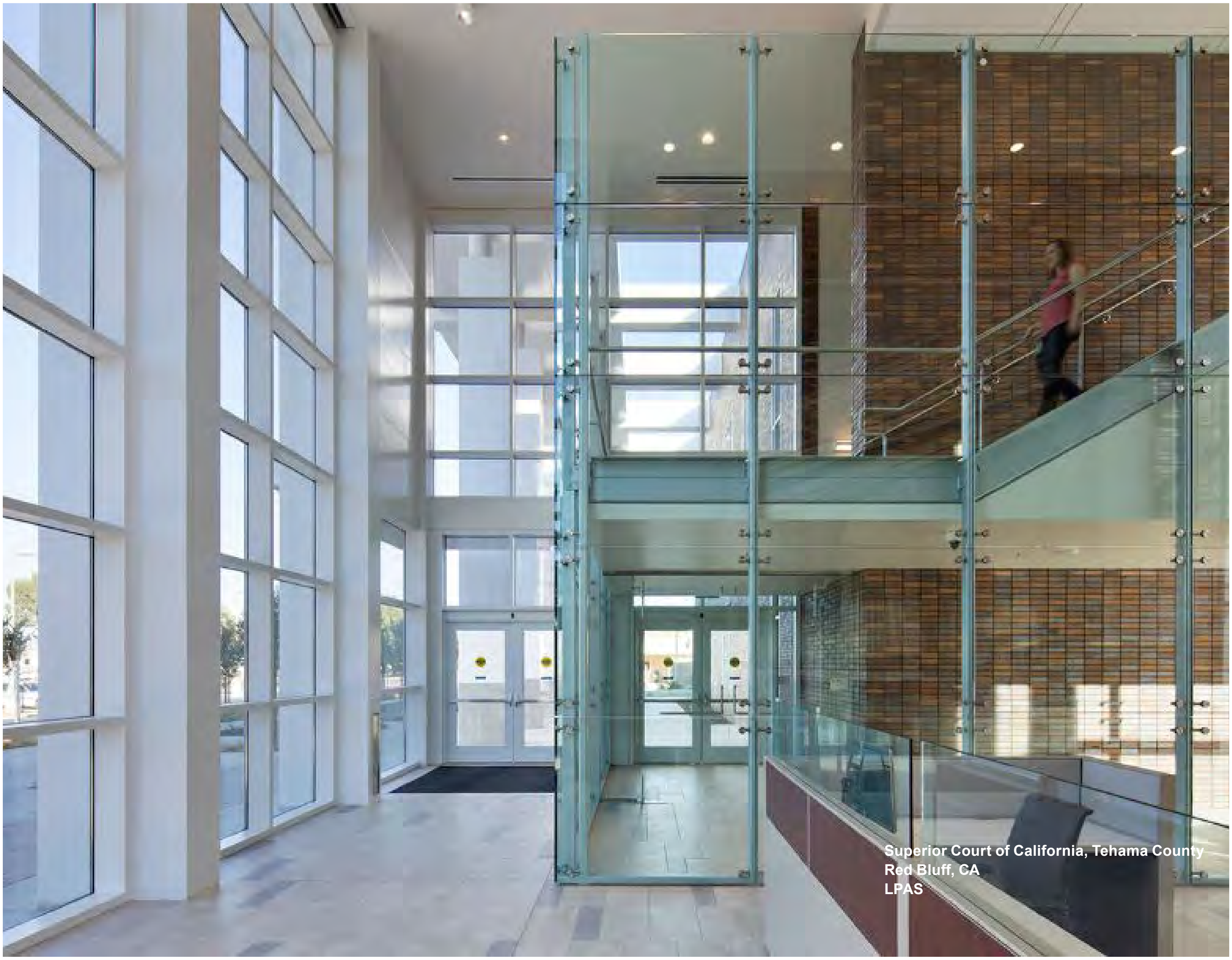
e. Provide a multiformat routing switcher or network switch for source selection and image processing. If feasible, combine this device with the audiovisual control system.

f. Provide one 7″ desk-mounted wired touch panel (PoE) to control all aspects of the audiovisual system.

g. At the discretion of the court, provide an installed videoconference system.

DIVISION TWO: TECHNICAL CRITERIA

19 ACOUSTICAL CRITERIA



Superior Court of California, Tehama County
Red Bluff, CA
LPAS

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, be free of detectable echoes, and 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 should be able to hear and be understood at normal speech volumes.

19.B ACOUSTICAL CRITERIA

1. Background Noise Levels

The acoustic design goal for heating, ventilation, and air-conditioning (HVAC) systems is the achievement of a level of background noise that is unobtrusive and low enough that 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 "Noise and Vibration Control" chapter of the American Society of Heating, Refrigerating and Air-Conditioning Engineers' *ASHRAE Handbook—HVAC Applications* 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. Using Room Criteria (RC) and reverberation time for setting design goals is the preferred method for courtrooms, conference rooms, and other high-occupancy spaces. Office areas and other lower-occupancy spaces may be designed by specifying the noise reduction coefficient (NRC) rating of finishes.

2. 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 reverberation time (RT60). Hard surfaces—such as untreated gypsum board, concrete, glass, and wood paneling—will promote sound reflections and 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 surfaces. Absorptive materials, as well as

Table 19.1 Background Noise Criteria

NOISE CRITERIA	SPACE TYPE—ROOM(S)
NC 30	Courtrooms
	Conference Rooms
	Meeting Rooms
	Training Spaces
	Interview Rooms
NC 35	Judicial Chambers
	Enclosed Offices
	Jury Deliberation Rooms
	Clerk's Office
NC 40	Reception Areas
	Lobbies
	Open Office Areas
	Corridors
	Dining Areas
NC 50	Warehouses
	Parking Garages

proper room shaping or the addition of diffusive panels, also help control any unwanted echoes.

Flutter echo is a resonant echo that occurs when sound reflects back and forth between two parallel, reflective surfaces.

Refer to table 19.2 for room acoustics considerations for select court facility spaces.

Table 19.2 Room Acoustics Requirements

SPACE TYPE	ROOM ACOUSTICS CONSIDERATIONS
Courtrooms	Reverberation time criteria should be 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 station, and clerk's workstation 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 well and the bench. This treatment 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 a 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 finishes can alleviate potential issues.
Conference Rooms, Training Spaces	Reverberation time criteria should be 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 and flutter echo.
	Carpet and upholstered furniture should be considered for conference and training rooms.
Enclosed Offices, Judicial Chambers, Jury Deliberation Rooms, Clerk's Office	The ceilings of these spaces should be a sound-absorptive material with a minimum noise reduction coefficient of 0.70.
Interview Rooms	The ceilings of the attorney side of interview rooms should be a sound-absorptive material with a minimum NRC of 0.70, and floors should be carpeted. The ceilings of the in-custody side of interview rooms should be detention-grade perforated metal and backed with a 1″ thick sound-absorbing material with a minimum NRC of 0.70.
Open Office Areas	The ceilings of open office spaces should be a sound-absorptive material with a minimum NRC of 0.85. Reverberation time criterion should be less than 1.5 seconds.
Lobbies	If lobbies will function as more than just circulation and security checkpoints (for receptions, speeches, gatherings, etc.), the reverberation time criterion should be reduced to approximately 1.0 second.
	A sound-absorptive ceiling is recommended in the lobby to help control excessive reverberation and loudness.
	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 is transmitted through it.

3. Sound Isolation and Speech Privacy

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).

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 acoustic guidelines established by the Office of Noise Control in the California Department of Health Services and other similar requirements for rated assembly types.

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* is speech that is detectable but with individual words that are indiscernible.

To achieve a normal speech privacy level, the sum of both numbers shall equal 70 or more. *Normal speech privacy* is when a few words may be understandable, but complete sentences cannot be comprehended.

For normal to raised speech levels, confidential speech privacy should be achieved when the STC rating of the construction separating two spaces plus the background NC level is greater than 80. A raised voice might result during lively conversation or the use of 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 speech privacy. 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 greater levels of speech privacy.

A higher STC rating or higher 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 electronically.

Details and specifications shall be provided by the design firm to appropriately construct sound-rated partitions in the field. Seal the perimeter of sound-rated walls, penetrating elements, outlets, junction boxes, and low-voltage receptacles to maintain sound isolation.

4. Doors

Doors to noise-sensitive areas should have sufficient sound transmission loss performance so that the partition sound isolation is not unduly compromised. 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. Sound isolation requirements for doors to mechanical rooms should be reviewed on a case-by-case basis.

5. Interview Room Windows

An unamplified passive solution for communication through the window to both sides of an interview room shall be provided; an amplification system shall be avoided. The glazed opening between the attorney and in-custody interview rooms must provide a sufficient free (open) area to support unamplified conversation between the two rooms. See chapter 25, Attorney-Client Interview Room Guidelines.

Table 19.3 Sound-Isolation Requirements

STC OF PARTITION*	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 room 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†
	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 office to adjoining areas
	Private offices requiring confidential speech privacy
	Toilet room to adjoining areas—no plumbing
	Telecommunications and audiovisual rooms with cooling equipment to adjoining areas
	Attorney interview rooms to adjoining areas (unless otherwise noted)
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
	Attorney interview room to public corridor or vestibule
STC 40	General office space to general office space
	In-custody interview rooms to adjacent spaces

* Partitions with doors need only be 10 points greater than the STC rating of the door.

† The partitions between shared restrooms and between restrooms or mechanical equipment rooms and occupied areas, especially 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 restroom or mechanical equipment room is adjacent to occupied space, both stud cavities should be filled with batt insulation, and a minimum of two layers of 5/8″ gypsum board should be installed on the occupied side of the partition.

AHUs = air-handling units

ANSI = American National Standards Institute

dB or dBA = decibel

IIC = impact insulation class

NEMA = National Electrical Manufacturers Association

OITC = outdoor-indoor transmission class

VAV = variable air volume

Table 19.4 Door Requirements

SPACE TYPE	DOOR REQUIREMENTS
Courtroom to Courtroom	Interconnecting doors are not recommended; use vestibules, if possible. If not possible, use only a laboratory-rated STC 53 door (or two fully gasketed doors in tandem).
Courtroom to Jury Deliberation Room	
Jury Deliberation Room	Laboratory-rated STC 43 (an electronic sound-masking system) is recommended in the corridor outside all nonequipment rooms.
Judge's Chambers	
Judicial Conference Room	
Attorney Conference and Interview Room (to public corridor)	
Computer and Server Rooms Containing Fans and Cooling Equipment (to occupied areas)	
Conference Rooms and Training Rooms	A minimum 1-3/4″ 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—is recommended.
Telecommunications and AV Rooms	
Courtroom Public Vestibule (both door sets)	
Courtroom and Attorney Interview Room to Secure Vestibule/Hallway	
Court Reporters' Work Area	
Small Electrical Rooms (to occupied areas)	
Mediation Rooms	
Investigator's Office	
Private Offices Requiring Speech Privacy	
In-Custody Interview Rooms	

6. Operable Partitions

The recommendations below should be considered if operable partitions will be included within the court facility:

a. The operable partition should be chosen with minimum ratings of STC 50 and NIC 42.

b. If the operable partition is separating a conference room, training room, or jury assembly space, an operable partition with a sound-absorptive finish with a minimum rating of NRC 0.65 would be beneficial.

c. Perimeter conditions must be properly detailed to reduce the effect of flanking and to maintain the transmission loss performance of the operable partition. Following are important conditions to consider:

- Provide an overhead barrier above the ceiling. The gypsum board barrier should be constructed without gaps and sealed airtight.
- 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, and the like.
- 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.

7. 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 floor and ceiling construction to insulate impact sounds can be determined by the IIC rating. As with the STC rating, the higher the IIC value of the assembly, the better the construction is at reducing impact noises.

a. 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.

b. Rooms with carpet on a concrete slab should meet a minimum IIC 50 rating.

c. Wood-framed construction presents special impact-insulation problems and should receive careful attention.

d. 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.

8. 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 one to four days, 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 outdoor-indoor transmission class (OITC) and STC ratings required to achieve an interior maximum single-event noise level of 50 dBA. For intrusive noise from exterior sources, such as traffic, calculation of the interior maximum single-event noise level using L10 (the measured noise level that is exceeded 10 percent of the measurement period) is recommended. The L10 is 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.

1. Mechanical, Electrical, Plumbing, and Vertical Transportation Systems and Equipment Noise Control

a. 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.

b. Do not use rooftop down-discharge AHUs, 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.

c. 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 before and following each attenuator should be straight and at least two duct diameters in length.

d. Do not locate variable air volume (VAV) units above courtrooms, chambers, conference rooms, or other rooms with a noise criteria level of NC 35 or less. Instead, locate VAV boxes in corridors or unoccupied spaces. If not possible, a gypsum board ceiling or an enclosure around the VAV box may be required.

e. Locating fan-powered VAV boxes above spaces with a noise criterion of NC 45 or less may require expensive and complicated sound-attenuating ceilings.

f. Do not exceed 1-1/4″ of static pressure at VAV box inlets.

g. Select air diffusers at least five points below the NC rating of the room they serve.

h. Locate volume dampers at least 10′ upstream from air diffusers in rooms with an NC rating of 35 or less. Do not use opposed-blade dampers in the face of outlet devices.

i. Provide a minimum 3′ of insulated-type flexible duct upstream of all supply diffusers and return grilles. The flexible duct should be free of kinks or deformities.

j. Maximum duct velocities shall be designed to meet the requirements listed in the “Noise and Vibration Control” chapter of the *ASHRAE Handbook—HVAC Applications.*

k. Vibration-isolate all mechanical and plumbing equipment per the requirements listed in the “Noise and Vibration Control” chapter of the *ASHRAE Handbook—HVAC Applications.*

l. All mechanical water, domestic water, and steam piping shall be resiliently supported as described in the “Noise and Vibration Control” chapter of the *ASHRAE Handbook—HVAC Applications.*

m. Independent seismic restraints are preferred to vibration isolators with integral seismic restraints.

n. Ductwork attached to the fan discharge is to be connected with a flexible connection.

o. Pipe and conduit penetrations through full-height partitions and floors shall 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.

p. Non-fire-rated ducts penetrating full-height partitions shall have a clear distance of at least 1/2″ 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 and a backer rod, if required.

q. All water pipes should be sized for a maximum velocity of 4 feet per second (fps) for pipe 2″ and smaller and 10 fps for larger pipe sizes.

r. To vibration-isolate transformers, inverters, rectifiers, and an uninterruptible power supply, use flexible conduit and resilient neoprene mounts with a minimum static deflection of 1/4″.

s. Avoid locating transformer rooms near sensitive locations. If not possible, consider double-stud partition construction.

t. Penetrations of cable trays through full-height partitions shall be packed tightly with heavy-density putty once the cables are pulled.

u. 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. Locate the emergency generator within the building, away from any noise-sensitive areas, when possible.

v. Provide transformers with sound levels that do not exceed the following maximums in accordance with National Electrical Manufacturers Association (NEMA) and American National Standards Institute (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 kilovolt-amps (kVA): 45 dB
   - 51–150 kVA: 50 dB
   - 151–300 kVA: 55 dB
   - 301–500 kVA: 60 dB

w. 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.

x. Limit pressure at fixtures to 70 pounds per square inch or less to minimize noise generation.

y. Pipes and conduits should not pass through sensitive spaces to service other areas.

z. Toilet rooms should be located away from noise-sensitive spaces. Do not put plumbing in walls next to or common with these spaces.

aa. Holding cell toilet fixtures should not be installed on partitions adjacent to occupied noise-sensitive spaces.

bb. 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.

cc. Install air chambers or shock-absorbing devices to prevent water hammer in lines subject to abrupt shutoff.

dd. 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 into the building. Elements to consider include, but are not limited to, pumps, motors, hydraulic lines, equipment rooms, hoists, sheaves, control units, roller wheels, and guide rails.

2. Sound Isolation and Speech Privacy

a. Mass and airspace are effective means to increase the sound isolation performance of partitions. Flanking paths, such as above-ceiling ducts or window mullions at partitions, degrade sound isolation performance.

b. The recommendation is to use the lightest-gauge studs possible. The stud depth and stud spacing of the partition should also be considered. The greater the stud depth and stud spacing, the better the partition should perform acoustically.

c. Higher levels of sound isolation are required for incompatible adjacencies or when acoustically sensitive spaces are located near sound-generating equipment.

d. Sound-rated partitions shall be sealed with nonhardening acoustical sealant around the entire perimeter and at partition intersections.

e. Full-height partitions should be used between adjacent rooms where confidential speech privacy or high levels of sound isolation are required.

f. For partitions requiring normal speech privacy, use a foam seal tape between the top of partition and the lay-in ceiling, or extend the partition 6″ above the ceiling.

g. Consider providing a sound-masking system, where the partition construction does not allow adequate speech privacy and/or where the background noise level is expected to be lower than desired.

h. For adjacent spaces along the exterior window façade where speech privacy is required, the joint detail between the partition and the mullion will need to be carefully reviewed and 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.

i. Doors with cam-lift hinges and thresholds are preferable to 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.

j. Use heavy-duty adjustable or dual gaskets, such as compression sound gaskets and smoke gaskets, in tandem, for sound-isolating doors.

k. Use acoustically rated doors where an exceptional degree of sound isolation is required.

l. Avoid duct paths that will create crosstalk between spaces.

m. The return-air path for rooms requiring confidential speech privacy should use a fully ducted return system. If not possible, install acoustically lined sound boots with at least one 90-degree turn on the return grilles. Aim the air opening away from the corridor.

n. Recessed junction boxes of all types must be offset at least 16″ on opposing sides of sound-rated construction.

o. Recessed junction boxes 4-gang and smaller are to have the back and sides sealed airtight using sheet caulking. Junction boxes larger than 4-gang require gypsum board backing.

p. Conduit must not bridge independently framed sound-rated partitions or resilient ceilings by rigidly connecting to the framing. Flexible conduit connections are required.

q. Use plastic tape, fiberglass, or neoprene wrapping to avoid all metal-to-metal contact.

3. Room Acoustics

Excessive 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. The panels should be arranged such that a hard-surfaced panel directly faces a soft panel on the opposing wall.

a. Typical fabric-wrapped sound-absorbing panels shall be at least 1″ thick with a minimum NRC of 0.70 or 2″ thick with a minimum NRC of 0.85 (preferred).

b. Fabric for acoustical panels must be porous. Do not use fabric with acrylic or other impervious backings.

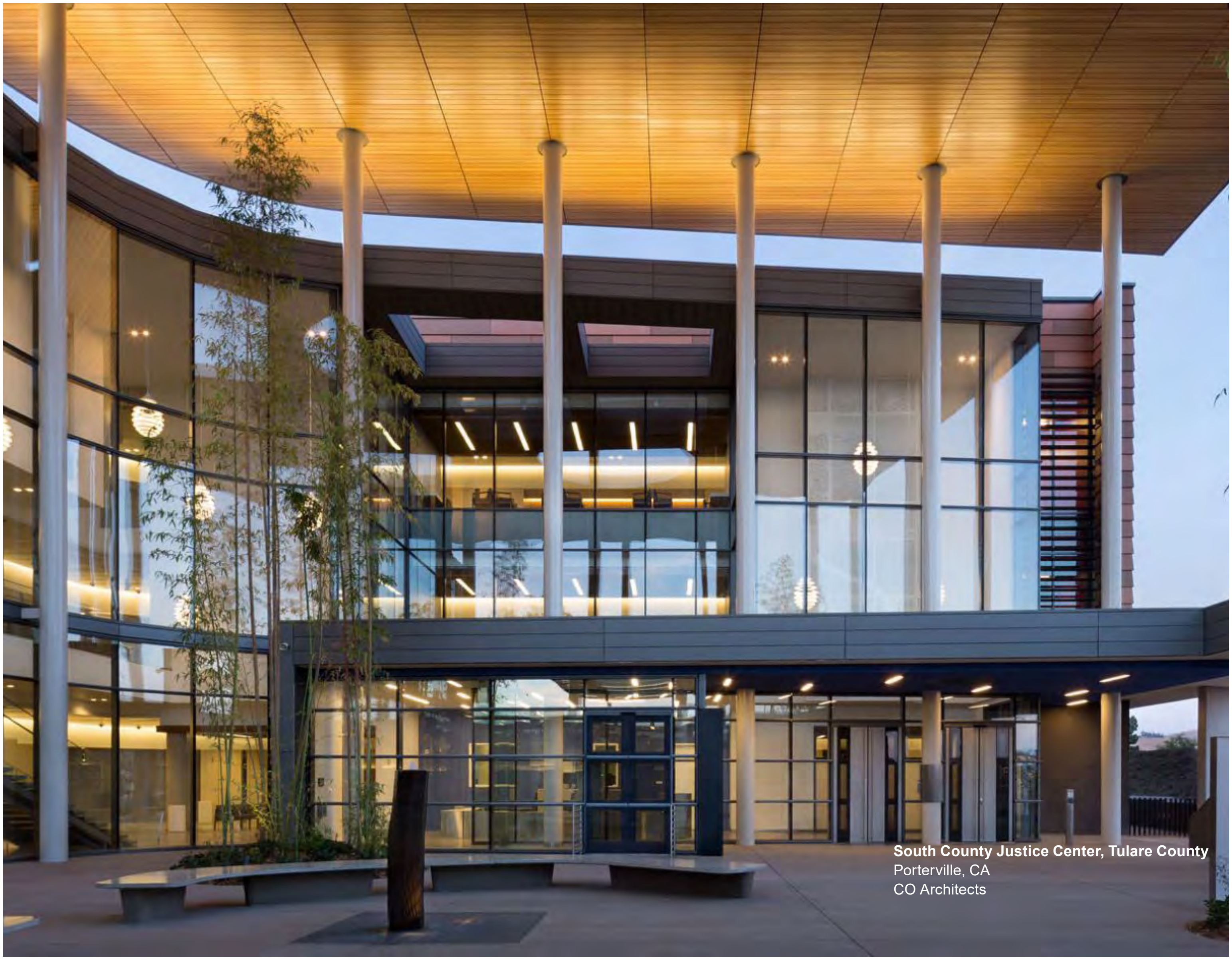
c. Acoustically absorptive materials installed on walls and ceilings should be as uniformly distributed as possible to achieve the target reverberation time as well as good speech intelligibility throughout the space.

d. Avoid concave or domed surfaces, which focus sound energy. If these surfaces cannot be avoided, they must be acoustically treated. Convex surfaces, which scatter sound energy, are preferred.

e. An efficient (i.e., NRC of 0.80+) sound-absorbing ceiling is the most effective initial treatment to control reverberation and loudness in most occupied rooms.

DIVISION TWO: TECHNICAL CRITERIA

20 FIRE PROTECTION CRITERIA



South County Justice Center, Tulare County
Porterville, CA
CO Architects

This chapter defines the general and technical criteria for fire protection systems, including recommendations and minimum acceptable performance criteria.

AHJ = authority having jurisdiction

AWWA = American Water Works Association

DPDT = double pole, double throw switch

NFPA = National Fire Protection Association

20.A OBJECTIVES

Fire protection systems protect life and property from fire through standardization of design, installation, and testing requirements for sprinkler systems based on sound engineering principles, applicable state fire code, and field experience. The following criteria set minimum acceptable standards for design and installation of fire protection systems. New technology and alternative arrangements may be applied with written Judicial Council approval, but they shall not reduce safety levels prescribed by these criteria or by state fire and building codes.

Designers shall use the following criteria to develop fire protection systems for new buildings, automatic sprinkler system retrofits 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 the criteria that satisfy applicable codes.

20.B FIRE PROTECTION CRITERIA

1. Interior Finishes

Wood 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 on the surface only).

2. Automatic Sprinkler Systems

a. All automatic sprinkler systems must be wet-pipe sprinkler systems, unless installed in areas subject to freezing.

b. Automatic sprinkler system zones shall be established by the installation of floor control assemblies for all floors in multistory buildings, including basements.

c. Automatic sprinkler system designs (wet pipe) shall achieve the minimum design criteria listed in table 20.1.

d. High-pressure systems shall be limited to a maximum working pressure of 300 pounds per square inch (psi).

e. All fire suppression systems shall be designed by a California registered fire protection engineer. Deferred-approval construction shop drawings may be prepared by a Class C-16 fire protection contractor (Cal. Code Regs., tit. 16, § 832.16).

Table 20.1 Minimum Design Criteria for Automatic Sprinkler System Designs (Wet Pipe)

OCCUPANCY CLASSIFICATION	DESIGN DENSITY (GPM/FT^2)	DESIGN AREA (FT^2)	HOSE STREAM ALLOWANCE (GPM)*	DURATION OF SUPPLY (MINUTES)
Light Hazard	0.10	1,500	100	30
Ordinary Hazard Group 1	0.15	1,500	250	60
Ordinary Hazard Group 2	0.20	1,500	250	60
Extra Hazard Group 1	0.30	2,500	500	90
Extra Hazard Group 2	0.40	2,500	500	90

* Combined inside/outside.
gpm/ft^2 = gallons per minute/foot squared.

f. Pressure seal-type fittings or methods of joining pipes shall not be permitted.

g. Automatic sprinkler system control valves must be located in accessible spaces; they are not permitted in above-ceiling spaces.

h. Onsite water storage, where required, shall be designed and installed per NFPA (National Fire Protection Association) Standard 22.

i. For automatic sprinkler systems in mechanical rooms, install the sprinkler system per NFPA requirements using corrosion-resistant, standard-response sprinklers.

j. Coordinate the location of each sprinkler head with the various systems shown in the 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.

k. Coordinate with the local fire authorities the location, signage, keying, and access of fire sprinkler shutoff and zone valves. Access and signage shall be obvious. Visibility shall not be blocked by equipment.

l. Coordinate sprinkler drain locations with plumbing drawings.

m. Specify sprinkler head guards to be installed on any heads subject to possible damage. Sprinkler head guards shall be Underwriters Laboratories (UL) listed.

n. Sprinkler guards must be provided on sprinklers installed in the following locations:

- Within elevator machine rooms and elevator pits.
- Within electrical closets.
- Within electrical equipment rooms.
- Less than 7′6″ above the floor.
- In main distribution frame (MDF) rooms, unless concealed-type sprinklers are installed.

o. On retrofit projects, replace existing standard-response sprinklers in light-hazard areas with quick-response sprinklers throughout the areas being retrofitted.

p. Provide adequate access to fire tank and pipe, and avoid confined space entry conditions. Underground fire tank, if applicable, shall be installed outside the building foundation.

3. Hydrants

Design and installation shall comply with NFPA 24 and meet requirements of the California Office of the State Fire Marshal and the local fire department, except as follows.

a. Contact the responding fire department for hydrant requirements.

b. Fire hydrants shall be located as required by the section 507.5 and Appendix C of the California Fire Code (Cal. Code Regs., tit. 24, pt. 9). The approximate distance between a fire hydrant and the building fire department connection shall be 50′.

c. Wet barrel hydrants are preferred where piping is not subject to freezing.

d. 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 the street to allow straight-line connection to the pumper.

DIVISION TWO:
TECHNICAL CRITERIA

11 Architectural Criteria
12 Structural Criteria
13 Mechanical Criteria
14 Building Management System Criteria
15 Electrical Criteria
16 Lighting Criteria
17 Network and Communication Systems
18 Audiovisual Systems
19 Acoustical Criteria
20 FIRE PROTECTION CRITERIA
20.A Objectives
20.B Fire Protection Criteria
20.C Fire Alarm System Objectives
20.D Fire Alarm System Criteria

e. Design site grading for surface drainage away from the hydrant.

4. 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.

a. Specify that a single vendor furnish pumps, motors, transfer switches, and all controls, and specify that all equipment be UL listed.

b. Require the pump manufacturer or representative to provide the services of a qualified engineer for startup and acceptance testing, in the presence of the authority having jurisdiction (AHJ).

c. 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.

d. Where an emergency generator is required or provided, and the emergency generator is intended to provide secondary or backup power to the fire pump, coordinate the electric fire pump starter type and loads with the generator for adequate starting capacity.

5. Piping Requirements

a. All above-ground automatic sprinkler system piping shall comply with the provisions of NFPA 13, section 6.3. Only black steel piping shall be allowed for above-ground piping.

b. For above-ground piping, provide a single air vent at a high point in the system in accordance with NFPA 13, section 7.1.5.

c. All underground fire protection piping shall comply with NFPA 24, section 10.1.1.

d. For corrosive soil areas, the underground piping shall be encased in polyethylene encasement in accordance with AWWA (American Water Works Association) C105 and shall be provided with cathodic protection.

e. 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.

f. Local water purveyor or fire or building department requirements for corrosion protection, if any, shall be incorporated into the project requirements.

g. Continuous detectable warning tape shall be installed directly above all underground fire service line piping, approximately 1′ below the finished grade surface.

h. When backflow preventers are installed in fixed fire protection systems for new buildings, a test connection must be provided downstream of all backflow prevention valves for flow tests at system demand.

i. 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 no more than five fire appurtenances are affected by shutdown of any single portion of the fire service main. Each fire hydrant, fire sprinkler system riser, and standpipe riser shall be considered a separate fire appurtenance.

j. Steel piping having a corrosion-resistant ratio less than 1 is not permitted to be installed.

k. Plain-end fittings are not permitted to be installed.

l. The automatic sprinkler system drainage piping shall be specified as galvanized steel pipe with galvanized threaded malleable iron fittings.

m. Install above-ground pipe, fittings, and hangers in accordance with NFPA 13 and local code requirements, including seismic sway and uplift bracing. Additional requirements for earthquake bracing shall be in accordance with NFPA 13, or a structural engineer shall sign the sway bracing details.

n. Make reductions in pipe sizes with one-piece reducing fittings. Bushings will not be acceptable, except when standard fittings of proper size are not manufactured.

o. Provide next to sprinkler main risers a framed, printed sheet—protected by transparent plastic, safety glass, or a plexiglass cover—with brief instructions regarding all necessary aspects of sprinkler controls and emergency procedure.

p. Install the 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 drainpipes for each sprinkler riser, and test connections to the building sanitary sewer system. The sewer system has to accommodate full flow for the main drain.

q. 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.

r. Install a hinged chrome-plated escutcheon at all visible wall, floor, and ceiling pipe penetrations in finished areas.

s. 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 a supervisory switch at these valves.

t. 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.

6. 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.

7. Piping Specialties

a. Specify piping specialties that are UL listed and made by a single manufacturer.

b. Specify pressure gauges to be 3-1/2″ dial with a dial range of twice the system working pressure, 1/4″ bottom connection, and shutoff valve.

c. Specify flow switches with adjustable time delays, UL listed. Each must have two contacts for local and remote alarms, double pole, double throw (DPDT).

d. Specify inspector's test and drain valve assembly in accordance with NFPA 13.

e. Specify valve supervisory switches to be UL listed, 120VAC (volts of alternating current)/30 VDC (volts of direct current), with DPDT.

f. Other specialty items shall be specified as by NFPA 13 or local conditions and codes.

g. Specify the sprinkler heads to be UL-listed automatic sprinklers in accordance with the following:

  - Specify a temperature rating of 155 degrees Fahrenheit (°F)–165°F, except when the application requires a higher rating.
  - Specify a 200°F temperature rating for sprinkler heads in all switchgear rooms, electrical rooms, elevator machine rooms, mechanical rooms, and skylights, and where required by NFPA.
  - Provide detention-grade, ceiling-mounted sprinkler heads in all inmate-accessible areas. Sprinkler heads must meet Compliance Services and Assessments (CSA) standards for suicide prevention and be located a minimum of 8′ above the finish floor. The sprinkler heads come with a factory finish. Tyco sprinkler heads shall be the basis of design and pricing, with smooth underside and no protruding elements.
  - Specify standard response–type sprinkler heads—upright, sidewall, or pendant—in open ceiling areas and for switchgear rooms, electrical rooms, elevator machine rooms, mechanical rooms, and other service areas.

8. Fire Department Connections

Specify the fire department connections (FDC) to be provided in accordance with NFPA, California Fire Code, and local fire department requirements. Hose threads shall conform to the standards of the responding fire departments.

The FDCs 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 hose thread swivels, of a style to meet local fire department requirements with threaded caps and chains. All hose inlets and threads shall meet National Standard Thread requirements and conform to local fire department requirements.

9. Sprinkler Control Valves

Specify sprinkler control valves to be UL listed, all with supervisory switches.

10. Post Indicator Valve (PIV) Assembly

When required by the local authorities, specify UL-listed PIV assembly. PIVs shall be monitored by the building fire alarm system.

11. Main Distribution Frame / 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 the Judicial Council, an automatic clean agent fire suppression system compliant with NFPA 2001 in high-value critical facilities rooms may be allowed in addition to the required automatic sprinkler protection. The detection system shall use cross-zone or counting-zone photoelectric detectors.

Activation of a minimum of two detectors is required before the agent discharge countdown sequence can begin. The quantity of detectors shall be determined by airflow within the hazard area, but the area protected shall not exceed 250 square feet per detector. Minimum detection to be provided for each clean agent protected room shall be two counting-zone detectors or two cross-zone detectors.

12. Coordination

a. Fire protection systems shall be coordinated with other specification sections, such as earthwork, architectural, site utilities, concrete, plumbing, structural, electrical, sheet metal, and mechanical sections.

b. All electrical equipment provided under fire protection systems shall be specified with wiring diagrams for interfacing with electrical work.

c. Coordinate automatic sprinkler systems with the building fire alarm system for transmitting all flow and tamper alarms.

d. The edge-of-slab fire-rated UL system shall address general requirements for protection of steel per the Office of the State Fire Marshal. Specify how ratings are to be maintained where walls abut exterior window walls and/or columns.

e. Specify that the Office of the State Fire Marshal may require sequential inspection of each component of the rated walls.

f. Clearly define fire and temperature rating requirements and products for mechanical, electrical, and plumbing systems (e.g., piping and conduit), and for large banks of pipes, conduits, and bus ducts.

13. Guarantee

The fire protection work shall be free from defects of workmanship and materials for two years after filing notice of completion, and the general contractor shall remedy any defects developing during this period, free of charge. Manufacturers whose equipment has a longer guarantee period shall provide a written guarantee.

14. 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 the Office of the State Fire Marshal before final acceptance of the fire protection system.

15. Cleaning

Specify that the sprinkler heads placed before 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 on sound engineering principles, applicable state and local codes, and field experience. These 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 construction of new buildings, retrofit of existing buildings, and 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.

The fire alarm system shall be coordinated with other specification sections, such as architectural, site utilities, plumbing, fire sprinkler, electrical, telephone, data, security, intelligent building, and mechanical systems.

20.D FIRE ALARM SYSTEM CRITERIA

1. General Requirements

a. The fire alarm and notification system shall be UL listed, State Fire Marshal approved, and manufactured by firms regularly engaged in manufacturing fire detection, alarm, and communication systems; be of types, sizes, and electrical characteristics required; and use products that 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 any networked remote fire alarm panels, where Class A wiring shall be provided. Minimum conduit size throughout the installation shall be 3/4″.

b. All fire alarm systems shall be designed by a California registered fire protection engineer; deferred-approval construction shop drawings may be prepared by a Class C-10 fire protection contractor.

c. The fire alarm system shall be specified with the following:

- For non-high-rise buildings, the fire alarm control panel shall be located in the security operations 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.
- For high-rise buildings, the fire alarm panel and other equipment and documentation, as required by section 508 of the California Fire Code, shall be located in the fire command center. It shall be shown in plans and elevations with all systems included. The layout shall be coordinated with the local fire department, and access shall be from within the building.

d. Fire alarm systems shall include 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.

e. 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 an all-call basis.

f. All fire alarm signals (i.e., alarm, supervisory, and trouble signals) must be automatically transmitted to a UL-listed central station service using one or more of the methods allowed by NFPA 72, section 26.6. Operation of a duct smoke detector is permitted to initiate a supervisory signal.

g. Manual fire alarm boxes must be installed in accordance with the requirements in NFPA 72 and the California Fire Code.

h. Fire alarm control units and annunciators shall be semirecessed in finished areas.

i. All wiring entering or exiting a fire alarm control panel must be clearly labeled marking destination or source and purpose (e.g., “Fan #22 Shutdown”).

j. In the event of primary power failure, all fire alarm systems shall be provided with battery backup power to accommodate a 24-hour standby load plus 15 minutes of alarm condition load.

k. 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, and elevator machine rooms. When smoke detection is installed in rooms having medium-voltage equipment, the smoke detection must not be installed directly above the medium-voltage equipment. MDF rooms containing server or mainframe computer equipment shall be provided with smoke detection connected to the fire alarm system, unless separate smoke detection provision (e.g., dedicated to clean agent systems detection or actuation) already exists.

l. Visible notification appliances are not permitted to be installed in exit stairwells.

m. All non-high-rise fire alarm systems must have an annunciator located near the primary fire department entrance to the building, except when the fire alarm control panel is already present in this location.

n. Fire alarm system signaling line circuits 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.

2. Rational Analysis

a. A rational analysis shall be performed and a report prepared to establish minimum requirements for the design, installation, and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants. The report and associated design, complying with the California Building Code, shall be submitted with the construction documents.

b. Provide a smoke control system where required by code. Roll-down doors provided as part of smoke control in high-volume spaces shall have smoke control fire alarm position switches for the smoke control panel.

c. Specifications shall describe the intent, scope, responsibilities, weekly testing, referenced specifications, and the like for the smoke control system. Include testing requirements for systems that use ductwork for both smoke exhaust and normal return. The smoke control ductwork pressure class shall be noted on supply, exhaust, and return systems. Define the testing requirements of the electric resettable link (ERL).

3. Quality Assurance

a. All materials specified shall be the best available, new, and approved by UL and the California Office of the State Fire Marshal.

b. All panels and peripheral devices shall be the standard product of a single fire alarm system manufacturer, under the appropriate UL category.

c. Installer shall be qualified with at least five years of successful installation experience on projects with fire detection, alarm, and communication systems installation work similar to that required for the project.

d. Comply with the California Energy Code, as applicable for construction and installation of fire detection, alarm, and communication system components and accessories.

e. The fire detection, alarm, and communication system components and accessories shall comply with all federal and state standards.

4. Identification

Specify that the proper identification and signage be provided at each fire alarm panel, conduit, branch circuit, pull box, and junction box using industry-standard materials and methods.

5. Guarantee

The fire alarm work shall be free from defects of workmanship and materials for two years after filing notice of completion, and the general contractor shall 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 requirements for the 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.

6. Tests and Adjustments

Specify that after installation has been completed, the entire system be tested in accordance with NFPA 72 by the contractor in the presence of the AHJ.

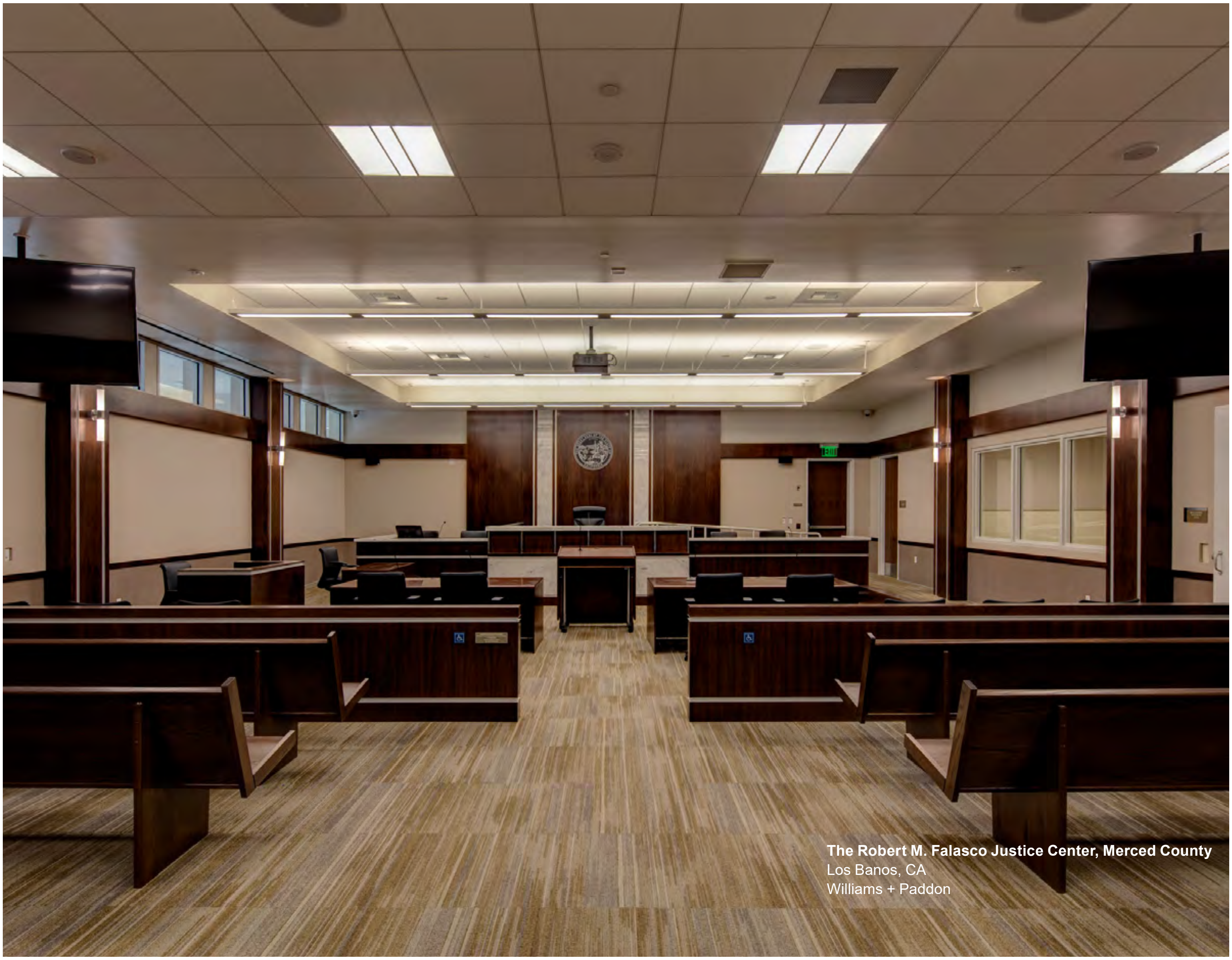
7. Installation Contractor Certification

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.

REQUIRED TOOLS

REQUIRED TOOLS

21 LIFE CYCLE COST ANALYSIS



The Robert M. Falasco Justice Center, Merced County
Los Banos, CA
Williams + Paddon

21.A PURPOSE

The life cycle cost analysis (LCCA) procedure documents the standardized process for conducting a life cycle cost analysis. LCCA is an economic assessment of an item, system, or facility considering all significant costs of ownership over an economic life, expressed in terms of equivalent costs. To ensure that costs are compared on an equivalent basis, the baselines used for initial cost must be the same as those used for all other costs associated with each option, including maintenance, operating cost, and replacement. LCCA is especially useful when comparing project alternatives that differ with respect to initial costs and operating costs in order to select the option that maximizes net savings.

LCCA is used to compare various options by identifying and assessing economic impacts over the whole life of each alternative. Future costs over the life of a facility—including operations, maintenance, and replacement—typically will match or exceed the initial cost of facility procurement. If staffing and other use costs are factored into the analysis, the initial procurement may be less than 20 percent of the total cost of ownership. Nearly every decision made during design and construction affects project costs. Some decisions are straightforward because they affect building performance or respond to codes and standards and their cost ramifications are apparent. Others are more subtle in their effect on cost and can profoundly affect disciplines and building systems beyond the prime decision maker, such as insulation or glazing choices, which affect building heating and cooling. Most design choices have a major effect on life cycle costs.

The Judicial Council expects designers to control future facility expenditures, while avoiding placing an undue burden on initial costs. The move toward sustainable design has highlighted the need for sensitivity to future cost. LCCA is an important tool in making more effective design decisions—ultimately for managing costs throughout the life of a facility, seeking optimum life cycle cost and balancing functional needs with economic limitations. Figure 21.1 shows the comparison between low first cost versus optimum life cycle cost.

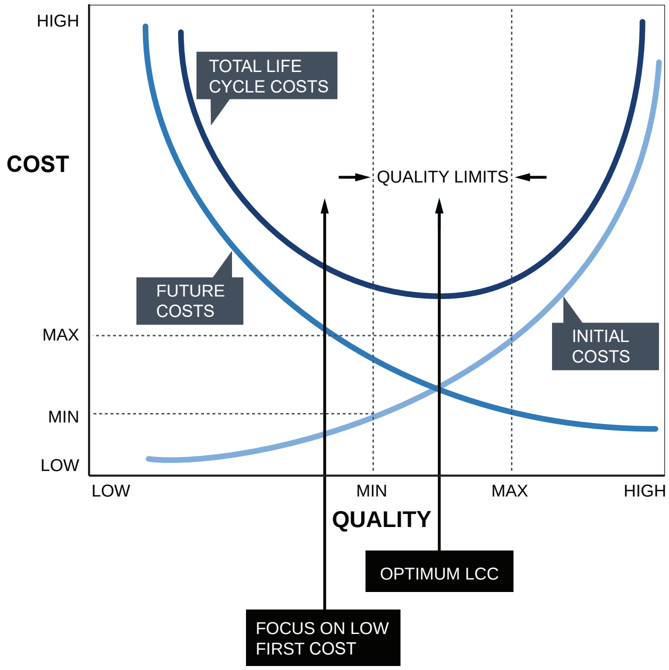


Figure 21.1 Life Cycle Cost Curve

There will always be questions on how best to prioritize design choices. The overriding requirement is to optimize life cycle costs while maintaining cost management responsibility for the construction cost limitation.

This topic discusses methods for defining, estimating, and managing life cycle costs.

21.B PRINCIPLES

In making decisions, both present and future costs need to be taken into account and related to one another. A dollar today is not equal to a dollar tomorrow. Money invested in any form has the capacity to earn interest. A current dollar is always worth more than the prospect of a dollar at some future time. The exact amount depends on the investment rate (interest or the cost of money) and the length of time. This relationship—that money has the power to earn more money—is fundamental to economic analysis and LCCA.

The terms *interest rate* and *discount rate* are generally used synonymously. *Interest* is more commonly used in financial analyses, whereas *discount* is more often used in economic studies. Both terms refer to the annual growth rate for the time value of money.

At a 5 percent discount rate, a dollar will grow in value by a factor of approximately 3.5 over a 25-year period; at a 15 percent discount rate, the factor is nearly 35. Even though the discount rates differ by a factor of 3, the resulting relationship in value differs by a factor of nearly 10. The selection of a discount rate is important to an LCCA.

What does the term *real discount rate* mean? Inflation can affect an economic analysis because over time it reduces the purchasing power of currency. This effect means that more currency in the future will be required to purchase the same goods.

General inflation does not directly affect the actual time value of money because, under all circumstances, money must have a time value. Inflation, however, does affect how the time value is calculated and must be accommodated in the calculation. So, if the real time value of money is 5 percent and inflation is predicted to be 3 percent, then any discounting analysis would need to use 8 percent as an interest rate and inflate all future costs by 3 percent. This is called a *current dollars analysis.*

As a simplification, especially in comparative analyses not used for cash flow calculations, constant dollars may be used. In this case, a 5 percent discount rate would be used and all future costs would be held at the base date relative cost and not inflated.

For all Judicial Council analyses a real discount rate (exclusive of inflation) of 3.25 percent will be used unless otherwise directed.

The one exception for an adjustment to a real discount rate would be for any future costs expected not to follow inflation. For example, energy costs have tended to increase at 1 to 2 percent above inflation over the last 10 years. In this case, future energy costs would be inflated differentially (above the general inflation rate) by 1 to 2 percent. This effect is referred to in economic analyses as *escalation*.

1. Economic Analysis Period

The economic or study period used when comparing alternatives is an important consideration. Predicting future costs for 25 to 40 years is usually long enough to capture the most significant costs for economic purposes. Nearly 90 percent of the total present value equivalent cost is consumed in the first 25 years at a 5 percent discount rate. For this reason, periods longer than 40 years generally add little benefit to an LCCA unless very low (below 2 percent) interest rates are used.

The Judicial Council requires a 30-year economic analysis period, unless there is a specific reason to deviate.

2. Life of an Element

A time frame must also be identified for each system or component under analysis relative to the overall study period. The *technological life* of an item is the estimated number of years until technology causes the item to become obsolete. The *useful life* of an item is the estimated number of years during which it will perform its function according to some established performance standard. The *economic life* of an item is the estimated number of years until that item no longer represents the least expensive method of performing its function.

The economic life is the most important of the three from the viewpoint of cost optimization. It is also generally the shortest, with the exception of consequential technological changes that bring in new solutions at much lower cost. However, technological and useful lives of an item should still be considered when its economic life is estimated.

Extending the life of an item beyond its economic life in an LCCA is generally economically neutral or negative. For example, a rooftop heating, ventilation, and air-conditioning (HVAC) component can operate past its 20-year economic life but will require above-normal maintenance, is more likely to fail, and will use more energy. The result in terms of total life cycle cost will be similar to simply allowing for replacement at the 20th year.

For all Judicial Council analyses, the economic life of systems or components will be used unless otherwise directed.

Table 21.1 provides guidelines for facility component economic life. Reference is from various sources, including *Life Cycle Costing for Facilities* by Alphonse J. Dell'Isola and Steven J. Kirk (RSMeans, 2003).

3. Categories of Cost

Over the life of a facility, costs will be expended on a broad range of components and for numerous purposes. A life cycle cost analysis is a comparative analysis; therefore, it is important that costs be properly identified and categorized ***so that common items can be eliminated from the analysis and effort can be focused on the difference between critical items.***

The costs of owning a facility can be subdivided as follows:

- Initial Costs
    - Construction
    - Fees
    - Other initial costs
- Future facility one-time costs
    - Replacements
    - Alterations

Table 21.1 Economic Life of Building Components

COMPONENT	ECONOMIC LIFE (YEARS)
General Construction (Divs. 2–14)	
Foundations	30(+)
Substructure	30(+)
Superstructure	
Steel	30(+)
Masonry	30(+)
Concrete	30(+)
Exterior Closure	
Masonry	30
Wood	20
Precast	25
Steel/Aluminum Curtain Wall	30
Glazing Systems	25
Sun Control Devices	15
Roofing	
Built-up	17
EPDM Single-ply	20
Interior Construction	
Drywall Partitions on Metal Studs	20
Masonry Interior Walls	30
Interior Finishes	10–20
Conveying Systems	
Passenger Elevators	30
Escalators	20
Equipment	10–20

EPDM = ethylene propylene diene monomer.

VAV = variable air volume.

COMPONENT	ECONOMIC LIFE (YEARS)
Mech/Elect Construction (Divs. 21–28)	
Plumbing	
Piping	30
Fixtures	20–30
Hot Water Heater	25
Roof Drainage	30
Air Conditioners	
Water-cooled Package	15
Computer Room	15
Rooftop Multizone	20
Boilers	
Steel/Cast Iron	25
Electric	15
Furnaces: Gas or Oil-fired	18
Unit Heaters	
Gas or Electric	12
Hot Water or Steam	20
Air Terminals	
Diffusers, Grilles, and Registers	25
Fan Coil Units	20
VAV Boxes	20
Duct Work	30
Fans	20–25
Chillers	20–25
Cooling Towers	20–25
Pumps	15–20
Controls	15–20
Electric Motors	15
Motor Starters	17
Branch Circuits and Wiring Devices	20
Switchgear	20
Liquid-filled Transformers	30
Dry-type Transformers	25
Interior Lighting Systems	20
Communications Systems	15-20
Engine/Generators	20
Turbine/Generators	25

  - Salvage
  - Other one-time costs
- Future facility annual costs
  - Operations
  - Maintenance
  - Financing
  - Taxes
  - Insurance
  - Security
  - Other annual costs
- Functional-use costs
  - Staffing
  - Materials
  - Denial of use
  - Other functional-use costs

Initial costs include construction, fees, and costs such as land acquisition and moving. These represent up-front costs associated with facility development. Future one-time costs represent major expenditures that are not annual (although they may be periodic) and include replacement, elective alterations, and salvage.

Facility annual costs include all costs to run the facility itself, such as operations, maintenance, and other built environment costs.

Functional-use costs are costs associated with using a facility, including staffing, materials, and any other nonfacility costs. Items such as denial-of-use costs may be necessary during construction and may include temporary space, operations, and added security.

4. Life Cycle Costing Procedures

Life cycle costing focuses on comparing competing alternatives. To compare alternatives, both present and future costs for each alternative must be brought to a common point in time using one of two methods: costs may be converted into today's costs by the *present-worth method*, or they may be converted to an annual series of payments by the *annualized method*. Either method will properly allow comparison between alternatives.

4.1 Present-Worth Method

The present-worth method requires conversion of all present and future expenditures to a baseline of today's cost. Initial (present) costs are already expressed in present worth. Future costs are converted to present value by applying the factors presented previously.

4.2 Annualized Method

The annualized method converts initial, recurring, and nonrecurring costs to an annual series of payments and may be used to express all life cycle costs as an annual expenditure.

Mortgage payments are an example of this procedure.

4.3 Other Economic Analysis Methods

Other methods of economic analysis can be used in a life cycle study, depending on the client's requirements and special needs. It is possible to determine the payback period, to establish a break-even point between alternatives, to determine the rate of return on total investment and extra investment, to determine rate-of-return alternatives, to perform a cash flow analysis, and to review the benefits and costs.

All methods, correctly applied, will yield results pointing to the same conclusion.

The Judicial Council requires the present-worth analysis to be used for LCCA.

5. Accuracy Requirements for LCCA

To perform a life cycle cost analysis, certain assumptions must be made. These assumptions concern significant economic variables, including discount rate, study duration, and escalation, as well as data defining cost and performance of competing alternatives. Seldom are clear-cut, obvious, and easy choices available. Invariably, good judgment, experience, and common sense need to be used in making decisions. Here are some guidelines to consider.

- Issues common to all alternatives can be ignored. The objective of LCCA is to select between competing alternatives. Therefore, assumptions need to be made and data that are sufficient to distinguish performance need to be gathered only for issues that differ between the alternatives.
- In general, because of likely margins of error in estimating costs, alternatives would have to exhibit a life cycle cost (LCC) differential greater than 10 percent to be judged conclusive. Numeric accuracy should be balanced between the need to differentiate the alternatives and the dependability of input information. Much of the LCC data available have been gathered from observation and are inherently highly variable.
- A sensitivity analysis should be considered whenever assumptions may be deemed questionable. Even when differentials exceed 10 percent, confidence in major variables in the analysis may limit confidence in the overall conclusions. In these instances, a sensitivity analysis may be required. It involves conducting multiple LCCAs using extremes of the cost parameters in question and evaluating the resulting sensitivity of the analysis to the assumptions. To reach the same overall conclusion even when assumptions are significantly varied is not uncommon.

6. Typical Areas of Study

The areas of study for an LCCA will vary among facilities and, to some degree, by geographic location. Table 21.2 of components that are typically selected for study provides some general areas for consideration.

7. Sources of Life Cycle Cost Data

Obtaining life cycle cost data is a challenge. Even when data are available, their applicability to a specific project may be questionable. That said, several sources of LCC data are available, including *Cost Planning and Estimating for Facilities Maintenance*, an annual publication of RSMeans; *Life Cycle Costing for Facilities*, an RSMeans publication; and CBRE's CostLab system.

Table 21.2 Typical Components to Be Considered in a Life Cycle Cost Analysis

COMPONENT	TYPICAL ALTERNATIVES TO BE ANALYZED
Predesign	
	Impacts of new acquisition, leasing and/or public-private partnerships
	Renovation, upgrade, or revitalization of an existing facility
	Use of other state facilities
General Life Cycle Cost Issues for All Components	
	Element/component service and replacement life
	Maintenance and maintainability
	Direct and indirect energy impacts
Site and Program	
	Building shape and orientation on the planned site (including impact on adjacent buildings)
	Alternative sites
	Seismic, environmental, and community issues
Architecture	
Substructure	
	Foundations—Water infiltration, special seismic features
	Slab on grade—Special loads, vibration isolation
	Basement excavation—Use of import/export materials
	Basement and retaining walls—Water infiltration
Superstructure	
	Floor construction—Seismic impacts, floor displacement, noise isolation, security
	Roof construction—Seismic impacts
	Stair construction—Long-term maintainability, safety
Wall construction	
	Increased insulation levels, insulation placement, etc.
	Mass (passive solar thermal storage)
	Daylighting
	Building envelope (exterior closure) type
Fenestration	
	Type, amount, and location/orientation of glass
	Indoor/outdoor shading devices
	Daylighting
Interior space plan	
	Space arrangement and circulation
	Demising walls and partitions
	Finishes and colors
	Ceiling and plenum heights

Table 21.2 continues on next page

Table 21.2 Typical Components to Be Considered in a Life Cycle Cost Analysis *continued*

COMPONENT	TYPICAL ALTERNATIVES TO BE ANALYZED
Architecture *(continued)*	
Roof construction	
	Increased insulation levels, type of insulation
	Roof membrane type and color
	Daylighting
Conveyances	
	Selection of elevators and dumbwaiters
	Escalators
Secondary HVAC systems	
	System types and zoning
	Operating plans, economizer cycle(s) and optimization
	Heat recovery (exhaust air, internal source, etc.)
	Controls
Primary HVAC systems	
	System types and energy sources
	Pumping/piping configuration
	Heat recovery (waterside economizer cycle, etc.)
	Thermal storage (electrical demand shifting)
	Controls
Plumbing	
	Domestic hot water generation (method and energy source)
	Water source—Municipal, well, or harvested
Electrical	
Lighting and communications	
	System selection
	Artificial lighting levels, methods, and control
	Daylighting
	Photovoltaic sources
	Communications and data management
Power	
	Voltage selection (building and large equipment)
	Transformers (quantity, locations, efficiencies)
	Emergency power

8. Design and Analysis Tools

The use of computer tools can considerably reduce the time and effort spent on formulating the LCCA, performing the computations, and documenting the study. The Judicial Council will provide an Excel spreadsheet for use with LCCA efforts.

As an alternative, the Building Life Cycle Cost (BLCC) Program—an economic analysis tool developed by the National Institute of Standards and Technology for the U.S. Department of Energy's Federal Energy Management Program (FEMP)—can be used.

9. LCCA Study Requirements

LCCA studies are required for the major systems and components of court facilities that are energy and maintenance sensitive. Refer to table 21.3. Typically, these studies would include:

- HVAC systems;
- Impact on overall building from seismic structural systems;
- Electrical lighting;
- Electrical power distribution;
- Flooring systems;
- Exterior closure;
- Fenestration;
- Solar panels; and
- Water distribution.

The number of studies required will be determined on a project-by-project basis.

Table 21.3 Number of LCCA Studies by Size of Courthouse

Number of Courtrooms	≤4	5–7	8–14	>14
Number of LCCA Studies Expected	1–2	2–3	2–4	3–5

10. Conducting an LCCA

An important aspect in LCCA is identifying appropriate alternatives and establishing good cost data.

Step 1: Identify Alternatives
The types of alternatives considered depend on the creativity of the design and management teams. The baseline and alternatives should represent a wide range of solutions to the identified objectives. It is often helpful to use an interdisciplinary team during this stage to draw from a wide range of backgrounds, perspectives, and past experiences. Developing specific criteria to measure the effectiveness of the proposed alternatives is also helpful.

Step 2: Define Parameters
The discount rate (3.25 percent) and analysis period (30 years) are defined by the Judicial Council. Any variations must be approved before an LCCA may be conducted.

Life expectancies for individual elements or components being studied are expected to be defined by the design or design-build team.

Differential escalation rates for energy are built into the LCCA Excel form (and the BLCC program) and are a function of the fuel type being consumed. Escalation rates for all other components of the analysis are up to the design or design-build team.

Step 3: Identify Costs and Savings
Typically two types of costs—nonrecurring and recurring—must be estimated. A nonrecurring cost appears as a lump sum cost in the present or at a fixed point in the future. An example of a nonrecurring cost is the capital expenditure for a new high-efficiency chiller unit.

Recurring costs are paid out periodically over the lifetime of the facility. An example of a recurring cost is a capital cost that is expected to occur in the future. Repair or maintenance costs that occur on a regular basis are also considered to be recurring costs.

Step 4: Document Baseline and Alternatives
Assumptions and cost information should be documented, along with eventual recommendations. The evaluation form shown in table 21.4 provides an approach. Most efforts can be defined on a single page.

Step 5: Perform the LCCA
Use the Excel spreadsheet provided by the Judicial Council to prepare an analysis for the system being evaluated. Alternatively, the BLCC program can be used. See table 21.5 for instructions followed by table 21.6 and figure 21.2 for an example project.

Step 6: Provide Documentation for Review and Acceptance
Provide forms; exhibits, as necessary; and the Excel spreadsheet—all in PDF form.

21.C PERFORMING LCCA

1. Overview

The life cycle cost analysis worksheet is a simple spreadsheet for use in comparing up to three options against a baseline design case to determine financial performance and life cycle cost. This spreadsheet is useful for identifying options for further study. It is not intended to provide a complete and detailed study, especially one representing cash flow.

2. Limitations

The spreadsheet does not consider effects of depreciation, tax alternatives, variable escalation of interest rates over a period of time, or other factors that may change the valuation or payback of an asset. It is suggested that studies be limited to a maximum 40-year cycle and whole percentage escalation rates up to 5 to 7 percent.

3. Reporting

Reports are formatted for printing and presentation on 8.5″ × 11″ paper in landscape format. Two pages total are provided for presentation. Normally only the results from the template pages are presented for use.

The output is provided in a format that meets most Judicial Council, General Services Administration, and other federal requirements for analysis.

Table 21.4 Life Cycle Cost Analysis Evaluation Form

LCCA EVALUATION FORM
System Evaluated:
Describe baseline system as currently considered:
Define Alternative 1:
Define Alternative 2:
Define Alternative 3:
RECOMMENDATION & RATIONALE SUMMARY
Identify recommended approach:
Define key advantages:
Assess any disadvantages:
ATTACH APPROPRIATE EXHIBITS AND LCCA SPREADSHEET RESULTS

4. Basics

Macros must be enabled for the spreadsheet to function properly. If some of the cells indicate *?NAME#*, macros have not been activated in your spreadsheet. Also, some cells may display *#DIV/0!* before key data are entered. These codes will disappear when data are entered.

A baseline design condition or scope of work must be entered for comparison and evaluation. Payback Period, Net Savings, and other items are calculated relative to the value of the baseline condition. All worksheets are protected, and data are to be entered in pale blue cells. Results are provided as tabular comparisons and graphical representations of total cost of ownership.

5. Contents

Table 21.5 provides instructions for completing the life cycle cost analysis worksheet. An example project worksheet is provided after the instructions.

Table 21.5 LCC General Purpose Worksheet Instructions

Contents
Worksheets include:
READ FIRST—An introduction and summary of features and instructions for use
Present Value (PV) Annuity—Calculation table of PV factors for an escalated equal annuity series used in support of main sheet
LCC-Form Template—Blank template for use
Sample Analysis—Completed spreadsheet sample for reference
LCC-Form Template HIDE—Hidden version of template sheet for recovery, if main sheet is accidentally deleted or corrupted
For Further Study
Architect's Essentials of Cost Management by Michael D. Dell'Isola, ISBN 0-471-44359-X
Life Cycle Costing for Facilities by Alphonse J. Dell'Isola and Stephen J. Kirk, ISBN 0-87629-702-5
Instructions
Instructions for use are presented by specific worksheet as listed below starting with Read First.
General Economic Notes
It is suggested that the user conduct the study using *constant dollars*, where the purchasing power of the dollar is held constant as of the date of the study, and *discount rates* are "real," excluding general inflation. Thus, an item costing $1,000 today would be replaced in the future at $1,000. Any real escalation or de-escalation is handled separately. If the user wishes to operate in *current* dollars, then future expenditures must be inflated individually, and the discount rate must be increased to include general inflation. The results are nearly identical unless inflation rates are extreme—over 15 percent.

Worksheet	Cell Reference	Required Information
General		Cells with a pale blue background are for entry of information for the analysis. The background color of the cells may be removed or changed following data entry.
		DO NOT ADD ANY ROWS ABOVE ROW 6
Worksheet Protection		The worksheets are protected against accidental overwriting or deletion of formulae. There is no password for the protection; it may be turned off (via Tools, Protection, Unprotect Sheet) to allow changes in formatting, if desired.
READ FIRST		No specific entry required.
PV Annuity	M2	Input Discount Rate. This sheet does not affect the calculations on the template or sample workbooks. These sheets are provided purely for reference, to show in tabular form the PV factors and effects.
PV Single	M2	Input Discount Rate. This sheet does not affect the calculations on the template or sample workbooks. These sheets are provided purely for reference, to show in tabular form the PV factors and effects.
LCC-Form Template		Copies of the template can be made for various alternatives and added as new worksheets to the file.

Table 21.5 continues on next page

Table 21.5 LCC General Purpose Worksheet Instructions *continued*

Worksheet	Cell Reference	Required Information
Option Names	K1, M1, O1, Q1	Input Option Names and Titles. Names of the Base Design and Options will be presented on the graphs and printed reports.
Project	C2	Input Project.
Title	D3	Input title of study and report.
Discount Rate	D4	Input Discount Rate for the study. This rate is 3.25 percent, as required by the Judicial Council. Alternative rates must be approved before the study. Note: this requirement assumes a "real" discount rate exclusive of inflation.
Date	G4	Input date of study.
Study Period	D5	Input period of analysis in years as a whole number—40 years maximum. Note that the Judicial Council requires a study period of 30 years. Alternative periods must be approved before the study.
Energy Location	G5	Drop-down menu for energy location for the study. Choose "West Commercial" as required by the Judicial Council. Energy escalation will be calculated from FEMP data. Alternative rates must be approved before the study.
Initial Costs	Rows 7–16	Input description of cost items and first costs for various options considered. Costs are entered in columns K, M, O and Q for the various items. Multiple cost items may be added to reach the total first cost of the various options. Since these items are first cost and not subject to the financial analysis and discounting procedure, they should sum to the value of the work being estimated. Use the Escalation Factor for initial costs only when directed.
Replacement Costs	Rows 21–30	Input description of cost items and current costs for various options considered. These items are generally SINGLE (not annual) expenditures during the life of the study. Enter either year of replacement for single-cost item OR number of years between replacement or upgrades to equipment and materials being provided in columns G or H. Only one of these values can be provided for each cost item. Enter assumed escalation or inflation rate for the study period in column I. This is to be an approximate value that will be applied for the entire period of the study. Costs for work items are entered in columns K, M, O, and Q for the various items. Multiple-cost items may be added to reach the total first cost of the various options. These values are entered as current market value and will be escalated to account for inflation and discounted based on the provided Discount Rate. Assumed salvage or residual value may be included here as a negative number. If the value results in a negative PV cost in this category, the graph will show this value and plot it below the X-axis (green bar). Salvage values are usually insignificant and ignored.

Table 21.5 continues on next page

Table 21.5 LCC General Purpose Worksheet Instructions *continued*

Worksheet	Cell Reference	Required Information
Annual Costs	Rows 34–45	Input description of cost items and current costs for various options considered. These items are generally recurring annual costs. Examples include annual energy usage costs, annual recurring maintenance costs, filter changes, and other costs that are incurred over the life of the asset. Escalation Rates: Energy costs can be escalated using FEMP. Select from drop-down menu in column F. Other Annual Costs such as maintenance or special energy costs separate from FEMP can have escalation entered as a numeric percentage in column I. For any annual cost, differing start/stop years can be used. This approach is most appropriate for maintenance costs, which can vary from year to year. Costs for work items are entered in columns K, M, O, and Q for the various items. Multiple-cost items may be added to reach the total first cost of the various options. These values are entered as current market value and will be escalated to account for inflation and discounted based on the provided Discount Rate.
Building Metrics	Rows 56–58	Input building information relative to size and number of seats or occupants.
Operation Cost Sensitivity	Row 64	Normally self-calculating. In cases where fewer than three options are being presented, the formulae in these cells will need to be manually adjusted. These cells calculate an average of the operations expenditures and compare each of the alternatives to one another. A factor higher than 1 means that the present value will be affected by a change in annual (or energy) costs more than other options. A value below 1 means that the option will be less affected by a change in annual (or energy) costs. *One or more of these values should* ALWAYS *be less than 1. If this is not the case, the formula reference to the “0” value cell must be removed to avoid incorrectly lowering the average.*
Summary and Recommendations	H97	Enter a brief description of summary conclusions from the analysis.

Table 21.6 Example Project

LCCA EVALUATION FORM

System Evaluated:

Evaluate different mechanical systems to determine the best system for the facility, including initial cost, maintenance cost, and efficiency

Describe baseline system as currently considered: VAV with current central plant efficiency

Variable air volume (VAV) air handlers use energy recovery wheel to precondition outside air. Variable volume terminal units use 140°F to 180°F hot water for reheat. The existing chiller plant capacity will be increased with no efficiency changes.

Define Alternative 1: Decoupled with current central plant efficiency

Dedicated outside air units will provide the code minimum of fresh air or makeup air to spaces. Dedicated outside air will be at lower temperatures to help offset some of the cooling loads. Multiple 4-pipe fan coil units will provide individual space conditioning for both heating and cooling.

Define Alternative 2: Decoupled + displacement ventilation with current central plant efficiency

In addition to Alternative 1, displacement ventilation systems would be used for air distribution in tall spaces and concourses. Ventilation systems will be routed under the floor to air devices in double-height spaces or taller. Assume most air devices from the displacement ventilation systems will be custom style integrated into architectural design.

Define Alternative 3: Decoupled + displacement ventilation with current central plant efficiency and wider comfort definition

See Alternatives 1 and 2 above for descriptions that would use 75°F cooling and 72°F heating space temperatures. Alternative 3 would evaluate cooling temperatures up to 76°F and heating temperatures down to 68°F. Alternative 3 would use spot fans to provide localized air movement.

RECOMMENDATION & RATIONALE SUMMARY

Identify recommended approach:

Recommend that the new facility HVAC systems use Alternative 2 with a combination of decoupled + displacement ventilation with current central plant efficiency

Define key advantages:

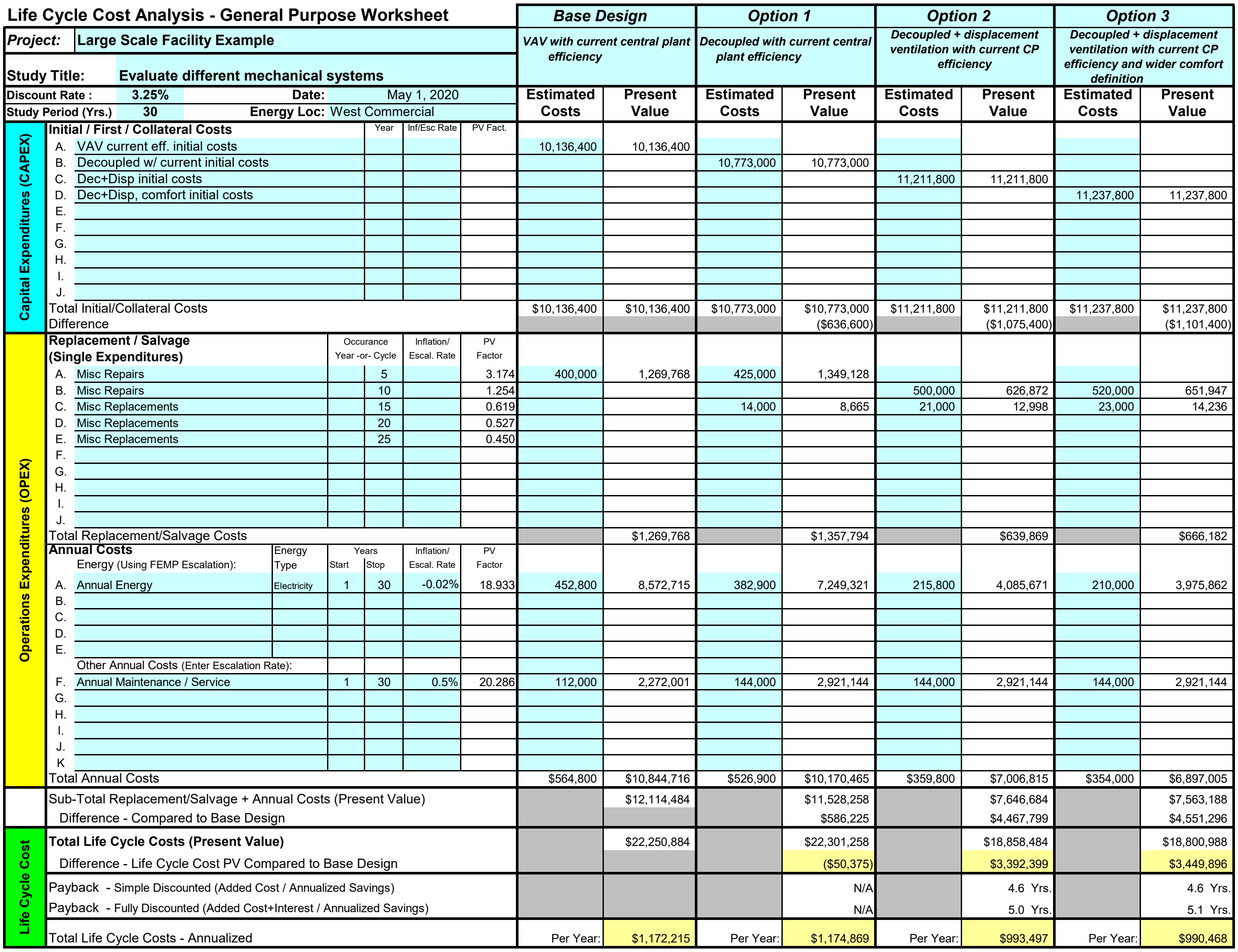
- Lowest energy costs and life cycle costs

Assess any disadvantages:

- Slightly higher installation costs

ATTACH APPROPRIATE EXHIBITS AND LCCA SPREADSHEET RESULTS

Figure 21.2 Life Cycle Study Template



Life Cycle Cost Analysis - General Purpose Worksheet

								Base Design		Option 1		Option 2		Option 3	
	Project:	**Large Scale Facility Example**						*VAV with current central plant efficiency*		*Decoupled with current central plant efficiency*		*Decoupled + displacement ventilation with current CP efficiency*		*Decoupled + displacement ventilation with current CP efficiency and wider comfort definition*	
	Study Title:	**Evaluate different mechanical systems**													
	Discount Rate :	**3.25%**		**Date:**	May 1, 2020			**Estimated Costs**	**Present Value**	**Estimated Costs**	**Present Value**	**Estimated Costs**	**Present Value**	**Estimated Costs**	**Present Value**
	Study Period (Yrs.)	**30**		**Energy Loc:**	West Commercial										
Capital Expenditures (CAPEX)		**Initial / First / Collateral Costs**			Year	Inf/Esc Rate	PV Fact.								
	A.	VAV current eff. initial costs						10,136,400	10,136,400						
	B.	Decoupled w/ current initial costs								10,773,000	10,773,000				
	C.	Dec+Disp initial costs										11,211,800	11,211,800		
	D.	Dec+Disp, comfort initial costs												11,237,800	11,237,800
	E.														
	F.														
	G.														
	H.														
	I.														
	J.														
	Total Initial/Collateral Costs							$10,136,400	$10,136,400	$10,773,000	$10,773,000	$11,211,800	$11,211,800	$11,237,800	$11,237,800
	Difference										($636,600)		($1,075,400)		($1,101,400)
Operations Expenditures (OPEX)		**Replacement / Salvage (Single Expenditures)**		Occurance Year -or- Cycle		Inflation/ Escal. Rate	PV Factor								
	A.	Misc Repairs			5		3.174	400,000	1,269,768	425,000	1,349,128				
	B.	Misc Repairs			10		1.254					500,000	626,872	520,000	651,947
	C.	Misc Replacements			15		0.619			14,000	8,665	21,000	12,998	23,000	14,236
	D.	Misc Replacements			20		0.527								
	E.	Misc Replacements			25		0.450								
	F.														
	G.														
	H.														
	I.														
	J.														
	Total Replacement/Salvage Costs								$1,269,768		$1,357,794		$639,869		$666,182
	Annual Costs	Energy (Using FEMP Escalation):	Energy Type	Years Start	Stop	Inflation/ Escal. Rate	PV Factor								
	A.	Annual Energy	Electricity	1	30	-0.02%	18.933	452,800	8,572,715	382,900	7,249,321	215,800	4,085,671	210,000	3,975,862
	B.														
	C.														
	D.														
	E.														
		Other Annual Costs (Enter Escalation Rate):													
	F.	Annual Maintenance / Service		1	30	0.5%	20.286	112,000	2,272,001	144,000	2,921,144	144,000	2,921,144	144,000	2,921,144
	G.														
	H.														
	I.														
	J.														
	K														
	Total Annual Costs							$564,800	$10,844,716	$526,900	$10,170,465	$359,800	$7,006,815	$354,000	$6,897,005
	Sub-Total Replacement/Salvage + Annual Costs (Present Value)								$12,114,484		$11,528,258		$7,646,684		$7,563,188
	Difference - Compared to Base Design										$586,225		$4,467,799		$4,551,296
Life Cycle Cost	**Total Life Cycle Costs (Present Value)**								$22,250,884		$22,301,258		$18,858,484		$18,800,988
	Difference - Life Cycle Cost PV Compared to Base Design										($50,375)		$3,392,399		$3,449,896
	Payback - Simple Discounted (Added Cost / Annualized Savings)										N/A		4.6 Yrs.		4.6 Yrs.
	Payback - Fully Discounted (Added Cost+Interest / Annualized Savings)										N/A		5.0 Yrs.		5.1 Yrs.
	Total Life Cycle Costs - Annualized							Per Year:	$1,172,215	Per Year:	$1,174,869	Per Year:	$993,497	Per Year:	$990,468

Life Cycle Cost Analysis - General Purpose Worksheet

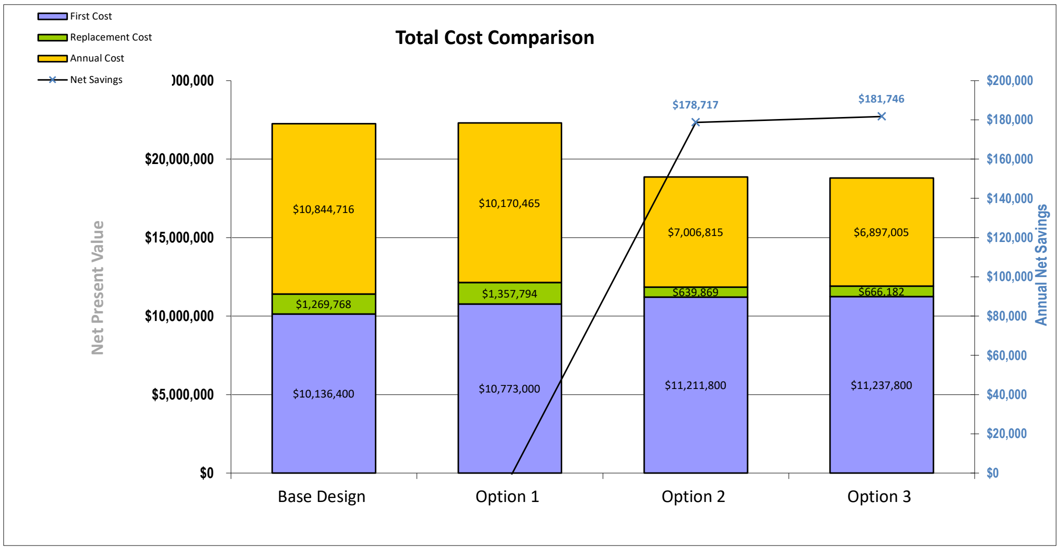
	Base Design	Option 1	Option 2	Option 3
Project: Large Scale Facility Example **Study Title:** Evaluate different mechanical systems	*VAV with current central plant efficiency*	*Decoupled with current central plant efficiency*	*Decoupled + displacement ventilation with current CP efficiency*	*Decoupled + displacement ventilation with current CP efficiency and wider comfort definition*

Other Comparison Metrics

Total Building Gross Square Footage	70,000
Total Building Net Usable Footage	50,000
Total Seats or Occupants	400

	Base Design	Option 1	Option 2	Option 3
PV per GSF	$ 317.87	$ 318.59	$ 269.41	$ 268.59
PV per NSF	$ 445.02	$ 446.03	$ 377.17	$ 376.02
PV per Seat	$ 55,627.21	$ 55,753.15	$ 47,146.21	$ 47,002.47
Annual Cost per Seat	$2,930.54	$2,937.17	$2,483.74	$2,476.17
First Cost (CAPEX) per GSF	$ 144.81	$ 153.90	$ 160.17	$ 160.54
Present Value Operations Expense (OPEX) per NSF	$ 242.29	$ 230.57	$ 152.93	$ 151.26
Ratio OPEX to CAPEX	1.67	1.50	0.95	0.94
Operation Cost Sensitivity	1.24	1.17	0.80	0.79

<u>Definition</u> : Ratio of annual operations costs to average of all options. Factor higher than 1 means present value will be affected by a change in annual (or energy) costs more than other options. Value below 1 means option will be less affected by a change.



Summary and Recommendations:

Recommend the new Facility HVAC systems use Alternative 2 with a combination of decoupled + displacement ventilation with current central plant efficiency. While it has a slightly higher installation cost, it has the lowest energy costs and life cycle costs.

REQUIRED TOOLS

22

CATALOG OF COURTROOM LAYOUTS FOR CALIFORNIA TRIAL COURTS

San Diego Central Courthouse
San Diego, CA
Skidmore, Owings & Merrill LLP

22.A COURTROOM LAYOUT OVERVIEW

MULTIPURPOSE COURTROOM TEMPLATES

GROUP 1—CENTER BENCH

TEMPLATE NAME	TOTAL SQUARE FEET *	SPECTATOR SEATING CAPACITY†	PAGE
Typical Trial Courtroom—Center Bench A	1,850	48	22.4
Typical Large Trial Courtroom—Center Bench A	2,050	71	22.6
Typical Trial Courtroom—Center Bench B	1,950	51	22.8
Typical Large Trial Courtroom—Center Bench B	2,250	74	22.10

Group 1 Courtrooms A use identical working areas, as do Courtrooms B. They vary from one another in that either a smaller gallery and two adjoining attorney-client conference rooms can be provided in the footprint or a larger gallery without the conference rooms can be selected.

GROUP 2—CORNER BENCH

TEMPLATE NAME	TOTAL SQUARE FEET *	SPECTATOR SEATING CAPACITY†	PAGE
Typical Trial Courtroom—Corner Bench A	1,796	48	22.12
Typical Large Trial Courtroom—Corner Bench A	2,008	65	22.14
Typical Trial Courtroom—Corner Bench B	2,056	48	22.16
Typical Large Trial Courtroom—Corner Bench B	2,285	73	22.18

As with the center bench designs, Group 2 designs vary based on tradeoffs between more gallery space and adjoining conference rooms. Corner bench designs are used in a number of California courthouses, and although they compromise somewhat the efficient utilization of space in comparison with the center bench configuration, they are approved for use.

GROUP 3—CENTER BENCH, WIDE

TEMPLATE NAME	TOTAL SQUARE FEET *	SPECTATOR SEATING CAPACITY†	PAGE
Typical Large Trial Courtroom—Center Bench C	2,200	52	22.20
Typical Large Trial Courtroom—Center Bench D	2,445	85	22.22

These floorplans are significantly wider—but otherwise similar to the other center bench template designs—and can be considered when cases of unusual scale are routinely encountered in a specific jurisdiction.

COURTROOM EXAMPLE DESIGNS

COURTROOM EXAMPLE	TOTAL SQUARE FEET *	SPECTATOR SEATING CAPACITY†	PAGE
San Diego Central Courthouse, Trial Courtroom, Center Bench	1,700	46	22.26
San Bernardino Justice Center, Trial Courtroom, Corner Bench	1,700	50	22.28
San Diego Central Courthouse, Large Trial Courtroom, Center Bench	2,100	98	22.30
San Diego Central Courthouse, Double Jury Courtroom, Center Bench	21,00	64	22.32
San Bernardino Justice Center, Double Jury Courtroom, Corner Bench	2,400	92	22.34
San Diego Central Courthouse, Arraignment Courtroom, Center Bench	1,800	98	22.36
San Diego Central Courthouse, Family Courtroom, Center Bench	1,700	46	22.38

HOLDING CORE TEMPLATES

	TOTAL SQUARE FEET *	TOTAL RATED CAPACITY	PAGE
Typical Holding Core A	572	4	22.42
Typical Holding Core B	605	7	22.43
Typical Holding Core C	496	4	22.44

* Includes ramp in corridor where applicable.

† Wheelchair spaces added to total spectator seating capacity.

22.B MULTIPURPOSE COURTROOM TEMPLATES

Group 1—Center Bench

Typical Trial Courtroom—Center Bench A

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING AT 18″	VOIR DIRE
Multipurpose Trial	1,850	46+2 WC*	74

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	6′6″/6′4″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+12″	2
Court Security Officer (CSO)	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′0″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	+0″	3 ea.
Lectern	2′6″	2′0″	N/A	0

* WC = wheelchairs.

Key Attributes of Courtroom Layout

- Seventy-four seats for voir dire to provide maximum flexibility for trial use.
- Increase of judge’s bench work surface from 6′ to 12′10″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Access ramps outside courtroom.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Optimal sightlines for all participants.
- Multidefendant capable because of movable well components.
- Multiple locations for sidebar conferences (shown with *).
- Exhibit storage table adjacent to clerk’s workstation.
- Stairs to clerk’s workstation area, which reduce width of courtroom.
- Jury box dimensions are efficient and control courtroom width.
- Adjustable-height work surfaces for judge and clerk.

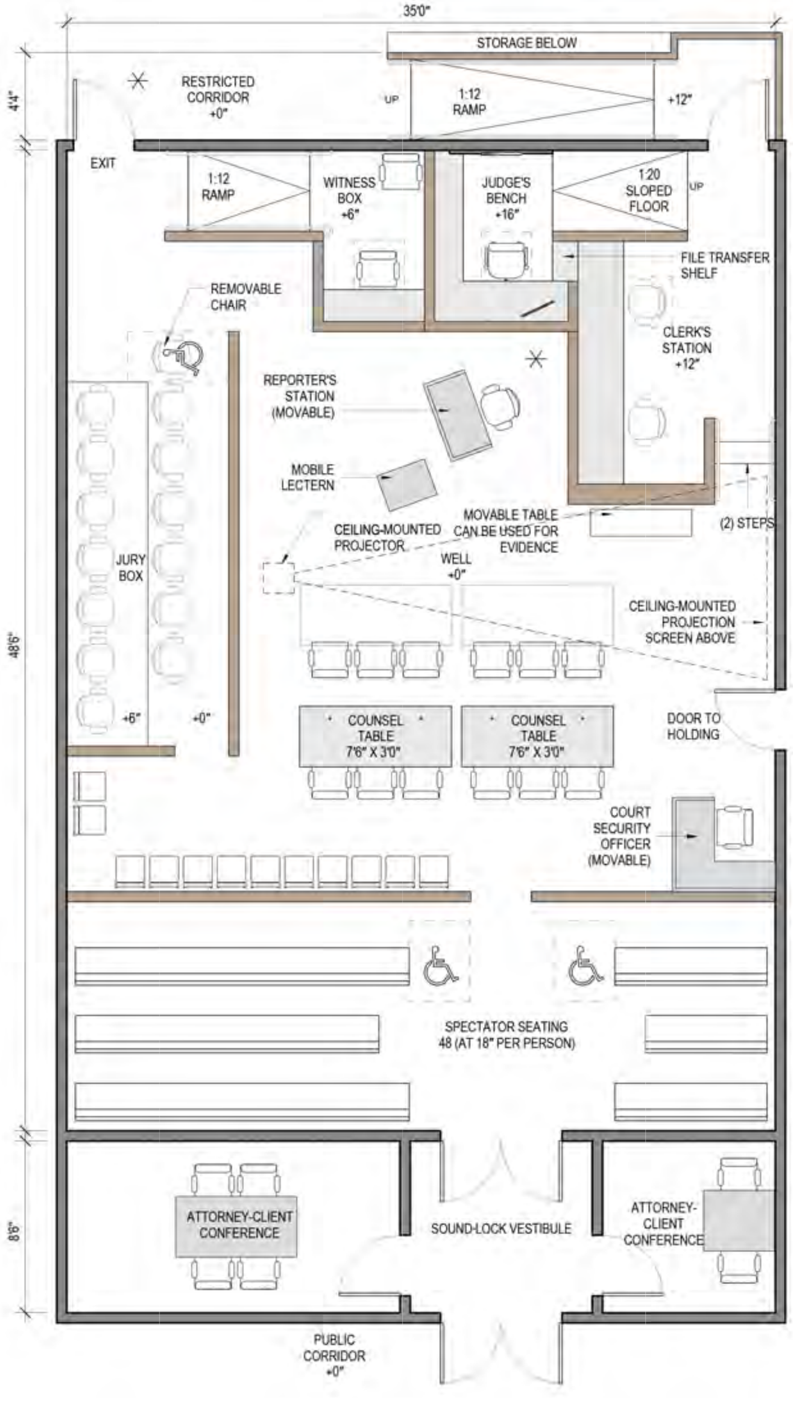
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station that facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.1 Typical Trial Courtroom—Center Bench A



Typical Large Trial Courtroom—Center Bench A

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,050	67+4 WC	97

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	6′6″/6′4″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+12″	2
Court Security Officer	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′0″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	+0″	3 ea.
Lectern	2′6″	2′0″	N/A	0

Key Attributes of Courtroom Layout

- Ninety-seven seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable.
- Increase of judge’s bench work surface from 6′ to 12′10″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Increase of clerk’s work surface from 10′ to 12′ long (two clerks).
- Jury box dimensions that are efficient and control courtroom width.
- Spectator seating increased by eliminating attorney-client conference rooms.

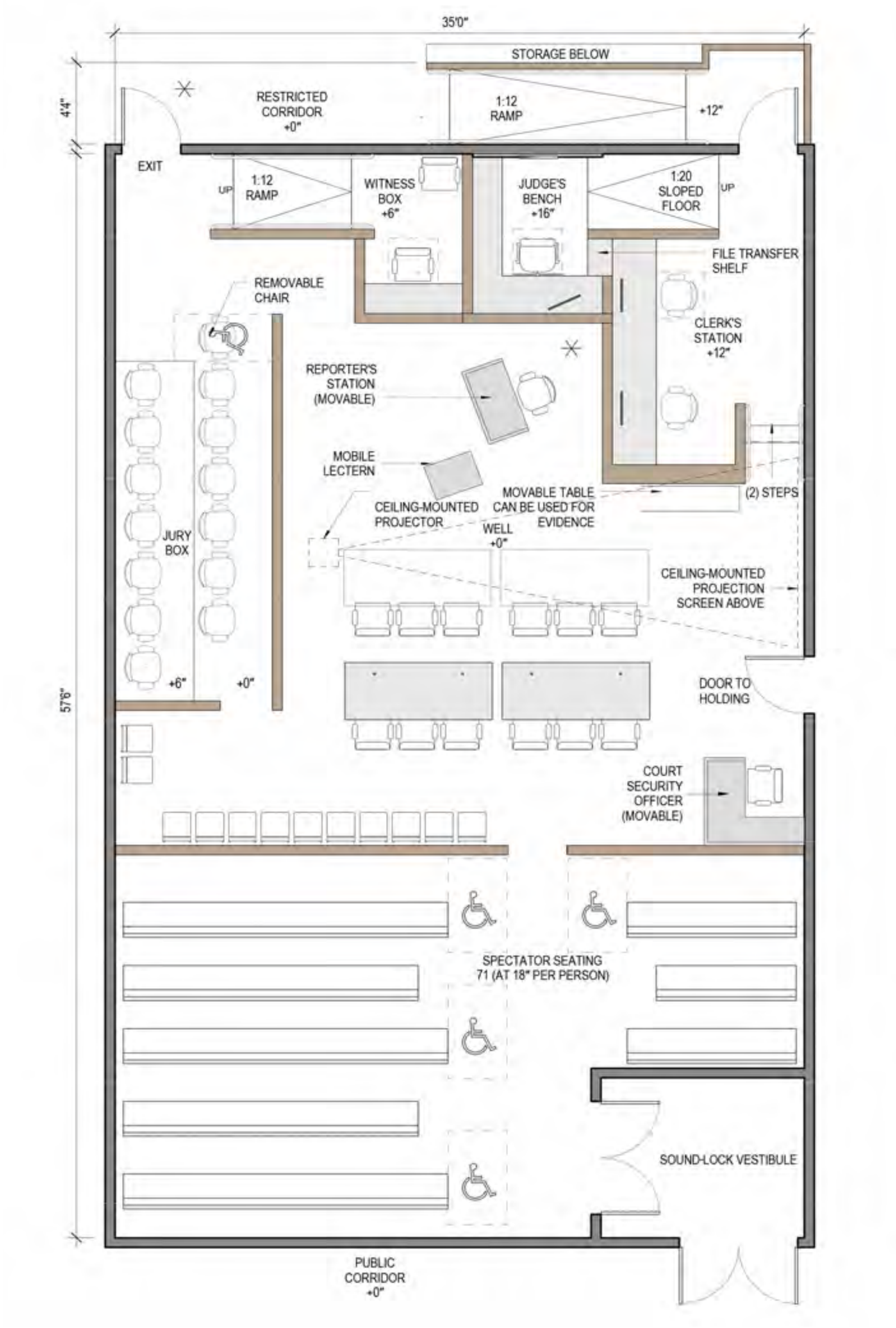
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station that facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.2 Typical Large Trial Courtroom—Center Bench A



Typical Trial Courtroom—Center Bench B

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Trial	1,950	49+2 WC	77

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′9″/6′4″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+12″	2
Court Security Officer	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	8′6″	3′0″	+0″	4 ea.
Lectern	2′6″	2′0″	N/A	0

Key Attributes of Courtroom Layout

- Seventy-four seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable because of movable well components and increased courtroom width.
- Increase of judge’s bench work surface from 6′ to 14′1″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Increase of clerk’s work surface from 10′ to 12′ long (two clerks).
- Stairs to clerk’s workstation area, which reduce width of courtroom.
- Adjustable-height work surfaces for judge and clerk.
- Counsel tables providing for four seats at each table.
- Jury box dimensions that are efficient and control courtroom width.

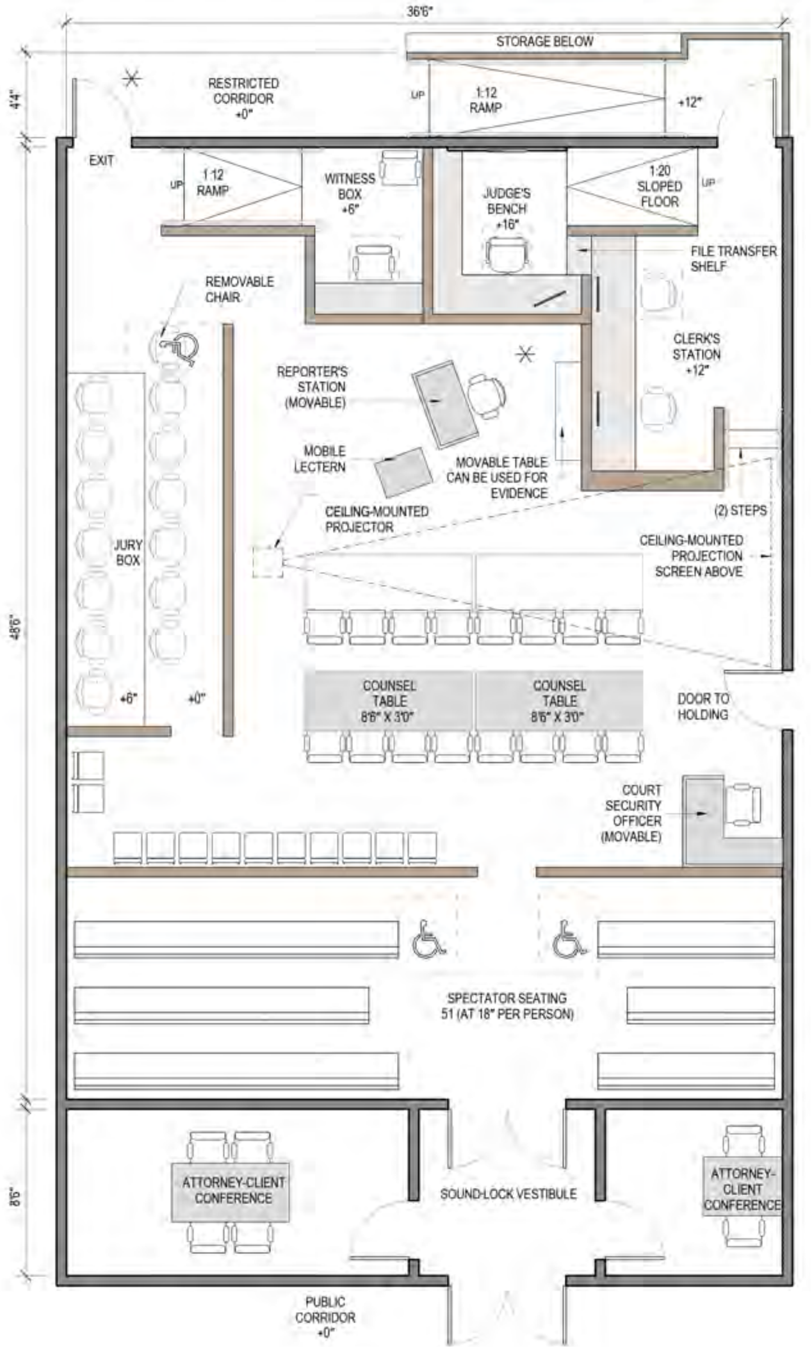
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.3 Typical Trial Courtroom—Center Bench B



Typical Large Trial Courtroom—Center Bench B

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,250	70+4 WC	100

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′9″/6′4″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+12″	2
Court Security Officer	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	8′6″	3′0″	+0″	4 ea.
Lectern	2′6″	2′0″	N/A	0

Key Attributes of Courtroom Layout

- One hundred seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable because of movable well components and increased courtroom width.
- Increase of judge’s bench work surface from 6′ to 14′1″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Increase of clerk’s work surface from 10′ to 12′ long (two clerks).
- Clerk’s storage in workstation area.
- Ramp provided to clerk’s workstation area.
- Counsel tables to provide for four seats at each table.
- Jury box dimensions that are efficient and control courtroom width.
- Spectator seating increased by eliminating attorney-client conference rooms.

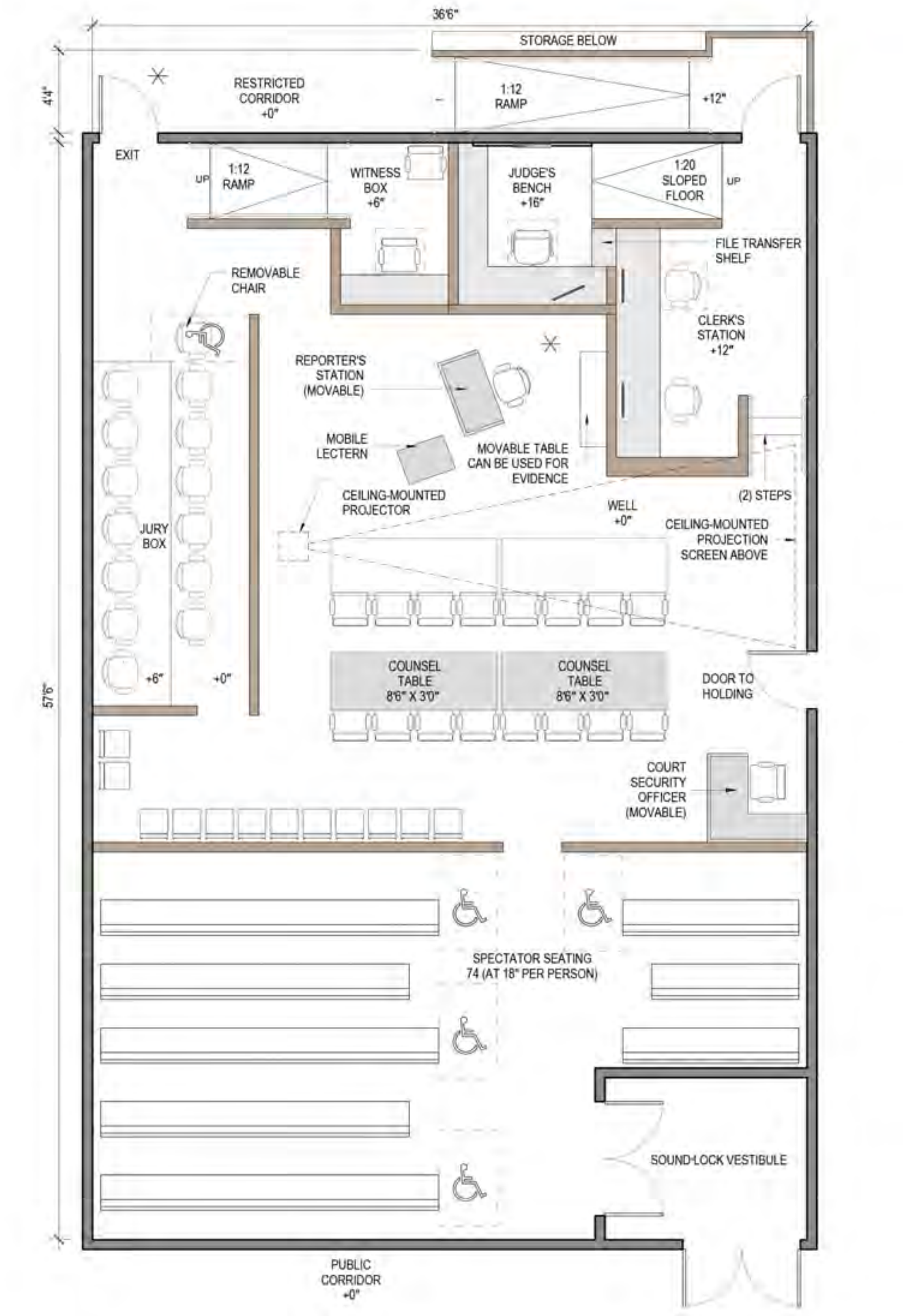
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station that facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.4 Typical Large Trial Courtroom—Center Bench B



Group 2—Corner Bench

Typical Trial Courtroom—Corner Bench A

Courtroom Component Information

COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″	VOIR DIRE
Typical Trial	1,796	46+2 WC	72

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	6′6″/6′9″	2′0″/1′6″	+16″	1
Courtroom Clerk	9′3″	2′3″	+12″	2
Court Security Officer	4′6″	2′0″	-	1
Court Reporter	4′0″	2′0″	-	1
Witness Stand	6′0″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	-	-
Lectern	2′6″	2′0″	-	-

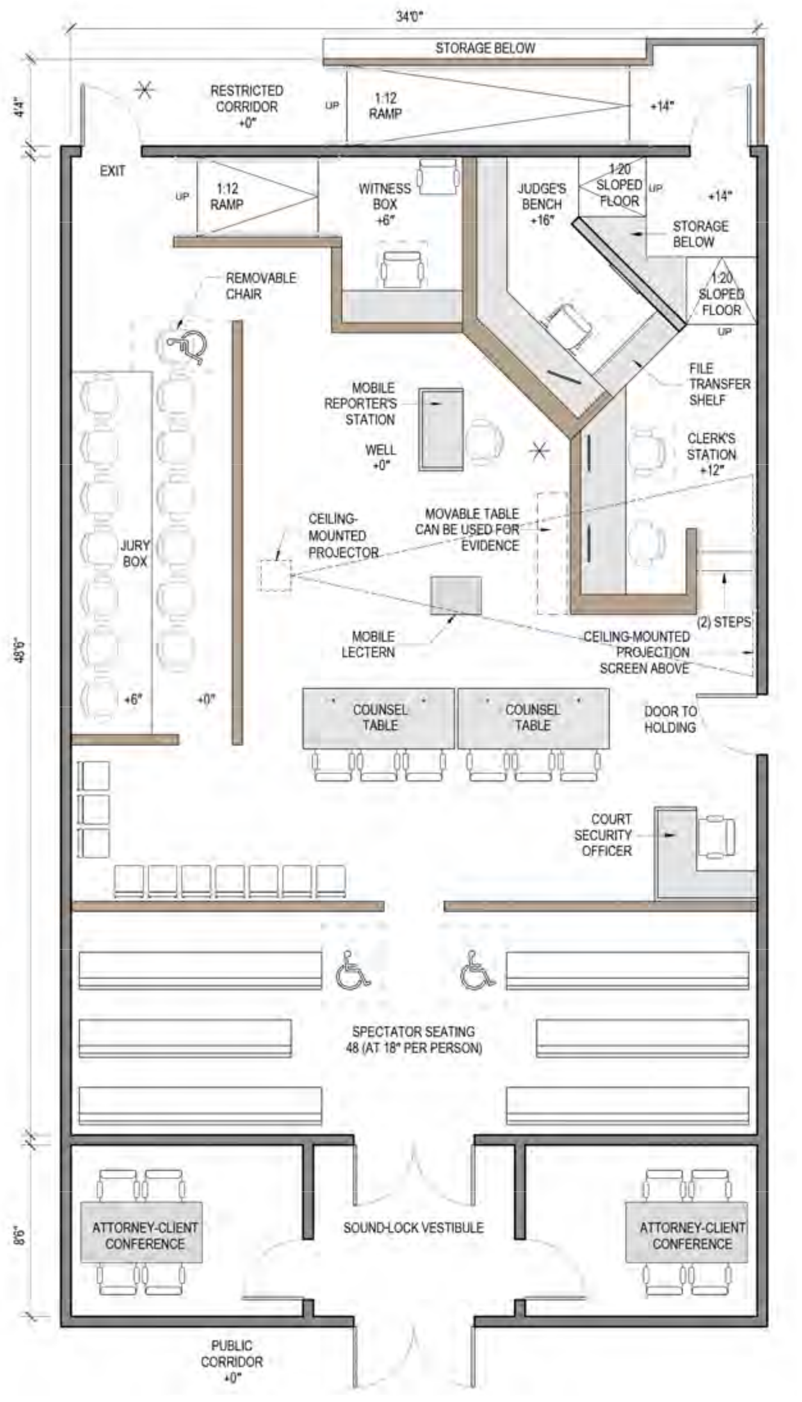
Key Attributes of Courtroom Layout

- Seventy-two seats for voir dire to provide maximum flexibility for trial use.
- Increase of judge’s bench work surface from 6′ to 13′3″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Stairs to clerk’s workstation area, which reduce width of courtroom.
- Adjustable-height work surfaces for judge and clerk.
- Jury box dimensions that are efficient and control courtroom width.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.5 Typical Trial Courtroom—Corner Bench A



Typical Large Trial Courtroom—Corner Bench A

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,008	61+4 WC	90

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	6′6″/6′9″	2′0″/1′6″	+16″	1
Courtroom Clerk	9′3″	2′3″	+12″	2
Court Security Officer	4′0″	2′0″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	+0″	3 ea.
Lectern	2′6″	2′0″	N/A	0

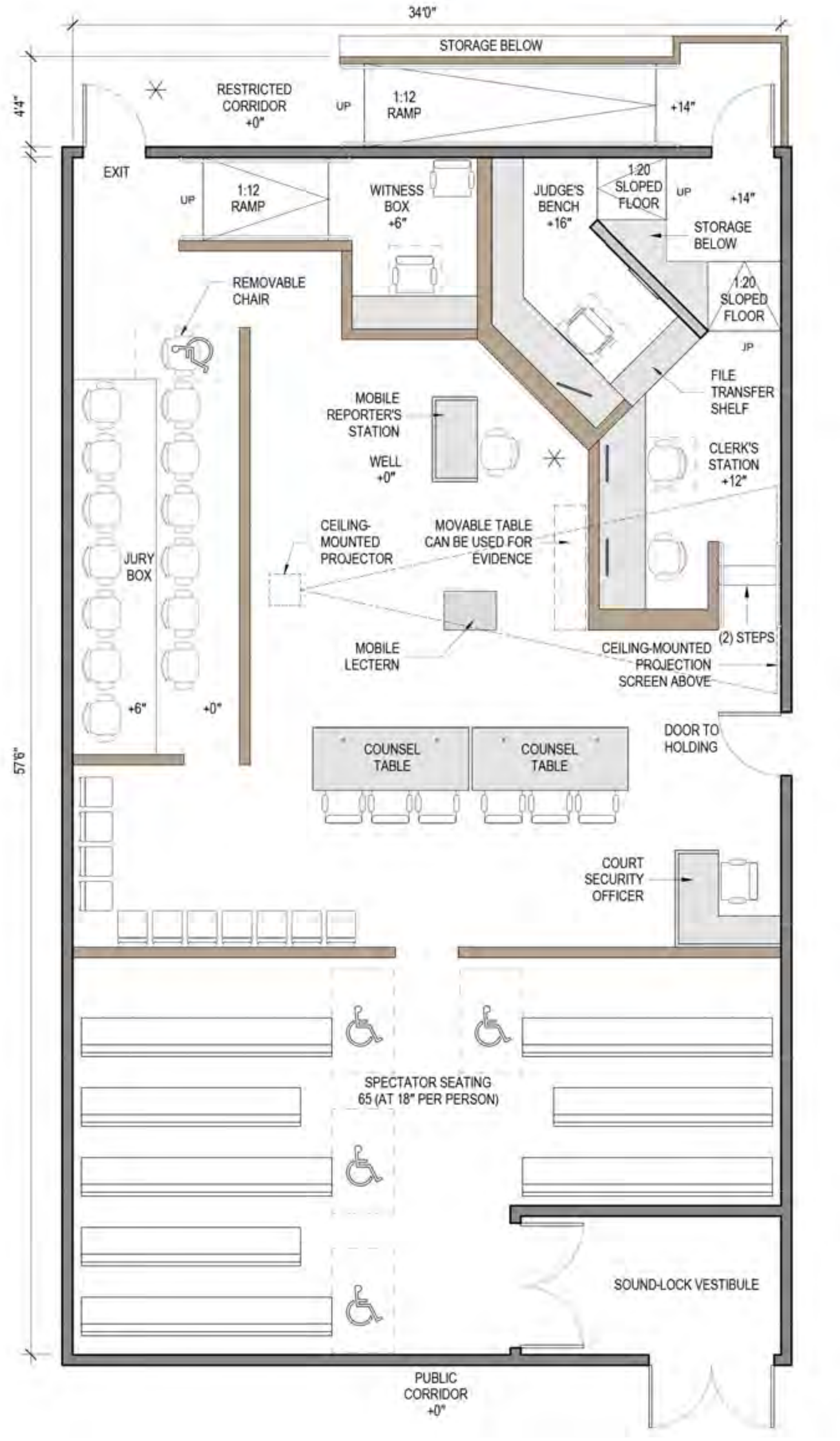
Key Attributes of Courtroom Layout

- Ninety seats for voir dire to provide maximum flexibility for trial use.
- Increase of judge’s bench work surface from 6′ to 13′3″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Jury box dimensions that are efficient and control courtroom width.
- Spectator seating increased by eliminating attorney-client conference rooms.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.6 Typical Large Trial Courtroom—Corner Bench A



Typical Trial Courtroom—Corner Bench B

Courtroom Component Information

COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″	VOIR DIRE
Typical Trial	2,056	46+2 WC	73

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	8′0″/6′9″	2′0″/1′6″	+16″	1
Courtroom Clerk	9′3″	2′3″	+12″	2
Court Security Officer	4′6″	2′0″	-	1
Court Reporter	4′0″	2′0″	-	1
Witness Stand	6′0″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	-	-
Lectern	2′6″	2′0″	-	-

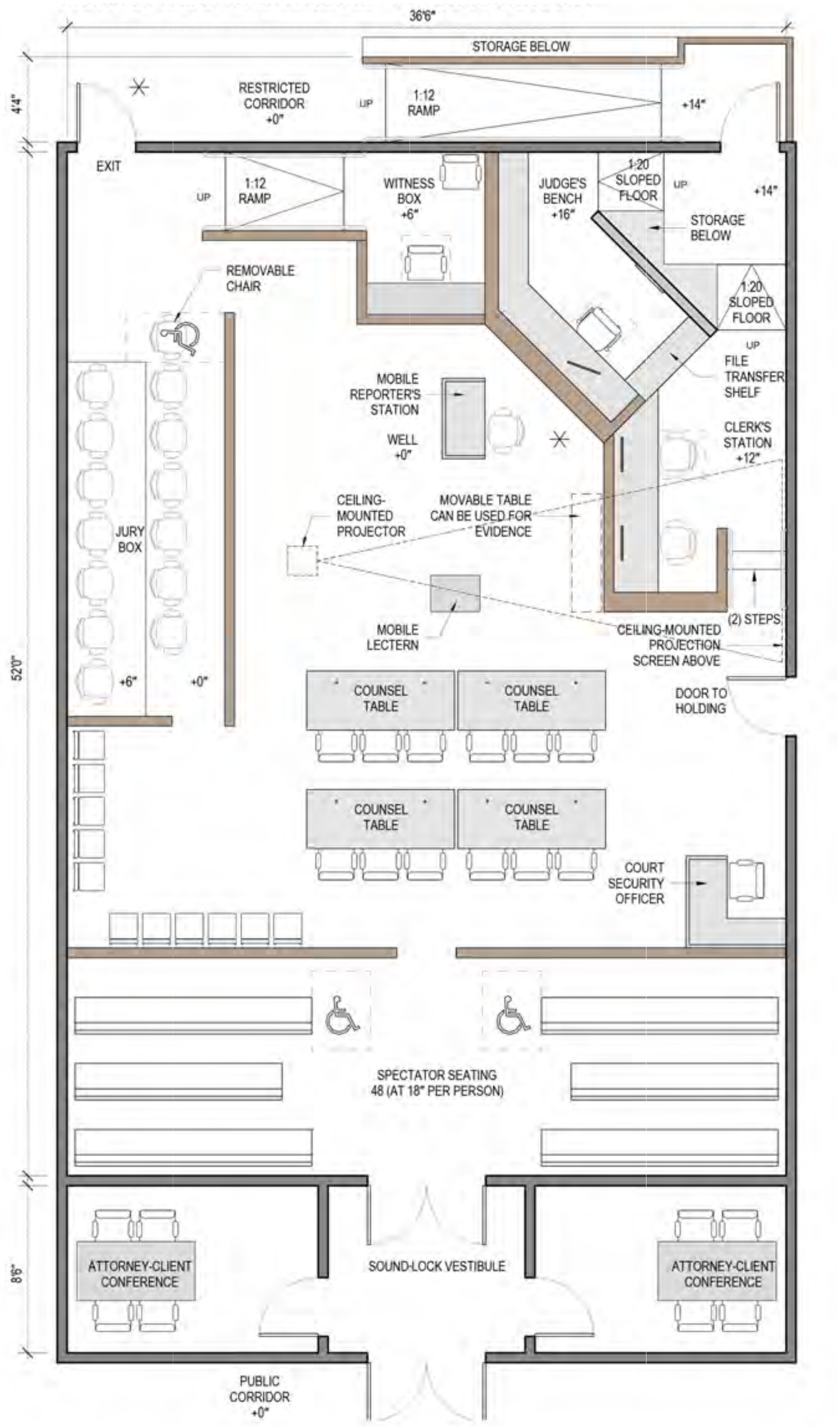
Key Attributes of Courtroom Layout

- Seventy-three seats for voir dire to provide maximum flexibility for trial use.
- Increase of judge’s bench work surface from 6′ to 14′9″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Multidefendant capable because of movable well components.
- Exhibit storage table adjacent to clerk’s workstation.
- Stairs to clerk’s workstation area, which reduce width of courtroom.
- Adjustable-height work surfaces for judge and clerk.
- Jury box dimensions that are efficient and control courtroom width.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.7 Typical Trial Courtroom—Corner Bench B



REQUIRED TOOLS

Typical Large Trial Courtroom—Corner Bench B

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,285	69+4 WC	100

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	8′0″/6′9″	2′0″/1′6″	+16″	1
Courtroom Clerk	9′3″	2′3″	+12″	2
Court Security Officer	4′0″	2′0″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′6″	3′0″	+0″	3 ea.
Lectern	2′6″	2′0″	N/A	0

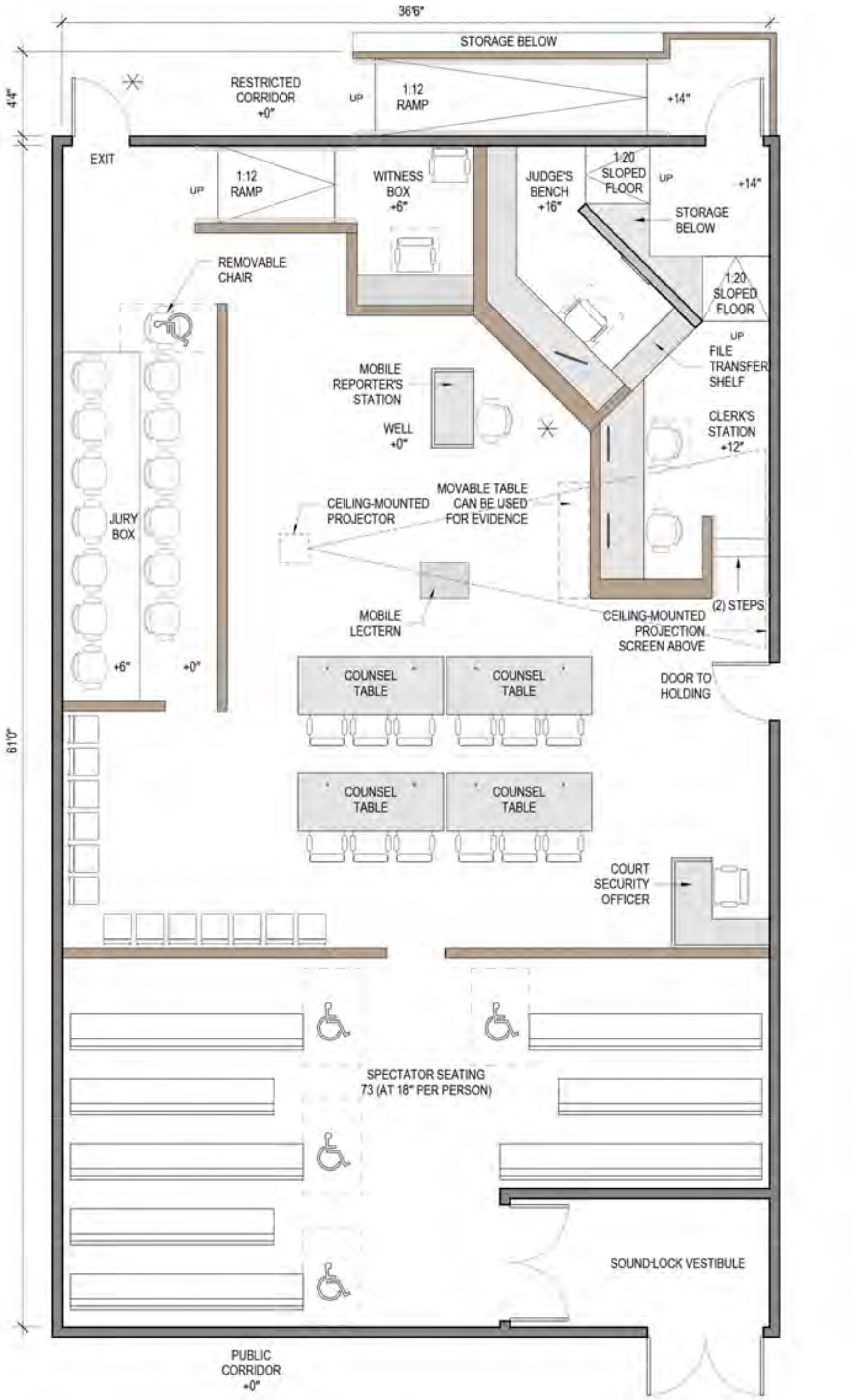
Key Attributes of Courtroom Layout

- One hundred seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable.
- Increase of judge’s bench work surface from 6′ to 14′9″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Jury box dimensions that are efficient and control courtroom width.
- Additional counsel tables accommodated by eliminating attorney-client conference rooms.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.8 Typical Large Trial Courtroom—Corner Bench B



Group 3—Center Bench, Wide

Typical Large Trial Courtroom—Center Bench C

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,200	50+2 WC	78

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′9″/6′10″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+10″	2
Court Security Officer	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	8′6″	3′0″	+0″	4 ea.
Lectern	2′6″	2′0″	N/A	0

Key Attributes of Courtroom Layout

- Seventy-eight seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable because of movable well components and increased courtroom width.
- Increase of judge’s bench work surface from 6′ to 14′7″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Clerk’s work surface increased from 10′ to 12′ long (two clerks).
- Clerk’s storage in workstation area.
- Ramp provided to clerk’s workstation area.
- Counsel tables providing for four seats at each table.
- Jury box that provides increased room to accommodate individual flat screen displays, room for jurors when exiting, and two alternative locations for wheelchair locations.

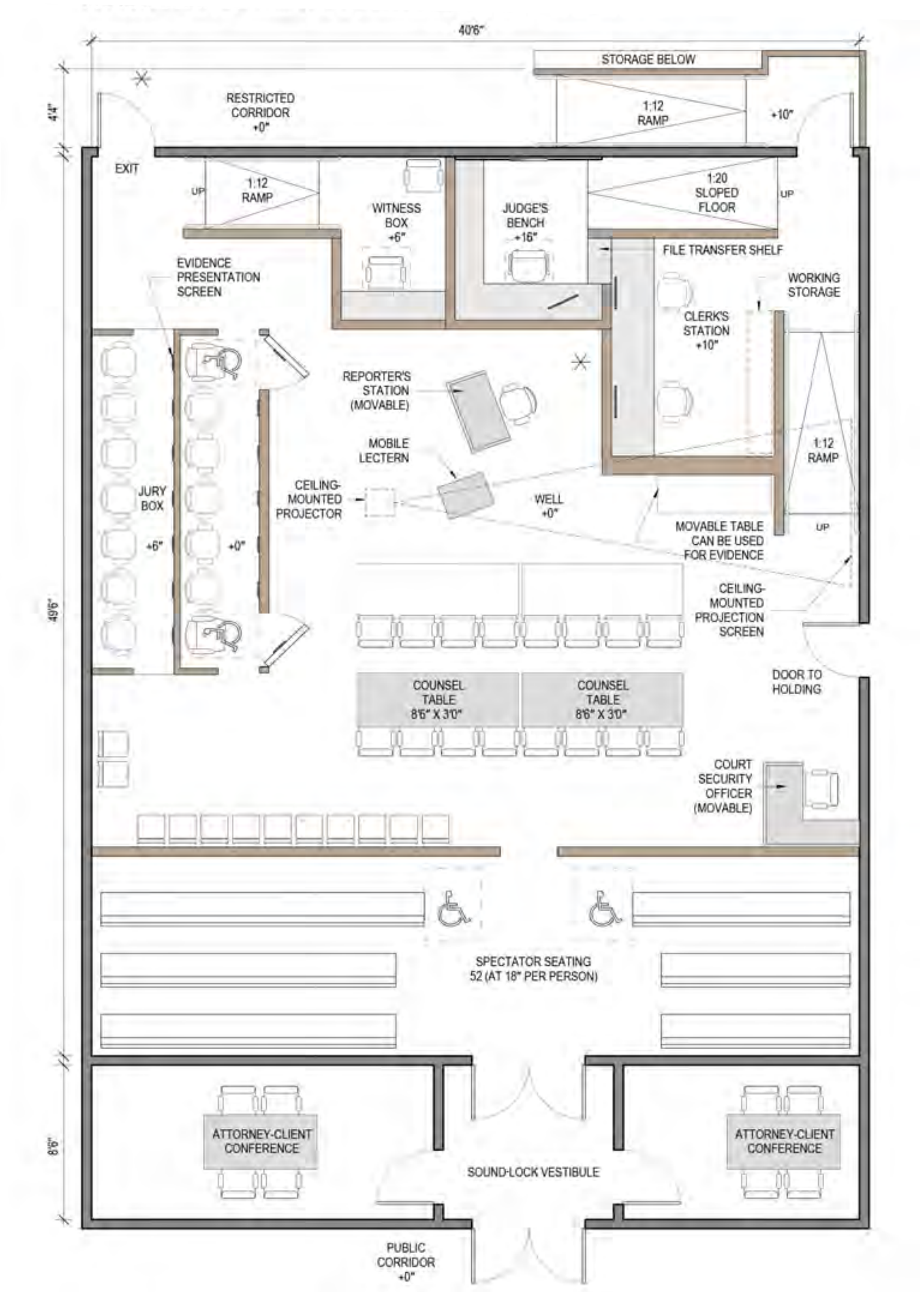
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station that facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.9 Typical Large Trial Courtroom—Center Bench C



Typical Large Trial Courtroom—Center Bench D

Courtroom Component Information

COURTROOM TYPE	SQUARE FEET	SPECTATOR SEATING (18″)	VOIR DIRE
Multipurpose Large Trial	2,445	81+4 WC	110

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′9″/6′10″	2′0″/1′6″	+16″	1
Courtroom Clerk	12′0″	2′3″	+10″	2
Court Security Officer	4′0″	2′6″	+0″	1
Court Reporter	4′0″	2′0″	+0″	1
Witness Stand	5′6″	1′7″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	8′6″	3′0″	+0″	4 ea.
Lectern	2′6″	2′0″	N/A	0

Key Attributes of Courtroom Layout

- One hundred ten seats for voir dire to provide maximum flexibility for trial use.
- Multidefendant capable because of movable well components and increased courtroom width.
- Increase of judge’s bench work surface from 6′ to 14′7″ long.
- Increase of work surface return at judge’s bench from 10″ to 18″ deep.
- Judge’s bench elevated 16″ to minimize need for ramping.
- Multiple locations for sidebar conferences (shown with *).
- Optimal sightlines for all participants.
- Exhibit storage table adjacent to clerk’s workstation.
- Adjustable-height work surfaces for judge and clerk.
- Clerk’s work surface increased from 10′ to 12′ long (two clerks).
- Clerk’s storage in workstation area.
- Ramp provided to clerk’s workstation area.
- Counsel tables providing for four seats at each table.
- Jury box that provides increased room to accommodate individual flat screen displays, room for jurors when exiting, and two alternative locations for wheelchair locations.
- Spectator seating increased by eliminating attorney-client conference rooms.

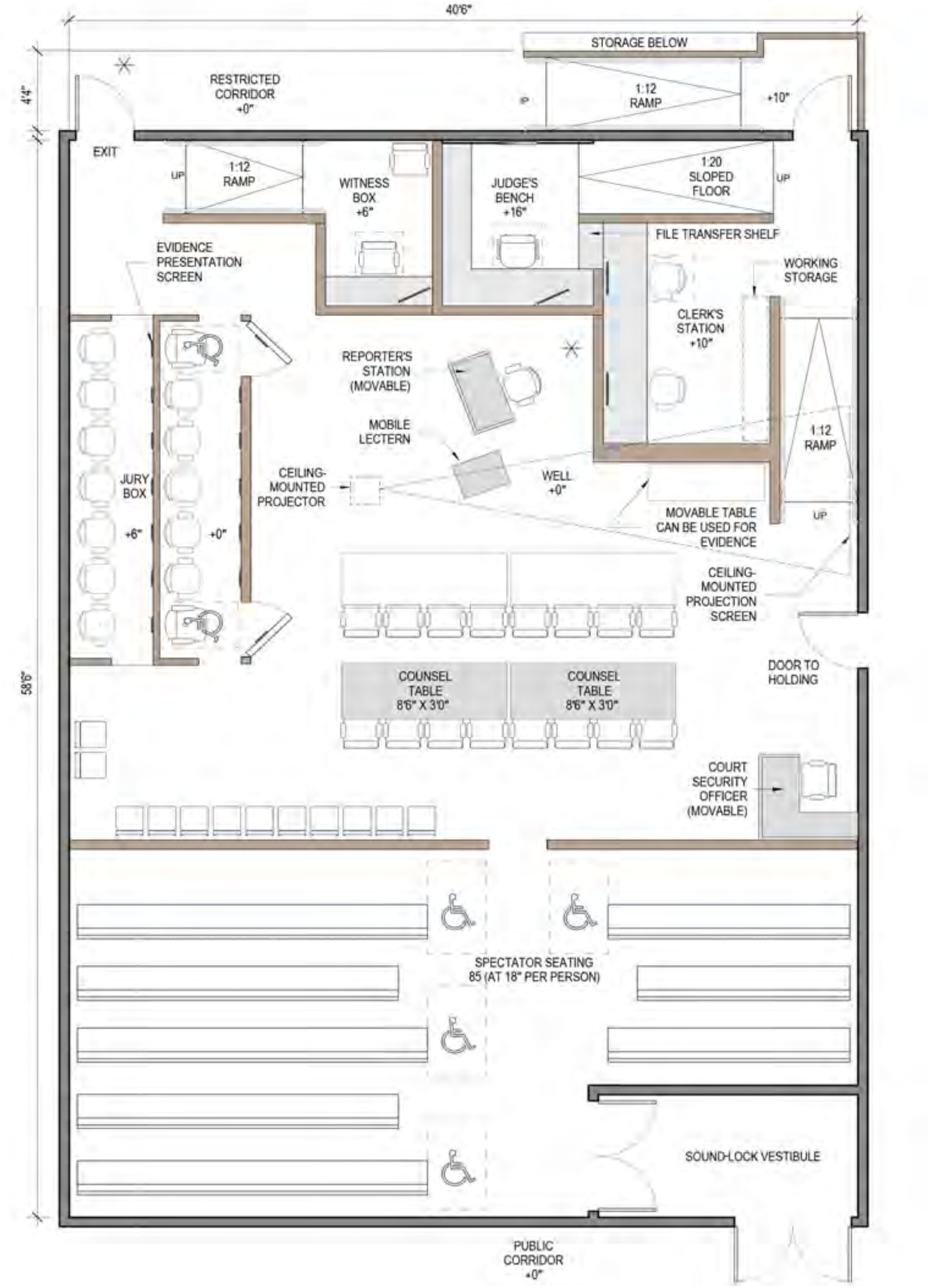
Options provided:

- Alternative court security officer desk and evidence table locations.
- Movable lectern and court reporter’s station that facilitate options for adding counsel tables.

Note:

- A court may adjust the combined ramp pitches from floor level to the bench to retain the bench height of 16″ while lowering the clerk floor height, so long as the maximum pitch utilized does not exceed a 1:12 ratio.

Figure 22.10 Typical Large Trial Courtroom—Center Bench D



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22.C COURTROOM EXAMPLE DESIGNS

	TOTAL SQUARE FEET*	TOTAL RATED CAPACITY†	PAGE
San Diego Central Courthouse, Trial Courtroom—Center Bench	1,700	46	22.26
San Bernardino Justice Center, Trial Courtroom—Corner Bench	1,700	50	22.28
San Diego Central Courthouse, Large Trial Courtroom—Center Bench	2,100	98	22.30
San Diego Central Courthouse, Double Jury Courtroom—Center Bench	2,100	64	22.32
San Bernardino Justice Center Double Jury Courtroom—Corner Bench	2,400	92	22.34
San Diego Central Courthouse, Arraignment Courtroom—Center Bench	1,800	98	22.36
San Diego Central Courthouse, Family Courtroom—Center Bench	1,700	46	22.38

* Includes ramp in corridor where applicable.

† Wheelchair spaces added to total spectator seating capacity.

San Diego Central Courthouse
Trial Courtroom—Center Bench

Courtroom Component Information

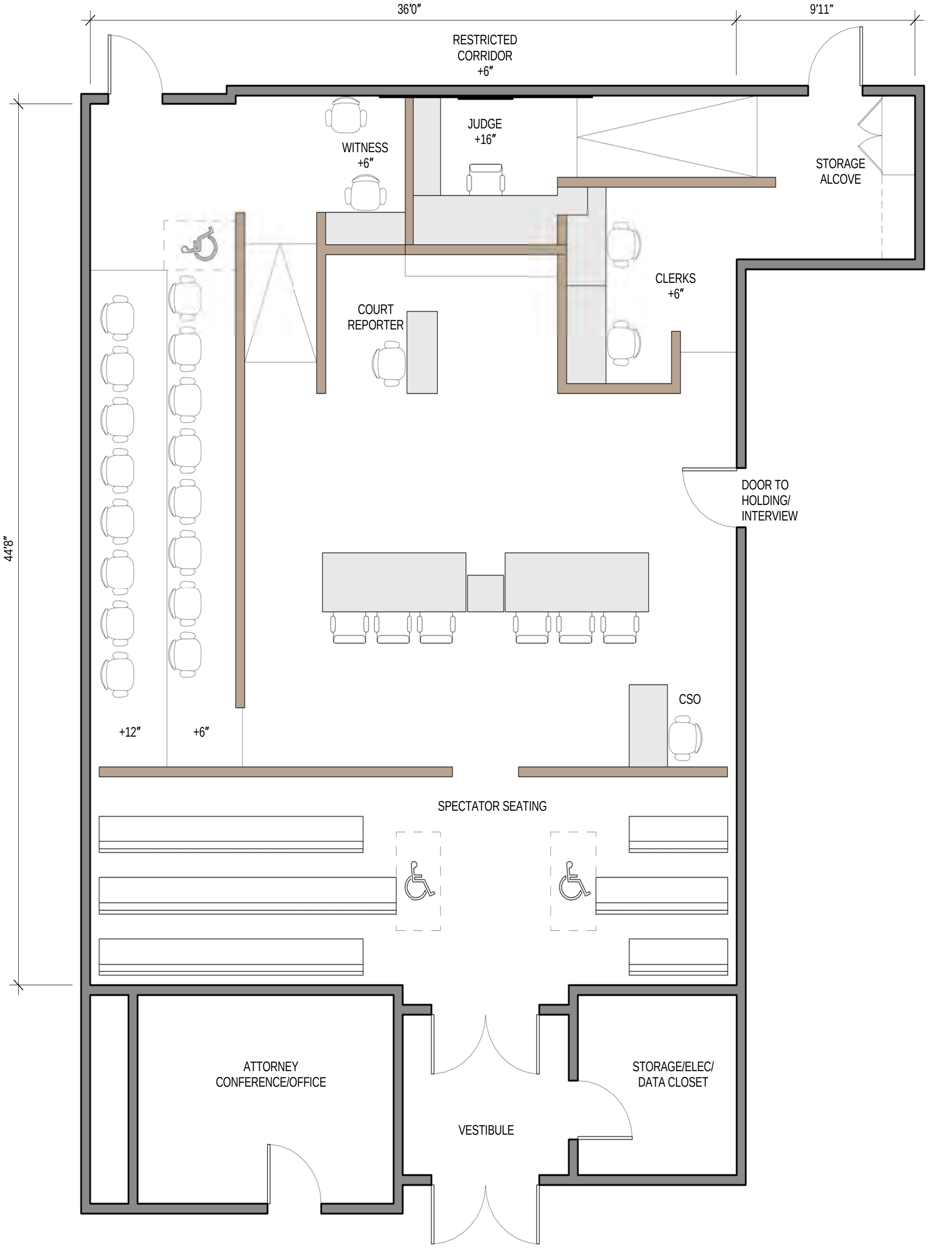
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Trial	1700	44+2 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	8′0″/5′0″	2′6″/1′6″	+16″	1
Courtroom Clerk	10′0″	2′2″	-	2
Court Security Officer	4′2″	2′2″	-	1
Court Reporter	4′2″	1′9″	-	1
Witness Stand	4′6″	1′8″	+6″	2
Jury Box	N/A	N/A	(1st row) +6″ (2nd row) +12″	16
Counsel Tables	8′0″	3′6″	-	3 ea.
Lectern	2′0″	2′0″	-	-

Notes for Future Applications

- Avoid jagged outline to the footprint of the courtroom. Simplify the shape to a rectangular room.
- Avoid jury seats in the jury box located behind counsel tables. All jury seats should be forward of counsel tables.
- Plan for additional chairs to be located forward of the spectator seating gallery.

Figure 22.11 San Diego Central Courthouse, Trial Courtroom—Center Bench



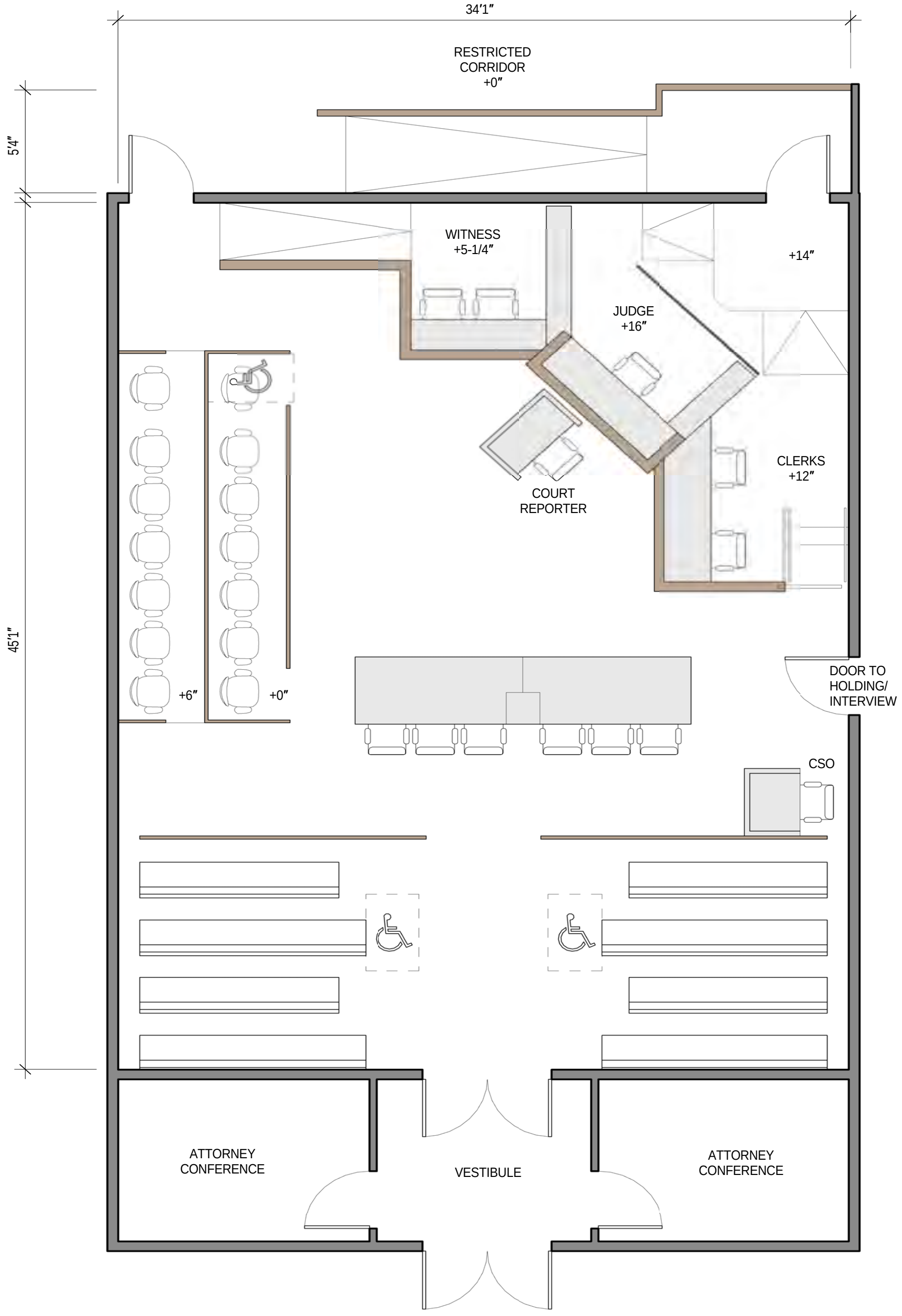
San Bernardino Justice Center
Trial Courtroom—Corner Bench

Courtroom Component Information

COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Trial	1,700	48+2 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′0″/4′9″	2′0″/1′2″	+16″	1
Courtroom Clerk	9′0″	2′2″	+12″	2
Court Security Officer	3′0″	2′4″	-	1
Court Reporter	3′9″	2′0″	-	1
Witness Stand	6′4″	1′7″	+5-1/4″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″	14
Counsel Tables	7′10″	3′6″	-	3 ea.
Lectern	-	-	-	-

Figure 22.12 San Bernardino Justice Center, Trial Courtroom—Corner Bench



San Diego Central Courthouse
Large Trial Courtroom—Center Bench

Courtroom Component Information

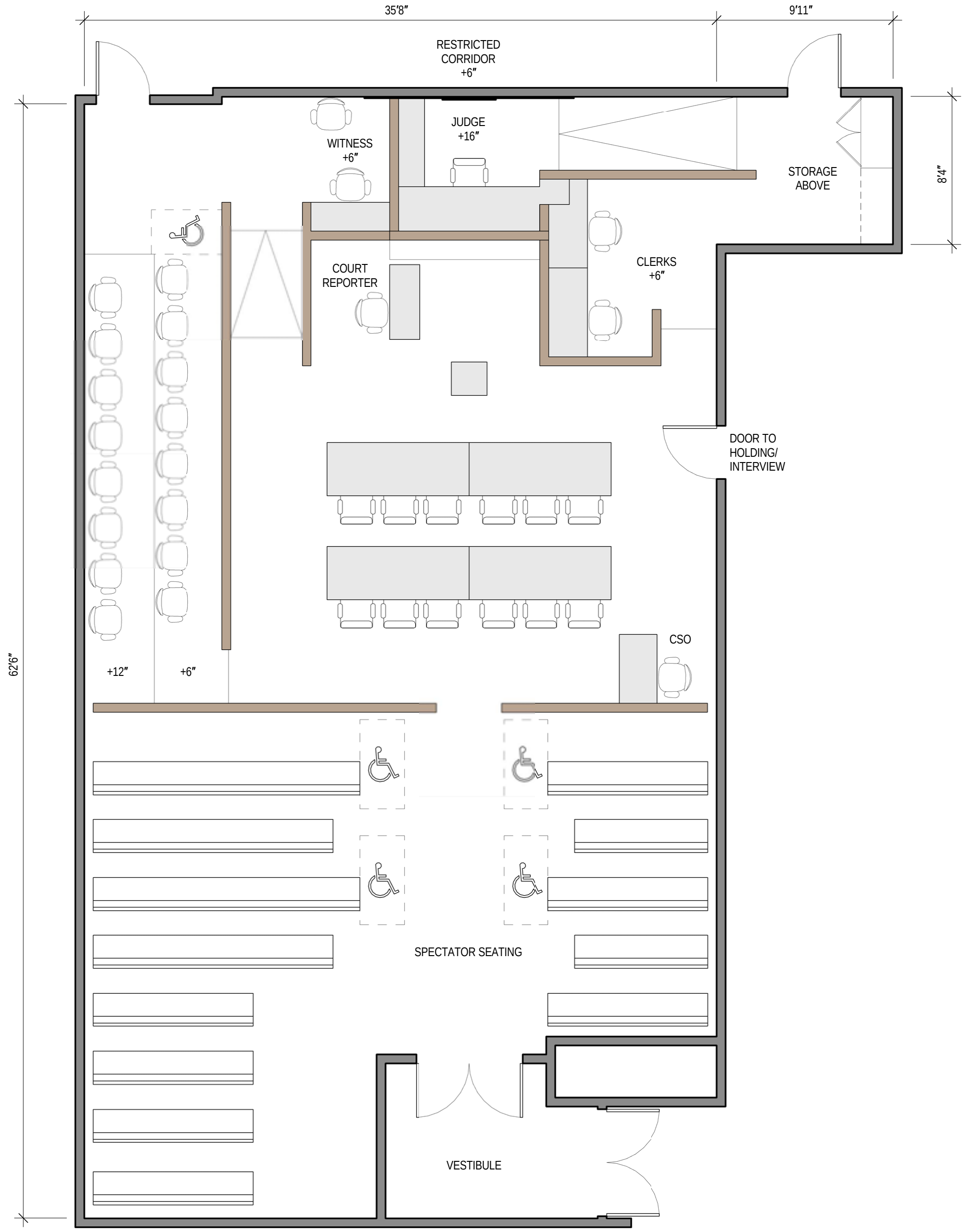
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Large Trial	2,100	94+4 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	8′0″/5′0″	2′6″/1′6″	+16″	1
Courtroom Clerk	10′0″	2′2″	+6″	2
Court Security Officer	3′10″	2′2″	-	1
Court Reporter	4′2″	1′9″	-	1
Witness Stand	4′6″	1′8″	+6″	2
Jury Box	N/A	N/A	(1st row) +6″ (2nd row) +12″	16
Counsel Tables	8′0″	3′6″	-	3 ea.
Lectern	2′0″	2′0″	-	-

Notes for Future Applications

- Avoid jagged outline to the footprint of the courtroom. Simplify the shape to a rectangular room.
- Avoid jury seats in the jury box located behind counsel tables. All jury seats should be forward of counsel tables.
- Plan for additional chairs to be located forward of the spectator seating gallery.
- Maintain clear circulation space next to court security officer desk so that obstructions don’t impede quick response to disturbance in the courtroom.

Figure 22.13 San Diego Central Courthouse, Large Trial Courtroom—Center Bench



San Diego Central Courthouse
Double Jury Courtroom—Center Bench
Courtroom Component Information

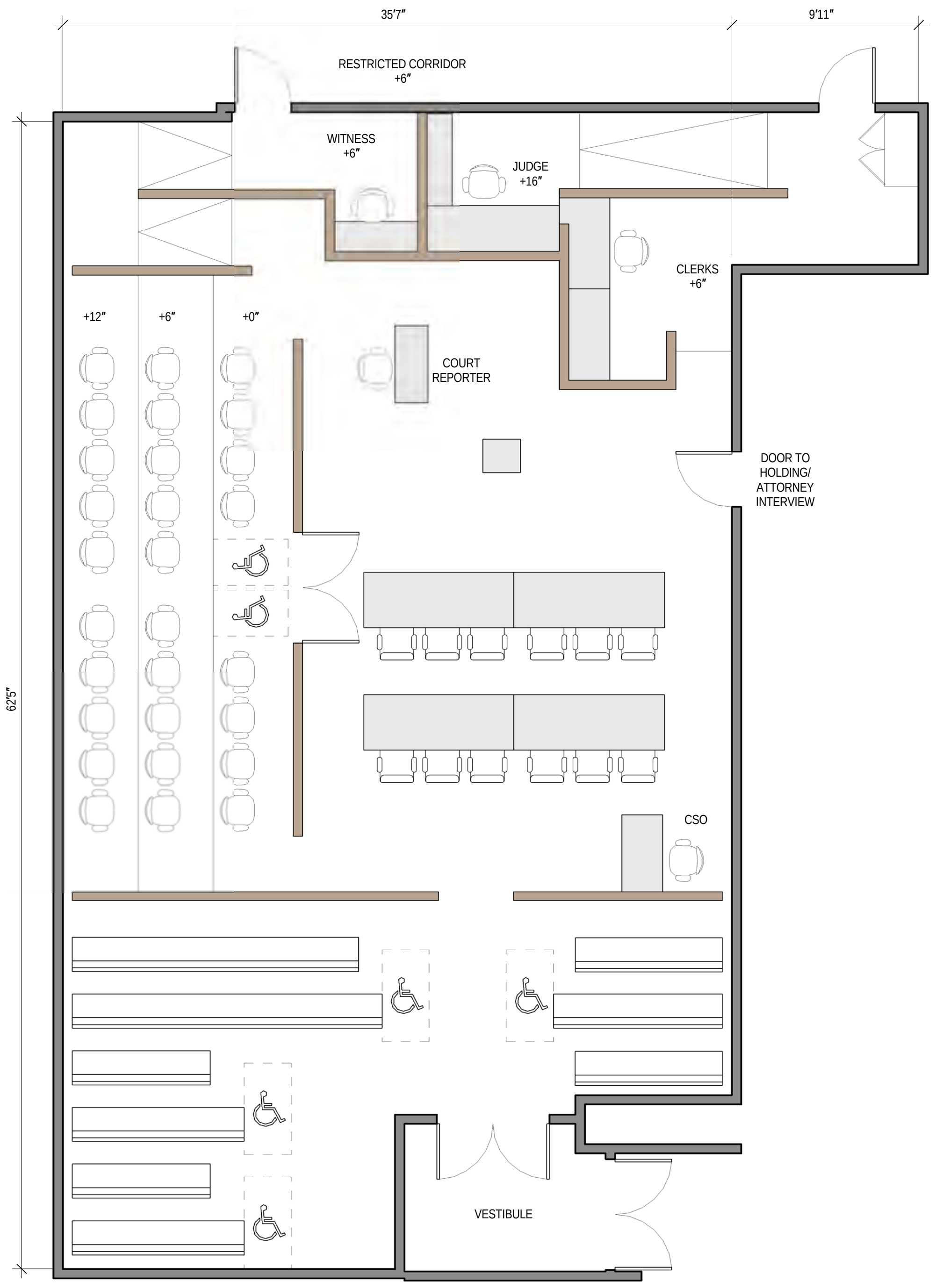
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Double Jury	2,100	60+4 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′0″/5′0″	2′6″/1′4″	+16″	1
Courtroom Clerk	9′0″	2′2″	+6″	2
Court Security Officer	4′2″	2′2″	-	1
Court Reporter	4′2″	1′9″	-	1
Witness Stand	6′4″	1′8″	+6″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″ (3rd row) +12″	28
Counsel Tables	7′0″	3′0″	-	3 ea.
Lectern	-	-	-	-

Notes for Future Applications

- Avoid jagged outline to the footprint of the courtroom. Simplify the shape to a rectangular room.
- Avoid jury seats in the jury box located behind counsel tables. All jury seats should be forward of counsel tables.
- Plan for additional chairs to be located forward of the spectator seating gallery.
- Avoid jury box seats that may obstruct sightlines from the bench to spectator seating.
- Provide clear space forward of accessible seats in the jury box.

Figure 22.14 San Diego Central Courthouse, Double Jury Courtroom—Center Bench



San Bernardino Justice Center
Double Jury Courtroom—Corner Bench

Courtroom Component Information

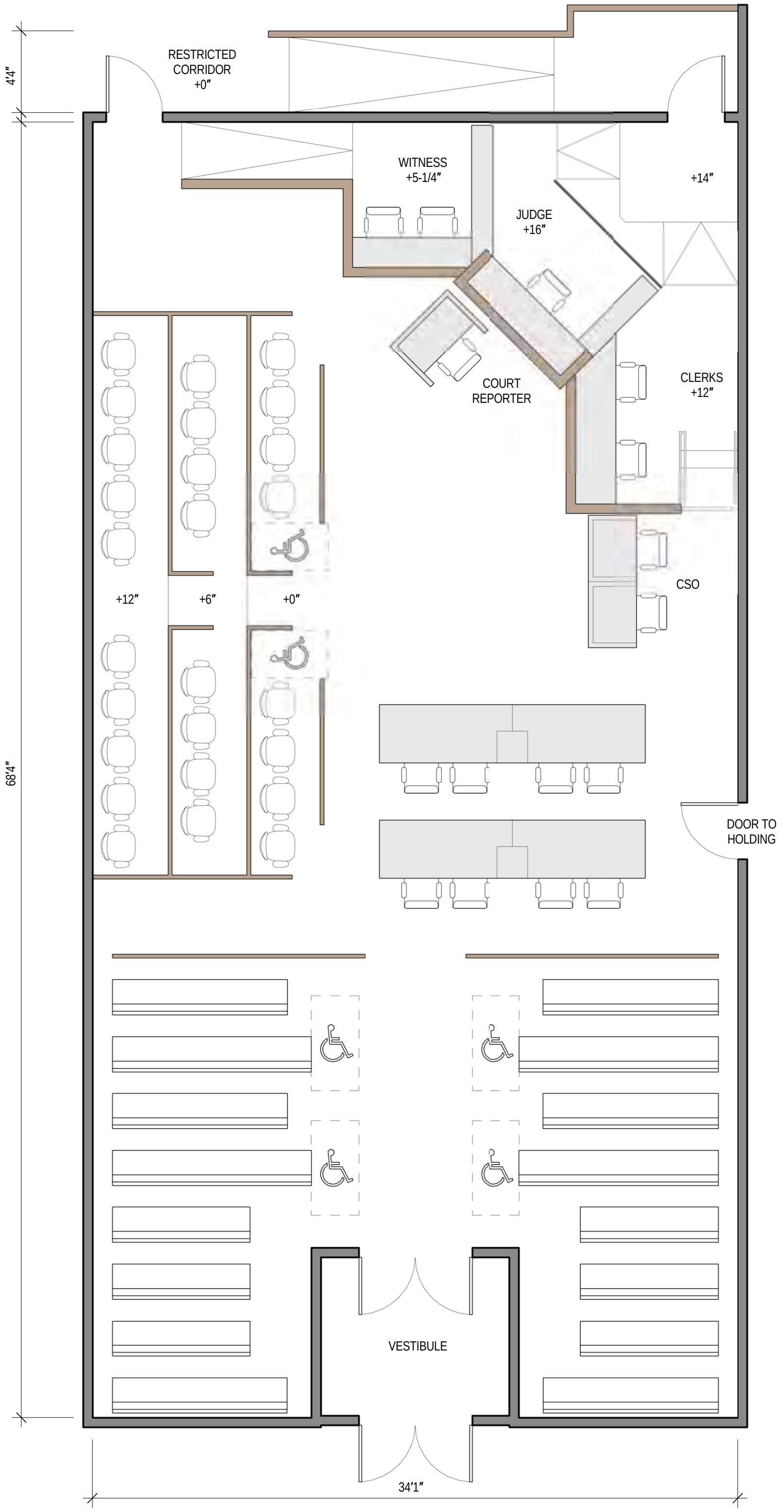
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Double Jury	2,400	88+4 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	7′0″/4′9″	2′0″/1′2″	+16″	1
Courtroom Clerk	9′0″	2′2″	+12″	2
Court Security Officer	7′0″	2′4″	-	2
Court Reporter	4′3″	2′0″	-	1
Witness Stand	6′4″	1′7″	+5-1/4″	2
Jury Box	N/A	N/A	(1st row) +0″ (2nd row) +6″ (3rd row) +12″	26
Counsel Tables	7′0″	3′0″	-	2 ea.
Lectern	-	-	-	-

Notes for Future Applications

- Avoid long, narrow courtroom.
- Avoid jury seats in the jury box located behind counsel tables. All jury seats should be forward of counsel tables.
- Plan for additional chairs to be located forward of the spectator seating gallery.
- Avoid jury box seats that may obstruct sightlines from the bench to spectator seating.
- Provide sightlines from the bench to all the seats in the spectator gallery.
- Locate court security officer closer to the gallery.

Figure 22.15 San Bernardino Justice Center, Double Jury Courtroom—Corner Bench



San Diego Central Courthouse
Arraignment Courtroom—Center Bench

Courtroom Component Information

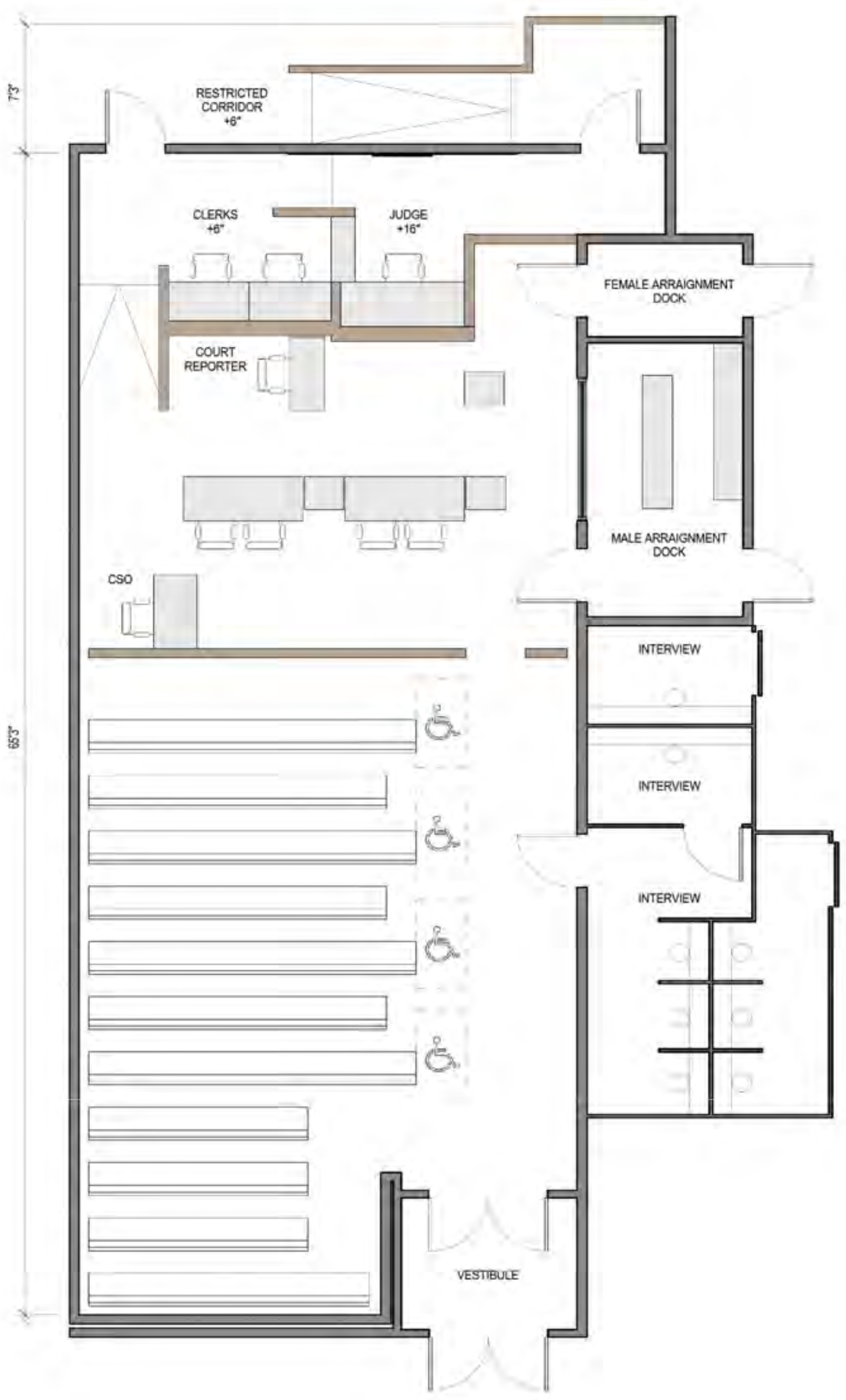
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Arraignment Courtroom	1,800	94+4 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	6′0″/3′8″	2′6″/1′3″	+16″	1
Courtroom Clerk	8′2″	2′6″	+6″	2
Court Security Officer	4′2″	2′2″	-	1
Court Reporter	4′2″	1′9″	-	1
Witness Stand	N/A		N/A	
Jury Box	N/A	N/A	N/A	N/A
Counsel Tables	6′0″	3′0″	-	2 ea.
Lectern	2′6″	2′0″	-	-

Notes for Future Applications

- Avoid jagged outline to the footprint of the courtroom. Simplify the shape to a rectangular room.
- Use the layout requirements for attorney-client interview rooms provided in chapter 25, Attorney-Client Interview Room Guidelines.
- Avoid long, narrow courtroom.
- Plan for additional chairs to be located forward of the spectator seating gallery.
- Locate door to arraignment dock forward of counsel table.
- Provide sightlines from the bench to all the seats in the spectator gallery.

Figure 22.16 San Diego Central Courthouse, Arraignment Courtroom—Center Bench



San Diego Central Courthouse
Family Courtroom—Center Bench

Courtroom Component Information

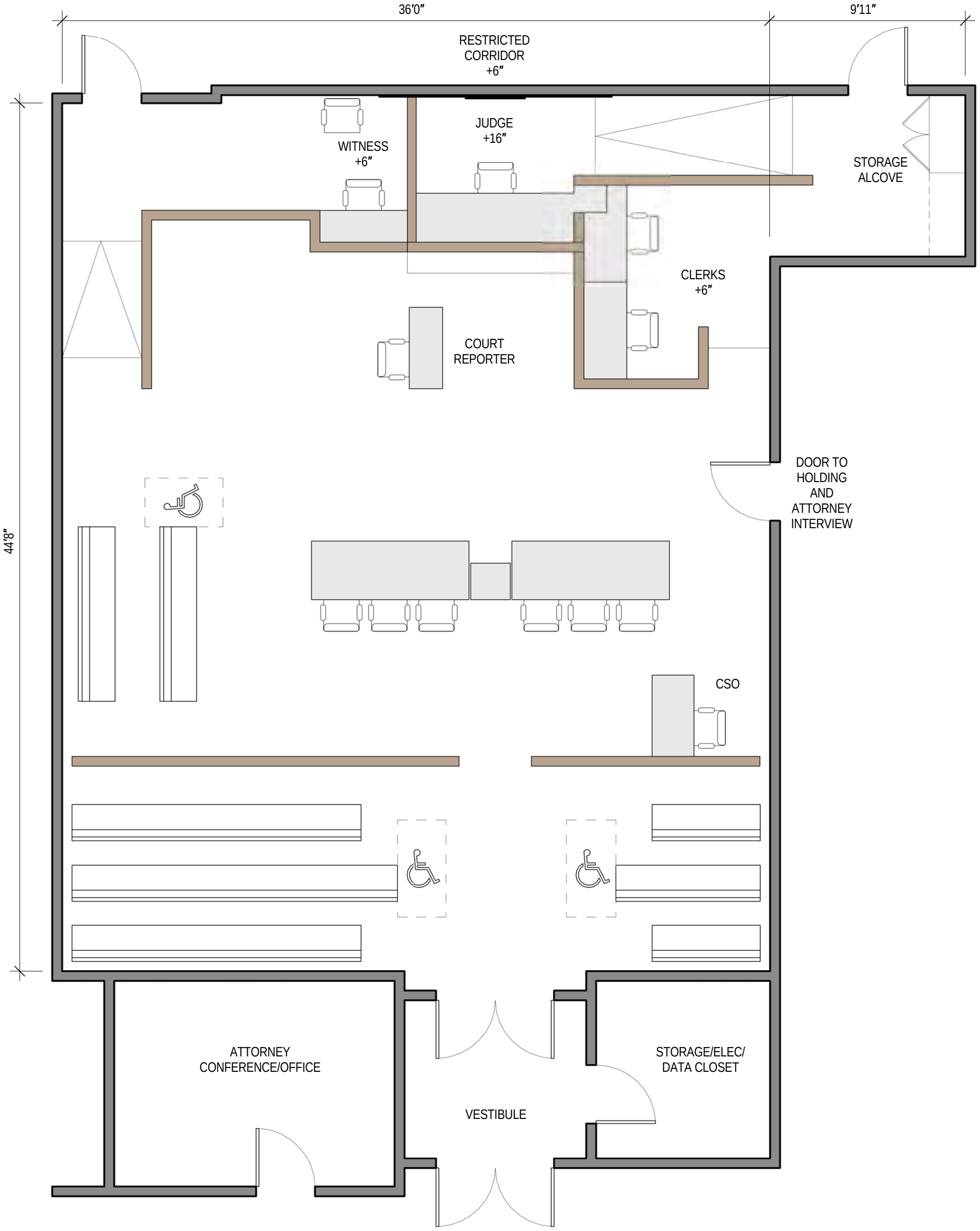
COURTROOM TYPE	TOTAL SQUARE FEET (INCLUDES RAMP IN CORRIDOR)	SPECTATOR SEATING AT 18″
Family	1,700	44+2 WC

ELEMENT OR WORKSTATION	FURNITURE/ WIDTH	CASEWORK DEPTH	HEIGHT ABOVE FLOOR	NO. OF OCCUPANTS
Judge	8′0″	2′6″	+16″	1
Courtroom Clerk	10′0″	2′2″	+6″	2
Court Security Officer	4′2″	2′2″	-	1
Court Reporter	4′2″	1′9″	-	1
Witness Stand	4′6″	1′8″	+6″	2
Jury Box	N/A	N/A	N/A	N/A
Counsel Tables	8′0″	3′0″	-	3 ea.
Lectern	2′0″	2′0″	-	-

Notes for Future Applications

- Avoid jagged outline to the footprint of the courtroom. Simplify the shape to a rectangular room.
- Plan for additional chairs to be located forward of the spectator seating gallery.

Figure 22.17 San Diego Central Courthouse, Family Courtroom—Center Bench



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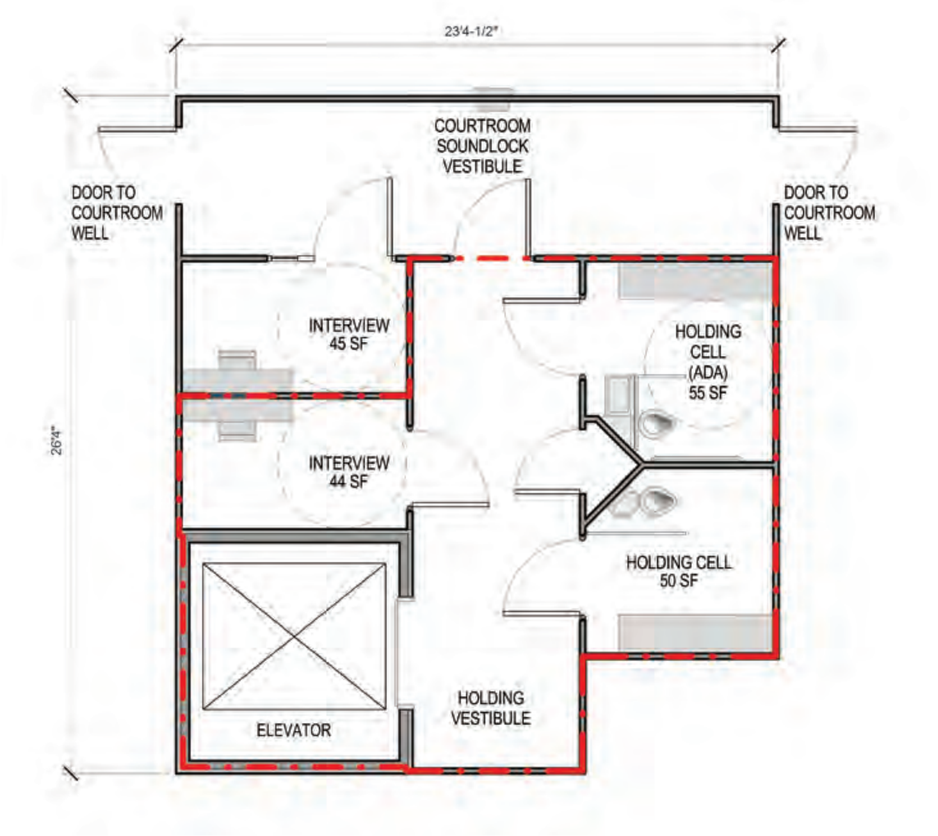
22.D HOLDING CORE TEMPLATES

	TOTAL SQUARE FEET	TOTAL RATED CAPACITY	PAGE
Typical Holding Core A	572	4	B.42
Typical Holding Core B	605	7	B.43
Typical Holding Core C	496	4	B.44

Typical Holding Core A

Holding Core Information

TOTAL SQUARE FEET	TOTAL RATED CAPACITY	TOTAL CELL COUNT
572	4	2



Note: The red line indicates rated wall boundary for institutional-occupancy separation.

ADA = Americans with Disabilities Act.

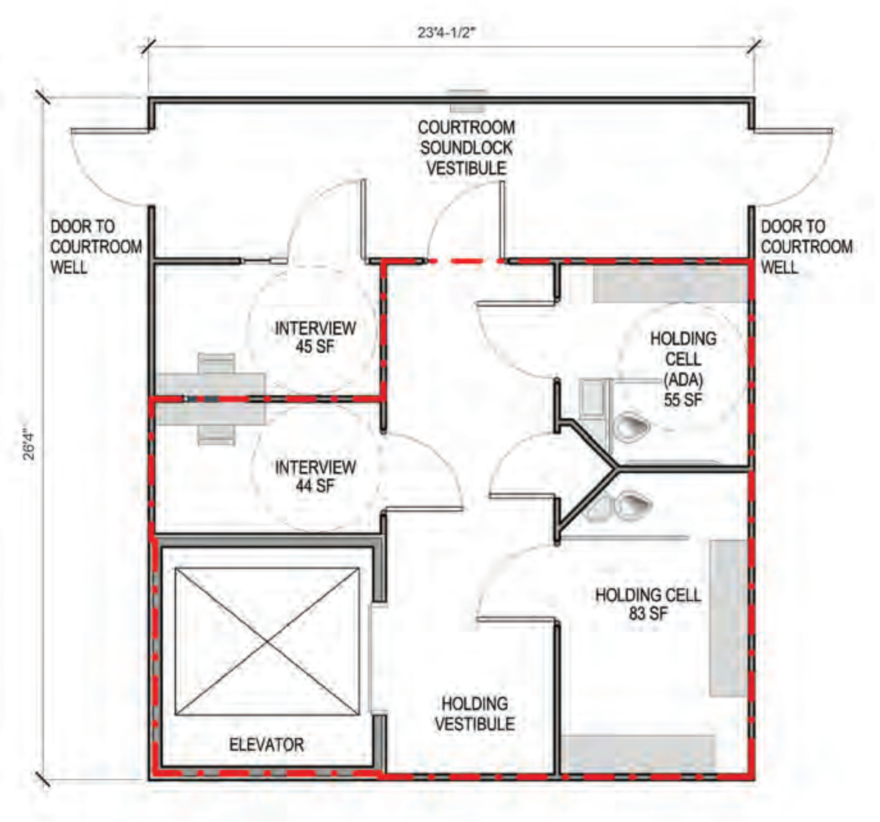
SF = square feet.

Figure 22.18 Typical Holding Core A

Typical Holding Core B

Holding Core Information

TOTAL SQUARE FEET	TOTAL RATED CAPACITY	TOTAL CELL COUNT
605	7	2



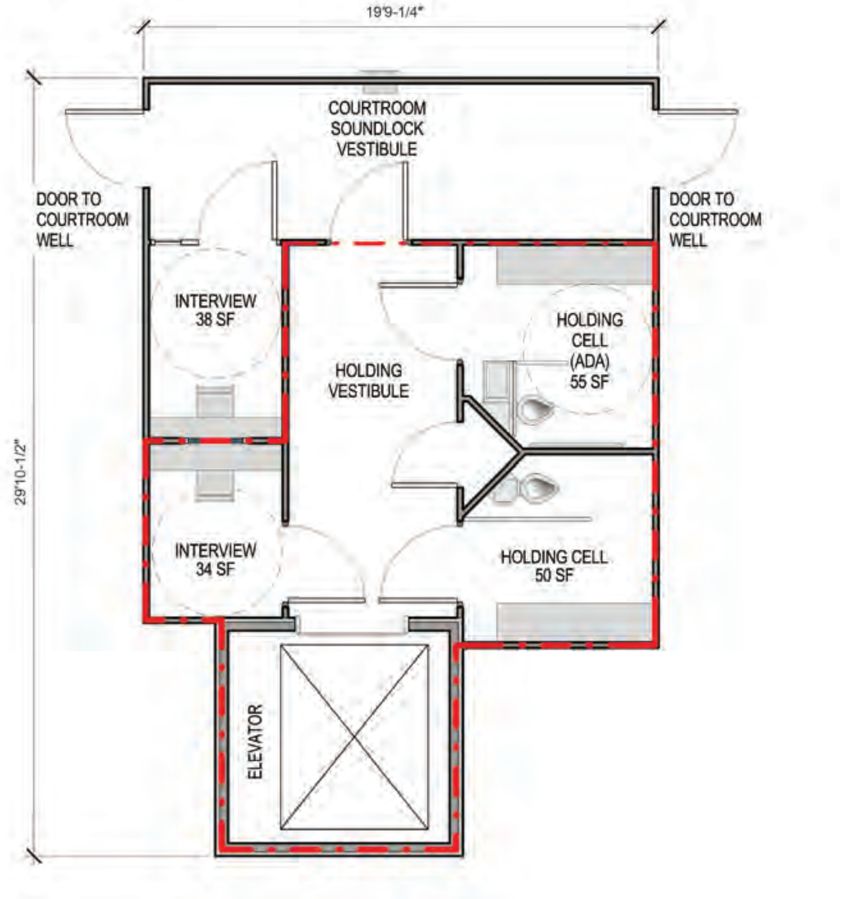
Note: The red line indicates rated wall boundary for institutional-occupancy separation.

Figure 22.19 Typical Holding Core B

Typical Holding Core C

Holding Core Information

TOTAL SQUARE FEET	TOTAL RATED CAPACITY	TOTAL CELL COUNT
496	4	2



Note: The red line indicates rated wall boundary for institutional-occupancy separation.

Figure 22.20 Typical Holding Core C

REQUIRED TOOLS

23

INTEGRATED NETWORK ARCHITECTURE

South County Justice Center, Tulare County
Porterville, CA
CO Architects

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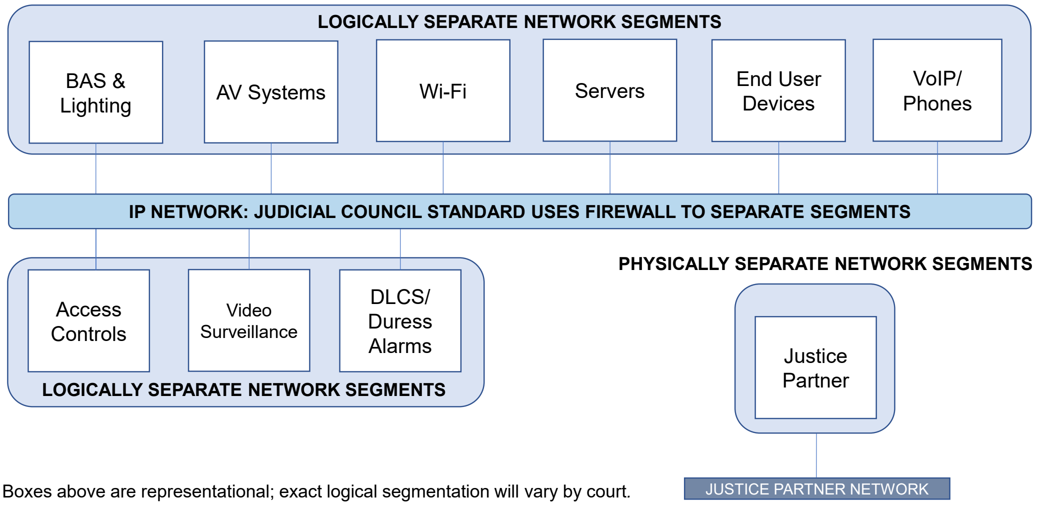


Boxes above are representational; exact logical segmentation will vary by court.

BAS = building automation system.

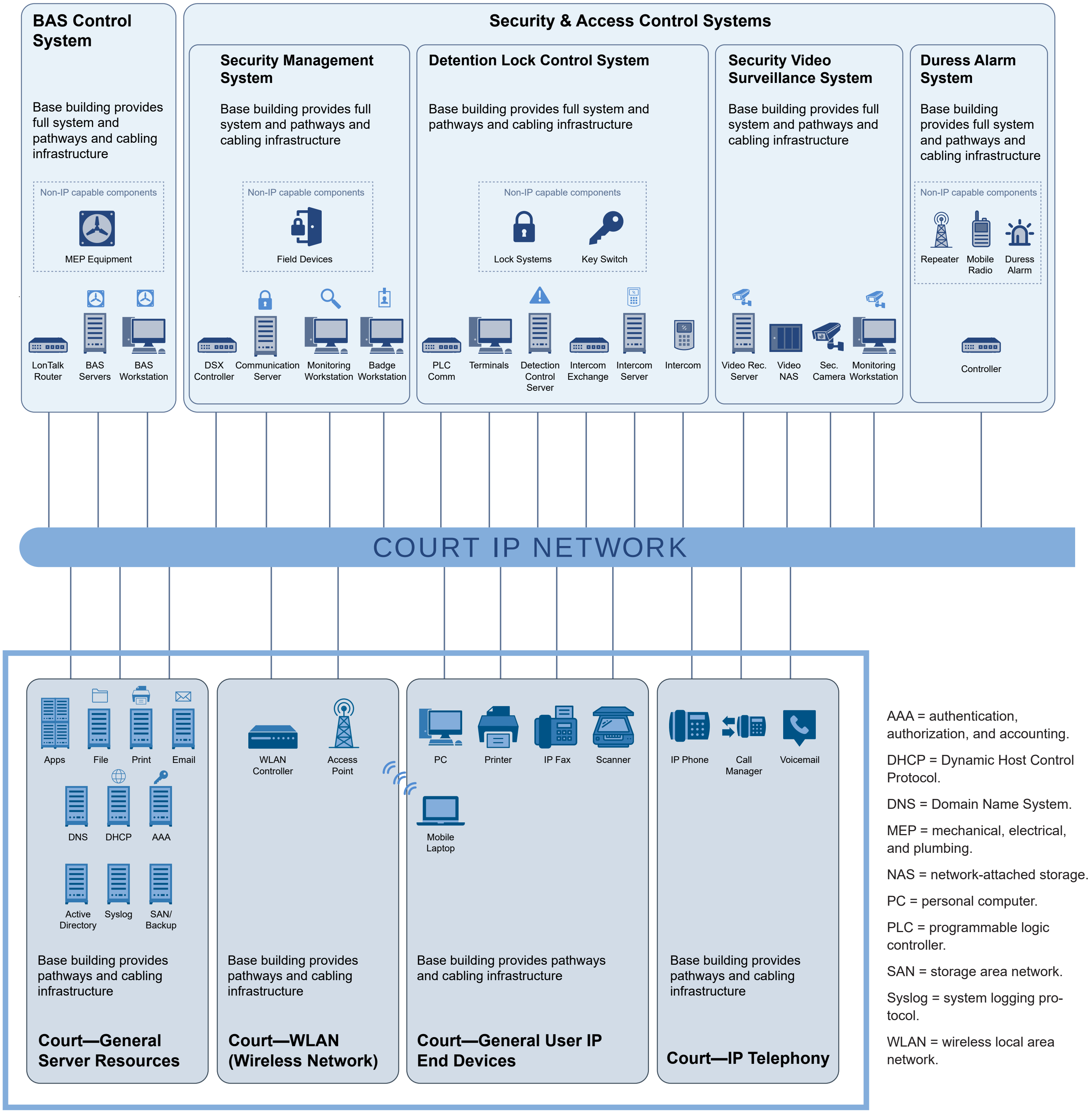
AV = audiovisual.

VoIP = Voice over Internet Protocol.

DLCS = detention lock control system.

Figure 23.1 Overview of Integrated Network Architecture

REQUIRED TOOLS



BAS Control System

Base building provides full system and pathways and cabling infrastructure

Security & Access Control Systems

Security Management System

Base building provides full system and pathways and cabling infrastructure

Detention Lock Control System

Base building provides full system and pathways and cabling infrastructure

Security Video Surveillance System

Base building provides full system and pathways and cabling infrastructure

Duress Alarm System

Base building provides full system and pathways and cabling infrastructure

Base building provides pathways and cabling infrastructure

Court—General Server Resources

Base building provides pathways and cabling infrastructure

Court—WLAN (Wireless Network)

Base building provides pathways and cabling infrastructure

Court—General User IP End Devices

Base building provides pathways and cabling infrastructure

Court—IP Telephony

AAA = authentication, authorization, and accounting.

DHCP = Dynamic Host Control Protocol.

DNS = Domain Name System.

MEP = mechanical, electrical, and plumbing.

NAS = network-attached storage.

PC = personal computer.

PLC = programmable logic controller.

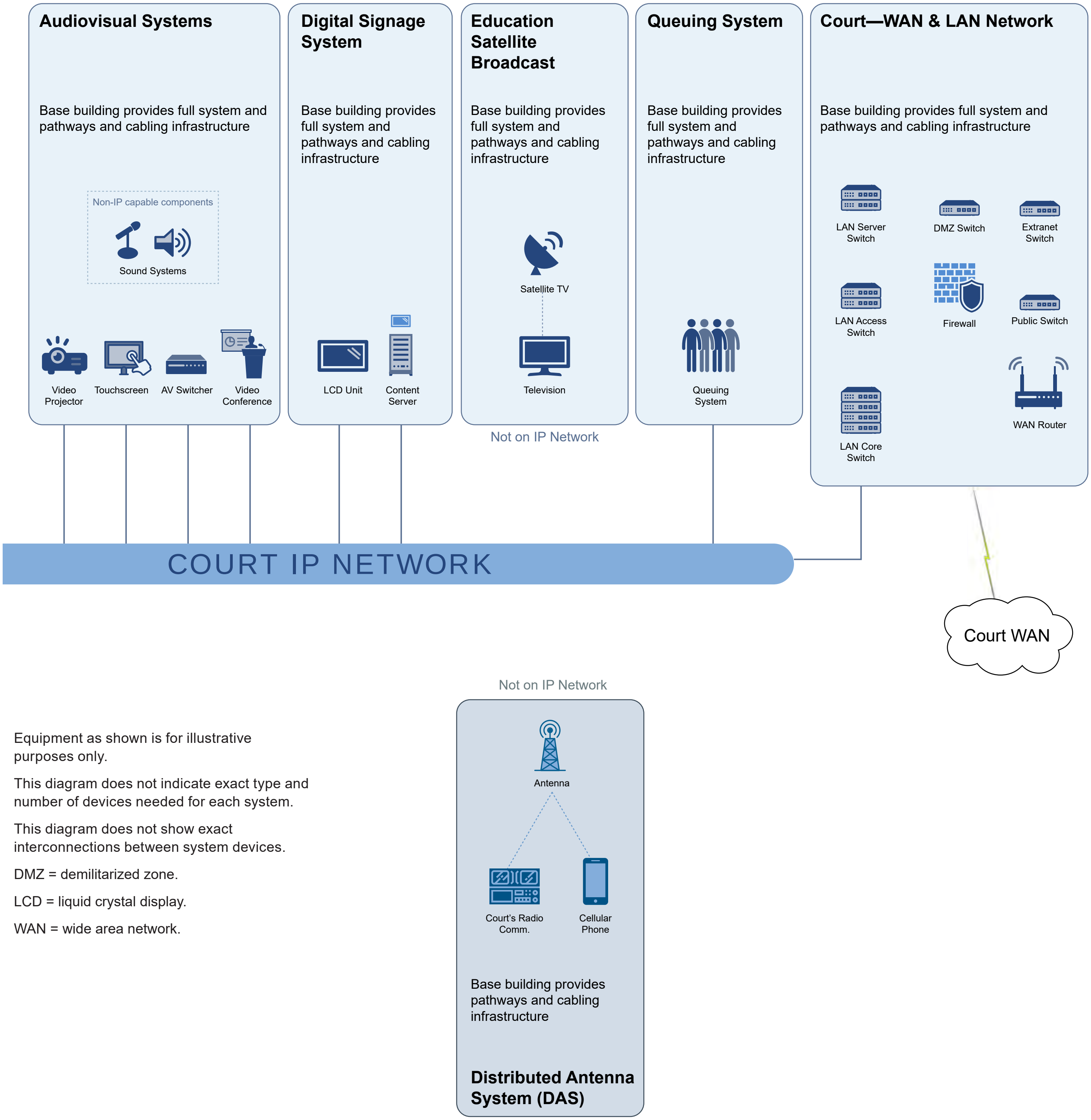
SAN = storage area network.

Syslog = system logging protocol.

WLAN = wireless local area network.

Figure 23.2 Integrated Network Architecture by Systems

Figure 23.2 continues on next page



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.

DMZ = demilitarized zone.

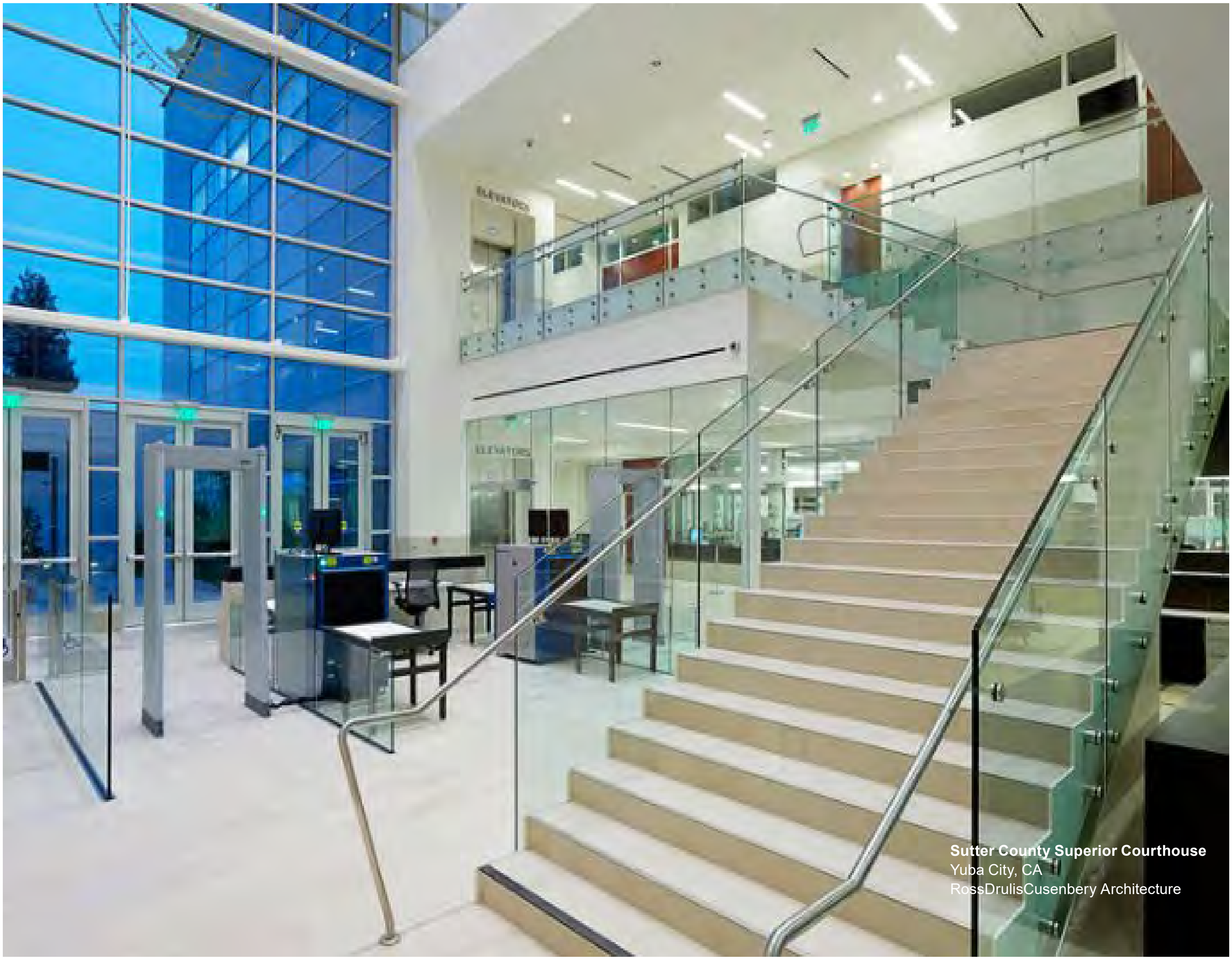
LCD = liquid crystal display.

WAN = wide area network.

Figure 23.2 Integrated Network Architecture by Systems *continued*

REQUIRED TOOLS

24 GRAPHICAL USER INTERFACE TEMPLATE



Sutter County Superior Courthouse
Yuba City, CA
RossDrulisCusenbery Architecture

24.A INTRODUCTION

The GUI (graphical user interface) template is provided as a starting point for the design of the courtroom touchscreen control panel located at either the judge, clerk, or bailiff's desk. It must be customized based on the specific capabilities and layout of each courtroom. Control panels for ancillary spaces should follow the same general layout, as much as possible. The following pages describe the step-by-step instructions to design and use the template.

24.B PAGE DESCRIPTIONS

Startup Page

If the page in figure 24.1 is visible, then the audiovisual (AV) system is off. Tap the seal to start the system.

Figure 24.1 Audiovisual System Startup Page

Press Seal to Start System
Courtroom 1

10-03-2019 10:06 AM

Audio Video Page

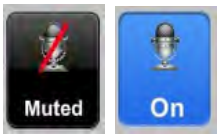
At the top of the resulting page—the simplified Audio Video page (figure 24.2)—is a ribbon of all the page views. On the ribbon, tap the tab of the page you wish to view.

Figure 24.2 Simplified Audio Video

On the Audio Video page, tap the applicable Laptop, DocCam, or Blu-ray button to connect the device at the indicated location to the display system. For example, figure 24.2 shows the laptop in the Right Counsel group as Selected, which means it is connected to the display system. To switch to the judge's laptop, tap the Laptop button in the Judge group.

Tapping any display button also turns on the courtroom projector and lowers the projection screen.

The Audio Video page also shows whether a microphone is on or off. The microphone button toggles between On and Muted. For example, figure 24.2 also shows that the microphones at the lectern and clerk's desk are on. Tap the Muted button to turn a microphone on and the On button to turn it off. On this simplified page, the microphone buttons in the Left Counsel or Right Counsel group, when tapped, mute and unmute both of the two microphones in those areas. To control them separately, see figure 24.3.



REQUIRED TOOLS

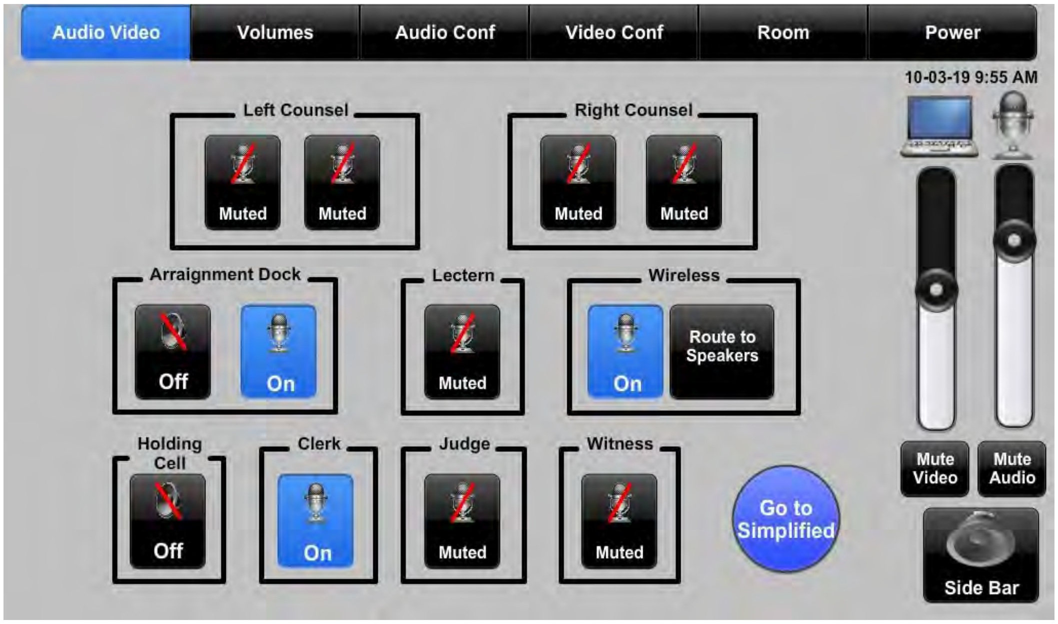
Tapping the Go to Advanced button toggles from the simplified page to the advanced page.

The next set of buttons appears on every page of the AV system.

- The two volume sliders control either the laptop volume or the master microphone volume.
- The Mute Video button mutes all video and Mute Audio mutes all audio.
- The Side Bar button turns on pink noise, mutes all microphones, and optionally sends audio from the sidebar to the court reporter. A pop-up window volume control allows the volume of the pink noise to be adjusted.

The advanced Audio Video page (figure 24.3) differs, in part, from the simplified page in that it has buttons for each of the two counsel microphones on each table (rather than one button for both), along with buttons that control arraignment dock and holding cell speakers, if available.

Figure 24.3 Advanced Audio Video Page

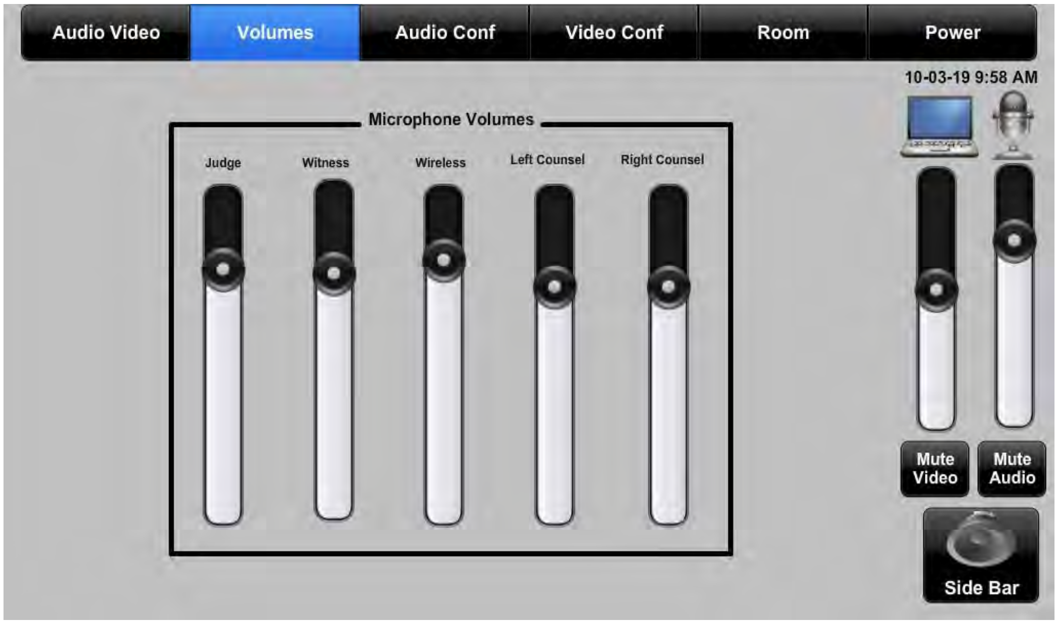


Another feature of the advanced page is the Wireless group, with buttons that control the wireless microphone. The default is to have the wireless microphone routed to the ceiling speakers. If the Route to Speakers button is tapped, the wireless microphone is routed to the infrared (IR) headsets in the courtroom. If a language interpreter is in the room, the interpreter can use the wireless microphone to translate what is being said in the courtroom directly to anyone wearing a wireless headset.

Tapping the Go to Simplified button toggles the page back from the advanced to the simplified Audio Video page.

Volumes Page

Figure 24.4 Volumes Page



The Volumes page has slider volume controls for each courtroom microphone.

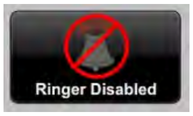
Audio Conf Page

Figure 24.5 Audio Conf Page

The Audio Conf page allows audio telephone calls with the microphones and speakers already used for amplification within the courtroom. Calls can be placed either by tapping the Dialtone button first or by entering the number and then tapping the Dial button. The volume control then adjusts the volume of the received telephone audio. The page can display the court's phone number and a message indicating to "Dial 9 for an outside line."

The Speakers button and Ch 2 button control the routing of the telephone audio feed. The default is to the ceiling speakers. If the language translator has been called on the telephone, the translator can hear what is being said in the courtroom and translate it for anyone who is wearing a wireless IR headset. If the Speakers button is blue, the system is set to the default, routing the telephone audio feed to the ceiling speakers. If the Ch 2 button is tapped, the blue Speakers button toggles to black and the Ch 2 button turns blue, changing the feed to channel 2 on the headsets.

The Ringer Disabled button indicates that the telephone ringer is disabled, so the courtroom will not be disturbed if someone calls the phone number of the courtroom. The ringer is disabled by default. If the button is tapped the ringer is activated.



The On microphone button acts as a privacy button, either enabling or disabling the sending of audio from the courtroom over the telephone.

Video Conf Page

Figure 24.6 Video Conf Page

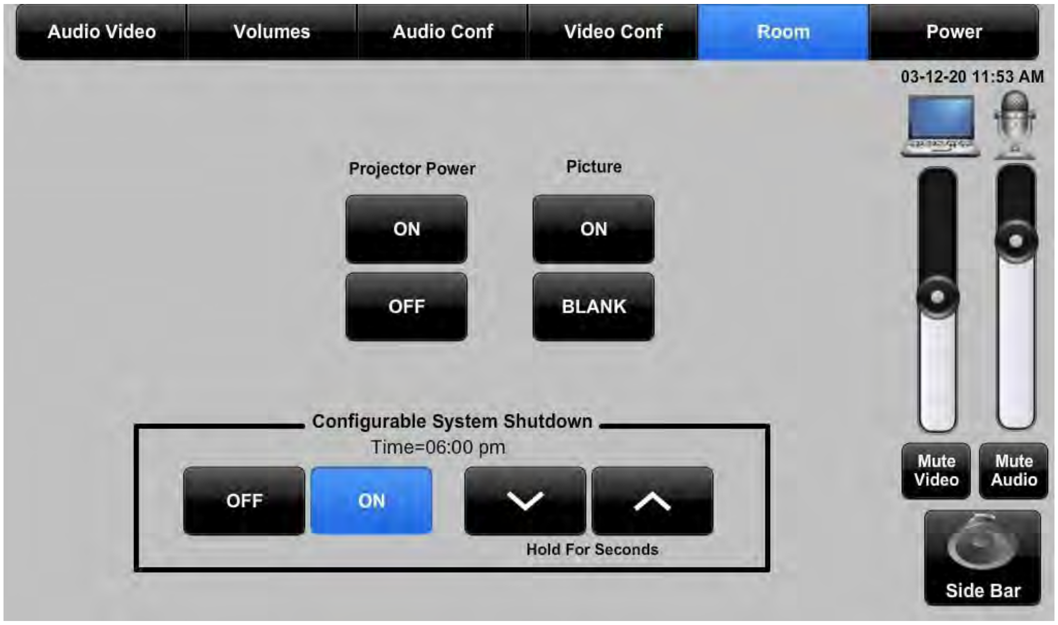
10-03-19 10:00 AM

My IP address is 192.168.1.1

The optional Video Conf page allows the making of videoconference calls with the cameras, microphones, and speakers installed in the courtroom. Because this capability is reserved for only a few courtrooms in a courthouse, the Video Conf tab will be available on only some of the touchscreens. This page must be customized based on the specific videoconference system installed.

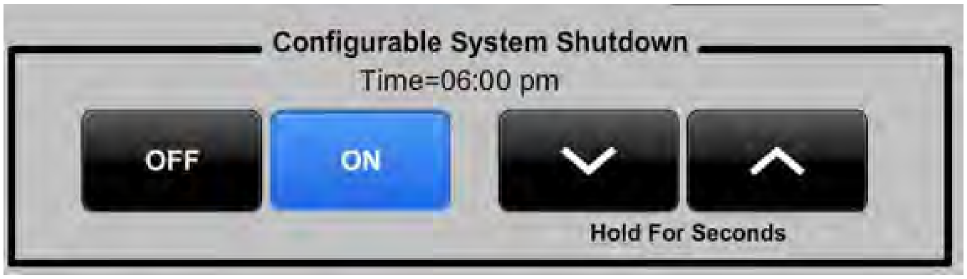
Room Page

Figure 24.7 Room Page



The Room page contains seldom-used and backup controls. It allows the projector power to be turned on and off and the picture image to be momentarily blanked.

The Configurable System Shutdown group controls the end-of-day auto shutdown. Set the time with momentary tapping of the up-down arrows, holding them for a few seconds as the time changes. The auto shutdown can be temporarily disabled by tapping the Off button, but it is automatically enabled the next day.



REQUIRED TOOLS

25

ATTORNEY-CLIENT INTERVIEW ROOM GUIDELINES

County of Santa Clara Family Justice Center
San Jose, CA
Zimmer Gunsal Frasca LLP

25.A ACOUSTIC STUDY

To ensure confidentiality, care must be taken in the construction of attorney-client interview rooms to prevent sound transmission to outside those rooms. The Judicial Council Facilities Services office has noted that the attorney-client interview rooms in the Superior Court of Santa Clara County's Family Justice Center Courthouse in San Jose, California, have kept conversations between attorneys and their clients sufficiently contained within the constructed interview rooms. The following report has been put together to characterize the existing space and to recommend acoustic standards based on these rooms to inform the construction of future attorney-client interview rooms.

1. Findings

Following is a summary of the findings of the existing conditions and the sound isolation assessment of a selected pair of attorney and in-custody interview rooms in the Family Justice Center Courthouse. Observations and measurements were focused on a fourth-floor pair of attorney and in-custody interview rooms. Architectural working drawings suggest similar construction at similar pairs of interview rooms on the second and third floors.

a. Attorney and in-custody interview room separation walls include windows with frame spacers to support unamplified conversation.

b. The entry door at the attorney interview room is fully gasketed, whereas the in-custody room has head and jamb seals only; corresponding sound isolation between interview rooms and adjacent circulation spaces was measured as noise isolation class (NIC) 34 and NIC 21, respectively.

c. Measured airborne sound isolation through the typical gypsum board wall at attorney interview rooms and the security wall at in-custody rooms was NIC 46 and NIC 34, respectively.

d. Because of the column layout on the fourth floor, interview rooms are separated from adjacent attorney-client rooms and a courtroom by double-wall assemblies; measured airborne sound isolation was NIC 52 to 62 through these assemblies.

e. HVAC (heating, ventilation, and air-conditioning) systems serving interview rooms consist of the following:

  - A supply duct path served by variable air volume (VAV) boxes that also serve adjacent spaces.
  - No ducted return air paths. Therefore, return air from the attorney interview room appears to pass through the window frame to the in-custody interview room, and return air then travels through the undercut door to the holding vestibule.

f. Background noise levels, because of HVAC systems, were NC (Noise Criteria) 38 in the attorney interview room and NC 27 in the in-custody interview room.

2. Guidelines

Following is a summary of guidelines for future interview rooms:

a. Transaction window between attorney and in-custody interview rooms shall allow unamplified speech communication at normal conversational levels.

b. Room acoustic treatments shall support speech intelligibility.

ABBREVIATIONS

ASHRAE = American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASTM = An international standards organization that develops and publishes voluntary consensus technical standards

NC = Noise Criteria: A single-number rating defined by ASHRAE that quantifies a steady-state noise

NIC = noise isolation class: A single-number rating defined in ASTM E336 that quantifies the ability of a partition to reduce airborne noise between adjacent enclosed spaces under field conditions

NRC = noise reduction coefficient: A number between 0 and 1 that represents how much an object hinders sound passing through it (with a higher number representing a greater sound barrier)

STC = sound transmission class: An integer rating used to indicate how well a building partition attenuates sound (with a higher rating indicating a greater sound barrier)

c. Sound isolation and minimum background sound levels shall provide confidential speech privacy between interview rooms and adjacent spaces.

d. HVAC systems shall support the intended use and maintain sound isolation.

25.B OBSERVATIONS AND MEASUREMENT RESULTS

The Family Justice Center Courthouse has three pairs of attorney and in-custody interview rooms, one on the second, third, and fourth floors. Each pair of rooms is separated by a concrete masonry unit (CMU) wall that breaks the ceiling plane and extends to within 6″ of the deck above. These walls include windows with frame spacers to support unamplified conversation. The attorney interview rooms are accessed from public circulation areas with fully gasketed doors and are separated from adjacent rooms by full-height metal stud walls. The in-custody interview rooms are accessed from holding vestibules with partially gasketed doors and are separated from adjacent rooms by security walls constructed of mortar and steel. Table 25.1 summarizes additional design features.

Conditioned air serving the interview rooms is provided by ducted air-handling units with zoned VAV systems. Although the attorney and in-custody interview rooms are served by separate VAV boxes, the boxes are shared with other adjacent attorney and in-custody spaces. Each room includes one ducted supply air diffuser. Mechanical drawings indicate that neither room has a ducted return air path. Therefore, it appears that return air from the attorney interview room travels through the conversation window to the in-custody interview room, and return air from both rooms travels through the undercut interview room door to holding vestibule.

When measurements were taken, the building was partially occupied and HVAC systems were operating as normal. Measurements quantified airborne sound isolation in terms of Noise Isolation Class, between interview rooms and adjacent spaces, as well as background noise levels caused by HVAC systems. Sound levels measured in the in-custody room were not adjusted to account for the effects of the room volume and furnishings. Figure 25.1 summarizes measured airborne sound isolation. Background HVAC noise was NC 38 in the attorney interview room and NC 27 in the in-custody interview room.

25.C REQUIREMENTS

The requirements for interview rooms are based on observations and measurements of existing interview rooms at the Family Justice Center Courthouse and industry standard knowledge. Requirements are also included in chapter 5, Court Set; chapter 8, In-Custody Defendant Receiving, Holding, and Transport; and chapter 19, Acoustical Criteria. Following is a summary of the requirements.

1. HVAC Noise

- Interview rooms: Background noise level of NC 30 or less so that it does not interfere with speech communication between interview rooms.
- Ducted supply and return air paths: Lined return air boots to support fully gasketed interview room doors. Undercutting the door for air return is not permitted. Note that this requirement is not followed in the application at the Family Justice Center Courthouse in that the in-custody interview room door is undercut to provide a return air path at that facility. Speech privacy is required at in-custody interview rooms, and the undercut may impede the privacy requirements. Hence, this variation will not be permitted in future projects.

Table 25.1 Construction Elements and Finishes of Attorney and In-Custody Interview Rooms

ROOM	FLOOR	CEILING	DOOR	WALLS
Attorney Interview Room 4C (427)	Carpet	Acoustical ceiling tile (USG Mars mineral fiber or equivalent product, NRC 0.75)	Metal door with head and jamb bulb gaskets; automatic drop bottom with threshold	Typical: Full-height single metal-stud assemblies sealed to the underside of the deck above. Corridor/circulation walls with three total layers of gypsum board and surrounding rooms with four. Additional furred walls where structural columns exist, including on the fourth floor.
In-Custody Interview Room 4-IC (428)	Polished Concrete	Detention-grade perforated metal	Metal door with full perimeter bulb seal and approximately 1″ gap at the bottom	Typical: Steel covered walls with mortar-filled corrugated metal interior composition.

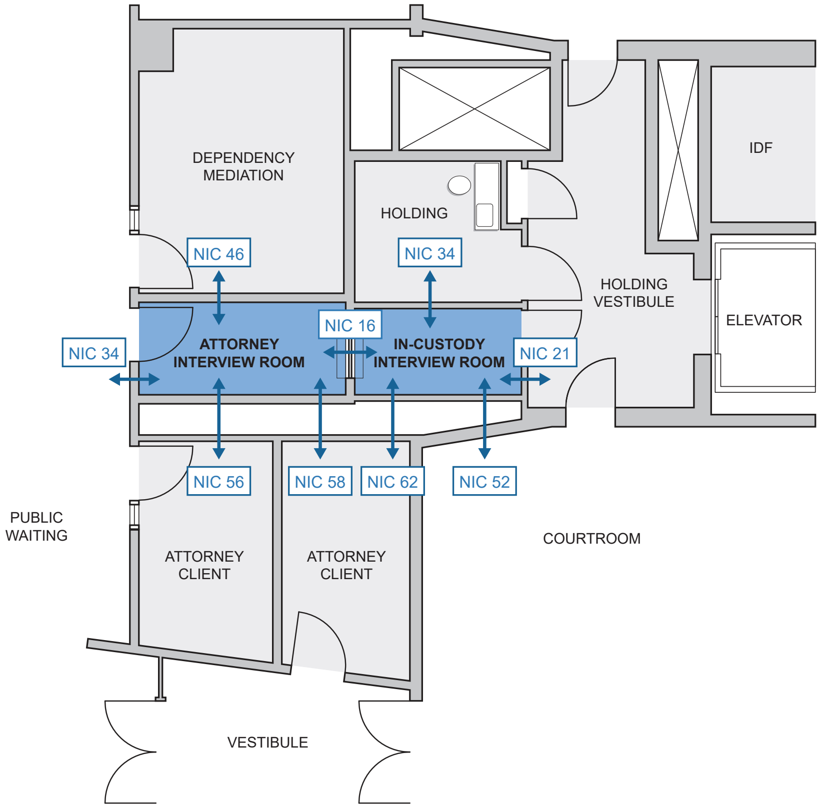


Figure 25.1 Airborne Sound Isolation Measurement

2. Room Acoustics

- Attorney interview rooms: Carpeted floor and sound-absorbing ceiling with minimum noise reduction coefficient (NRC) of 0.70 to support clear speech communication.
- In-custody interview rooms: Hard-finish floor, and ceilings that are detention-grade perforated metal with a 1″ thick sound-absorbing material above (minimum NRC 0.70).

25.D SPEECH PRIVACY

Speech privacy is a function of the acoustic separation between two spaces, quantified in terms of sound transmission class (STC), and the background noise level in the receiving space, measured in terms of Noise Criteria (NC). For normal conversational levels, speech privacy is generally considered to be normal when the composite STC and NC is 70 and confidential when the composite is 80. For reference, *normal speech privacy* generally means the ability to comprehend an occasional word but not complete sentences, and *confidential speech privacy* generally implies that an occupant in the adjacent space may be aware that a conversation is taking place but would be unable to understand individual words.

Following are the requirements for sound isolation at interview rooms. The design team shall review adjacencies on a project-by-project basis to confirm that confidential speech privacy is achieved and upgrade wall and door assemblies, and/or background noise levels, as needed. If HVAC systems operate at varying fan speeds, electronic sound masking may be needed to maintain a constant background noise level in adjacent spaces.

25.E SOUND ISOLATION

1. Wall Assemblies

- Attorney interview room to adjoining areas (unless otherwise noted): STC 50, using for instance a single metal stud with two layers of gypsum board on each side and batt insulation in stud cavities.
- Attorney interview room to public corridor or vestibule: STC 45, using for instance a single metal stud with two layers of gypsum board on one side and one layer on the opposite side and batt insulation in stud cavities.
- In-custody interview rooms to adjacent spaces: STC 40, using for instance grout-filled metal security wall assembly.

2. Doors

- Attorney interview to public corridor: Laboratory-rated STC 43.
- Attorney interview to secure vestibule or hallway: A minimum 3/4″ solid-core wood door or hollow metal steel door with a full set of acoustical seals, including perimeter gasketing and an automatic door bottom.
- In-custody interview room: A minimum 3/4″ solid-core wood door or hollow metal steel door with a full set of acoustical seals, including perimeter gasketing and an automatic door bottom. MegaMet Industries’ MegaSCIF doors rated up to STC 52 and made of military-grade, 14-gauge stainless steel are available. If removal of the typical seals they use are a self-harm concern for the in-custody person, they offer custom doors, which could minimize the chances of the seals being removed for this purpose.

3. Floors

- Attorney interview rooms: Carpeted floor and sound-absorbing ceiling to reduce unwanted echoes and increase speech intelligibility, with a minimum NRC of 0.70.
- In-custody interview rooms: Hard finish, with perforated metal ceilings with a 1″ thick absorbing material above (minimum NRC 0.70).

4. Windows

The wall separating attorney and in-custody interview rooms is typically CMU or grout filled for security purposes. The design and construction shall allow for unamplified speech communication. Provide voice-around transaction windows that allow for natural voice transmission through the frame, as consistent with security requirements. Appropriate products shall be equivalent to Aluminum Voice Around Transaction Windows by Total Security Solutions (TSS). More specific requirements for windows in these interview rooms are listed below:

- Interview room windows: A glazed opening between attorney and in-custody interview rooms that provides sufficient open areas in the frame to support unamplified conversation between the two rooms, as consistent with security requirements.
- Attorney door windows: Integrated door windows provided by the manufacturer to meet the desired sound rating.
- In-custody door windows: Security windows as required.
- In sound-rated construction, seal the perimeter walls, penetrating elements, outlet boxes, junction boxes, and low-voltage receptacles to maintain sound isolation.

25.F AS-BUILT DIMENSIONED DRAWING

The as-built drawing of the Family Justice Center Courthouse may be used as a template for future interview rooms. The airborne sound isolation measurement drawing is shown in figure 25.2.

25.G SELECTIVE PERFORMANCE REQUIREMENTS FOR INTERVIEW ROOMS SPECIFICATION

1. General

1.1 Related Documents

a. Drawings and general provisions of the construction contract, including General and Supplementary Conditions and other Division 01 Specification sections, apply to this section.

b. The construction or renovation shall comply with the *2020 California Trial Court Facilities Standards*, including but not limited to chapter 5, Court Set; chapter 8, In-Custody Defendant Receiving, Holding, and Transport; and chapter 19, Acoustical Criteria.

1.2 Summary

a. This section includes general requirements and procedures for compliance with sound containment in attorney and in-custody interview rooms, as indicated in the drawings.

b. This section also includes the Noise Criteria requirements for the interview room to ensure speech communication without noise interference.

1.3 Definitions

The definitions that follow explain the difference between several sound ratings used in the performance requirements outlined in this specification. They measure noise reduction, noise criteria, noise buildup within a space, and sound transmission between spaces. These factors are combined to achieve the desired sound performance of the space.

a. Noise Isolation Class—A single-number rating, defined in ASTM E336, that quantifies the ability of a partition to reduce airborne noise between adjacent enclosed spaces under field conditions. The sound levels measured in the receive room are not adjusted to account for the effects of the room volume and furnishing. Higher NIC ratings correspond to improved airborne sound isolation.

b. Noise Criteria—A single-number rating, defined by ASHRAE, that quantifies a steady-state noise. It is based on a family of curves that includes noise from 63 to 8,000 hertz (Hz). NC is typically used to rate the loudness of HVAC system noise in a room.

c. Sound Transmission Class—The STC measures the sound transmission between spaces. A single-number rating is used to measure the assembly's barrier effect. A higher STC rating blocks more noise from transmitting through a partition. Loud speech can be understood through an STC 30 wall but should not be audible through an STC 60 wall. For instance, Fiberlite Technologies' cellulose insulation products have an STC rating of 44 to 68 depending on the wall construction. STC ratings do not assess the low-frequency sound transfer. They are based on performance with frequencies from 125 to 4,000 Hz (speech frequencies). The STC rating is a lab test that does not take into consideration weak points, penetrations, or flanking paths.

d. Noise Reduction Coefficient—The NRC measures the buildup of noise within a space. A single-number index rating is used to measure the sound absorption of a material. Fiberlite's cellulose insulation products have an NRC rating from 0.75 to 0.82 depending on wall design, materials, and applied density of the product. Fiberlite's cellulose insulation products will absorb 75 to 82 percent of the sound that they come in contact with and will reflect 18 to 25 percent of the sound back into the space. However, NRC does not address a material's barrier effect. Nor does it give information as to how absorptive a material is in the low and high frequencies. NRC is only the average of the midfrequency sound absorption coefficients (250, 500, 1,000, and 2,000 Hz) rounded to the nearest 5 percent.

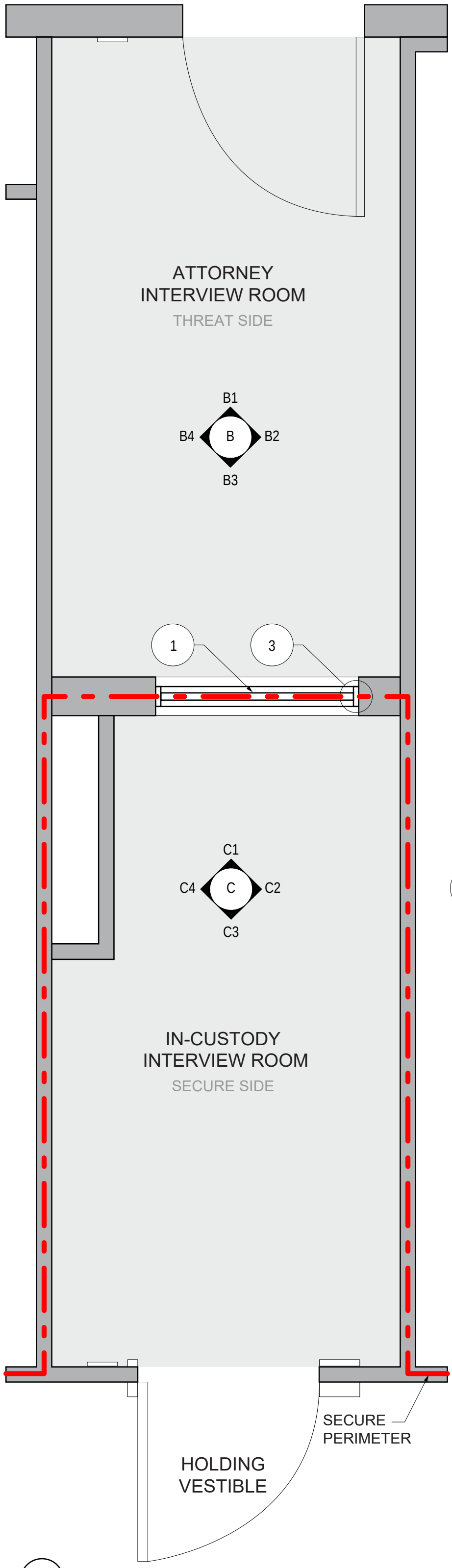
1.4 Interview Room Performance Requirements

a. HVAC noise: All interview rooms shall have a background of NC 30 or less so that noise does not interfere with speech communications.

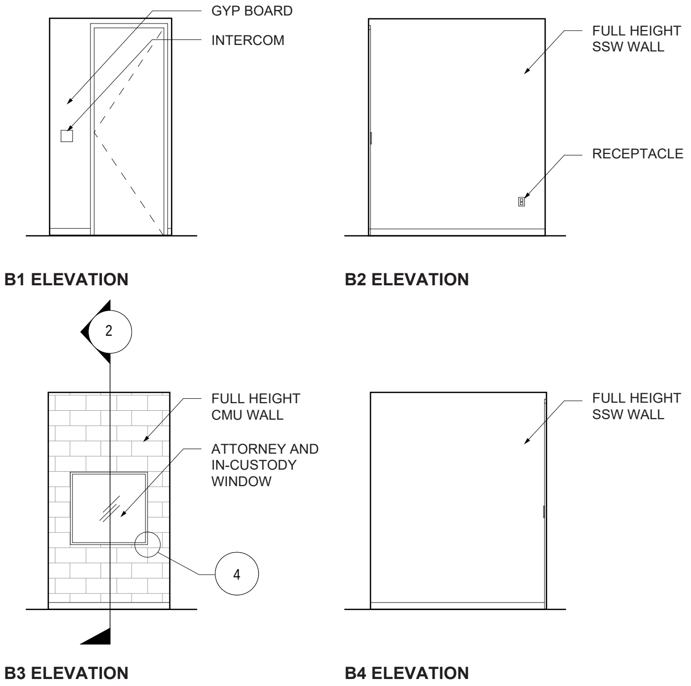
b. Room acoustics: Interview rooms shall include sound-absorbing elements with a minimum NRC of 0.70.

c. Sound isolation: Transmission class will vary depending on adjacent spaces and room occupancy as follows:

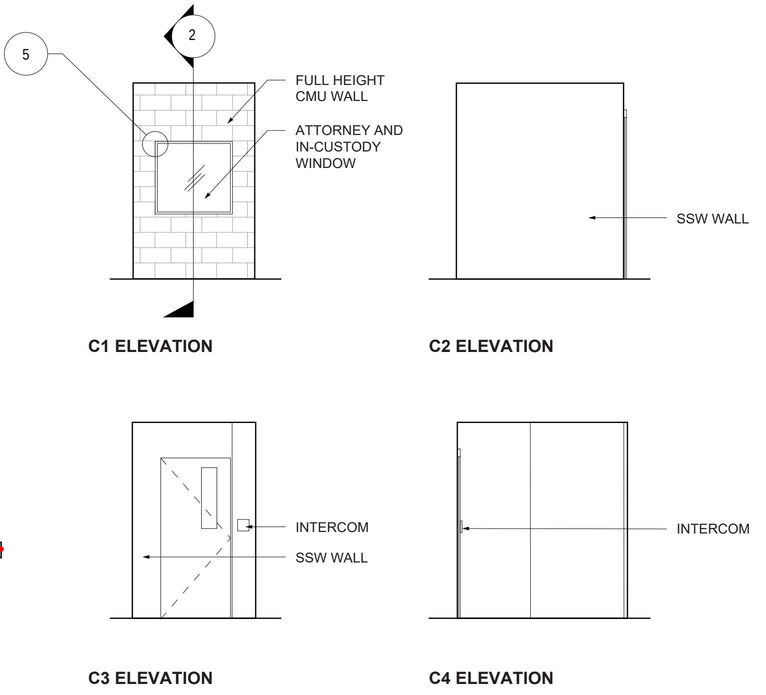
   1. Attorney interview rooms to adjacent areas shall have an STC 50 rating.
   2. Attorney interview rooms to secure vestibule or hallway shall have an STC 45 rating.
   3. In-custody interview room to adjacent spaces shall have an STC 40 rating.



A **ENLARGED FLOOR PLAN**
SCALE: N.T.S.



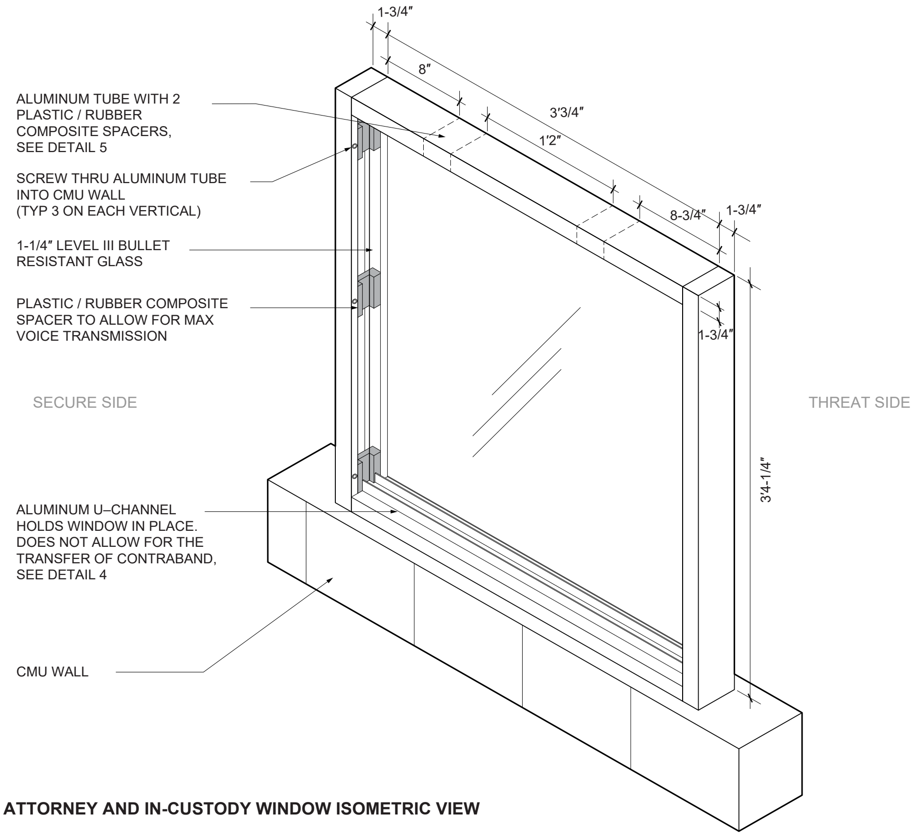
B **ELEVATION: ATTORNEY INTERVIEW ROOM**



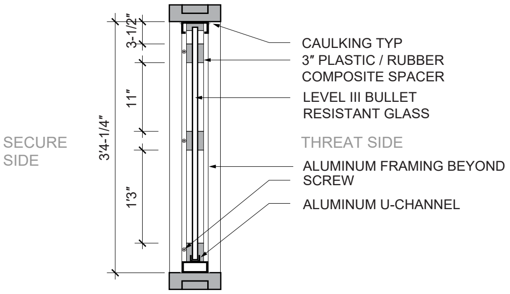
C **ELEVATION: IN-CUSTODY INTERVIEW ROOM**

SSW = Steel Strong-Wall

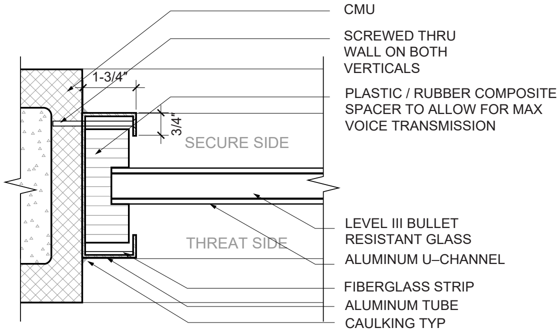
Figure 25.2 As-Built Drawing (not to scale)



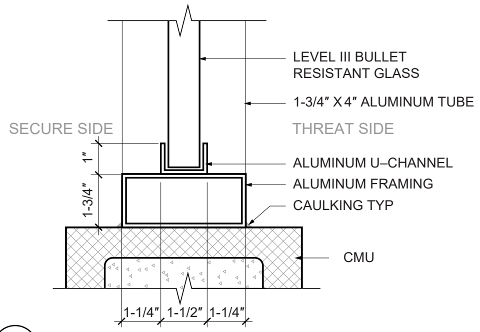
① **ATTORNEY AND IN-CUSTODY WINDOW ISOMETRIC VIEW**



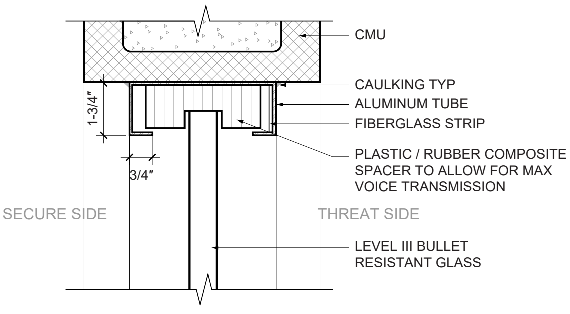
② **ATTORNEY AND IN-CUSTODY WINDOW SECTION**



③ **ATTORNEY AND IN-CUSTODY WINDOW SIDE DETAIL**



④ **ATTORNEY AND IN-CUSTODY WINDOW BASE DETAIL**



⑤ **ATTORNEY AND IN-CUSTODY WINDOW TOP DETAIL**

d. Doors transmission: Doors shall be laboratory tested and rated for STC 43.

e. Window speech passage: Window sound ratings and open area to support unamplified conversation between two rooms shall be certified by manufacturer and tested after installation to ensure that room will meet the sound criteria.

   1. Through the design, manufacturing techniques, and material application, the TSS Natural Voice Rail transaction window shall be of the "non-ricochet" type. This design is intended to permit the capture and retention of an attacking projectile, lessening the potential of a random injury or lateral penetration. This design shall employ a spacer within the frame to allow for natural sound transmission. Each transaction position may have a stainless steel dip tray at the court's request. Components must be manufactured in strict accordance with the specifications, design, and details. All vision panels shall be cut to size, with all exposed edges polished. Necessary holes shall be predrilled and tapped where required. Stainless steel assembly screws and acrylic spacers shall be provided. Frame and channel shall be provided. Anchor screws shall be provided by the installer.

      No field alterations to the construction of the units fabricated under the acceptable standards shall be allowed unless approved by the manufacturer and the architect. Standard manufacturing tolerances shall be ±1/16″.

   2. Materials shall meet or exceed Underwriters Laboratories' UL 752 requirements.

1.5 Design Meetings

a. Predesign conference: Conduct conference at the project site to review interview room requirements and action plans for compliance with these requirements.

b. After preparation of proposed sound performance measures, conduct a review meeting.

1.6 Administrative Requirements

a. Respond to questions and requests from the Judicial Council about proposed sound compliance measures.

b. Submit documentation to the Judicial Council project manager.

1.7 Action Submittals

a. Provide sound performance calculations for each compliance measure listed in paragraph 1.4.

b. Provide shop drawings of the proposed assemblies included in the compliance measures—including HVAC ductwork, wall and ceiling assemblies, floor attenuation, door types and proposed seals and gaskets, window types, and sound rating—to provide unamplified conversation.

c. Provide detail of sound-rated construction—including seals around perimeter walls and treatment of penetrating elements, including air terminal devices, outlet boxes, junction boxes, and receptacles, as required—to maintain sound isolation.

2. Products and Materials

2.1 General

a. Provide materials per approved shop drawings, product data submittals, and proposed room assemblies for ceilings, walls, and floor.

b. All materials shall be new and shall meet the Judicial Council requirements.

c. Materials shall form a passive system with spacers, sound insulation, gaskets, and seals to meet the sound performance requirements.

2.2 Wall Assemblies

a. In attorney interview rooms, build walls with metal studs with sound-absorbing fiberglass insulation in cavity and faced with two layers of drywall on each side. QuietRock or an equivalent product may be used on one layer facing the interview room side, if necessary, to meet the required sound rating.

b. The walls for in-custody interview rooms shall be constructed of grout-filled, metal security wall assembly and shall meet the Sound Transmission Class specified.

2.3 Floor Assemblies

a. Carpet or rubber sound-absorbing materials may be used in attorney interview rooms to meet the required Sound Transmission Class.

b. A hard-finished floor is required at in-custody interview rooms. Other measures shall be applied to wall assembly and ceiling to meet the required Sound Transmission Class.

2.4 Ceilings

a. Drywall or acoustical ceiling with sound control measures for all penetrating elements shall be used in attorney interview rooms.

b. In-custody interview rooms shall include detention-grade perforated metal ceiling lined above with 1″ minimum of sound absorbing material as required to meet STC requirements.

2.5 Doors

a. Doors shall be a minimum 3/4″ solid wood core or hollow metal steel.

b. Doors shall have a full set of acoustical seals, including a perimeter gasket.

c. Doors shall have an automatic seal door bottom.

2.6 Windows

a. General Requirements

1. All windows shall meet the Judicial Council security requirements.
2. In-custody door windows shall be high-security rated to prevent breakage.
3. All windows shall meet the room-specified sound rating.
4. The glazed opening between the attorney and in-custody interview rooms must provide sufficient free (open) area to support unamplified conversation between the two rooms without compromising the security requirements.
5. Integrated door windows shall be certified by the manufacturer to provide the desired sound rating.

b. Window Products

  1. Product shall be a TSS Natural Voice Rails transaction window or approved equal.
  2. Window system shall consist of a custom prefabricated bullet-resistant glazing section with secure air passage through frames, with black foam and wood spacers as required for natural voice transmission.
  3. It shall include a frame with optional plastic laminate shelf and optional recessed transaction tray. The shelf and transaction tray may be provided if requested by the court.
  4. All accessories for installation shall be included.
  5. Available frame selections are aluminum, steel, or stainless steel, but see item f below.
  6. Product size of TSS Natural Voice Rail transaction window shall be a recommended width not to exceed 36″ and height not to exceed 48″.

c. Bullet-Resisting Glazing Material Options

  1. Bullet Resistant Level 1: 3/4″ LP 750 laminated, 1/4″ uncoated acrylic, and GCP (glass-clad polycarbonate) 750
  2. Bullet Resistant Level 2: 1″ LP 1000 laminated, 3/8″ uncoated acrylic, and TSS 002 L/S
  3. Bullet Resistant Level 3: 1/4″ LP 1250 laminated and TSS 003 L/S
  4. Bullet Resistant Levels 4–8: TSS 004 L/S through TSS 008 L/S

d. Optional Transaction Tray

  1. Brushed stainless steel counter, mounted or recessed, is optional.
  2. Transaction tray shall be 18 gauge stainless steel, #4 finish, 16″ × 10″ from the outside edge of flanges with a clear opening.

e. Optional Shelf

  1. Provide a 1-1/2″ thick shelf with an optional recessed transaction tray, if requested by the court.
  2. The shelf shall be full width of window, 18″ deep, centered under the glazing, and covered with a black high-pressure laminate, with an optional stainless steel 18 gauge #4 finish.

f. Recommended Frame Material: Aluminum

  1. Frame shall be anodized aluminum (optional 18 gauge primed or stainless steel, as specified). The bottom of the glazing shall be capped with corresponding material on the frame (i.e., stainless steel on stainless steel).
  2. Aluminum sections shall be manufactured in accordance with ASTM B209, extruded aluminum alloy 6063 T5 anodized or powder-coated finish to match the existing décor and be free of sharp edges or burrs when in place.
  3. Glazing channel shall be a U-channel specifically designed for securing transparencies tightly in place. Angles and stops are acceptable only for top attachment.

2.7 HVAC

a. The HVAC system shall include ducted supply air and return air ducts.

b. Supply air shall be ducted to a VAV box and/or to main air distribution duct. It shall not be connected to another room distribution branch where sound transmission between rooms could occur.

c. Return air ducts shall include a lined return air box before connecting to the return air fan.

d. Undercutting the door for air return is not permitted. Interview room doors shall include an automatic basket.

REQUIRED TOOLS

APPENDIXES

APPENDIXES

CODES AND STANDARDS

The construction and modification of buildings using the Facilities Standards shall comply with the following codes, standards, and guidelines, and any other applicable nationally recognized code, standard, or guideline. The latest adopted code edition, standard, or guideline shall be used, regardless of dates shown in this document. If a triennial update of a code is due to occur after beginning of schematic design and before submission for plan check, the applicable code edition shall be determined after discussions with the authorities having jurisdiction. This list is not intended to limit the use of other reference documents.

A

Air Movement and Control Association Inc. (AMCA)

AMCA 300: Reverberant Room Method for Sound Testing of Fans

AMCA 301: Methods for Calculating Fan Sound Ratings from Laboratory Test Data

ANSI/AMCA 330: Laboratory Method of Testing to Determine the Sound Power in a Duct

ANSI/AMCA 500-L: Laboratory Methods of Testing Louvers for Rating

AMCA Certified Ratings Program

Air-Conditioning, Heating, and Refrigeration Institute (AHRI)

ANSI/AHRI 260: Sound Rating of Ducted Air Moving and Conditioning Equipment

ANSI/AHRI Standard 350: Sound Rating of Non-ducted Indoor Air-Conditioning Equipment

AHRI Standard 880: Performance Rating of Air Terminals

American Concrete Institute (ACI)

ACI 318: Building Code Requirements for Structural Concrete and Commentary

ACI 530: Building Code Requirements for Masonry Structures and Related Commentaries

American Institute of Steel Construction (AISC)

AISC 303: Code of Standard Practice for Steel Buildings and Bridges

AISC 341: Seismic Provisions for Structural Steel Buildings

AISC 358: Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications

AISC 360: Specification for Structural Steel Buildings

AISC Design Guide 11: Vibrations of Steel-Framed Structural Systems Due to Human Activity

American Iron and Steel Institute (AISI)

AISI S100: North American Specification for the Design of Cold-Formed Steel Structural Members

American National Standards Institute (ANSI)

ANSI C80.1: Electrical Rigid Steel Conduit

American Society of Civil Engineers (ASCE)

ASCE 7-05: Minimum Design Loads for Buildings and Other Structures

ASCE/SEI 7-10: Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASCE 25-06: Earthquake-Actuated Gas Shutoff Devices

ASCE 31-03: Seismic Evaluation of Existing Buildings

ASCE 41: Seismic Rehabilitation of Existing Buildings

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

ASHRAE Standard 15: Safety Code for Mechanical Refrigeration

ASHRAE Standard 34: Safety Classification of Refrigerants

ASHRAE Standard 52.2: Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size

ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy

ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality

ASHRAE Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings

ASHRAE Standard 100: Energy Efficiency in Existing Buildings

ASHRAE Standard 105: Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emissions

ASHRAE Standard 111: Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems

ASHRAE Standard 135: BACnet: A Data Communication Protocol for Building Automation and Control Networks

ASHRAE Standard 135, Addendum bj: BACnet SC Secure Connect and the NIST Cybersecurity Framework

ASHRAE Standard 189.1: Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

ASHRAE Standard 223P: Designation and Classification of Semantic Tags for Building Data *(proposed at the time of writing)*

ASHRAE Handbooks and Guidelines

  ASHRAE Handbook—Fundamentals

  ASHRAE Handbook—HVAC Systems and Equipment

  HVAC System Duct Design

  Practical Guide to Seismic Restraint

  ASHRAE Handbook—HVAC Applications

  ASHRAE Guideline 4: Preparation of Operating and Maintenance Documentation for HVAC&R Systems

  ASHRAE Guideline 36: High-Performance Sequences of Operation for HVAC Systems

  ASHRAE TC9.9: Data Center Power Equipment Thermal Guidelines and Best Practices

American Society of Mechanical Engineers (ASME)

ASME A17.5/CSA-B44.1: Elevator and Escalator Electrical Equipment

ASME A17.1: Safety Code for Elevators and Escalators, and all supplements as modified and adopted by the AHJ

ASME A17.1S: Safety Code for Elevators and Escalators, supplement to A17.1 as modified and adopted by the AHJ for Machine Room Less (MRL) installations

ASME A17.2: Guide for Inspection of Elevators, Escalators, and Moving Walks

ASME A17.3: Safety Code for Existing Elevators and Escalators, as modified and adopted by the AHJ

ASME A17.4: Guide for Emergency Personnel (including emergency evacuation of passengers from elevators)

American Society of Plumbing Engineers (ASPE)

ASPE Data Books

American Society for Testing and Materials (ASTM)

ASTM C423: Method for Measuring Sound Absorption

ASTM C1071: Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material)

ASTM D6754: Standard Specification for Ketone Ethylene Ester Based Sheet Roofing

ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E90: Method for Measuring Sound Transmission Loss

ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials

ASTM E413: Determination of Sound Transmission Class

ASTM E477: Test for Duct Lining and Silencer Performance

ASTM E492: Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

ASTM E779: Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

ASTM G21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

ASTM E1332: Standard Classification for Determination of Outdoor-Indoor Transmission Class

ASTM E2813: Standard Practice for Building Enclosure Commissioning

ASTM E3158: Standard Test Method for Measuring the Air Leakage Rate of a Large or Multizone Building

ASTM F476: Standard Test Methods for Security of Swinging Door Assemblies

ASTM F588: Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact

ASTM F710: Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

ASTM F842: Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact

ASTM F1642: Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings

ASTM F1915: Standard Test Methods for Glazing for Detention Facilities

ASTM F2170: Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

ASTM F2656: Standard Test Method for Vehicle Crash Testing of Perimeter Barriers

ASTM F3010: Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings

American Water Works Association (AWWA)

AWWA C105: Polyethylene Encasement for Ductile-Iron Pipe Systems

American Welding Society (AWS)

Americans with Disabilities Act (ADA)

Americans with Disabilities Act Accessibility Guidelines (ADAAG) (Section 11)

Applied Technology Council (ATC)

ATC-40: Seismic Evaluation and Retrofit of Concrete Buildings

ATC-58: PACT Program Software

Architectural Woodwork Institute (AWI)

Audiovisual and Integrated Experience Association (AVIXA)

AVIXA A102.01:2017: Audio Coverage Uniformity in Listener Area

B

Board of State and Community Corrections (BSCC)

Building Industry Consulting Services International (BICSI)

BICSI Information Transport Systems Installation Manual (ITSIM)

BICSI Telecommunications Distribution Methods Manual (TDMM)

BICSI Outside Plant Design Reference Manual (OSPDRM)

BICSI Wireless Design Reference Manual (WDRM)

Building Owners & Managers Association (BOMA)

Gross Areas of a Building: Standard Methods of Measurement

C

California Air Resources Board

Regulation for the Management of High Global Warming Potential Refrigerants for Stationary Sources

California Code of Regulations (CCR)

Title 8: Division 1, Chapter 4, Subchapter 7, General Industrial Safety Orders

Title 15: Division 1, Chapter 1, Subchapter 4, Minimum Standards for Local Detention Facilities

Title 16: Professional and Vocational Regulations

Title 17: Public Health, Section 95380 et seq. (Air Resources Board, Subarticle 5.1, Management of High Global Warming Potential Refrigerants for Stationary Sources)

Title 19: Public Safety, Division 1, State Fire Marshal

Title 22, Social Security, Division 4.5: Environmental Health Standards for the Management of Hazardous Waste

Title 24, Part 1, California Administrative Code (CAC)

Title 24, Part 2, California Building Code (CBC)

Title 24, Part 3, California Electrical Code (CEC)

Title 24, Part 4, California Mechanical Code (CMC)

Title 24, Part 5, California Plumbing Code (CPC)

Title 24, Part 6, California Energy Code (CEnC)

Title 24, Part 9, California Fire Code (CFC)

Title 24, Part 11, California Green Building Standards Code (CALGreen)

Title 24, Part 12, California Referenced Standards Code

California Department of Health Services

California Disabled Accessibility Guidebook (CALDAG)

California Energy Commission

Nonresidential Alternative Calculation Method Reference Manual

California Rules of Court

Rule 5.215, Domestic Violence Protocol for Family Court Services

Rule 10.180, Court Facilities Standards

Rule 10.181, Court Facilities Policies, Procedures, and Standards

California Standards of Judicial Administration

Standard 10.24

Crime Prevention Through Environmental Design (CPTED)

Cast Iron Soil Pipe Institute (CISPI)

CISPI Standards

Center for Universal Design

Code of Federal Regulations (CFR)

Title 40, Part 761: Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

Canadian Standards Association (CSA)

Compliance Services and Assessments, LLC (CSA)

Concrete Reinforcing Steel Institute (CRSI)

Consumer Electronics Association (CEA)
- ANSI/CEA-709.1-B-2000 Control Network Protocol Standards

D

Division of the State Architect (DSA)
- Access Checklist
- Interpretation of Regulations (IR) 25-2.13
- IR 25-3.13
- Structural Safety (SS)

E

Electronic Industries Alliance (EIA/ECA)
- EIA/ECA-310-D: Cabinets, Racks, Panels and Associated Equipment

Energy Efficiency Policy

Energy Independence and Security Act of 2007 (EISA)

Energy Star Portfolio Manager Technical Reference: Source Energy

F

Family Code
- Division 8, Custody of Children, Section 3113
- Division 8, Custody of Children, Section 3180
- Division 10, Prevention of Domestic Violence, Section 6218

Factory Mutual Global Standards

Federal Communications Commission (FCC)
- CFR Title 47, Part 15: Radio Frequency Devices

Federal Emergency Management Agency (FEMA)
- FEMA 74: Reducing the Risks of Nonstructural Earthquake Damage: A Practical Guide
- FEMA 412: Installing Seismic Restraints for Mechanical Equipment
- FEMA 413: Installing Seismic Restraints for Electrical Equipment
- FEMA 460: Seismic Considerations for Steel Storage Racks Located in Areas Accessible to the Public
- FEMA: HAZUS Program Software

Federal Energy Management Program (FEMP)

Fiber Optic Testing Procedures

G

Green Building Action Plan

Government Code
- Section 70391

Guiding Principles for Sustainable Federal Buildings

I

Illuminating Engineering Society (IES)
- ANSI/IES TM-30-18 IES: Method for Evaluating Light Source Color Rendition
- Lighting Handbook

InfoComm International
- ANSI/INFOCOMM 2M: Standard Guide for Audiovisual Systems Design and Coordination Processes
- AV Design Reference Manual
- AV Installation Handbook
- Dashboard for Controls Design Reference

Institute of Electrical and Electronics Engineers (IEEE)
- IEEE C2: National Electrical Safety Code
- IEEE 241: IEEE Recommended Practice for Electric Power Systems in Commercial Buildings (IEEE Gray Book)
- IEEE 493: IEEE Recommended Practice for Design of Reliable Industrial and Commercial Power Systems (IEEE Gold Book)
- IEEE 802.3ae: 10Gb/s Ethernet Standard
- IEEE 802.3af & at: Power over Ethernet Standards

IEEE 802.11: Wireless Ethernet Standards, including 802.11a, 802.11b, 802.11g and 802.11n

IEEE 1100: IEEE Recommended Practice for Powering and Grounding Electronic Equipment (IEEE Emerald Book)

Instrument Society of America (ISA)
Instrument Data Sheets

International Association of Plumbing and Mechanical Officials (IAPMO)

International Building Code (IBC)

International Electrotechnical Commission (IEC)
IEC 60297-3-100: Mechanical Structures for Electronic Equipment—Dimensions of Mechanical Structures of the 482,6 mm (19 in) Series—Part 3-100: Basic Dimensions of Front Panels, Subracks, Chassis, Racks and Cabinets

International Organization for Standardization (ISO)
ISO 14044: Environmental management—Life cycle assessment—Requirements and guidelines

International Risk Insurance (IRI)

J

Judicial Council of California

Courthouse Naming Policy

Project Procedure A-14: Quality Management Plan

Statewide Action Plan for Serving Self-Represented Litigants

Justice for All: Designing Accessible Courthouses

L

LEED (Leadership in Energy and Environmental Design) Green Building Rating System, U.S. Green Building Council (USGBC)

M

Montreal Protocol

Model Water Efficient Landscape Ordinance (MWELO)

N

National Design Specifications (NDS)
Manual for Engineered Wood Construction

NDS for Wood Construction

NDS Supplement: Design Values for Wood Construction

Special Design Provisions for Wind and Seismic

National Electrical Manufacturers Association (NEMA)

National Electrical Contractors Association (NECA)
NECA/FOA 301: Standard for Installing and Testing Fiber Optics

ANSI/NECA/BICSI-568: Standard for Installing Commercial Building Telecommunication Cabling

National Fire Protection Association (NFPA)
NFPA 10: Portable Fire Extinguishers

NFPA 13: Standard for the Installation of Sprinkler Systems

NFPA 14: Standard for the Installation of Standpipe and Hose Systems

NFPA 17: Standard for Dry Chemical Extinguishing Systems

NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection

NFPA 22: Standard for Water Tanks for Private Fire Protection

NFPA 24: Installation of Private Fire Service Mains and Their Appurtenances

NFPA 25: Water-Based Fire Protection Systems

NFPA 30: Flammable and Combustible Liquids Code

NFPA 37: Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines

NFPA 54/ANSI Z223.1: National Fuel Gas Code

NFPA 70: National Electrical Code (NEC)

NFPA 72: National Fire Alarm and Signaling Code

NFPA 80: Standard for Fire Doors and Other Opening Protectives

NFPA 90A: Standard for Installation of Air-Conditioning and Ventilation Systems

NFPA 96: Standard for Ventilation Control and Fire Protection of Commercial Cooking Spaces

NFPA 101: Life Safety Code

NFPA 110: Standard for Emergency and Standby Power Systems

NFPA 111: Stored Electrical Energy Emergency and Standby Power Systems

NFPA 780: Standard for the Installation of Lightning Protection Systems, Annex L

NFPA 2001: Clean Agent Fire Suppression System

National Floor Safety Institute (NFSI)
B101.1: Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials

B101.6: Standard Guide for Commercial Entrance Matting in Reducing Slips, Trips and Falls

National Institute of Standards and Technology (NIST)
Cybersecurity Framework

National Institute for Occupational Safety and Health (NIOSH)
Guidance for Protecting Building Environments from Airborne Chemical, Biological, or Radiological Attacks

O

Office of Statewide Health Planning and Development (OSHPD)

OSHPD Preapproved Details (OPD)

P

Principles of Universal Design

R

Research Council on Structural Connections (RCSC)

S

Savings By Design

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

State Administrative Manual (SAM)

State Executive Order (EO)

B-18-12

B-30-15

State of California Green Buildings website, *www.green.ca.gov/Buildings/*

T

Telecommunications Industry Association (TIA)
ANSI/TIA-492.AAAD: Detail Specification for 850-nm Laser-Optimized, 50-µm Core Diameter/125-µm Cladding Diameter Class Ia Graded-Index Multimode Optical Fibers Suitable for Manufacturing OM4 Cabled Optical Fiber

ANSI/TIA-492.CAAB: Detail Specification for Class IVa Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak

ANSI/TIA/EIA-526-7: Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

ANSI/TIA/EIA-526-14A: Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant

ANSI/TIA/EIA-568-C.0: Generic Telecommunications Cabling for Customer Premises

ANSI/TIA/EIA-568-C.1: Commercial Building Telecommunications Cabling Standard Part 1: General Requirements

ANSI/TIA/EIA-568-C.2: Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components

ANSI/TIA/EIA-568-C.3: Commercial Building Telecommunications Cabling Standard Part 3: Optical Fiber Cabling Components

ANSI/TIA/EIA-568-C.3-1: Addendum 1, Addition of OM4 Cabled Optical Fiber and Array Connectivity

ANSI/TIA-568.0-D: Generic Telecommunications Cabling for Customer Premises

ANSI/TIA/EIA-568.3-D: Optical Fiber Cabling Components

ANSI/TIA/EIA-569-D: Commercial Building Standard for Telecommunications Pathways and Spaces

ANSI/TIA/EIA-598-C: Optical Fiber

ANSI/TIA/EIA 606A/B/C: Administration Standard for Commercial Telecommunications Infrastructure

ANSI/TIA/EIA-607-C: Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

ANSI/TIA/EIA-758-B: Customer-owned Outside Plant Telecommunications Infrastructure Standard

ANSI/TIA 862: Building Automation Systems Cabling Standards for Commercial Buildings

ANSI/TIA-942: Telecommunications Infrastructure for Data Centers

ANSI/TIA-1152: Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

U–Z

U.S. Army Corps of Engineers

PDC-TR 06-02, Rev. 1, Protective Design Center Technical Report

PDC-TR 06-08, Rev. 1, Single Degree of Freedom Structural Response Limits for Antiterrorism Design

U.S. Court Design Guide

U.S. General Services Administration

Facilities Standards for the Public Buildings Service

U.S. Green Building Council (USGBC)

Underwriters Laboratories (UL)

UL 181: Standard for Factory-Made Air Ducts and Air Connectors

UL 300: Standard for Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment

UL 464: Audible Signaling Devices for Fire Alarm and Signaling Systems, Including Accessories

UL 521: Standard for Heat Detectors for Fire Protective Signaling Systems

UL 752: Standard for Bullet-Resisting Equipment

UL 916: Standard for Energy Management Equipment

UL 924: Standard for Emergency Lighting and Power Equipment

UL 1449: Standard for Surge Protective Devices

UL 1971: Standard for Signaling Devices for the Hearing-Impaired Standards

Unified Facilities Criteria (UFC)

UFC 4-023: Design of Buildings to Resist Progressive Collapse

Uniform Federal Accessibility Standards (UFAS)

Welfare and Institutions Code

Section 300 et seq.

Section 325 et seq.

APPENDIXES

LIST OF ABBREVIATIONS

°C degrees Celsius

°F degrees Fahrenheit

% percent

4W four wire

A

A or Amp ampere

ABB ASEA (Allmänna Svenska Elektriska Aktiebolaget) Brown Boveri

ACI American Concrete Institute

ACU Audio Coverage Uniformity

ADA Americans with Disabilities Act of 1990

ADAAG Americans with Disabilities Act Accessibility Guidelines *or* ADA Accessibility Guidelines

ADR alternative dispute resolution

AFF above finished floor

AHJ authority/authorities having jurisdiction

AHRI Air-Conditioning, Heating, and Refrigeration Institute

AHU air-handling unit

AISC American Institute of Steel Construction

AISI American Iron and Steel Institute

ALS assistive listening system

AMCA Air Movement and Control Association

ANSI American National Standards Institute

$\mathbf{a}_o$ acceleration

$\mathbf{a}_p$ peak acceleration

Arch. architecture

ARMM abrasion resistant millimeters

ASCE American Society of Civil Engineers

ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers

ASME American Society of Mechanical Engineers

ASPE American Society of Plumbing Engineers

ASTM American Society for Testing and Materials

ATC Applied Technology Council

ATTY attorney

AV audiovisual

AVIXA Audiovisual and Integrated Experience Association

AWG American Wire Gauge

AWI Architectural Woodwork Institute

AWS American Welding Society

AWWA American Water Works Association

B

BACnet Building Automation and Control Network

BAS building automation system

BECx Building Enclosure Commissioning

BGSF building gross square feet

BICSI Building Industry Consulting Services International

BMS building management system

BOMA Building Owners and Managers Association

BSCC Board of State and Community Corrections

BTL BACnet Testing Laboratories

Btu British thermal unit

C

CA California

CAC California Administrative Code

CAL California

Cal/OSHA California Occupational Safety and Health Administration

CALDAG California Disabled Accessibility Guidebook

CALGreen California Green Building Standards Code

CATV community antenna television (cable television)

CBC California Building Code

Cal. Code Regs. California Code of Regulations

CEA Consumer Electronics Association

CEC California Electrical Code

CEO court executive officer

CFAC Court Facilities Advisory Committee

CFC California Fire Code

CFCs chlorofluorocarbons

cfm cubic feet per minute

CFM customer flow management

CFR Code of Federal Regulations

CGSF component gross square feet

CISPI Cast Iron Soil Pipe Institute

CLG. MTD. ceiling mounted

CMC California Mechanical Code

CMU concrete masonry unit

CO_2 carbon dioxide

CONF conference

CPC California Plumbing Code

CPTED Crime Prevention Through Environmental Design

CPUC California Public Utilities Commission

CRI color rendering index

CRSI Concrete Reinforcing Steel Institute

CSA Canadian Standards Association

CSA Compliance Services and Assessments, LLC

CSO court security officer

CxA certified commissioning authority/agent *or* commissioning authority/agent

D

DAS distributed antenna system

dB decibels

dBA decibels, A-weighted

DCR detention control room

DCS detention control system

DDC direct digital control

Delta T temperature difference

DEPS digital evidence presentation system

DLCS detention lock control system

DMZ demilitarized zone

DNA deoxyribonucleic acid

DPDT double pole, double throw

DSA Division of the State Architect

DSA-SS Division of the State Architect—Structural Safety

DVD digital versatile disc

DVI Digital Visual Interface

DX direct expansion

E

e.g. for example

EIA/ECA Electronic Industries Alliance standards

EISA Energy Independence and Security Act of 2007

EL elevation

ELEC electric/electrical

EMT electrical metallic tubing

EO executive order

EPDM ethylene propylene diene monomer

ERL electronic resettable link

et seq. et sequens

etc. etcetera

exp exponential

F

FAA Federal Aviation Administration

FAIA Fellow of the American Institute of Architects

FC foot-candle

FCC Federal Communications Commission

FCS Family Court Services

FDC fire department connections

FEMA Federal Emergency Management Agency

FEMP Federal Energy Management Program

f_n natural frequency

FOA Fiber Optic Association

fpm feet per minute

fps feet per second

ft. feet

FT^2 square foot/feet

FW firewall

G

g gravity

Gb gigabyte

gpm gallons per minute

GSF gross square feet

GUI graphical user interface

H

h hour

HDMI High-Definition Multimedia Interface

Hg mercury

HP horsepower

hr hour

HTML hypertext markup language

HVAC heating, ventilation, and air-conditioning

I

I.D. identification

IAPMO International Association of Plumbing and Mechanical Officials

IBC International Building Code

ID inside diameter

IDF intermediate distribution frame

IEC International Electrotechnical Commission

IEEE Institute of Electrical and Electronics Engineers

IES Illuminating Engineering Society

IIC impact insulation class

incl. including

IP Internet Protocol

IPTV Internet Protocol Television

IR infrared; Interpretation of Regulations

IRI International Risk Insurance

IS Information Systems

ISA Instrument Society of America

ISO International Organization for Standardization

ISP inside plant

IT information technology

ITSIM Information Transport Systems Installation Manual

K

km kilometer

kVA kilovolt-amps

kVAR kilovolt-ampere reactive

kVARh kilovolt-ampere reactive hour

kW kilowatt

kWh kilowatt-hour

L

L10 measured noise level that is exceeded 10 percent of the measurement period

L70 70% of the Initial Lumens

LAN local area network

lb. pound/pounds

LC latched connector

LCC life cycle cost

LCCA life cycle cost analysis

LCD liquid crystal display

LED light-emitting diode

LEED Leadership in Energy and Environmental Design

LEP limited English proficient

LJS latex joint sealants

LOMMF laser-optimized multimode fiber

M

MAX maximum

MC metal clad

MDF main distribution frame

Mech. mechanical

MEP mechanical, electrical, and plumbing

MERV minimum efficiency reporting value

min. minimum

misc. miscellaneous

MPOE minimum point of entry

MRL machine room less

msec. millisecond

MSF modular systems furniture

MWELO Model Water Efficient Landscape Ordinance

N

N/A not applicable

NAS network-attached storage

NC Noise Criteria

NDS National Design Specifications

NEC National Electrical Code

NECA National Electrical Contractors Association

NEMA National Electrical Manufacturers Association

NFPA National Fire Protection Association

NFSI National Floor Safety Institute

NIC noise isolation class

NIOSH National Institute for Occupational Safety and Health

NIST National Institute of Standards and Technology

nm nanometer

NPLV nonstandard part load values

NRC noise reduction coefficient

NSC nonstructural seismic coordinator

NSF net square feet

O

OITC outdoor-indoor transmission class

OPEX operating/operations expense/expenditure

OSHA Occupational Safety and Health Administration

OSHPD Office of Statewide Health Planning and Development

OSP outside plant

OSPDRM Outside Plant Design Reference Manual

P

PACT Performance Assessment Calculation Tool

PC personal computer

PDC Protective Design Center

PECI Portland Energy Conservation, Inc.

perm unit of permeation

PEX cross-linked polyethylene

PH phase

pH potential of hydrogen

PIN personal identification number

PIV post indicator valve

PLC programmable logic controller

P_o constant force representing the excitation, pounds

PoE Power over Ethernet

psf pounds per square foot

psi pounds per square inch

pt. part

PTZ pan-tilt-zoom

PV present value

PVB polyvinyl butyral

PVC polyvinyl chloride

R

R9 fidelity red

R_a average color rendering index value

RA risk assessment

RC Room Criteria

RCSC Research Council on Structural Connections

Regs. regulations

REX request-to-exit

RF radio frequency

R_f fidelity Index

R_G gamut Index

RH relative humidity

RHH rubber-insulated, high-heat resistant

rpm revolution/s per minute

RT reverberation time

S

SC Secure Connect

SDI serial digital interface

SEI Structural Engineering Institute

SF/ft^2 square foot/feet

SGF security epoxy resin gap filler

SJS security joint sealant

SMACNA Sheet Metal and Air Conditioning Contractors' National Association

SMF single-mode fiber

SMS security management system

SMS short message service

SOC security operations center

SR strongly recommended

SS Security System

SS Structural Safety

STC sound transmission class

Syslog system logging protocol

T

TARR Texture Appearance Retention Rating

TBD to be determined

TC Technical Committee

TCP temperature control panel/field panel

TCP Transmission Control Protocol

TDD telecommunications device for the deaf

TDM transportation demand management

TDMM *Telecommunications Distribution Methods Manual*

TEFC totally enclosed, fan cooled

THHN thermoplastic high-heat-resistant nylon-coated

THWN thermoplastic heat- and water-resistant nylon-coated

TIA Telecommunications Industry Association

tit. title

TM Technical Memorandum

TNT trinitrotoluene

TR Technical Report

TSS Total Security Solutions

TV television

TVSS transient voltage surge suppressor

U

UFAS Uniform Federal Accessibility Standards

UFC Unified Facilities Criteria

UL Underwriters Laboratories

UPS uninterruptible power supply/source

U.S. United States

USGBC U.S. Green Building Council

UTP unshielded twisted pair

V

V volt

VA volt-amps

VAC volts of alternating current

VAV variable air volume

VCT vinyl composition tile

VDC volts of direct current

VDT video/visual display terminal

VFD variable-frequency drive

VLAN virtual local area network

VOC volatile organic compound

VoIP Voice over Internet Protocol

VSD variable-speed drive

VSS video surveillance system

W

W Effective Weight

W wire

WC water column; wheelchair

WAN wide area network

WAP wireless access point

WDRM *Wireless Design Reference Manual*

WLAN wireless local area network

WRB weather-resistive barrier

X

XHHW cross-linked polyethylene, high-heat resistance, water-resistance

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APPENDIXES

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The Judicial Council acknowledges the contributions of the following committee members, staff, and consultant firms for their input and guidance during the creation of the 2020 edition of the *California Trial Court Facilities Standards.*

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Guidelines for Exiting Calculations for Courtrooms and Adjacent Areas

08.31.2022

The Judicial Council of California Facilities Services, Quality Compliance Unithas developed these guidelines to assist in the plan review process by confirming the classification of occupancies and calculation of occupancy loads for exiting. The code application and illustration of life safety information contained herein were developed in collaboration as part of the continuing California Trial Court Facilities Standards implementation effort.

Overview

The purpose of this document is to standardize the application of occupancy and exiting calculations for the courtrooms and adjacent areas in California superior court buildings for the design of new courthouse facilities.

General Method of Calculation for Occupant Load

During design, designers shall verify that the building exiting adequately accommodates the actual number of occupants. Occupant Load Factors will be determined in accordance with current adopted edition of the California Building Code, California Code of Regulations, Title 24 unless indicated otherwise within this document.

Graphic Depiction of Occupant Load on Code Diagrams

Use colored tones and hatches on code diagrams on life safety sheets to depict different occupancy classifications and areas.

Graphic Depiction of Fire and Smoke Areas

Use color toned areas and hatches on the smoke control diagrams produced by the Fire Protection Engineer on the design team.

Graphic Depiction of Rated Walls on Code Diagrams

Use different colored line-types, excluding red to distinguish between walls of varying fire resistive ratings. Rated walls will be shown on main Architectural floor plans, smoke control diagrams, life safety floor plans, HVAC floor plans, plumbing floor plans, electrical floor plans, fire alarm plans, and sprinkler plans.

Graphic Depiction of Exiting and Path of Travel (POT)

Plans shall clearly show POT and Means of Egress from all areas and show direction of travel within all egress systems, i.e. directional arrows within stairways, exit signage on Fire Life Safety drawings, areas of refuge, and exit passageways. Fire Life Safety drawings shall clearly show POT to the public right of way, and the accumulative occupant load along the POT. This is needed to ensure that the width of the POT is adequate for the occupant load shown (see requirement in CBC, Section 1004.2.1).

Occupant Loads in Courtrooms

Three occupant load values shall be used in courtrooms. The public seating area load shall be based on either number of fixed seats or by one person for each 18-inch length of bench. The occupant load of wheelchair spaces and the associated companion seat shall be based on one occupant for each wheelchair space and one occupant for the associated companion seat provided in accordance with Section 1108.2.3. Jury box shall be calculated separately and be based on the number of fixed and movable chairs in the jury box. The occupant load of the remaining courtroom well (minus area of jury box) shall be calculated using an occupant load factor (OLF) of 40 sf/person net.

Occupant Load in Attorney / Client Conference Rooms

These spaces shall be classified as meeting/conference rooms. The occupant load shall be calculated at assembly unconcentrated 15 sf/person net.

Occupant Load in Public Corridor

The occupant loads in the circulation area of the public corridor shall be calculated using an OLF of 40 sf/person net (considered as part of “courtroom” base building use). In addition, the occupant load of the seating area shall be calculated by counting the total number of fixed seating or one seat for each 18-inch length of bench. 18-inch in front of the seating shall be excluded from the corridor load calculation. This includes public corridors on the main entry level.

Occupant Load in Restrooms

Public and staff Restrooms shall be included in the gross area calculation with an OLF of 150 sf/person.

Public Lobby and Elevator Lobby Transition Space

Public lobbies and elevator lobbies shall be calculated with an OLF of 150 sf/person, using the Business use occupancy gross calculation.

Occupant Load in Restricted Corridor

Occupant loads in the restricted corridor shall be calculated with an OLF of 150 sf/person, using the Business use occupancy gross calculation.

Rated Corridors

Any room or space in accordance with the provisions for assembly occupancies that exceeds 100 persons (i.e. courtroom) shall have access to at least one 1-hour fire resistive corridor system.

Occupant Load in Jury Deliberation Rooms

Occupant loads for rooms designed exclusively for jury deliberation rooms shall be assigned an occupant load of 14, which accounts for 12 jurors plus 2 alternates, using the code section 1004.5 exception.

Occupant Load in Queuing and Waiting Areas (Business offices & transaction counters)

Shall be calculated using an occupant load factor (OLF) of 5 sf/person net (Assembly without fixed seats – standing space).

Occupant Load In Courtroom Holding Cells

Shall be calculated at 1 person per 18 linear inches of fixed seating in cells plus 1 person for bailiff in each holding core.

Occupant Load In Judge’s Chambers and Judge’s Restrooms

The Judge’s Chambers which includes the Judge’s Restrooms and robing areas will be calculated at 150 sf/person gross (these spaces shall be classified as a business area).

Stair Width Measurement

Stairs shall be measured in accordance with Figure 1 below, from inside stringer to inside stringer. In courthouses equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2 and an emergency voice/alarm communications system in accordance with Section 907.5.2.2, the egress capacity factor shall be 0.2 inch for stairways, and .15 inch for door openings and other egress components (1005.3.1 Exception 1 and 1005.3.2 Exception 1).

Cumulative Loading Calculations

Along the path of travel through intervening rooms and/or spaces the occupant load of each space shall be cumulative in accordance with the provisions of CBC 1004.2 – Cumulative occupant loads.

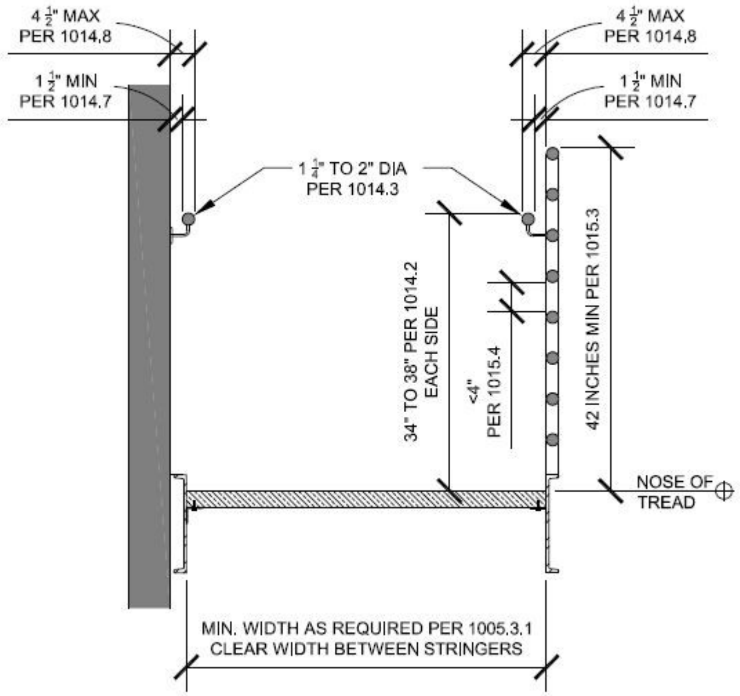


Figure 1 – Egress Width Measurement Method
Code citations refer to the California Building Code

Foreword: Court Floor Plan for Exiting and Occupancy Analysis
08.31.2022

The following example floor plan reflective of a typical courtroom floor on an upper level; it is not intended to represent the requirements of the ground floor. The plan accounts for the more restrictive code requirements of high-rise buildings. Per CBC 403.1, high-rise-buildings have occupied floors located more than 75 feet above the lowest level of fire department vehicle access. In some instances, these JCC requirements exceed code minimums.

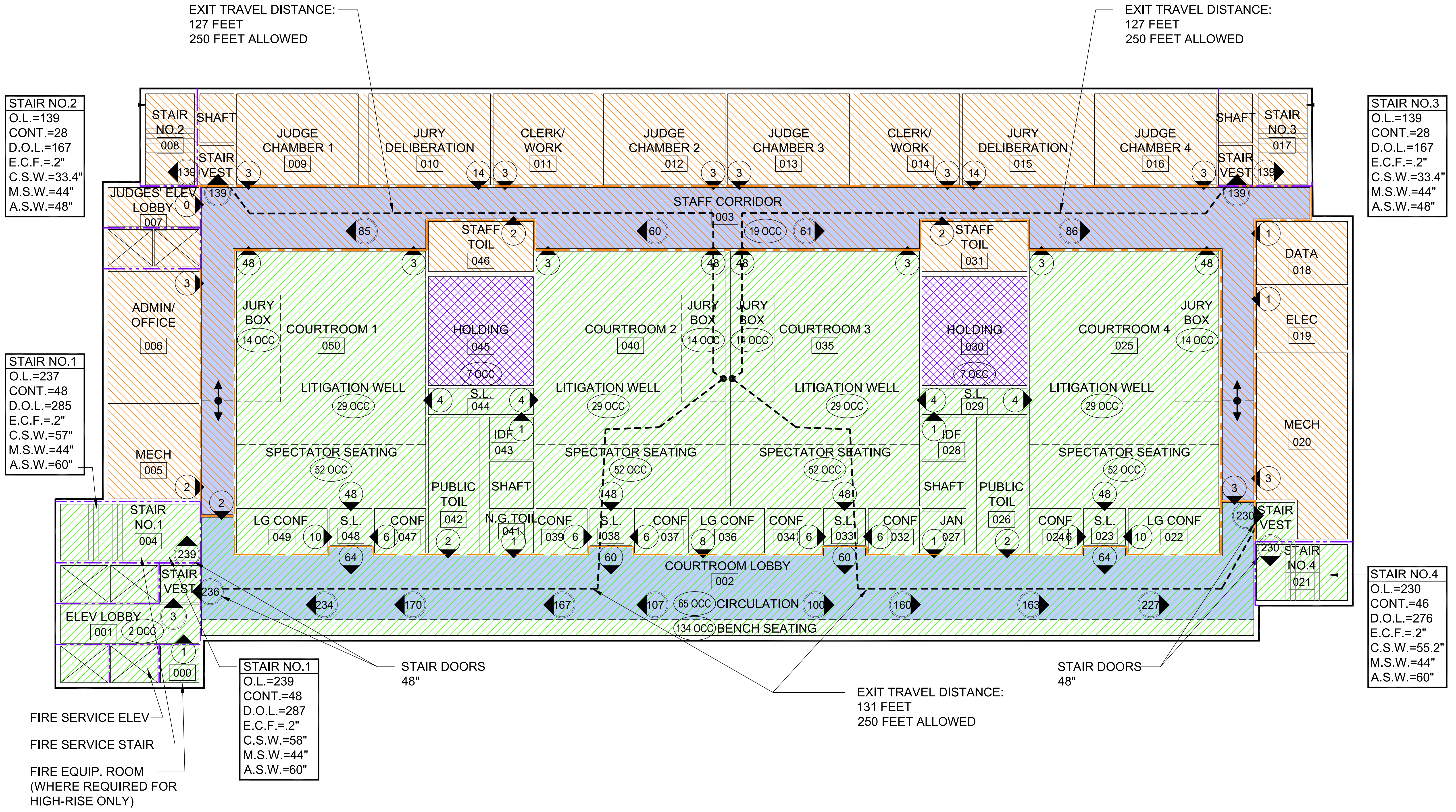
The floor plan focuses primarily on exit analysis requirements. The plan is diagrammatic and not intended to limit design creativity or specify exact locations or organization of spaces. Low-rise courthouses have greater flexibility relative to the location of the elevator cores and stairs, but this configuration of those elements is recommended for high-rise buildings. The requirements for each project are distinct and therefore each project will have a unique floor plan. However, in the interest of communicating JCC requirements, the plan provides the following direction:

- Each occupied space shall be labeled with a room name and number
- An Occupant Load Table shall be included for every occupied floor level to include the following:
    - Room number
    - Room name
    - Area
    - Function (as defined by CBC Table 1004.5)
    - Occupant Load Factor (OLF as defined by CBC Table 1004.5 or per supplemental JCC requirements listed herewith)
    - Net/Gross area requirements (as required by CBC Table 1004.5)
    - Number of fixed seats as required by CBC 1004.6
    - Occupant load based on dividing area by OLF and/or by determining the number of fixed seats
    - Details which may clarify how the occupant load was calculated
- The exit load from each room should be shown at each exit door, and should be align with the occupant load values shown in the Occupant Load Table
- Cumulative occupant loads shall be indicated along the exit access route
- Occupant loads at each exit stair or exterior exit shall be indicated
- A 20% contingency shall be added to each occupant load discharging to exit stairs or exterior exits
    - A calculation at each exit stair or exterior exit will include the following:
        - Occupant load
        - Contingency (20 % of the occupant load)
        - Design load factor (the occupant load + contingency)
        - Egress capacity factor (typically .2 inches per section 1005)
        - Calculated stairway width (design load factor x egress capacity factor)
        - Minimum stair width (per 1005.3.1 and 44 inches minimum when serving a design occupant load > 50)
        - Actual stair width (as measured between stringers)
- The width requirements of each door shall be shown either with a calculation for each door or a note clarifying how many occupants each standard sized door can accommodate

- The public lobby and the secure staff corridor shall be constructed as a corridor and protected by a 1-hour fire partition at a minimum
- Required stairwells shall be enclosed in shafts constructed as 2-hour fire barriers at a minimum*
- For high-rise buildings, each stairwell shall be accessed via a vestibule as required by 909.20.1
- For high-rise buildings over 420 feet in building height, and additional stairway shall be provided per 403.5.2.
- Elevators shall be enclosed in shafts providing 2-hour fire barrier construction and openings protected with either a smoke curtain or an elevator lobby meeting the same requirements*
- Exit travel distances from the most remote spaces on each floor to the nearest stairwells or exits shall be demonstrated
- For high-rise buildings, the fire service elevator and stair shall be indicated
    - The fire service stair must have access to the roof and must discharge directly to the exterior (may discharge through an uninterrupted exit passageway)
- For high-rise buildings, a fire equipment room may be required. Refer to local requirements
- The Occupancy Group for each zone shall be indicated on the plan (generally A-3 for lobbies and courtrooms, B for office areas, and I-3 for locked inmate areas)
  *refer to the CBC for exceptions for stairs and elevators connecting only two floors

The floor plan is not intended to show the following:

- The structural system
- Construction type
- Fire resistive requirements for building components:
    - Primary structural frame
    - Bearing walls
    - Non-bearing partitions
    - Floor construction
    - Roof construction
    - Shaft construction
- Exterior openings
- Protection of exterior walls and openings
- Requirements of local jurisdictions
- Mechanical, plumbing, and electrical systems and infrastructure or actual sizes of rooms
- The ground floor requirements
- Basement level requirements
- Roof level requirements
- Non-court floor requirements



ROOM NUMBER	ROOM NAME	AREA	FUNCTION	OCCUPANT LOAD FACTOR	NET/ GROSS	NUMBER OF SEATS	OCCUPANT LOAD	DETAILS
000	FIRE EQUIPMENT ROOM	50	ACCESSORY/STOR/MECH	300	GROSS		1	
001	ELEV LOBBY	193	-	150	GROSS		2	
002	**COURTROOM LOBBY**							
002A	LOBBY SEATING	600	FIXED SEATING (200' BENCH)	NA		134	134	18" PER OCC
002B	LOBBY CIRCULATION	2,573	CIRCULATION/SEATING	40	NET		65	PER JCC REQUIREMENTS
003	STAFF (RESTRICTED) CORRID	2,730	CIRCULATION/B OCC. GROSS	150	GROSS		19	PER JCC REQUIREMENTS
004	STAIR NO.1	225	-	NA			0	CIRCULATION/NOT OCCUPIED
005	MECH	315	ACCESSORY/STOR/MECH	300	GROSS		2	
006	ADMIN/OFFICE	402	BUSINESS	150	GROSS		3	
007	ELEV LOBBY	136	-	150	GROSS		0	PER JCC REQUIREMENTS
008	STAIR NO.2	162	-	NA			0	CIRCULATION/NOT OCCUPIED
009	JUDGE CHAMBER 1	402	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
010	JURY DELIBERATION	277	FIXED SEATING	NA			14	
011	CLERK/WORK	329	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
012	JUDGE CHAMBER 2	402	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
013	JUDGE CHAMBER 3	402	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
014	CLERK/WORK	329	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
015	JURY DELIBERATION	277	FIXED SEATING	NA			14	
016	JUDGE CHAMBER 4	402	BUSINESS	150	GROSS		3	PER JCC REQUIREMENTS
017	STAIR NO.3	162	-	NA			0	CIRCULATION/NOT OCCUPIED
018	DATA	208	ACCESSORY/STOR/MECH	300	GROSS		1	
019	ELEC	208	ACCESSORY/STOR/MECH	300	GROSS		1	
020	MECH	615	ACCESSORY/STOR/MECH	300	GROSS		3	
021	STAIR NO.4	162	-	NA			0	CIRCULATION/NOT OCCUPIED
022	LG CONF	148	ASSEMBLY W/TABLES/CHAIRS	15	NET		10	
023	S.L. (SOUND LOCK)	56	-	NA			0	CIRCULATION/NOT OCCUPIED
024	CONF	83	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
025	**COURTROOM 4**							
025A	LITIGATION WELL	1,160	COURTROOMS-W/O FIX SEATS	40	NET		29	PER JCC REQUIREMENTS
025B	JURY BOX	169	FIXED SEATING			14	14	PER JCC REQUIREMENTS
025C	SPECTATOR SEATING	420	FIXED SEATING			52	52	PER JCC REQUIREMENTS
026	PUBLIC TOILET	250	-	150	GROSS		2	
027	JAN	67	ACCESSORY/STOR/MECH	300	GROSS		1	
028	IDF	67	ACCESSORY/STOR/MECH	300	GROSS		1	
029	S.L. (SOUND LOCK)	100	-	NA			0	CIRCULATION/NOT OCCUPIED
030	HOLDING	415	FIXED SEATING	NA		6	7	+1 FOR ADA
031	STAFF TOIL	160	-	150	GROSS		2	
032	CONF	83	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
033	S.L. (SOUND LOCK)	56	-	NA			0	CIRCULATION/NOT OCCUPIED
034	CONF	87	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
035	**COURTROOM 3**							
035A	LITIGATION WELL	1,160	COURTROOMS-W/O FIX SEATS	40	NET		29	PER JCC REQUIREMENTS
035B	JURY BOX	169	FIXED SEATING			14	14	PER JCC REQUIREMENTS
035C	SPECTATOR SEATING	420	FIXED SEATING			52	52	PER JCC REQUIREMENTS
036	LG CONF	119	ASSEMBLY W/TABLES/CHAIRS	15	NET		8	
037	CONF	87	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
038	S.L. (SOUND LOCK)	56	-	NA			0	CIRCULATION/NOT OCCUPIED
039	CONF	83	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
040	**COURTROOM 2**							
040A	LITIGATION WELL	1,160	COURTROOMS-W/O FIX SEATS	40	NET		29	PER JCC REQUIREMENTS
040B	JURY BOX	169	FIXED SEATING			14	14	PER JCC REQUIREMENTS
040C	SPECTATOR SEATING	420	FIXED SEATING			52	52	PER JCC REQUIREMENTS
041	N.G. TOIL (NON GENDER)	67	-	150	GROSS		1	
042	PUBLIC TOILET	250	-	150	GROSS		2	
043	IDF	67	ACCESSORY/STOR/MECH	300	GROSS		1	
044	S.L. (SOUND LOCK)	100	-	NA			0	CIRCULATION/NOT OCCUPIED
045	HOLDING	415	FIXED SEATING	NA		6	7	+1 FOR ADA
046	STAFF TOIL	160	-	150	GROSS		2	
047	CONF	83	ASSEMBLY W/TABLES/CHAIRS	15	NET		6	
048	S.L. (SOUND LOCK)	56	-	NA			0	
049	LG CONF	147	ASSEMBLY W/TABLES/CHAIRS	15	NET		10	
050	**COURTROOM 1**							
050A	LITIGATION WELL	1,160	COURTROOMS-W/O FIX SEATS	40	NET		29	PER JCC REQUIREMENTS
050B	JURY BOX	169	FIXED SEATING			14	14	PER JCC REQUIREMENTS
050C	SPECTATOR SEATING	420	FIXED SEATING			52	52	PER JCC REQUIREMENTS
TOTAL							747	

ABBREVIATIONS

O.L.	**OCCUPANT LOAD** AS CALCULATED PER SECTION 1004
CONT.	**CONTINGENCY** (20% ADDED TO ARRIVE AT DESIGN LOAD OCCUPANCY)
D.O.L	**DESIGN OCCUPANCY LOAD** (120% OF OCCUPANT LOAD)
E.C.F.	**EGRESS CAPACITY FACTOR*** PER SECTION 1005
C.S.W.	**CALCULATED STAIRWAY WIDTH** PER 1005.3.1 (44 INCH MIN. REQ'D WHEN SERVING 50 OR MORE PER 1011.2)
M.S.W.	**MINIMUM STAIR WIDTH** PER 1005.3.2 (44 INCH MIN. WHEN SERVING 50 OR MORE PER 1018.2 AND 1020.2)
A.S.W.	**ACTUAL STAIR WIDTH** CLEAR DIMENSION BETWEEN STRINGERS

*FOR A-3 OCCUPANCIES THE EGRESS CAPACITY FACTOR IS:

- STAIRWAYS: .2 INCHES PER 1005.3.1 EXCEPTION 1 WHEN BUILDING IS EQUIPPED WITH AN AUTOMATIC SPRINKLER SYSTEM AND AN EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM
- OTHER EGRESS COMPONENTS (AISLES AND DOORWAYS): .15 INCHES PER 1005.3.2 EXCEPTION 1 WHEN BUILDING IS EQUIPPED WITH AN AUTOMATIC SPRINKLER SYSTEM AND AN EMERGENCY VOICE/ALARM COMMUNICATION SYSTEM

DOOR SIZING

USING THE CALCULATIONS ABOVE FOR DOORWAYS (OTHER EGRESS COMPONENTS):

- EXIT STAIRS AND DOORS INTO THOSE STAIRS SHOULD BE DESIGNED WITH A 20% CONTINGENCY
- A 36" DOOR (WHICH PROVIDES 32" CLEAR OPENING) CAN ACCOMMODATE 213 OCCUPANTS (32"/.15"=213.3)
- A 42" DOOR (WHICH PROVIDES 38" CLEAR OPENING) CAN ACCOMMODATE 253 OCCUPANTS (38"/.15"=253.3)
- A 48" DOOR (WHICH PROVIDES 44" CLEAR OPENING) CAN ACCOMMODATE 293 OCCUPANTS (44"/.15"=293.3)
- ALL DOOR SERVING FEWER THAN 200 OCCUPANTS ARE 36 INCHES WIDTH
- ALL DOORS SERVING 200 TO 250 OCCUPANTS ARE 42 INCHES IN WIDTH
- ALL DOORS SERVING 250 TO 290 OCCUPANTS ARE 48 INCHES IN WIDTH
- NO EXIT SERVES MORE THAN 290 OCCUPANTS; ADDITIONAL EXITS SHOULD BE PROVIDED
- DOORS SWINGS SHALL NOT REDUCE THE REQUIRED WIDTH OF CORRIDORS OR STAIRS BY MORE THAN 50%.

LEGEND

50 ▶	EXIT LOAD
160 ▶	ACCUMULATIVE EXIT LOAD
93 OCC	ROOM OCCUPANCY FOR ROOMS/SUITES WITH MORE THAN ONE EXIT
🟩	A-3 OCCUPANCY
🟧	B OCCUPANCY
🟪	I-3 OCCUPANCY
🟦	RATED CORRIDOR IN THE A-3 OCCUPANCY
▨	RATED CORRIDOR IN THE B OCCUPANCY
– –	-HOUR FIRE PARTITION
–·–	2-HOUR FIRE BARRIER

Example Court Floor Plan for Exiting and Occupancy Analysis
08.31.2022

JUDICIAL COUNCIL
OF CALIFORNIA
ADMINISTRATIVE DIVISION

Building Management System Requirements and Guidelines

This document provides general oversight and guidance to the requirements for the Building Management System (BMS) for Judicial Council of California (JCC).

The following are the components:

I. General JCC Building Management Systems (BMS) Requirements

A. All BMS designs shall include these requirements and BMS designers shall ensure that design specifications include these requirements.

B. BMS system will consist of the Tridium Niagara 4 platform to create Smart Device Applications. System will support encrypted Rest API that allows for secure 3rd party custom applications and interfaces. System will be compliant and support HTML5 framework.

C. Submittal Requirements:

1. Riser diagram
2. Standard for naming components
3. Design drawings for control panels, including wiring design diagram
4. Sequence of operation (To be developed in a collaborative effort with the JCC)
5. Detailed network architecture diagram showing internet and/or active port connections
6. Detailed drawings showing cable pathways
7. Drawings showing all fire-rated walls and required fire-rated assemblies through rated walls

D. All BACnet equipment and software supplied for JCC projects shall be supported by manufacturer supplied Protocol Implementation Conformance Statement (PICS) certifying that the device complies with the specified BACnet requirements.

1. As a minimum, each BACnet PICS shall convey the following information:

    a. Basic information identifying the vendor and describing the BACnet device.

   b. The BACnet Interoperability Building Blocks supported by the field device.
   c. The standardized BACnet device profile to which the device conforms.
   d. All non-standard application services that are supported along with an indication for each service of whether the device can initiate the service request, respond to a service request, or both.
   e. A list of all standard and proprietary object types that are supported.
   f. For each object type supported:
      i. any optional properties that are supported,
      ii. which properties can be written-to use BACnet services,
      iii. if the objects can be dynamically created or deleted using BACnet services, and,
      iv. any restrictions on the range of data values for properties.
   g. The data link layer options supported, both real and virtual.
   h. Whether segmented requests are supported.
   i. Whether segmented responses are supported.

2. All products shall have a BTL Mark certifying that the product was independently tested by a third-party testing facility and complies with BACnet conformance requirements.

3. Provide a full warranty for a minimum period of 2 years after system acceptance.

E. Design specifications for BMS installations shall provide detailed specifications for all components of the BMS including equipment, field devices, wire/cable, conduit, pneumatic tubing, mounts, terminations, etc.

F. The BMS designer shall fully coordinate BMS design requirements with the other project design team parties (where applicable). The BMS designer shall coordinate field panel mounting locations, intended DCP/ASC locations, power supply requirements, communications outlet requirements, etc.

G. All new BMS installations shall be integrated and include all associated graphics. No exceptions.

H. The following are general installation guidelines for BMS installations:

1. All equipment and materials furnished shall be new.

2. All equipment and materials shall be UL listed. All Temperature Control Panels (TCPs) shall be UL Listed as a UL Listed Enclosure and built by a UL listed panel shop. Equipment and components shall be labelled accordingly.

3. All similar components (e.g., temperature sensors, differential pressure transducers, current transformer/relay combinations, signal transmitters, etc.) in a BMS installation

shall be provided by the same manufacturer.

4. Components shall be provided which are suitable for the intended application. Components shall be capable of maintained operation in the applicable environmental conditions and shall be capable of operation in contact with the controlled/monitored medium.

5. Except for field mounted instrumentation and devices, all BMS components shall be installed in field panels (TCPs). Panels and enclosures shall meet, at minimum, the following requirements:

   a. Painted steel panels with hinged locking door. All panels shall be keyed to a standard key.
   b. Ventilated to prevent excessive heat build-up, where excessive heat buildup is expected.
   c. Field cabling shall be terminated on terminal stripes. Cable within enclosures shall be installed in cable trays with snap on covers.
   d. Internal components shall be installed to allow easy access for diagnostics, maintenance, removal, or replacement.
   e. Panel or enclosure shall be suitably rated for the environment in which it is to be installed. Exterior enclosures shall be, at a minimum, NEMA-4 rated.
   f. UL listed and registered.

6. Panels and enclosures shall only be located within mechanical rooms or at approved locations. Panel locations shall be coordinated during design with a JCC representative and shall be identified on project design drawings. For new construction projects the BMS panel locations shall be identified in the project mechanical design drawings. For retrofit applications the BMS panel locations shall be identified on building floor plan drawings, to be included in the project documents.

7. All components of the BMS shall be identification tagged. Identification tags shall be plastic laminated “luggage style” tags securely fastened to the end device. Tags shall be of a minimum size of 3.15” x 1” engraved with 0.5” bold lettering. Identification tags shall be provided for, at minimum, the following:
   a. Sensors.
   b. Transmitters.
   c. BMS controlled valve and damper actuators.
   d. End-Devices.
   e. Distributed Control Panels (DCPs).
   f. BACnet Advanced Application Controllers (B-AACs).
   g. BACnet Application Specific Controllers (B- ASCs).
   h. Field panels.

8. All BMS wire, cable, and pneumatic control tubing shall be identification tagged. Wire/cable shall be identification tagged at every termination location. Wire/cable and tubing terminating at DCPs, and ASCs shall be tagged with the DCP/ASC controller termination number. Wire/cable and tubing terminating at field devices shall be tagged with both the DCP/ASC number and the DCP/ASC termination number. At any splices or terminal strips between the field device and DCP/ASC, the wiring shall be tagged on both sides of the termination point the same as for a field device termination.

9. 120 VAC power supply sources shall be provided to all BMS field panel and DCP mounting locations. The selection of normal power supply or standby power supply facilities shall be based on project and application specific requirements. See Chapter 15 of the California Trial Court Facilities Standards for power requirements. In general, however, BMS DCPs/ASCs (and associated network interface equipment) monitoring designated building critical alarm points shall be provided with standby power supplies. The DCP/ASC at which the critical building alarms are terminated shall be designated at the "tie-in" panel for the building. Where no standby power is available in the building, the tie-in panel shall be provided with uninterruptible power supply equipment. The BMS tie-in panel is required to remain operational in the event of loss of normal power supply to the building. The tie-in panel shall continue to operate in the event of a power supply failure for thirty minutes and shall provide alarm annunciation, monitoring, and control of connected systems/devices from the ASC. The electrical power supply circuit shall be clearly labelled at the electrical distribution panel and at the BMS field panel location. As-built documentation shall detail power supply circuit source panels and termination locations.

10. All installations shall be provided to readily allow access for maintenance.

11. Provide submittals on memory key (USB) to the JCC at completion of project.

12. Room sensors in public spaces shall be supplied without displays or keypads. Coordinate with the JCC for specific project requirements.

13. Software Requirements:

    a. Trending Logs
    b. Schedules
    c. Storage Requirements
    d. Event Logging
    e. Alarm Generation and Processing
    f. Programming
    g. Report Creation

II. General BMS Pneumatic Control Requirements

(NOTE: THIS SECTION ONLY APPLICABLE TO EXISTING INSTALLATIONS, NOT FOR NEW INSTALLATIONS)

A. The following are minimum requirements related to BMS pneumatic controls installations:

1. All installations shall be in accordance with applicable codes, statutes and ordinances. All pneumatic controls air tubing shall be specified to comply with minimum operating temperatures and pressures.

2. Pneumatic control air lines installed within mechanical rooms may be copper tubing and/or polyethylene type tubing, shall be rated for the installation application, and shall be suitably labelled.

3. Pneumatic control air tubing may be installed in ceiling spaces without conduit where code permits. Tubing installed in ceiling spaces without conduit shall be suitably rated and labelled. Tubing shall be securely supported and installed in a neat and workmanlike manner following building lines. Sleeves shall be provided for all tubing which penetrates wall partitions, concrete slabs, or rated partitions.

4. In retrofit applications, three-way switch over valves shall be provided on existing pneumatic control air lines to controlled devices for switching between new BMS control and existing pneumatic control facilities. Existing pneumatic control facilities shall remain installed and operational until the work of the BMS is complete and demonstrated to the Owner. The BMS designer shall specify the requirement for the removal of redundant pneumatic controls components.

5. BMS pneumatic control air facilities shall meet the following minimum requirements:

   a. Tubing shall be installed with suitable support using standard fittings and conditions and shall run parallel to building lines.
   b. Tubing shall be installed with protection from ambient and outdoor temperature effects. Where required tubing shall be installed with stand-offs, insulation, etc.
   c. Multiple tubing runs shall be installed in parallel runs, and shall be suitably supported and tie-wrapped in tube bundles.
   d. Pneumatic control air tubing shall be terminated with standard fittings at panel mounted devices or at pneumatic bulkhead fittings within panels. Field device connections may be run in steel protective spring or BX conduit.
   e. Rubber grommets shall be provided wherever control tubing passes through ducts or plenum walls.

f. A pressure gauge shall be provided at each tapping off the main air line. If a pressure reducing valve is required, then the gauge shall be positioned after the valve.
g. BMS pneumatic control output lines to each controlled device shall be provided with two pressure gauges. The gauges shall be mounted at the DCP/ASC control output location and at the input to the control actuator.

6. Pilot positioners shall be provided for all BMS controlled pneumatic actuators that are controlled in sequence (e.g., mixed air dampers, 1/3 - 2/3 steam valves, etc.).

7. In line desiccant filters shall be provided on all main pneumatic control air lines supplying DCPs and ASCs with BMS pneumatic control outputs. The in-line desiccant filters shall be provided in addition to the building main’s pneumatic control air dryer/filter facilities.

8. In a BMS retrofit application, the existing building pneumatic control air facilities shall be inspected during design phase to ensure that air dryer and filter equipment are installed and operational. If the building is not equipped with satisfactory pneumatic control air filtration and dryer equipment this equipment shall be installed as part of the BMS installation project. The following are minimum pneumatic controls air dryer and filtration equipment requirements:

   a. Two refrigerant type air dryers shall be provided in a duty/standby configuration,
   b. Installed in discharge air line from controls air compressor set and storage tank,
   c. Complete with air inlet and outlet pressure gauges and automatic moisture removal trap,
   d. Complete with three-way valve manifold and piped in a duty/standby configuration to allow the operation of one dryer at a time with the second (standby) dryer valve off and switched off.
   e. Installation shall be complete with dual air filtration to remove moisture, oil, and particulate matter from the controls air supply. BMS monitored low pressure alarm indication device. Low pressure alarm condition shall be annunciated at the BMS front end.

III. General BMS Design Requirements

A. The BMS shall incorporate hardware and software resources sufficient to meet the functional requirements of the specifications. The Facility Local Area Network and Device Level Network shall be based on industry standard open platforms and protocols, and utilize commonly available operation, management and application software. Systems shall utilize BACnet IP via Cat6a cable. All software packages and databases shall be licensed to the Judicial Council of California to allow unrestricted maintenance and operation of the BMS. Contractor shall include all items not specifically itemized in these requirements and guidelines that are necessary to implement, maintain, and operate the system in compliance with the functional intent of the Specifications.

B. All BMS shall conform to the most recent revision of the ANSI/ASHRAE Standard 135 including all issued addenda, at minimum, at the Management data communication network level as defined within these guidelines. All BMS systems shall also be native BACnet compliant at the Automation data communication network level.

C. When applicable, the BMS designer shall use sequences of operation in compliance with the most recent version of ASHRAE Guideline 36 (High-Performance Sequences of Operation for HVAC Systems).

D. BMS installations shall allow for centralized operator interface for monitoring and supervisory control of the individual building BMS.

E. BMS installation shall use standardized iconography as part of the Graphical User Interface (GUI). These graphical icons will be based on the type of equipment and must be approved by the JCC at time of system design.

F. All BMS installations shall have a network data server computer, where specified, with associated BMS manufacturer application software installed and running and installed onsite. Network data server computer shall be provided by the associated BMS contractor to owner, complete with all manufacturer-specific BMS operator interface software for programming, database development, data archiving and storage, and controller program backup.

G. BMS installations shall be provided which incorporate BMS equipment and network facilities in compliance with the requirements identified in these guidelines. The BMS network segments shall be dedicated to the BMS. The BMS designer shall specify detailed BMS equipment requirements and BMS network architecture requirements in the BMS design specifications. BMS equipment and data communication network specifications shall incorporate good BMS engineering, design, and application practices and shall incorporate the UBC BMS Design Guideline requirements.

   i. Network latencies must match, or respond faster than, the fastest controller device node on the BMS network.

H. The DCPs shall be designed around open and secure communications standards using HTML5 *(or the now current major version of the HTML standard)* web technology. DCPs shall have the capability to communicate via multiple industry open protocols running over building network infrastructures and computer networks. As a minimum, the DCP shall be able to communicate directly with BACnet, LonWorks, and Modbus devices and controllers, using TCP/IP.

I. It shall be possible to access the BMS remotely. With a proper username and password, a remote operator shall be able to monitor or control BMS functions via a graphical interface. The remote access shall be through a standard Internet browser. The system shall be capable of supporting an unlimited number of remote clients. A VPN gateway shall be provided for security protection.

J. Browser-based access: A remote/local user, with proper username and password, shall have access to monitor or control the BMS functions via a graphical interface. Native Internet browser-based user interfaces must be HTML5 compliant, and not require plug-ins (thin clients). The system shall be capable of supporting an unlimited number of clients using a standard Web browser

K. BMS online editing is necessary for all controllers that serve critical equipment (to be determined by project team) which cannot be shut down without a maintenance shutdown notice.

L. BMS installations in JCC buildings shall incorporate the following minimum requirements:

  i. Equipment shall be approved components as manufactured by one of the JCC approved BMS manufacturers and shall follow the BMS Design Guidelines.
  ii. Management and Automation level communication LANs shall be provided to ensure the following:
    a. The failure of a DCP shall not affect the operation of other operating DCPs. UCs supervised by the failed DCP shall continue to function and shall control associated equipment according to specified failure routines. Where information in the failed DCP is used by other DCPs, UCs, buildings, routines, etc. the non-availability of the information shall be alarmed, and alternate control strategies shall be automatically initiated.
    b. The failure of a UC shall not affect the operation of another operating UC or DCP.
    c. All BMS monitored and controlled points associated with an individual HVAC system or equipment shall be terminated in the same UC or DCP. It is not acceptable for BMS monitored and controlled points associated with an individual system to be terminated at separate distributed DCPs or UCs.
    d. All required logic programming and point database facilities associated with an individual building system shall reside in the same UC or DCP to which the system input/output points are terminated. It is not acceptable for logic programming and database facilities required for BMS monitoring and control of a building system to reside in a DCP or UC other than the one in which the system input/output points are terminated.
    e. UCs controlling space terminal units (e.g., VAV terminal units, fan powered terminal units, etc.) shall reside on the same automation LAN as the UC that is controlling the associated air handling unit. If an AHU is controlled directly by a DCP, the UC's

controlling space terminal units shall be supervised by that DCP.
   f. All BMS designs and installations must incorporate and interface with lighting control systems, as applicable.
   g. Sequence of operations shall be provided by the system designer to JCC prior to installation, as part of the submittal process.
   h. Hardware, firmware, and client software upgrades shall be performed only if they enhance specific features applicable to the existing BMS environment, security or system architecture.

M. In existing facilities with standalone internet connections, the following shall apply:
   1. The BMS installation shall include software, firmware, and a firewall to ensure network protection.
   2. The installer shall be responsible for generating the required IP addresses for all BMS devices. This information will be provided as part of the closeout documentation.

N. In existing facilities connected to the Court's network, the following shall apply:
   1. Court IT coordinate shall be facilitated through the Quality Assurance Low Voltage Engineering Specialist.
   2. The installer shall identify the active port connections needed for the system
   3. Quality Assurance will request the Court to create a Virtual Local Area Network (VLAN) for the BMS.
   4. The installer will generate a series of IP addresses based off the VLAN information provided by the Court.

IV. BMS System Requirements

A. Acceptable Manufacturers:

   1. Johnson Controls, Inc.
   2. Honeywell
   3. Schneider Electric
   4. Distech Controls
   5. Approved equal.

B. BMS installations shall be provided by BMS contractors who meet the following requirements:

   1. Must have been in operation in the BMS industry for a minimum of 10 years.
   2. Employ qualified staff in the State of California capable of undertaking a complete BMS installation project and of providing routine and emergency maintenance on all elements of the BMS.
   3. Have successful project experience on similar projects for a minimum period of five (5) years.
   4. Supplier shall have service and support available 24 hours per day, 7 days per week.
   5. Have access to local supplies of BMS components with a maximum delivery period of 24 hours.

C. All BMS DCPs, UCs, OIWs where applicable, and other BMS manufacturer specific equipment within a building shall be manufactured by the same manufacturer. All HVAC and building services monitoring and controls shall be provided by BMS facilities from one of the approved BMS manufacturers. In applications where HVAC system controls within an existing building are being retrofitted and BMS facilities of any of the approved BMS manufacturers exist within the building, BMS facilities shall be provided by the manufacturer of the BMS equipment already installed. The retrofitted BMS installation shall be provided to interconnect the new renovation work into the existing building and campus BMS facilities.

D. BMS DDC controllers shall be products manufactured by a company that is an active Corporate Member of the BACnet Manufacturers Association (BMA).

E. All BMS systems shall be fully demonstrated and operational to meet with the JCC’s satisfaction and approved by Judicial Council Facilities Services prior to being considered as an approved product or equal.

F. The maximum allowed distance from the local field office of the system provider to the project site shall be no more than 75 miles.

V. List of Abbreviations

A. The following is a list of abbreviations used throughout this document.

ANSI.............. American National Standards Institute

ASC................ Application Specific Controller

ASHRAE .... American Society of Heating, Refrigerating and Air-Conditioning Engineers

BMS .... Building Management and Control System

BACnet.......... Building Automation and Controls Network – ANSI/ASHRAE Standard 135

BMA .... BACnet Manufacturer’s Association

BTL .... BACnet Testing Laboratory: A recognized, independent third-party laboratory certified to test product for compliance to BACnet standards.

BTL Mark	A seal affixed to product certifying that it has been tested by a recognized BACnet Testing Laboratory and found to conform to BACnet standards.
DCP	Distributed Control Panel
DDC	Direct Digital Control
HTML	Hypertext Markup Language
LAN	Local Area Network
NEMA	National Electric Manufacturers Association
OIW	Operator Interface Workstation
PICS	Protocol implementation conformance statement: All devices conforming to the BACnet protocol shall have a documented statement (PICS) that identifies all the portions of BACnet that are implemented in the device.
TCP/IP	Transport Control Protocol/ Internet Protocol
UC	Unitary Controller
VPN	Virtual Private Network

VI. References

Johnson Controls - https://www.johnsoncontrols.com/buildings/building-management

Honeywell - https://buildingsolutions.honeywell.com/en-US/solutions/hvacbuildingmanagement/Pages/default.aspx

Schneider Electric - https://www.schneider-electric.com/en/product-category/1200-building-management/

Distech Controls - https://www.distech-controls.com/en/us/products/building-automation-system/

CAL FIRE Office of the State Fire Marshal (OSFM) Plan Review Section is responsible for the review of construction plans submitted for all state occupied buildings and specifically identified state leased buildings. Plans are reviewed for compliance with adopted California Code of Regulations Title 24, California Code of Regulations Title 19, and applicable nationally recognized standards. Plan review consists of the preliminary review, initial review, back check, over the counter, addendums, and change orders.

OSFM has converted to electronic plan review in addition to the paper review format that is currently used. Electronic plan review will be completed in ProjectDox. New to electronic plan review or not sure how to get started? Please see the information provided below prior to submitting your documents and the **GETTING STARTED SECTION.**

INQUIRIES

Plan Review queue times

- Initial reviews approximately 8 weeks
- Backcheck reviews approximately 4 weeks
- Review times dependent on complexity and quality provided

Notifications

- Updates are not provided during the review
- GOVmotus and ProjectDox will auto generate e-mail notifications at each review milestone within the process

DEFERRED SUBMITTALS

OSFM only allows the following to be deferred

- Fire Alarm
- Fire Sprinklers
- Smoke Control
- Emergency Responder Radio Coverage

AMMR's, PERMIT EXTENSIONS, PRELIMINARY MEETINGS

- These requests require a **GOVmotus** application and shall be in accordance with submittals for **PAPER PLAN REVIEW**

OVER THE COUNTER REVIEWS

- Hours are Tuesdays from 830am to 1230pm. Check-in starts at 8:00 am.
- Projects are handled on a first come first served basis with no guarantee of review.
- Reviews are limited to one hour with the last appointment starting at 1230.
- Applications for permit shall be completed in GOVmotus prior to arrival
  - Provide a copy of application when signing in for review.
- Plans shall be in accordance with the requirements found under **PAPER PLAN REVIEW**
- Plans that have already been submitted through our normal process with not be taken out of the que for an OTC review.

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY
DEPARTMENT OF FORESTRY AND FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL
FIRE AND LIFE SAFETY DIVISION
PHASED PERMIT BUILDINGS SUBMITTAL GUIDE
SFM-G-10 (12/2020)

Phased Permit Buildings Submittal Guide

GENERAL INFORMATION

The Phased Permit Building Program was created to allow building permits to be issued in phases for complex facilities. The following are the minimum requirements to be provided by the project team and approved by the Office of the State Fire Marshal, prior to any permits being issued or commencement of construction; Any holders of a Phased Permit proceed at their own risk without assurance that a permit for the entire structure will be granted;

PREREQUISITES

The following are the minimum requirements to be eligible for phased permitting:

- The project construction duration must exceed twelve (12) months from foundations to final Certificate of Occupancy.
- A preliminary meeting may be required between the Office of the State Fire Marshal (OSFM), State Agency representative, owner representative, and the various project designers to review the project scope, the proposed phased permit schedule, the valuation of each proposed design phase, and to answer any questions the State Agency or designers may have regarding the phased permit process or code requirements.

PRELIMINARY MEETING

A preliminary meeting may be requested by OSFM or the design team depending on the complexity of the project. An application shall be submitted and the permit# provided to the OSFM prior. The attendees must include the State Agency representative, owner representative, principal design professional, architect, structural engineer, mechanical engineer, electrical engineer, civil engineer and contractor. Please call (916) 568-3801 to schedule this required preliminary meeting.

The project team shall provide the following information at this meeting:

1. A list of the State Agency representative(s), owner representative(s), and the design professionals associated with the project;
2. A detailed description of the entire project, including building(s) analysis and property ownership;
3. A preliminary design, permit, and construction schedule;
4. A site plan indicating all existing and proposed property lines showing the project location and yards;
5. A sufficient number of building elevations and cross sections necessary to convey the overall scope of the project; and
6. Any project specific information
7. Completed applications alternate materials and/or alternate methods for proposal.

The OSFM will provide the following information:

1. A review to verify minimum submittal requirements have been met;
2. Answer questions pertaining to minimum code requirements;
3. Describe construction limits which will be placed on each of the proposed phased permit applications;
4. Agreement on phased approach and schedule.

PHASE I DESIGN - CODE ANALYSIS PACKAGE AND CIVIL/GRADING/UTILITIES/FOUNDATIONS

Phase I of the phased permit process is the submittal of the Code Analysis Package and the grading, underground utilities, and the foundations for the entire project. These construction documents must be submitted for review and include the following:

A. A Fire Protection Report signed by a licensed California Fire Protection Engineer may be required depending on the complexity of the project.
B. Descriptive and complete scope of work;
C. Design Summary/Code Analysis including;
    1. Proposed building uses/occupancies.
    2. Separated or Non-separate design.
        a) Mixed-Use design analysis.
    3. Building construction type.
    4. Building area (in square feet).
    5. Number of stories.
    6. Actual building height.
    7. Area increase.
        a) Justify allowable area(s) increase, show area(s) using frontages, justify each proposed increase.
    8. Height increase justification.
        a) Provide allowable building height increase analysis.
    9. Occupant load of each building (itemized by each proposed use).
    10. Occupant load for entire building and each floor.
    11. Fire Sprinklers.
    12. Fire Alarm.
    13. Other fire protection systems proposed.
    14. Fire protection design, including all passive and active elements and design.
    15. Accessibility analysis.
    16. Confirm if the site in a High Fire Hazard Severity Zone.
    17. Emergency Responder Radio Coverage (if applicable).
D. Site Plans which indicate all existing and proposed property lines, easements, fire department access, all accessibility routes on the property between buildings including from the right-of-way and all buildings/structures, and separation/setback distances;
E. Utility Plans indicating all fire hydrant locations, documentation of required fire flow, and all underground plumbing, electrical and mechanical (if applicable);
F. Preliminary Smoke Control Report, which is conceptual in nature, but still includes all aspects required in the final report. The acceptance of the preliminary Smoke Control Report does not constitute final approval.
G. Chemical Inventory List and HMIS Statement- CFC 5001.5.2
H. Hazardous Materials Control Areas – number of and location clearly indicated and coordinated with the HMIS
I. High-Piled, Combustible Storage – locations, dimensions, types of commodities; identified in accordance with CFC 3201.3
J. A complete grading and drainage plan, including landscape and irrigation, and any temporary or permanent dewatering system for the entire site;
K. All soil bearing pressures taken directly form the Geotechnical reports prepared by a California registered civil engineer;
L. Complete structural foundation plans, calculations, and all other supportive data for this phase;
M. All electrical, mechanical and plumbing plans associated with the scope of work proposed for the foundation design phase;
N. Electrical power distribution plans including all grounding and bonding;
O. Architectural plans of the exterior elevations for each building or structure;
P. Fire Department vehicle access (during construction).

PHASE II DESIGN - STRUCTURE PLAN AND COMPLETE ARCHITECTURAL, ELECTRICAL, PLUMBING, AND MECHANICAL DESIGNS

The second phased permit submittal is for the entire structure of each building or for the entire project, the complete architectural, electrical, mechanical, and plumbing designs either by individual building(s) or for the entire project. The required construction documents include the following:

1. Completed plan review application with phase clearly indicated and phased design schedule;
2. All previously submitted and approved documents with any deviation from approved documents noted;
3. Complete sets of all structural plans, calculations, and all other supportive data;
4. Complete exterior wall cladding designs including all structural connection details and edge of slab protection details;
5. Stairs, handrails and guards, and associated cross-sections and details;
6. All electrical, mechanical, and plumbing plans associated with the scope of work proposed for the structural design phase (i.e., concrete or masonry embeds);
7. Electrical power distribution plans including all grounding and bonding;
8. Steel fireproofing plans and schedules which must include:
    a. Structural framing backgrounds with hourly fire-resistance ratings.
    b. Fireproofing schedules.
9. Architectural reference plans of the exterior elevations for each building; and
10. Architectural reference floor plans of each floor of each building.

Architectural plans will include but are not limited to:

1. Completed plan review application with phase clearly indicated and phased permit schedule;
2. All previously submitted and approved documents with any deviation from approved documents noted;
3. Floor plans which indicate the use of each space and all wall types;
4. Exterior and interior elevations;
5. Roof and floor/ceiling assemblies, any horizontal assemblies, penetrations protectives, and reflective ceiling plans;
6. Interior and exterior wall plans including all wall framing details, fire-resistance-rating details and connection to structure details indicating all fire walls, fire barriers, shaft enclosures, fire partitions, smoke barriers, smoke partitions, penetrations, fire-resistant joint systems, opening protective’s, exit enclosures, all construction details and fire-stopping methods;
7. Exterior wall cladding systems, including Exterior Insulation and Finish Systems (EIFS), curtain walls, store fronts, etc., and all edge of slab protection details (if applicable);
8. Furniture and fixture plans per floor;
9. Seating plans for all possible event configurations (if applicable);
10. Building cross-sections;
11. Door & window schedules including fire-resistance ratings;
12. All necessary architectural details;
13. Stairs, handrails and guards, and associated cross-sections and details; and
14. Interior and exterior floor, wall and ceiling finishes, including; schedules and details.
15. The approved Hazardous Materials Inventory Statement- CFC 5001.5.2
16. Hazardous Material Management Plan- CFC 5001.5.1
17. High-Piled Combustible Storage –Construction documents in accordance with CFC 3201.3

Mechanical/Plumbing Plans for the scope of work should include the following:

1. Site Utility Plan, indicating cooling towers, fire pumps, private and public sewer lines, manholes, cleanouts, materials, sizing, and slopes;
2. Mechanical and plumbing floor plans (indicating all fire-resistance rated walls and horizontal assemblies and the required duct and air transfer opening protection);
3. All equipment and fixture schedules (for both plumbing and mechanical);
4. Provide calculations for minimum outside air ventilation requirements;
5. All refrigeration systems, refrigerant classifications, machinery rooms, and piping;

6. All smoke control and smoke exhaust designs (if applicable);
7. Duct and register materials, sizes and support methods for supply, return, outside air, environmental air, product conveying systems, commercial hoods and kitchen ventilation;
8. Vertical riser diagrams for all multi-story structures, for drain, waste and vent fittings (DWV), water, gas and mechanical ventilation systems;
9. Seismic restraint design and details of all required mechanical and plumbing elements (if applicable);
10. Locations and functions of all smoke/fire detectors and duct smoke detectors;
11. Locations of all smoke/fire dampers;
12. Location and programming of all control devices;
13. Waste and vent materials, sizing and isometric layouts;
14. Water supply and distribution materials, sizing, calculations and isometric layouts;
15. Indirect waste, materials, sizing, and cleanouts;
16. Fuel gas piping, design pressures, regulator locations, and shut-off valves (if medium or high pressure gas are to be used an approval letter from the gas provider is required);
17. Combustion air openings and details;
18. All gas venting sizing, terminations and details;
19. Cross-connection control devices;
20. Primary and Secondary Roof drainage piping plans and calculations; and
21. Sand, oil, and grease interceptors with calculations.
22. Smoke Control report: which includes smoke control system design, and pass/fail criteria; including necessary weather conditions acceptable during commissioning testing without further review.
23. Letter from third party that has reviewed the smoke control system and finds it to be acceptable.

Electrical Plans for the scope of work should include the following:

1. Electrical site plan identifying all site lighting, utility transformer(s), service location(s), emergency generator location(s) and fire pump(s);
2. Electrical floor plans for lighting, power, communications and all special systems with all circuits clearly identified;
3. Provide ¼” = 1’-0” scale drawings of all electrical rooms, elevator machine rooms, generator rooms and fire pump rooms;
4. Electrical symbol schedule and legend;
5. Switchboard and panel board schedules with Ampere Interrupting Capacity (AIC) ratings, specifications and loads clearly shown;
6. Provide electrical specifications for all HVAC and Refrigeration equipment and all other mechanical equipment;
7. Lighting fixture schedule;
8. Show locations of all normal and emergency panel boards and distribution equipment, etc.;
9. Power distribution plans and single-line diagrams indicating size and types of all transformers, conduit, conductors, over-current protection, grounding and bonding for all distribution boards, switchboards, panels and services, including all electric utility information;
10. All raceways, wiring methods, materials, feeder sizes, and circuits;
11. All over current protection;
12. Bus bracing fault-current calculations;
13. Complete electrical load calculations;
14. Seismic restraint design and details of all required electrical elements (if applicable);
15. Protection of emergency and standby systems;
16. All egress illumination and egress identification;
17. All systems supplied by emergency and standby power; and
18. Location of emergency lighting with photometric justification.

PERMITS

Permits for construction will only be issued after the Phased Permit Building application has been submitted, reviewed and approved. Only one job card/permit and construction binder will be issued. Work is authorized for each phase by the approved plans.

Close control will be maintained to assure that the latest approved plans are on the job site and that construction does not proceed beyond the permitted scope of work. Construction will be stopped if it progresses beyond the scope of work for which permits have been issued.

DEMOLITION PERMITS:

The demolition phase may be approved by the local Deputy State Fire Marshal; If it is too complex or time consuming then the plan can be submitted to the plan review office; Provide a complete demolition plan that includes site, staging, and any alternate egress plans for existing building in proximity of the construction site.

GRADING PERMITS:

1. A phased permit for grading only may be obtained separately for the entire project site. This permit includes excavation only for the foundation and may include on-site drainage channels and underground box culverts.
2. If a site contains multiple buildings, a grading permit will be required for the entire site. Grading permits will not be issued for partial sections.

SUBMITTAL PACKAGE

Construction design plans and supporting documents must be prepared, wet or electronically signed and stamped by a California registered architect or professional engineer (as applicable for the discipline involved). All plans shall be drawn to scale on the same size sheets, bound, and must weigh less than 40 pounds.

A contractor licensed under the provisions of the Contractors State License Board may prepare and submit his own plans, provided that the plans are signed by the contractor and meet the conditions specified in Contractor State Licensing Boards Laws and Regulations.

SUBMITTAL PROCEDURES

Plan review application must be submitted in GOVmotus for all submittals; during the application process you may choose to submit electronic plans or paper. Paper submittals must be submitted in person or mailed to:

CAL FIRE – Office of the State Fire Marshal
Fire and Life Safety Division, Plan Review Section
2251 Harvard Street Suite 130
Sacramento, CA 95825
(916) 568-3801

For further Information please visit: http://osfm;fire;ca;gov/firelifesafety/firelifesafety;php

Pd Box 115
Local

RECORDED AT REQUEST OF
City of Lakeport
AUG 11 4 11 PM 1971

11079

COUNTY RECORDER

EASEMENT DEED

We, JOHN W. SEREGOW and LOUISE SEREGOW, his wife,

Grant to the CITY OF LAKEPORT, a Municipal Corporation, a cone of vision easement upon, over and across that portion of grantor's property in the northeast quarter of Section 25, Township 14 North, Range 10 West, Mount Diablo Base and Meridian described as follows:

Beginning at the southwest corner of grantors' property, being the center of Section 25, Township 14 North, Range 10 West, Mount Diablo Base and Meridian, and running thence northerly, along the west line of said northeast quarter, a distance of 245.64 feet to the true point of beginning.

Said cone of vision will be bounded on the south side by a line that bears South 65° East from the true point of beginning.

Said cone of vision will be bounded on the north side by a line that bears North 85° East from a point on the west line of said northeast quarter located 75.00 feet northerly of the true point of beginning.

Said view corridor will remain unobstructed by buildings, appurtenances or other improvements above elevation 1416.00 as determined by the USC&GS mean sea level datum, 1956.

In the event that for any reason whatsoever that certain Agreement between the CITY OF LAKEPORT and the STATE OF CALIFORNIA establishing a Vista Point along the westerly boundary of this easement is terminated, then such action shall extinguish this cone of vision easement.

- 2 -

Dated this 21st day of June 19 71.

John W. Seregow

Louise Seregow

FORM RW-5B (REV. 4-62)

STATE OF CALIFORNIA

County of Lake } ss.

On this 21st day of June in the year one thousand nine hundred and seventy-one before me, the undersigned, a Notary Public in and for the County of Lake State of California, personally appeared JOHN W. SEREGOW and LOUISE SEREGOW

Known to me to be the persons whose names are subscribed to the within instrument, and acknowledged that they executed the same.

WITNESS my hand and official seal.

CAROL A. BRAITO
My Commission Expires January 22, 1973

Carol A. Braito

Carol A. Braito
Name (Typed or Printed)

(ACKNOWLEDGMENT)
EST. 412. 67874 5-63 2800 SPO

CERTIFICATE OF ACCEPTANCE

THIS IS TO CERTIFY that an Easement Deed dated June 21,1971, from JOHN W. SEREGOW and LOUISE SEREGOW, his wife, to the CITY OF LAKEPORT, a Municipal Corporation, is hereby accepted by order of the City Council of the City of Lakeport; and Grantee consents to recordation thereof by its duly authorized officer.

DATED this 21st day of June, 1971.

Bernice M. Hudson
CITY CLERK, City of Lakeport

Design-Build Division 01

Section 010000

Table of Contents – Judicial Council of California

SECTION 012100 – ALLOWANCES

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council . Related sections to be listed here without limitation.]

1. 01 33 00 Submittals

2. 01 40 00 Quality Requirements

3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions unless specifically listed otherwise within this section.

1.3 SUMMARY

A. The specific allowances for this project are as follows:

1. [Insert Allowance #1 Title; insert Allowance #1 Amount]

[Provide detailed scope for Allowance #1]

2 [Insert Allowance #2 Title; insert Allowance #2 Amount]

[Provide detailed scope for Allowance #2]

2.1 UNUSED MATERIALS

A. The Design Build Entity shall return unused materials purchased under an Allowance to manufacturer or supplier for credit to Judicial Council, after installation has been completed and accepted.

B. Upon the request of the Judicial Council, the Design Build Entity shall prepare, and deliver unused material for storage by Judicial Council when it is not economically practical to return the material for credit. If so directed, the Design Build Entity shall deliver unused material to Judicial Council's designated storage space. Otherwise, disposal of unused material is Design Build Entity's responsibility.

END OF SECTION 012100

SECTION 013100 - COORDINATION AND PROJECT MEETINGS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 50 00 Temporary Facilities and Controls

2. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 SECTION INCLUDES

1. General Responsibilities
2. Project Kickoff Meeting
3. Design Meetings
4. Preconstruction Conference
5. Progress Meetings
6. Pre-Installation Conferences
7. Post Construction Dedication

B. GENERAL RESPONSIBILITIES OF THE DESIGN BUILD ENTITY

1. Design Build Entity shall utilize a web-based project management information system to service the project. Design Build Entity shall ensure that the Judicial Council's project management and inspection team have access to the web-based project management information system.

2. Design Build Entity shall become familiar with the Judicial Program Information and Controls system ("JPIC") which is the project management process utilized by the Judicial Council to review its projects for all phases of a project (pre-design through construction and Completion) for compliance with budgets and schedules. Design Build Entity shall ensure that its documents are provided in format and organization compatible with the JPIC system. The Construction Manager and Project Manager will assist the Design Build Entity and coordinate with this effort.

3. Design Build Entity shall establish a Big Room for the duration of the Pre-GMP and Post-GMP phases. Refer to 01 50 00 Temporary Facilities and Controls for requirements. All design review meetings shall be scheduled at this location unless an alternate location is approved by the Judicial Council. Design Build Entity will coordinate location of Big Room with Judicial Council. Design Build Entity shall facilitate communications and management of the design process.

4. Design Build Entity shall make arrangements for all project meetings, prepare agendas, preside at meetings, and shall record minutes and distribute copies within two (2) business days of meetings.

C. PROJECT KICKOFF MEETING

1. Design Build Entity will schedule a project kickoff meeting immediately after execution of the Agreement.

D. DESIGN MEETINGS

1. Design Build Entity shall establish smaller cross-discipline design groups within the Big Room in accordance with Target Value Design principles. These smaller groups should be made up of cross-functional project team members, including the Judicial Council’s Representative(s), Design Build Entity contractor’s team, Design Build Entity design team, and subcontractors. Design Build Entity will work with Judicial Council to ensure there is stakeholder representation within each group as needed.

2. Design group meetings will be held at a frequency necessary to keep the design development process on schedule and designing to target costs established within the Target GMP. Cross-group coordination and report out meetings should be held as necessary to keep information coordinated and communicated among groups.

E. PRECONSTRUCTION CONFERENCE

1. Design Build Entity will schedule a conference immediately after execution of the amendment finalizing the GMP.

2. Mandatory Attendance: Construction Manager, Judicial Council Project Manager, Project Inspector, Design Build Entity’s Architect, Design Build Entity's Project Manager, and Design Build Entity's Job/Project Superintendent.

3. Optional Attendance: Design Build Entity’s consultants and utility company representatives.

F. POST-GMP PROGRESS MEETINGS

1. Design Build Entity, Construction Manager, and Judicial Council Project Manager shall schedule and administer meetings throughout progress of the Work at a minimum of every week.

2. Attendance Required: Superintendent, Design Build Entity Project Manager, Construction Manager, Judicial Council Project Manager, Project Engineer(s), Project Inspector, Architect, and Subcontractors and Suppliers as appropriate to agenda topics for each meeting.

G. PRE-INSTALLATION CONFERENCES

1. When required pursuant to an individual specification section, Design Build Entity shall convene a pre-installation conference prior to commencing work of the section. Refer to the individual specification section for timing requirements of conference(s).
2. Design Build Entity shall require its Subcontractors and suppliers directly affecting, or affected by, work of the specific section to attend.
3. Notify the Judicial Council Project Manager, Construction Manager, and Project Inspector four (4) days in advance of meeting date.
4. The pre-installation conference may coincide with a regularly scheduled progress meeting.
5. The purpose of the meeting will be to review Contract Documents, conditions of installation, preparation and installation procedures, and coordination with related work and manufacturer's recommendations.
6. Pre-installation Schedule: As a minimum, Work being installed under the Contract Documents technical sections will require pre-installation conferences. Design Build Entity shall develop the technical specifications and add all additional requirements for pre-installation meetings contained in those sections.

H. GROUNDBREAKING AND DEDICATION CERIMONIES

1. Design Build Entity shall work coordinate with the Judicial Council to facilitate any groundbreaking and/or topping-out ceremonies that may be requested by the Judicial Council. The requirements of these may include provisions for access to a gathering location, and/or provisions for shade, water, and sanitary facilities for attendees.
2. Design Build Entity shall work with the Judicial Council to mutually establish the date, agenda, and any refreshments to be provided for the Dedication ceremony.

END OF SECTION 013100

[Text in red to be edited by Design Build Entity.]

SECTION 013120 – DOCUMENTATION REQUIREMENTS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1. RELATED DOCUMENTS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 78 23 Operation and Maintenance Data
3. 01 78 36 Warrantees
4. 01 78 39 Record Documents
5. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2. DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3. RESPONSIBILITIES

Design Build Entity shall use the following file naming conventions and formats for documents. If Design Build Entity would like to use a different naming convention, Design Build Entity shall provide its proposed naming convention to the Judicial Council for review and acceptance prior to use.

Document Type	**Format**	**File Name Convention**	**Document Title**
Service Manuals	PDF	CSI######_Name_SM pdf	“#####” Manual
RFIs	PDF	RFI_####_rev##_yyyymmdd Name.pdf	“RFI #”
Approved Submittals	PDF	CSI######_ yyyymmdd Name_pkg# Final.pdf	Technical Specifications “## ## ##.##”
Warranty Documents	PDF	CSI######_Name_warranty.pdf	“######” Warranty
Licensing Documents	PDF	CSI######_Name_license.pdf	Technical Specifications “## ## ##.##” - License Expiration Date “MMDDYYYY”

Certificates (Fire, Elevator, Generator AQMB, etc	PDF	CSI######_Name_permit.pdf	None
Key Schedule	Excel	CSI######_Name.pdf	None
Record Photographs	JPG	yyyymmdd_(level)_(location).jpg	None

1.4. CLOSEOUT SUBMITTAL PROCESS

All documents from the construction phase, including documents submitted for both informational and action purposes such as submittals and/or RFIs, are to be turned over to the Judicial Council of California per the process and procedures established by the Judicial Council of California in Section 01 33 00 and consistent with the Contract Documents. Design Build Entity shall certify that the documents from the construction phase provided to the Judicial Council meet the required standards set forth herein.

1.5. FORMAT

A. All documents must be submitted in an electronic format unless specified otherwise.

END OF SECTION 013120

SECTION 01 32 16 - CONSTRUCTION SCHEDULE – NETWORK ANALYSIS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISION

A. *[Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]*

- *1.* 01 33 00 Submittals
- *2.* 01 77 00 Contract Closeout
- 3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 PERFORMANCE REQUIREMENTS

Design Build Entity shall meet the following performance requirements:

A. Ensure adequate scheduling during design and construction activities so Work may be prosecuted in an orderly and expeditious manner within stipulated Contract Time.

B. Ensure coordination of Design Build Entity and Subcontractors at all levels.

C. Ensure coordination of submittals, fabrication, delivery, erection, installation, and testing of Products, materials and equipment.

D. Ensure on-time delivery of Judicial Council furnished Products, materials and equipment.

E. Ensure coordination of jurisdictional reviews.

F. Prepare applications for payment.

G. Monitor progress of Work.

H. Prepare proper requests for changes to Contract Time.

I. Prepare proper requests for changes to Contract Schedule.

J. Identify and detect schedule delays; identify any corrective actions.

1.4 QUALIFICATIONS

A. Scheduler:

1. Design Build Entity shall retain a construction scheduler to work in enough capacity to perform all of the Design Build Entity’s requirements to prepare

the Contract Schedule including detailed construction activities. The Scheduler shall meet all the requirements set forth in the General Conditions. The Scheduler shall not be the Project Manager, Project Engineer, Foreman, or the Superintendent. Scheduler shall plan, coordinate, execute, and monitor a Critical Path Method (CPM) schedule as required for Project.

2. Scheduler will cooperate with Judicial Council and shall be available on site as needed for monitoring, maintaining and updating schedules in a timely manner.

3. Judicial Council has the right to reject the Scheduler based upon a lack of experience as required by this Document or based on lack of performance and timeliness of schedule submittals/fragnets on current project. Design Build Entity shall within seven (7) calendar days of Judicial Council's rejection, propose another scheduler who meets the experience requirements stated above.

1.5 SUBMITTALS

A. Upon Award of Contract, immediately commence development of the Initial Contract Schedule. Initial Contract Schedule shall be submitted within fourteen (14) calendar days of the Effective Date and authorization for Pre-GMP Services. The Initial Contract Schedule shall provide a fully detailed set of activities for Pre-GMP services. The Initial Contract Schedule shall contain a limited number of activities for the remainder of the project, including all contractual milestones.

B. No more than fourteen (14) calendar days after Notice to Proceed (NTP) for Post-GMP Services, Design Build Entity shall submit the updated Contract Schedule for all Work of the Project, including Post-GMP Services and construction. The Contract Schedule should be based on the submitted Preliminary Schedule, the Initial Contract Schedule, and incorporate all review comments provided by the Judicial Council during Pre-GMP services. Show sequence and interdependence of all activities required for complete performance of all Work, beginning with NTP for Pre-GMP Services and concluding with date of final completion of Post-GMP Services.

C. The Contract Schedule shall be based on and incorporate all milestone and completion dates specified in Contract Documents. Only the Final Contract Completion date shall have a hard constraint.

D. Submit Short Interval Schedule weekly, directly derived from project CPM construction schedule, one day prior to each project progress meeting.

E. Notify Judicial Council of a potential Time Impact within seven (7) calendar days of the date that the Design Build Entity becomes aware of any delay impacting the critical path in completing the Work.

F. The Design Build Entity shall prepare a requested time adjustment schedule in accordance with 1.10 of this section and submit along with any Proposed Change Order (PCO) and a Time Impact Analysis (TIA) which includes both a written narrative and a schedule diagram depicting how the changed work may affect the progress of work and other schedule activities. The schedule diagram shall show how the Design Build Entity proposes to incorporate the changed work in the schedule, and how it impacts the current updated schedule and critical path. Failure to include a TIA with the PCO shall constitute a waiver of the right to later claim any adjustment in time based upon changed or unforeseen Work.

G. Submit recovery schedules in accordance with 1.11 as required for timely completion of Work or when requested by the Judicial Council.

H. Submit job cost reports with each monthly schedule update, or when requested by the Judicial Council.

I. Submit one (1) native electronic copy, (1) electronic PDF file in submitted format, and two (2) hard copies of each schedule and cost report.

1.6 REVIEW AND EVALUATION

A. Design Build Entity shall participate in joint review of Contract Schedule and any reports with Judicial Council or representatives as requested.

B. Within seven (7) calendar days of receipt of Judicial Council comments, Design Build Entity shall provide satisfactory revision to Contract Schedule or adequate justification for activities in question.

C. In the event that an omission or error is not detected by Judicial Council review, such omission or error shall be corrected by next scheduled update and shall not affect Contract Time.

D. Acceptance by Judicial Council of corrected Contract Schedule shall be a condition precedent to making any progress payments.

E. The basis for determining progress payments will be the progress assigned to the Schedule of Value items for the associated work and shall be verified by progress of the associated CPM schedule activities. Actual Start and Finish dates from the construction schedule will be referenced to the job cost report

F. Review and acceptance by Judicial Council of the Initial Contract Schedule or updated Contract Schedule does not constitute responsibility whatsoever for accuracy or feasibility of schedules nor does such acceptance expressly or impliedly warrant, acknowledge or admit reasonableness of activities, logic, duration, manpower, or equipment loading stated or implied on schedules.

1.7 FORMAT

A. Prepare Critical Path Method (CPM) Schedule, diagrams and supporting mathematical analyses using Precedence Diagramming Method (PDM), under concepts and methods outlined in AGC Construction Planning and Scheduling Manual, or other method pre-approved by Judicial Council.

B. Submit electronic files and hard copies to Judicial Council on a monthly basis on the preset dates agreed to by the Design Build Entity and Judicial Council.

C. Unless otherwise specified, the terms “day” or “days” shall have the meaning set forth in the General Conditions.

1.8 COST AND SCHEDULE REPORTS

A. Activity Tabular Report: Tabulate each activity of network diagram and identify for each activity:

1. Activity ID Number.
2. Description.
3. Predecessor and Successor Activity ID numbers.
4. Original Duration.
5. Remaining Duration.
6. Earliest start date.
7. Earliest finish date.
8. Actual start date.
9. Actual finish date.
10. Latest start date.
11. Latest finish date.
12. Total and free float.
13. Identification of critical path activity.
14. Schedule of Values code.
15. Work Package ID number.
16. Responsibility.
17. Percentage complete based on Planned Duration.
18. Finish Variance in positive or negative duration.

B. Job Cost Report

1. Prepare a Cost Report listing each activity and its associated cost, percentage of Work accomplished, total earned value to date, and previous payments and amount earned prior to the update period, and current amount earned this update period.
2. Produce a projected cash flow report of actual costs and projected costs using the Schedule of Values:
   a. The latest versions of Oracle’s Primavera P6, Microsoft Project or Excel are recommended software programs to be utilized.
   b. Each line item in the Schedule of Values will be represented in the Cash flow as a single line and provide the ability to summarize by either CSI Division or bid package (subcontractor).

c. Each line item shall have a start and finish date that correspond to the latest schedule update and work shall be continuous throughout its duration.

d. The original baseline, planned expected, and actual costs for each SOV item should be summarized on a monthly unit basis for the duration of the project.

e. The cashflow report should show monthly totals, and accumulated costs for the duration of the project.

C. Produce an updated cash flow with each monthly update:

1. The cash flow projection shall be updated on a monthly basis
2. Actual Earned Value for each line item will be input on a monthly basis
3. Projected billings of future months, or estimate to complete each item will be adjusted accordingly
4. Projected and Actual Start and Finish dates on each cash flow item will be adjusted accordingly
5. Corresponding monthly progress schedule should include a summary of activities that made progress that month and should be broken down by SOV code so that the staff can easily identify the corresponding SOV items that should have actual cost associated with them in that month.
6. Update the Schedule of Values to include all executed change orders with projected or actual start and finish dates.

D. Required Sorts: If requested by the Judicial Council, provide a listing of the activities in the following sorts or groups:

1. By the Design Build Entity’s Work Breakdown Structure (WBS).
2. By CSI Divisions.
3. By Work Packages (subcontract).
4. By Schedule Of Values code.

1.9 CONSTRUCTION SCHEDULING

A. By execution of the Contract, the Design Build Entity represents they have analyzed the Work, the materials and methods involved, the systems of the building, availability of qualified labor, restrictions of the Project Site, constraints imposed, their own workload and capacity to perform the Work, and agrees that the specified times presented in the Preliminary Schedule are reasonable considering the existing conditions prevailing in the locality of the Work, including weather conditions, and other factors, with reasonable allowance for variations from average or ideal conditions.

B. Design Build Entity shall develop and submit an activity coded schedule of construction (or Contract Schedule) as required by this Document and the Contract Documents. It shall be submitted in computer generated network format and shall be organized by Activity Codes, representing the major CSI Divisions and Bid Package associated with each activity. The Contract

Schedule shall include activities such as design timelines, design review, permitting, utility coordination, mobilization, preparation of design submittals, specified review periods, procurement items, fabrication items, milestones, and a summary of construction activities.

C. Upon Judicial Council's acceptance of the Contract Schedule, Design Build Entity shall update the accepted Contract Schedule until Design Build Entity's schedule of construction activities is fully developed and accepted. Since updates to the Contract Schedule support the SOV, which is the basis for payment to Design Build Entity, submittal and acceptance of the Contract Schedule and updates shall be a condition precedent to making of monthly payments, as indicated in the General Conditions.

D. Failure to submit an adequate or accurate Contract Schedule, or updates thereto or failure to submit on established dates, will be considered a cause for withholding payment, or partial payments, until a revised or subsequently updated Contract Schedule is submitted, reviewed and accepted by Judicial Council.

E. Failure to include any activity shall not be an excuse for completing all Work by required Completion Date.

F. Reference the date identified in the Notice to Proceed for Pre-GMP Services as Day "1," the start of the Contract Time.

1. The Contract Schedule shall comply with and include the following:

2. Provide a written narrative describing Design Build Entity's approach to mobilization, procurement, and construction during the first thirty (30) calendar days including crew sizes, equipment and material delivery, Site access, submittals, and permits.

3. Shall comply with all requirements set forth in the General Conditions, Article 15, Schedules / Submittals Required of Design Build Entity.

4. Treat each story or separate area as a separate numbered activity for each principal element of the Work.

5. With the exception of contract completion milestones, the use of constraints that override the Master Project Schedule's calculated early or late dates will not be allowed.

6. The Contract Schedule shall include all non-workdays on which the Design Build Entity anticipates Work will not be performed, including any selected Holidays, Labor Union non-workdays, and adverse weather days that are anticipated to occur within the workday calendar. Testing periods and days for training Judicial Council staff shall not include Holidays, based on the Judicial Council's calendar. Submit with the schedule a list of anticipated non-workdays, such as weekends, holidays, labor union agreements, and potential adverse weather days that are anticipated to occur within the workday calendar for the duration of the Contract. Normal and anticipated non-workdays, included an average annual amount of "Inclement weather"

days shall not be considered a cause of a lost working day.

7. Activity**.** An activity shall meet the following criteria:
   a. Any portion or element of Work, action, or reaction that is precisely described, readily identifiable, and is a function of a logical sequential process.
   b. Descriptions shall be clear and concise. Beginning and end shall be readily verifiable. Starts and finishes shall be scheduled by logical restraints.
   c. Responsibility shall be identified with a single performing entity.
   d. Each activity must have a single corresponding Schedule of Values (SOV) code. The sum of all activities with the same SOV code shall correlate with the total value of the SOV item.
   e. Additional codes shall identify building, floor, bid item and CSI classification.
   f. Activities labeled start, continue or completion are not allowed.
8. Equipment and Materials**.** For equipment and materials on or near (within 10 workdays) of the critical path, or having a long lead time (requiring greater than *120* calendar days for fabrication and delivery) show a sequence of activities including: *[Revised]*
   a. Preparation of shop drawings and sample submissions.
   b. Review of shop drawings and samples.
   c. Finish and color selection.
   d. Fabrication and delivery.
   e. Erection or installation.
   f. Testing.
9. Include a minimum of thirty (30) calendar days prior to Completion Date for completion of punch list work and clean up. No other activities shall be scheduled during this period.

1.10 SHORT INTERVAL SCHEDULE

The Four-Week Rolling Schedule shall meet the following requirements:

A. The Four-Week Rolling Schedule shall be based on the most recent Judicial Council updated Contract Schedule. It shall include weekly updates to all construction, submittal, fabrication/procurement, and separate Work Contract activities. Design Build Entity shall ensure that it accurately reflects the current progress of the Work.

B. The Four-Week Rolling Schedule shall be fully developed horizontal bar-chart-type schedule based on corresponding Construction Schedule.

C. Prepare schedule on sheet of sufficient width to clearly show data.

D. Provide continuous heavy vertical line identifying first day of week.

E. Provide continuous subordinate vertical line identifying each day of week.

F. Identify activities by same activity number and description as Contract Schedule.

G. Show each activity in proper sequence.

H. Indicate graphically sequences necessary for related activities.

I. Indicate activities completed or in progress for previous one (1) week period.

J. Indicate activities scheduled for succeeding three (3) week period.

K. Further detail may be added if necessary, to monitor schedule.

L. Indicate critical and near critical path activities.

M. Indicate additional issues or potential impacts to the start or finish of contract activities.

1.11 REQUESTED TIME ADJUSTMENT SCHEDULE

Any request for an adjustment to the Contract Schedule shall meet the following requirements:

A. An updated Contract Schedule shall not show a Contract Completion Date later than the Contract Time, subject to any time extensions approved as part of a Change Order.

B. If Design Build Entity believes that the Work has been impacted at no fault by the Design Build Entity such that the project completion date will be delayed, the Design Build Entity must submit proof demonstrating the delay to the critical path. Any submitted proof must be in conformance with the requirements set forth in Article 19, CHANGES IN THE WORK.

C. Indicate requested adjustments in Contract Time which are due to changes or delays in completion of Work.

D. Extension request shall include forecast of Project Completion date and actual achievement of any dates listed in Contract Documents.

E. To the extent that any requests are pending at time of any Construction Schedule update, Time Adjustment Schedule shall also be updated.

F. Schedule shall be a time-scaled network analysis.

G. Accompany schedule with formal written time extension request and detailed impact analysis justifying extension.

H. An “As-Built/Impacted vs. As-Planned” time impact analysis shall demonstrate time impact based upon date of delay, and status of construction at that time and event time computation of all affected activities. Event times shall be those as shown in latest updated and approved Contract Schedule.

I. Activity delays shall not automatically constitute an extension of Contract Time.

J. Failure of Subcontractors shall not be justification for an extension of time.

K. Float is not for the exclusive use or benefit of any single party. Float time shall be apportioned according to needs of project, as determined by the Judicial Council.

L. Float suppression techniques such as preferential sequencing, special lead/lag logic restraints, extended activity durations, or imposed dates shall not be allowed.

M. When a delay to the project as a whole can be avoided by revising preferential sequencing, resource restraints, or logic, and the Design Build Entity chooses not to implement the revisions, the Design Build Entity shall not be entitled to a time extension and no compensation for extended overhead.

N. Extensions will be granted only to extent that time adjustments to activities exceed total positive float of the critical path and extends Completion date.

O. Judicial Council shall not have an obligation to consider any time extension request unless requirements of Contract Documents, and specifically, but not limited to these requirements are complied with.

P. Judicial Council shall not be responsible or liable for any construction acceleration due to failure of Judicial Council to grant time extensions under Contract Documents should requested adjustments in Contract Time not substantially comply with submission and justification requirement of Contract for time extension requests.

Q. In the event a Requested Time Adjustment Schedule and time impact analysis are not submitted within ten (10) days after commencement of a delay, it is mutually agreed that delay does not require a Contract Time extension.

1.12 RECOVERY SCHEDULE

A. Should a Contract Schedule update show the projected project completion date more than fourteen (14) Days later than current Contract completion date, prepare and submit a recovery schedule prior to the next monthly schedule update.

B. Design Build Entity shall prepare and submit to the Judicial Council a Recovery Schedule within seven (7) calendar days of being requested by the Judicial Council, at no cost to the Judicial Council, including but not limited to when:

1. Delay in completion of any critical activity or group of activities indicates an overrun of the Contract Time or milestone dates by ten (10) Working Days.
2. When delays in submittals, deliveries, or work stoppages are encountered making necessary the re-planning or rescheduling of activities.
3. When Contract modification necessitates schedule revision, submit schedule analysis of change order work with cost proposal.
4. Form and detail shall be sufficient to explain and display how activities will be rescheduled to regain compliance with Construction Schedule and to complete the Work by the Completion Date.
5. Create a separate submittal for Recovery Schedule. Do not submit recovery provisions with or as a schedule update.
6. Upon acceptance, the Recovery Schedule shall become the current Construction Schedule.

1.13 UPDATING SCHEDULES

In addition to the general schedule update requirements outlined in 15.2.8 of the General Requirements, schedule updates shall meet the following requirements:

A. Review and update schedule at least five (5) days prior to submitting an Application for Payment.

B. Maintain Contract Schedule weekly to record actual prosecution and progress.

C. Activities representing additional or changed work in accordance with approved Change Orders shall be identified as separate new activities. Use appropriate detail and logic to properly represent the complexity of the Change Order work.

D. Change Orders of less than $5,000.00 value or less than three (3) days duration, and do not impact the critical path of work, need not be shown with corresponding logic ties to contract work.

E. Written Narrative Report: Design Build Entity shall include a written report to explain the monthly schedule update, and any recovery schedule. The narrative shall, at a minimum include the following headings with appropriate discussions of each topic:

1. Activities or portions of activities completed during previous reporting period.
2. Actual start dates for activities currently in progress.
3. Deviations from critical path in days ahead or behind.

4. Progress analysis describing problem areas, referenced to associated Field Instructions, RFIs, Proposed Change Orders, Change Orders, etc.

5. Current and anticipated delay factors and their impact.

6. Proposed corrective actions and logic revisions for recovery schedule.

7. Modifications, additions, deletions, and changes in logic of the Contract Schedule.

8. In updating the Contract Schedule, Design Build Entity shall not modify activity ID numbers, schedule calculation rules/criteria, or the activity coding structure required.

9. The Contract Schedule update shall correspond to the Schedule of Values which will form basis upon which progress payments will be made.

10. Judicial Council will not review or process an Application for Payment until schedule and Progress Report have been submitted.

1.14 DISTRIBUTION

A. Following joint review and acceptance of updated schedules, Design Build Entity shall distribute electronic and hard copies to Judicial Council, representatives, and all other concerned parties.

B. Design Build Entity shall instruct recipients of the Contract Schedule or any schedule update to promptly report in writing any problem anticipated by projections shown in schedule. Notwithstanding the foregoing, Design Build Entity shall not be relieved of responsibility for an error in the schedule in the event that a recipient fails to notify Design Build Entity of such error.

1.15 SCHEDULING SOFTWARE

A. Design Build Entity shall utilize Primavera P6 Project Management® software (latest version) by Oracle, or Judicial Council-approved equivalent scheduling software to employ the Critical Path Method (CPM) in the development and maintenance of the Construction Schedule. Regardless of the software ultimately used, it must be capable of generating time-scaled logic diagrams, bar charts, layouts and reports with any and/or all activity detail.

1.16 ELECTRONIC DATA

A. Design Build Entity shall provide scheduling files in both the electronic native format and in PDF by electronic media. The electronic Primavera P6 Project Management® files shall be saved in “.XER” type format.

END OF SECTION

SECTION 013300 – SUBMITTALS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

- *1.* 01 31 20 Documentation Requirements
- *2.* 01 32 16 Construction Schedule
- *3.* 01 43 39 Visual Mock-ups and Benchmarks
- *4.* 01 78 23 Operations and Maintenance Data
- *5.* 01 78 39 Record Documents
- 6. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

B. Architect of Record: Shall mean that term as defined in the General Conditions.

C. Submittal Registry: Comprehensive list of all required submittals for the Project developed by the Design Build Entity and submitted to Judicial Council.

1. Design Build Entity is required to provide Judicial Council and its representatives the submittal registry within thirty (30) days of issuance of Notice to Proceed (NTP) for Post-GMP Services.
2. Once in receipt of the submittal registry, the Judicial Council shall identify those submittals to be provided to the Judicial Council and its representatives and identify each item as submitted for action or for informational purposes.
3. A revised registry may be required prior to start of construction as requested by the Judicial Council. Specific submittals may be required to be provided to the Judicial Council prior to completion of the submittal registry to obtain Phase One construction approval by the Office of State Fire Marshal.

D. Action Submittals:

1. Written and graphic information that requires Judicial Council’s review, response, and ultimately approval.

E. Informational Submittals:

1. Written and graphic information provided for informational purposes only and that does not require Judicial Council’s approval. However, these submittals may be rejected for not complying with Performance Criteria or

other applicable Project requirements.

1.3 SUBMITTAL PROCEDURES

A. Design Build Entity shall utilize a submittal process compatible with the project information controls and document management software program selected for the project and approved by the Judicial Council.

B. All submittals transmitted to the Judicial Council and its representatives shall be in electronic format.

C. [Design Build Entity shall complete and fully expand upon the specific submittal requirements for all subcontractors and consultants engaged in the project.]

1.4 MOCK-UP

A. Within thirty (30) days after NTP for Post-GMP Services, Design Build Entity shall provide Judicial Council with a comprehensive list of all Mockups to be completed for the Project. Judicial Council will review and approve this list and identify the field review and stakeholder and/or representative approval needed for each item.

B. Reference Section 014339 in addition to these requirements.

C. [Design Build Entity shall complete and fully expand upon the specific submittal requirements for mock-up, including those occurring prior to installation of any in-situ assemblies for all subcontractors and consultants engaged in the project.]

END OF SECTION 013300

[Text in red to be edited by Design Build Entity.]

SECTION 01 35 54

BUILDING INFORMATION MODELING (BIM) FOR DESIGN BUILD

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

PART 1 GENERAL

1.1 RELATED DOCUMENTS AND PROVISIONS

A. *[Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]*

1. 01 33 00, Submittal Procedures
2. 01 77 00 Contract Closeout
3. 01 78 23 Operation and Maintenance Data
4. 01 78 39 Record Documents
5. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 SUMMARY

A. The requirements of this Section provide the framework for the Judicial Council, the Project Design-Build Entity (Design Build Entity), and Construction Manager to utilize Building Information Modeling (BIM) technology and its best practices on all phases of the Project. The intent is to have a shared master 3D model that contains all of the building and/or site information together (including all design attribute information), enabling the Judicial Council to utilize BIM as a facility management tool at the conclusion of construction.

B. The Design Build Entity shall develop and submit for approval a Federated Model (Fed Model) of the Project utilizing a BBIM system as defined by this Section.

1. The Design Build Entity shall develop their design and construct the project in compliance with the Project Agreement including by reference the requirements of the Judicial Council's Criteria Architect.
2. The Design Build Entity shall:
    a. Submit as a minimum a Level of Development (LOD) 300 FedModel to the Judicial Council's representative for review and approval prior to start of construction.
    b. Use the Fed Model to facilitate the construction methods and means.

[Text in red to be edited by Design Build Entity.]

c. Update the Fed Model progressively throughout the construction period to incorporate all construction actions so that the Fed Model shall be developed to LOD 500 As-built Fed Model including:
    1) Shop Drawings:
    2) Approved Change Orders
    3) Fabrication, assembly and detailing
    4) Field Modifications
d. Submit the Fed Model to the Judicial Council for review and approvals upon fixed, mutually agreed milestones.
e. Create and submit a BIM Execution Plan (BEP) as described.
f. Provide and support a BIM Share Site.

3. The Judicial Council and Construction Manager shall be entitled to use or add to the design model during the design and construction process as well as after project completion. This includes any model produced by the efforts of either the design team or the Design Build Entity.
4. The BIM model will be a deliverable to the Judicial Council, for their exclusive use, after construction completion.
5. Design Build Entity to deliver an As-Built model including the appropriate data suitable for use and implementation into a BIM Facilities Management system to be determined.

DEFINITIONS AND ACRONYMS

A. Capitalized terms shall mean that term as defined in the General Conditions unless as stated and defined below as used throughout the BIM Requirements.

1. As-Built Fed Model: A Fed Model incorporating all construction phase modifications to a LOD 300 or better.

2. Building Information Model: Shall mean that term as it is defined in the General Conditions.

3. BIM Manager: The individual responsible for managing the Design-Build Entity's (Design Build Entity) modeling and coordination process, including managing the Design-Build Entity's BIM Staff and all other aspects of the Design Build Entity's BIM requirements.

4. BIM Share Site: The server or web-based system where all models and pertinent data shall be hosted for sharing and storing during the Work of the Project.

5. Criteria Architect: Shall mean that term as it is defined in the General Conditions.

6. Federated Model: The Federated Model or Fed Model combines the various discipline Native Models, and their modeled elements or assemblies, to become a virtual representation of the entire Project. The Federated Model can be assembled to a specified LOD at any stage in the Project's design and construction phases. The process of linking the various discipline model files from their native platforms maintains their native properties.

[Text in red to be edited by Design Build Entity.]

7. Level of Development (LOD): The term used to describe the fullness and definitiveness of the Model. The LOD definition is based on the AIA G 202 – 2013 document and expanded in document.
8. Linking Files: A process of externally referencing a Native Model into the Federated Model.
9. Model: The term used to describe the 3D virtual representation of a Project and its Objects.
10. Model Element: A Model Element is a portion of the BIM representing a component, system or assembly within a building or building site.
11. Model Element Author: The Model Element Author (MEA) is the primary party who shall develop the content of a specific Model Element to the LOD listed for a particular phase of the project.
12. Native Model: A Model created in a specific 3D parametric modeling software platform. For example, a model made in Revit.
13. Nomenclature: This is a term that applies to a system of principles, procedures and terms related assignment of a location, object or property.
14. Object: The term used to describe the 3D virtual representation of each of the separate sub-parts of Model such as doors, walls, equipment etc. If an Object is, in itself, comprised of several sub-elements, the sub-elements shall be grouped into one virtual representation of that Object.
15. Room: The term used to describe any space within the enclosing walls of the building. The space may be rectangular or more complex.

1.4 USE OF THE FEDERATED MODEL

A. The Fed Model shall be developed for finalizing the design, engineering analysis, trade coordination, and as-built construction. The Fed Model shall be a reference source for communication and collaboration throughout each phase of the Project.

B. The Fed Model may vary in level of detail for individual elements, but at a minimum shall include sufficient data to support use and analysis of:

1. Functional and visual representation of all spaces.
2. Constructability review of Design Build Entity's documents.
3. Clash detection and correction of all major systems.
4. Construction scheduling.
5. Energy and Sustainability analysis
6. Cost estimating.
7. As-built documentation and modeling.
8. Identification labeling of all components and equipment in compliance.

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C. The Construction Documents (drawings and specifications) shall be derived information from the Fed Model described herein. If any or all of the Judicial Council's Criteria Architect's own models are available for use by the Design Build Entity in developing the Fed Model, such usage shall be for reference only.

1. The Contract Documents are not intended to be modified by the Fed Model. If the Design Build Entity through development and/or use of the Fed Model identifies any potential changes that the Design Build Entity thinks should be reflected in changes to the Contract Documents, the Design Build Entity shall notify the Judicial Council of a potential Change Order(s) and have the issue(s) resolved prior to making any such changes.
2. The Design Build Entity shall work with the Criteria Architect regarding questions, clarifications and interpretations of their documents in accordance with the Project RFI process.
3. Any changes to the Fed Model, once Construction Documents have been approved shall be archived in the Judicial Council's Project-defined file storage system.
4. All changes to the Fed Model, subsequent to completion of the work, including additional modeling by others, shall be solely the responsibility of the entity providing the changes or additions.

E. At the completion of the Work, the Fed Model shall be turned over to the Judicial Council. The Judicial Council shall have exclusive rights to the model for their use as:

1. Editable models for future expansion or remodel projects.
2. As a 3D user interface and source of data in operating and maintaining the facility.

1.5 UNIFORMAT II

A. Uniformat II is a format for classifying building elements and related sitework. Uniformat II is a reference system that shall serve as the foundation upon which information is transferred between the construction and facility operations phases.

B. The Design Build Entity shall include the appropriate Uniformat II in the list of attributes.

1.6 LEVEL OF DEVELOPMENT (LOD)

A. The American Institute of Architects (AIA) document *G202- 2013*, has developed a Level of Development (LOD) system which serves as the basis for the Project with Project-specific modifications as shown in the following definitions:

1. <u>LOD 100</u>: This is the “programming” level. Buildings and/or structures shall be modeled as masses indicative of area, height, volume, spatial location, and orientation.
2. <u>LOD 200</u>: This is the “planning” level. Buildings and/or structures including major architectural, structural, mechanical, electrical, and plumbing objects shall be modeled as generalized systems or assemblies with approximate quantities,

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approximate configuration, spatial location, and orientation. Each enclosed space shall be identified as a unique Room with associated parameters.

3. LOD 300: This is the “design” level. Buildings and/or structures including all objects shall be modeled as specific systems or assemblies with accurate quantities, recognizable configuration, spatial location, and orientation. Each enclosed space shall be identified as a unique Room with associated parameters.
4. LOD 400: This is the “construction” level. Buildings and/or structures including all objects shall be modeled as specific systems or assemblies with accurate quantities, recognizable configuration, spatial location, and orientation, with complete fabrication, assembly, and detailing information. Each enclosed space shall be identified as a unique Room with associated parameters.
5. LOD 500: This is the “as-built” level. Buildings and/or structures including all objects shall be modeled as constructed systems or assemblies with accurate quantities, shape, spatial location, and orientation. All model elements previously modeled to a LOD 300 or LOD 400 must include any quantity or configuration changes made during construction to achieve a LOD 500. Each enclosed space shall be identified as a unique Room with associated parameters.

1.7 BIM MANAGER and STAFF

A. The Design Build Entity shall provide qualified BIM Manager and staff to manage the BIM process and develop the required BIM Execution Plans (BEP). The Design Build Entity BIM Manager shall be responsible for overseeing development of all submittals generated from BIM data, and managing the coordination process including:

1. Managing the information of the Design Build Entity and subcontractor’s responsible for creating models, analyzing “clashes” and resolving coordination issues.
2. “Gap” modeling of all design elements and building systems, that may occur between systems discipline models, as necessary for design clarity and coordination of the work.

1.8 BIM WORK ROOM / CONFERENCE ROOM

A. The Design Build Entity shall provide a BIM Work Room / Conference Room on-site, sized to provide work space for BIM modelers and function as a collaborative conference room for design reviews, presentations and BIM coordination work sessions. The BIM Work Room shall accommodate trade subcontractors, the Design Build Entity’s design team, the Design Build Entity’s BIM staff, plus representatives from the Judicial Council.

B. The Design Build Entity shall:

1. Provide hardware to support BIM modeling, presentations and coordination work sessions.

2. Provide projectors and large interactive viewing screens or large flat panel monitor for reviewing and/or modifying BIM models.
3. Provide web and voice conferencing capabilities for the duration of the Project and allow for greater than fifteen (15) concurrent participants.

1.9 BIM SHARE SITE

A. The Design Build Entity shall provide and maintain a BIM Share Site to host all BIM models and files. Models on this shared site shall be fully accessible on-line to all members of the Project team, including the Judicial Council and the Criteria Architect. The Design Build Entity BIM Manager shall:

1. Assign site users and passwords.
2. Submit updates to the site per the BEP.
3. Coordinate and approve the BIM information that is updated into the shared site.
4. Monitor usage and ensure capacity and function of this system.
5. Administer read/write rights and hierarchy to support revision control.
6. Comply with all requests from the Judicial Council and/or the Judicial Council's representative.

1.10 BIM DATA SECURITY

A. The Design Build Entity shall establish a data security protocol to prevent any possible data corruption, virus "infections", data loss, misuse, or deliberate damage by users of the BIM Share Site. The protocol shall include:

1. 24 hours, 7 days a week operation and support.
2. Full capacity backup on a nightly basis at a remote server.
3. Adequate user access rights to prevent data loss or damage.
4. A narrative description of the data security protocol for Judicial Council acceptance as part of the final draft of the BEP.

1.11 SUBMITTALS

A. BIM submittals shall be made consistent with Section 013300 "Submittal Procedures,"

B. Design Build Entity shall provide a BIM Execution Plan within (14) days of the notice to proceed in accordance with the requirements of this section

C. BIM Submittals shall be identified and described in the BIM Execution Plan.

D. Design Build Entity must provide As-Built documentation in accordance with the requirements in this section.

PART 2 PRODUCTS

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2.1 MINIMUM, ACCEPTABLE MODEL SOFTWARE REQUIREMENTS

A. The Native Model(s) shall be developed to include parametric components of major building and site elements as defined in this Section. All discipline Native Models shall be linked to the Architectural Native Model.

B. The Fed Model and each of its Native Models shall be developed to dimensional accuracy of at least ¼".

1. Object configuration shall be modeled to visually represent the intended size and shape. For LOD 300 and above, this is further defined as:

    a. Manufactured Objects shall be modeled to show actual exterior configuration in all model views. Internal components are not required, but if necessary to indicate spatial, visual, or functional relationship to other Objects, or the manufacturer has modeled the internal components of their Objects, then those Objects should have internal components modeled to the extent necessary. Example: a toilet of one manufacturer shall show its exterior configuration such that it is discernable from another type or manufacturer's unit.

    b. Field-built assemblies shall be modeled to show actual composition of the assembly, including all primary components in all model views. Example: a non-bearing wall assembly (partition) shall be modeled to show structural cavity and all layers of applied materials including wainscoting. Light-gauge metal framing is not required to be modeled, however if it is modeled for construction coordination, then the metal framing Native Model shall be included. Blanket Insulation in the structural cavity is not required to be modeled but the symbol should be drafted in all details.

C. BIM application(s) and software(s) for reviewing the Fed Model shall:

1. Use the current version of Autodesk® Navisworks software.
2. Utilize Navisworks software (Manage, Simulate or Freedom) for scheduling analysis.
3. Use Autodesk BIM 360 Design, Coordinate, and Ops or similar products for BIM Model Management and FM (Facilities Management) purposes.

D. The preferred Native Model software is listed in the following matrix. The selection of software other than the preferred listed shall be reviewed and approved by the Judicial Council and its BIM consultants. Any software proposed by the Design Build Entity for use must support the BIM Requirements listed in this document and the resulting functions of the BEP.

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Suggested Native Model Software Matrix		
Discipline	**Native Model Software**	**Comments**
Architectural	Revit®	
Fixtures, and Equipment	Revit®	Applies to stationary items only
Structural	Revit®	
HVAC	Revit® AutoCAD MEP ® CAD-Duct ®	
Plumbing	Revit® AutoCAD MEP CAD-Pipe	
Fire Protection	AutoSPRINK®	
Electrical	Revit® AutoCAD MEP	
Security Electronics	Revit® AutoCAD MEP	
Civil	AutoCAD Civil 3D ®	
Landscape	Revit® AutoCAD	

2.2 OBJECT IDENTIFICATION – NOMENCLATURE

A. Every Object in the Model shall have a Unique Identification (UID) and a Common Name attached to it in the Native Model.

1. The UID may be in the form of alpha, numeric, or alpha-numeric.

a. If the UID form is alpha-numeric, it shall be a consistent string format for all Objects, within its discipline, and shall be readable by any commonly available database. The UID is an “Instance” parameter. It is acceptable to utilize the Revit GUID for all objects automatically created for all objects in Revit.

b. If the Native Model software is not a full object-based, parametric, database platform, such as some of the 3D CAD programs, the UID shall be attached to the Object manually, if necessary, so that it can be read by the user without additional software applications.

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        c. The UID can be automatically generated or manually assigned and shall adhere to pre-established nomenclature.

    2. A “Common Name” naming convention shall be a parameter in the Native Models. Examples of a Common Name include: door, window, toilet, VAV Box, etc. Typically, the Common Name requirement is satisfied within Revit by the naming conventions for ‘Family’ or ‘Type’ names, but if it is not clear, it shall be input manually in the Native Model. The Common Name is an Object “Type” parameter.

2.3 OBJECT PARAMETRIC ATTRIBUTES – MINIMUM REQUIREMENTS

A. The following attributes shall be attached to each maintainable or serviceable Object: If a required attribute is not automatically generated by Native Model software, it shall be manually input in the Native Model, or provided in an Excel or Access document that includes the UID.

1. Unique Identification (auto generated in Revit - GUID)Common Name
    a. Type
    b. Description
2. Uniformat II Classification Code levels 1, 2, and 3
3. Manufacturer (where applicable)
4. Model Number (where applicable)

2.4 SYSTEM DISCIPLINE MODELS

A. Civil Systems: The Civil Systems Model shall be a sub-system model linked to the Architectural System Model and serve as the basis for project shared coordinates through which the position of building elements on the site shall be coordinated such as:

1. Topography:
    a. Existing natural and/or graded contours
    b. New grades and finish contours.
2. Planting:
    a. Existing major landscaped areas,
    b. Existing trees to remain
    c. New landscaped areas
    d. New trees
    e. Irrigation lines over 2” diameter.
3. Surface Improvements:
    a. Pavements
    b. Curbs and gutters

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        c. Retaining walls
        d. Exterior non-building structures such as pools, shade structures etc.

4. Existing Structures:
    a. All buildings within the project area intended to remain
    b. Buildings intended to be demolished.
    c. All existing structures may be modeled exterior surface only, interior elements are not required.
5. Storm Water and Sanitary Sewers:
    a. Existing lines (over 3” diameter), boxes and structures within project area,
    b. All new lines, boxes and structures
    c. Existing public lines, boxes and structures beyond the project area but serving as points of connection for the project.
6. Utilities:
    a. Existing domestic and fire water main and branch lines (2” and larger diameter) within project area
    b. All new domestic and fire water lines
    c. Existing electrical overhead and underground lines within project area, all new electrical lines outside buildings
    d. Existing telephone and data lines within project area
    e. All new telephone and data lines outside buildings
    f. Existing gas lines within project area
    g. All new gas lines outside buildings.
7. Roads and Parking:
    a. All necessary roadways and parking lots or parking structures, including necessary intelligence to produce accurate plans, profiles and cross-sections.
8. Other requirements:
    a. Quantities: data to reflect accurate quantities of the above elements.
    b. Schedules: data for installation of the above elements.

B. <u>Architectural Systems</u>: The Architectural Systems Model shall be the primary model to which others are linked and provide for the following:

    1. Spaces:

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   a. Net square footage of all occupied spaces
   b. Gross constructed floor area
   c. Room names and numbers
   d. Floor, base, wall, and ceiling finishes. NOTE: Model room names and numbers shall match the Judicial Council's Architectural Program space names and numbers.

2. Exterior Walls and Curtain Walls:
   a. Type and composition
   b. Height, length, and width
   c. Thermal, acoustic, fire, and security ratings.
3. Partitions:
   a. Type and composition
   b. Height, length, and width
   c. Thermal, acoustic, fire, and security ratings.
4. Floors:
   a. Type and material
   b. Thickness
   c. Finishes with manufacturer's name and product numbers. Link floor structure to the Structural Systems Model.
5. Ceilings:
   a. Type and composition
   b. Height, length, and width
   c. Thermal, acoustic, fire, and security ratings.
6. Access Panels
   a. Type and composition
   b. Height, length, and width
   c. Thermal, acoustic, fire, and security ratings.
   d. Location
7. Roof Coverings and Openings:
   a. Configuration
   b. Drainage system
   c. Penetrations for modeled building components.
8. Exterior Doors, Windows, and Louvers:
   a. Type and material
   b. Height, width, and thickness

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    c. Thermal, acoustic, fire, and security rating
    d. Location
    e. Hardware elements or group.

9. Interior Doors, Windows, and Louvers:
    a. Type and material
    b. Height, width, and thickness
    c. Thermal, acoustic, fire, and security rating
    d. Location
    e. Hardware elements or group.
10. Stairs and Ramps:
    a. Stairs and railings
    b. Ramps and railings
    c. Handrails and guardrails.
11. Elevators and Escalators:
    a. Elevator cabs and doors
    b. Elevator hoist-way doors and trim
    c. Elevator machinery and equipment
    d. Escalator belts and railings
    e. Escalator machinery and equipment.
12. Casework and Counters:
    a. Type and material
    b. Height, width, and depth
    c. Location
    d. Hardware.
13. Systems Furniture
    a. Type and material
    b. Height, width, and depth
    c. Location
    d. Hardware.
    e. Link Systems Furniture to Electrical Systems Model.
14. Detention Furnishings
    a. Type and material
    b. Height, width, and depth
    c. Location

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    d. Hardware.

15. Plumbing Fixtures:
    a. Type and material
    b. Location
    c. Trim
    d. Finishes.
    e. Link fixtures and trim to the Mechanical Systems Model.
16. HVAC Grills and Registers:
    a. Type and material
    b. Location
    c. Trim
    d. Finishes.
    e. Link fixtures and trim to the Mechanical Systems Model.
17. Electrical Fixtures and Equipment:
    a. Type and material
    b. Bulb type and wattage
    c. Location
    d. Trim
    e. Finishes.
    f. Link fixtures and trim to the Electrical Systems Model.
18. Security Electronics:
    a. Type and material
    b. Camera and Cabling Types
    c. Access control
    d. Location and view
    e. Trim
    f. Finishes.
    g. Link fixtures and trim to the Electrical Systems Model.
19. Miscellaneous Fittings:
    a. Toilet partitions
    b. Toilet room accessories
    c. Grab bars
    d. Personal storage lockers
    e. Display cases

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      f. Other surface applied quasi-permanent items such as mirrors etc.

   20. Other requirements:

      a. Quantities: data to reflect accurate quantities of the above elements.
      b. Schedules: data for installation of the above elements.

C. Structural Systems: The Structural Systems Model shall be a sub-system model and provide for the following:

1. Foundations and footings:
   a. Type and configuration
   b. Depth, length, and width.
2. Slab(s) on-grade:
   a. Type and configuration
   b. Under-slab base and waterproofing
   c. Recesses, curbs, pads, closure pours
   d. Major penetrations.
3. Basement Walls:
   a. Type and composition
   b. Height, length, and width
   c. Thermal, acoustic, fire, and security ratings.
4. Elevated Floors:
   a. Columns and beams
   b. Primary and secondary framing members
   c. Bracing
   d. Connections
   e. Framed, composite, and/or slab decks.
5. Roofs:
   a. Columns and beams
   b. Primary and secondary framing members
   c. Bracing
   d. Connections
   e. Framed, composite, and/or slab decks.
6. Joints:
   a. Expansion and/or contraction
   b. Seismic.

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7. Stairs and Ramps:
    a. Openings and framing
    b. Railing supports.
8. Shafts and Pits:
    a. Openings and framing
    b. Railing supports.
9. Other requirements:
    a. Quantities: include data to reflect accurate quantities of the above elements.
    b. Schedules: data for installation of the above elements.
    c. Fireproofing: Fireproofing is not to be included in the BIM but clash detection studies shall include definition of tolerances for conflict detection.
    d. Color Code: color code structural steel from other elements.

D. Mechanical: The Mechanical Systems Model shall be a sub-system model and provide for the following:

1. Heating, Ventilating, and Air Conditioning:
    a. All heating, ventilating, air-conditioning, exhaust fans, and specialty equipment,
    b. Air supply, return, ventilation and exhaust ducts, including space-consuming elbows and transitions
    c. Fire dampers with ratings
    d. Mechanical piping
    e. Registers, diffusers, grills and hydronic baseboards.
    f. Coordinate and link fixtures and trim to the Architectural Systems Model.
2. Plumbing:
    a. All domestic plumbing piping and fixtures
    b. Floor and area drains
    c. Valves (regardless of pipe size)
    d. Related equipment.
    e. Piping larger than 1 .5" diameter shall be modeled.
3. Roof Drainage:
    a. All piping and fixtures

    b. Related equipment.
    c. Piping larger than 1 .5" diameter shall be modeled.
  4. Other requirements:
    a. Quantities: data to reflect accurate quantities of the above elements.
    b. Schedules: schedule data for installation of the above elements.
    c. Equipment Clearances: Clearances for major equipment and all M/E/P Equipment and Architecturally Significant Specialty Equipment, as model objects for conflict detection and maintenance access requirements.
    d. Color Code: separate color code for each type element.

E. Electrical: The Electrical Systems Model shall be a sub-system model and provide for the following:
  1. Interior Electrical Power and Lighting:
    a. All interior electrical components
    b. Lighting, receptacles, special and general purpose power receptacles
    c. Lighting fixtures
    d. Panel-boards and control systems
    e. Conduit and cable trays.
    f. Individual conduit larger than 1 .5" diameter shall be modeled.
    g. Groups or clusters runs, and cable trays of conduit of all sizes shall be modeled.
  2. Exterior Building Lighting:
    a. All exterior electrical components
    b. Lighting, receptacles, special and general purpose power receptacles
    c. Lighting fixtures
    d. Panel-boards and control systems, and transformers
    e. Utility connection and equipment.
    f. Individual conduit larger than 1 .5" diameter shall be modeled.
    g. Grouped or clustered runs of conduit of all sizes shall be modeled.
  3. Telephone, Data, Television, and Other Low Voltage:
    a. All interior low voltage components

    - b. Outlets, receptacles, special and controls
    - c. Fixtures
    - d. Panel-boards, equipment racks, and control systems
    - e. Conduit and cable trays.
    - f. Individual conduit larger than 1 .5" diameter shall be modeled.
    - g. Groups or clusters runs of conduit of all sizes shall be modeled.
  - 4. Security Electronics
    - a. All security electronics components
    - b. Outlets, receptacles, special and controls
    - c. Cameras and views
    - d. Access Controls
    - e. Panel-boards, equipment racks, and control systems
    - f. Conduit and cable trays.
    - g. Individual conduit larger than 1.25" diameter shall be modeled.
    - h. Groups or clusters runs of conduit of all sizes shall be modeled.
  - 5. Other requirements:
    - a. Quantities: data to reflect accurate quantities of the above elements.
    - b. Schedules: schedule data for installation of the above elements.
    - c. Equipment Clearances: Clearances for major as model objects for conflict detection and maintenance access requirements.
    - d. Color Code: separate color code for each type element.

F. <u>Fire Suppression</u>: The Fire Suppression Systems Model shall be a sub-system model and provide for the following:

  - 1. Fire Suppression System:
    - a. Valves and risers
    - b. All main, branch, and drains lines
    - c. Sprinkler heads, and fittings
    - d. Pumps.
  - 2. Fire Alarms:
    - a. Alarm and notification devices

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        b. Detection systems.
    3. Smoke Evacuation System:
        a. Alarm and notification devices
        b. Detection systems.
    4. Other requirements:
        a. Quantities: data to reflect accurate quantities of the above elements.
        b. Schedules: schedule data for installation of the above elements.
        c. Equipment Clearances: Clearances for major equipment as model objects for conflict detection and maintenance access requirements.
        d. Color Code: separate color code for each type element.

G. Specialty Equipment: The Specialty Equipment Model shall be a sub-system model. Specialty Equipment include medical equipment and systems, security equipment and systems, detention equipment, conveyance equipment and systems, manufacturing equipment and systems, etc. and provide for the following:

    1. Specialty Equipment:
        a. Equipment
        b. Related mechanical, plumbing, and electrical requirements.
        c. Quantities: data to reflect accurate quantities of the above elements.
        d. Schedules: schedule data for installation of the above elements.
        e. Equipment Clearances: equipment clearances as model objects for conflict detection and maintenance access requirements.

PART 3 EXECUTION

3.1 BIM EXECUTION PLAN (BEP)

A. The Design Build Entity shall submit for approval a BIM Execution Plan (BEP) as part of the required BIM services.

B. Draft BEP: the draft BEP shall include:

1. Proposed BIM staff for the Design Build Entity’s design team and the designated subcontractors. Subsequent iterations shall include additional subcontractors as Project progresses.
2. Software selections as defined in this document.
3. Schedule of BIM activities.

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4. Schedule of submittal milestones during design and construction.
5. File Folder structure.
6. File Naming system.
7. Hardware and Software for access BIM Share Site.
8. Define the responsibilities of Design Build Entity's BIM staff.
9. Methodology for validating As-Built Models.
    a. The origin point for the Project. All models shall be in the correct location in 3D Space (x, y, and z coordinates). This includes correct floor elevation(s).
    b. Modeling minimum Level of Development (LOD) as required by this document.

    NOTE: The Draft BEP may be required to be submitted as part of the RFP requirements. If not, the Draft BEP shall be developed and submitted within 20 days of the Notice to Proceed.

C. Final BEP: based on acceptance of the Draft BEP, the Design Build Entity shall develop its Final BEP and submit it to the Judicial Council for review and written approval. Final approvals of BEP must be completed within 30 days of the Notice to proceed.

NOTE: If the Draft BEP is required to be submitted as part of the RFP requirements, the Final BEP shall be submitted within 20 days of the Notice to Proceed.

3.2 DEVELOPMENT AND SUBMITTAL OF THE MODELS DURING Design Build Entity's DESIGN PHASE

A. The Design Build Entity shall develop the Fed Model and its discipline systems Native Models in compliance with the Agreement Documents and the following:

1. The Design Build Entity shall meet on a regular basis with Judicial Council, its designated facility users, and the CM to finalize the design of the Project. The meetings shall be working sessions optimizing BIM's collaboration, visualization, and information technology through "live" model utilization.
2. The Design Build Entity shall provide copies of their Fed Model to Judicial Council for review and acceptance at specified schedule milestones as follows:
    a. 100% completion of Design Development phase.
    b. 100% completion of Working Drawings phase.
    c. 100% completion finalized Construction Documents including pickups and corrections of Fire Marshall review and back-check, and Judicial Council's constructability reviews.

3. Develop and submit all of the discipline systems Native Models concurrently with the Fed Model. Qualified deferred approvals may be submitted separately.
4. Submit updated discipline systems Native Models complying with final approved shop drawing submittals.

3.3 UPDATING THE MODELS DURING CONSTRUCTION PHASE

A. The Fed Model and all of its Native Models shall be routinely updated to keep current with construction activity, as follows:

1. Routine updates resultant from subcontractor and trade approved changes shall be incorporated into the Native Models and uploaded to the BIM Share Site within 24 hours of each update or revision.
2. Progress updates for Judicial Council reviews shall occur on a quarterly basis and uploaded to the BIM Share Site. The Fed Model and its Native Models shall include Judicial Council-required data sheets.

B. The Fed Model and coordinated subcontractor and trade Native Models shall be used as the basis of weekly Project meetings for scheduling and coordinating Work means and methods, and shall be used for manufacturing and prefabrication.

1. The Design Build Entity shall coordinate the Work with installer and representatives of manufacturers and fabricators who are involved in or affected by such Work prior to installation.
2. Review fully coordinated Native Models for progress of other Work and preparation for particular Work under consideration.

C. Continuously update the various models to record all as-built conditions. The fully updated Navisworks files(.nwd) and Native Models shall be uploaded to the BIM Share Site as part of Project close-out.

3.4 SUBMITTAL OF FINAL AS-BUILT MODELS

A. The final, approved updated and revised LOD 500 Fed Model and all its discipline systems Native Models shall be submitted to the Judicial Council as part of the Project close-out submittals. The models shall be:

1. The latest as-built versions. Including changes made by change orders or RFI’s which effect the model.
2. In the agreed to, and organized, file folder structure.
3. Linked to all the appropriate Native Models that make up the Fed Model.

3.5 SUBMITTAL OF FINAL AS-BUILT .DWG files

A. Design Build Entity shall provide a complete set of .dwg files for each sheet which makes up the overall As-Built/ Record set of drawings for all disciplines.

3.6 SUBMITTAL OF OPERATIONS AND MAINTENANCE (O&M) DOCUMENTS

A. Sections 01 33 00, Submittal Procedures and 01 78 23 Operation and Maintenance Data govern the work of this Paragraph, with additional requirements contained herein.

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B. Electronic O&M Documents: In addition to the submission of hard copy (paper) documents, the Design Build Entity shall provide all required O&M documents in individual Portable Document Format (PDF) files. The O&M documents shall include at a minimum:

1. Object Identification: The object tag(for example,AHU-1) or Common Name.
2. Manual: Product data, installation, maintenance, and operating instructions.
3. Shop Drawings: Item data, installation, and maintenance instructions.
4. Warranty: Manufacturer’s warranty, Subcontractor’s warranty.
5. Training: special instructions for maintenance work.

C. Organization of O&M Documents: The documents shall be organized to match the As-Built Fed Model Objects.

1. Common Name: Each O&M document shall be assigned a PDF file name that corresponds to the Object’s classification.
2. Individual Documents: O&M documents, relating to each classification of Object, shall be organized and submitted as individual documents, not as parts of a larger group document. For example: a “toilet” Object and its related elements and components shall have a stand-alone O&M PDF document, not as a part of the whole group of “plumbing”.
3. Bookmarking PDF’s: All PDF documents shall be bookmarked for quick reference to individual objects.
4. Quality PDFs: All PDF documents shall be high quality, clean, straight, high contrast documents. Documents shall be created directly from the origin software or document. Copies of copies are not acceptable.

3.7 FACILITIES MANAGEMENT SYSTEM

A. Design Build Entity shall deliver a model which can be integrated with a Facility Asset Management System: The digital interface shall have the ability to link all close out documents including: O&Ms, Submittals, Warranties, and Record Drawings to the as Built model.

1. Specific requirements to be developed within the BIM Execution Plan in collaboration with the Judicial Council and Construction Manager.
2. Existing Facility Management system used by the Judicial Council is CAFM, Design Build Entity shall verify with the Judicial Council for any changes or upgrades to their existing Facility Management System.

END OF DOCUMENT

SECTION 014000 - QUALITY REQUIREMENTS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 31 00 Coordination and Project Meetings
2. 01 43 39 Visual Mock-ups and Benchmarks
3. 01 91 13 General Commissioning Requirements
4. 01 91 19 Building Enclosure Commissioning Requirements
5. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Design Build Entity of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.

2. Specified tests, inspections, and related actions do not limit Design Build Entity’s other quality-control procedures that facilitate compliance with the Contract Document requirements.

3. Requirements for Design Build Entity to provide quality-control services required by Judicial Council, Judicial Council’s Consultants, Representatives, or Authorities Having Jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions unless noted otherwise within this section.

A. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction

B. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Design Build Entity or another entity engaged by Design Build Entity as an employee or Subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades-people of the corresponding generic name

D. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.

E. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

F. Product Testing: Tests and inspections that are performed by an NRTL (National Recognized Testing Laboratory), an NVLAP (National Voluntary Laboratory Accreditation Program), or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.

G. Quality-Assurance Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with the Contract Documents and the requirements set forth therein.

H. Quality-Control Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements. Quality-Control Services do not include contract enforcement activities performed by Judicial Council or its Consultants.

I. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Judicial Council for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Judicial Council for a decision before proceeding.

1.5 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Control" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards, codes or regulations.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

C. Reports: Prepare and submit certified written reports that include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.

7. Identification of product and Specification Section.

8. Complete test or inspection data.

9. Test and inspection results and an interpretation of test results.

10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

12. Name and signature of laboratory inspector.

13. Recommendations on retesting and reinspecting.

D. Test reports shall include a description of deficiencies noted, and corrective action undertaken to resolve such deficiencies. Deficiencies observed shall immediately be brought to the attention of the Design Build Entity's field superintendent, and trade foreman. In the event deficiencies are not corrected, or if an interpretation of the Contract Documents is required, the Testing Agency shall immediately notify the Judicial Council and applicable Consultant, Architect, or Engineer.

E. The Testing Agency shall maintain a deficiency list of all items not corrected and shall reinspect the area after the deficiency has been corrected.

1. The list shall include a description of the deficiency, the date and time the deficiency was observed, who was notified, the date of reinspection and description of corrective action taken.

2. Distribute the deficiency list at least once per month.

F. At the end of the project, the Testing Agency shall submit a final signed report stating whether the work tested and inspected conforms to the contract documents.

G. Permits, Licenses, and Certificates:

H. For Judicial Council's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work

1.6 MOCKUPS:

A. Reference section 01 43 39 Visual Mockups and Benchmarks for specific mockup requirements.

B. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Judicial Council or their Consultant.

2. Notify Judicial Council and their Consultants seven (7) days in advance of dates and times when mockups will be constructed.

3. Demonstrate the proposed range of aesthetic effects and workmanship.

4. Obtain Judicial Council's and its Consultants' approval of mockups before starting work, fabrication, or construction.

5. Allow seven (7) days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work. Demolish and remove mockups when directed, unless otherwise indicated.

C. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.7 RETESTING AND REINSPECTION

A. Regardless of whether original tests or inspections were Design Build Entity's responsibility, provide quality-control services, including retesting and reinspection, for construction that replaced Work that failed to comply with the Contract Documents.

1.8 TESTS AND SPECIAL INSPECTIONS

A. Judicial Council will engage a qualified testing agency to conduct tests and special inspections required by authorities having jurisdiction, including but not limited to, as follows:

1. *[Design Build Entity and AOR to develop and insert list of required inspections]*

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:

1. *[Design Build Entity and AOR to develop and insert list of required inspections]*

C. Testing and Inspection Log

1. Prepare a record of tests and inspections. Include the following:

- Date test or inspection was conducted.

- Description of the Work tested or inspected.
- Date test or inspection results were transmitted to Judicial Council.
- Identification of testing agency or special inspector conducting test or inspection.

2. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Judicial Council’s reference during normal working hours

END OF SECTION 14000

SECTION 014339 - VISUAL MOCK-UPS AND BENCHMARKS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 40 00 Quality Requirements
3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

B. Visual Mock-Ups: Special construction used to illustrate materials and workmanship, which will not be part of the finished construction.
(Modify where scope is applicable)

1.3 SUMMARY

A. Site Concrete:

1. Flatwork: Construct 6'-0" x 6'-0" mock-up for each concrete type and finish. Paving Module: Construct a mock- up of one special paving module, including banding, 12’-0” x 12’-0”.

B. Unit Pavers:

1. Mockups for each form and pattern of unit pavers required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution.

C. Building Facade:

1. Scope as indicated on Drawings. Provide evaluation mock-up at location as directed by Judicial Council to illustrate erection, anchorage of aluminum curtain wall system, precast concrete panels, sealants, glass, glazing, and finishes.

D. Design Concept:

1. Mock-up requirements shown on the Drawings are intended to establish general configuration and scope. Design the mock-up as a complete and independent structure, including required structural supports. Design Build Entity shall make necessary additions and modifications to the details as may be required to comply with aesthetic requirements while maintaining the design.

   a. Evaluation mock-up shall be built of the same materials, components and using the construction procedures and subcontractors proposed for the Work.

b. Modifications to the Work, if needed, to obtain the quality of workmanship and finish required in the finished structure shall be made during construction of the mock-up.

E. Courtroom Bench Mockup:

1. After approval of shop drawings for the judge/clerk/witness bench mock-up, Design Build Entity shall prepare the visual mock- up, and obtain approval prior to, proceeding with fabrication and/or installation of the courtroom casework.

2. Courtroom Bench Mock-up to comply with the following requirements:

a. Location: At location designated by Judicial Council.

b. Include judge, clerk and witness stations, work surfaces, built in casework and rail at spectator seating.

c. Judicial/Witness Bench shall be fabricated complete and with all finished components proposed for the Project. Install the ballistic protection sheet behind the finished panels.

d. Construct an elevated floor for support of benches to simulate the actual conditions that will exist in the Courtroom.

e. Portion of the Judges/Clerk Bench and Witness Stand shall utilize the same materials proposed for the Project; construct mock-up in sections as planned for the final work; employ a method of joining individual front panel and transaction counter sections which will enable disassembly and possible reuse, while demonstrating joint design and tightness. All wood veneers and solid stock shall be finished to match previously approved samples.

f. Fabricate and erect mock-up utilizing the same craftspeople as that intended to be used for the actual Work. Should field installation be accomplished by a firm other than the fabricator, the firm responsible for the field installation must be present during all phases of shop assembly of the mock-up.

g. Provide a minimum of twenty (20) days notice to Judicial Council of time when mock-up will be available for evaluation.

h. Mock-up will be examined to ascertain quality of the Work and conformity to AWI (Architectural Woodwork Institute) quality standards and specification requirements. Approved mock-up shall serve as a standard of comparison for all remaining casework with respect to workmanship, design, materials, finish, joining, and tolerances.

i. Provide additional materials and labor if required to obtain approval of mock-up at no additional cost to Judicial Council.

j. Design Build Entity may reuse as much of the approved mockup as is practical, when approved by the Judicial Council; the decision as to methods employed in constructing mock-up to maximize its reuse shall rest with the fabricator. Fabricator shall not be entitled to additional compensation if it is determined upon disassembly that all, or a portion of the approved mock-up is not acceptable for reuse within the building.

F. Other Mockups: *[The following items to be edited or removed as applicable to the project]*

  1. *Cement-Based Underlayment: Architect will select one area or surface to represent surfaces and conditions for application on each substrate required. Mockups shall demonstrate qualities of materials and execution.*

  2. *Unit Masonry Assemblies: Sample panels of Brick, approximately 32 inches (800 mm) wide by 48 inches (1200 mm) high by full thickness. Use materials proposed for the Work, including typical field units and mortar, to verify selections made under sample submittals and to demonstrate aesthetic effects. Approval required prior to work on visual mockup for building façade.*

  3. *Water Repellents:*

    a. *Use visual mock-up specified to establish actual application rates necessary to meet Project requirements. At no time shall the rate of coverage be less than that recommended by the manufacturer's printed data sheets.*

    b. *Apply water repellent to mockup, for full coverage as directed, before proceeding with installation. Comply with installation requirements of this Section*

  4. *Firestopping (Field Samples):*

    a. *Penetration of Fire Rated Partitions*

      1. *Install a mock-up of each type of floor and wall penetration firestop to show materials used and quality of workmanship. All trades that penetrate a fire rated partition shall be included in the mock-up including components such as the fire damper and ductwork, fire sprinkler piping, electrical conduit, and cabling. Prior to construction, obtain the State Fire Marshal’s approval of mock-up locations, size, components, material, etc.*

      2. *No Firestopping work shall commence until mock-ups are approved by the Judicial Council. Remove mock-ups that are not approved and provide additional mock-ups, at the same location, as necessary to obtain approval.*

1.4 BENCHMARKS

A. Benchmarks are first construction of assemblies to be repeated throughout the Work. Approved benchmarks are intended to serve as a standard of quality during construction. Design Build Entity shall protect the benchmarks from damage to ensure they are undisturbed at time of Acceptance and may become part of the completed Work.

B. Build benchmark mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation.

C. Approval of mockups may serve to provide approval for other materials and/or construction qualities when specifically approved by Judicial Council in writing.

D. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Judicial Council in writing.

E. Benchmark Mock-ups: *[The following items to be edited or removed as applicable to the project]*

1. *Interior Architectural Woodwork:*
    - *a. Elevator Lobbies: One complete set of wall panels at Elevator Lobby front.*
    - *b. First transaction / cashier counter.*
    - *c. First audience rail.*
    - *d. First jury box and rail, with fixed seating installed.*
2. *Door Hardware, Hollow Metal (Steel) Doors and Frames, and Flush Wood Doors:*
    - *a. First 180-degree opening door assembly.*
    - *b. First opening assembly from public corridor to courtroom entry vestibule.*
    - *c. First opening assembly from courtroom entry vestibule to courtroom.*
3. *Toilet Rooms:*
    - *a. Complete first Toilet Room.*
    - *b. Acoustical Panel Ceilings:*
        - *1. Two structural bays long by full width complete ceiling including cut outs for fixtures.*
    - *c. Toilet Compartments:*
    - *d. Typical and disabled access.*
    - *e. Toilet Accessories:*
        - *1. First toilet room, complete with required toilet accessories.*
    - *f. Toilet Room Benchmark: Complete one first floor core toilet room completely before beginning work on any others. Benchmark shall include all fixtures, lighting and interior finishes and will be evaluated for any required modifications.*
4. *Detention Cell*
    - *a. All surfaces in detention cells shall be smooth, with no blemishes that would permit contraband or deleterious materials to be*

secreted.

- *b. Detention cells surfaces must be durable and resistant to defacing.*
- *c. Install all fixed detention furnishings and accessories. Grind smooth any sharp edges to inhibit injury.*
- *d. Utilize "no pick" security caulk to seal gaps that would allow items to be secreted or where materials could be introduced to cause damage to anchors.*

1.3 EVALUATION

A. Completed mock-ups and benchmarks as accepted by the Judicial Council shall be maintained in good condition during the Work as standards of workmanship and appearance for the completed Project.

B. Mock-ups shall not be disassembled until Judicial Council provides notice to Design Build Entity that its evaluation and use of the mock-ups is complete.

END OF SECTION 014339

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1. RELATED DOCUMENTS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

  1. 01 31 00 Coordination and Project Meetings

  2. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2. DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.1 TEMPORARY UTILITIES AND SERVICES

A. Electric Power and Lighting:

  1. Design Build Entity will furnish and pay for power during the course of the Work. Design Build Entity shall be responsible for providing temporary electric service facilities required on the Project Site to point of intended use.

  2. Design Build Entity shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work.

  3. Design Build Entity shall be responsible for maintaining existing lighting levels in the Project vicinity should temporary outages or service interruptions occur.

  4. Design Build Entity shall be responsible for the payment of all utility costs for temporary electric service facilities and the new building until the date of Beneficial Use or Final Completion, whichever occurs first.

B. Heat and Ventilation:

  1. Design Build Entity shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions and per manufacturers' requirements for the installation and curing of materials, and to protect materials and finishes from damage due to improper temperature and humidity conditions.

  2. Design Build Entity shall provide temporary temperature and humidity sensors on all floors/ Quantity and coverage shall be per manufacturer's recommendations to provide adequate coverage on

each floor. The temporary system shall monitor and graphically display the relative humidity and temperature over time - and not just record a static, isolated data point.

3. Design Build Entity shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
4. Design Build Entity shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.
5. Use of Permanent Heating System for Temporary Heat:
    a. Agreement for Use: Permanent heating system shall not be used for temporary heat until it has undergone commissioning and operational testing and the work associated with that system is accepted by the Judicial Council. Use of a permanent heating system for temporary heat shall not occur, unless consent is obtained by Judicial Council and an agreement mutually acceptable to Judicial Council and Design Build Entity is placed in writing prior to use.
    b. Operation and Maintenance: Provide operator, maintain permanent heating system, and continue to do so during entire time temporary heat is required, and until the entire Work is Accepted by Judicial Council. Maintenance shall include replacement of filters and other dispensable items.
    c. Cost of fuel, operators, and maintenance for permanent heating system shall be borne by Design Build Entity until Acceptance of building by the Judicial Council
6. Refer to technical specifications for requirements relating to replacement of filters and other items used for temporary heating.

C. Water:

1. Design Build Entity will furnish and pay for water during the course of the Work. Design Build Entity shall be responsible for providing temporary water facilities required.
2. Design Build Entity shall make potable water available for human consumption.

D. Sanitary Facilities:

1. Design Build Entity shall provide temporary sanitary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The sanitary facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Judicial Council or the Design Build Entity completes all Work.

E. Fire Protection:

1. Design Build Entity shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California State Fire Marshal and/or its designee.
2. Where on-site welding and burning of steel is unavoidable, Design Build Entity shall provide protection for adjacent surfaces.

F. Cleaning and Trash Removal:

1. Design Build Entity shall provide trash removal on a timely basis from all Site Offices and throughout the Site.
2. Design Build Entity shall be responsible for professional cleaning services of all Site Offices. Offices shall be cleaned once a week at a minimum.

G. Security:

1. Design Build Entity will be responsible for site security during the course of the work until Project Completion. In the event of repeat security breaches, the Judicial Council may require Design Build Entity to provide, or increase the number of, night-time security guards, and/or to implement additional security measures to ensure the safety of the Site.
2. Design Build Entity shall secure all construction equipment, machinery and vehicles, park and store only within fenced area, and render inoperable during nonwork hours. Design Build Entity is responsible for ensuring that no construction materials, tools, equipment, machinery or vehicles can be used for unauthorized entry or to damage or interfere with activities and security of existing facilities adjacent to and in the vicinity of the Project Site. Design build Entity shall repair any damages to work and shall be responsible for any loss of materials due to vandalism or theft, within this responsibility and as set forth in the Contract Documents.
3. CONSTRUCTION MONITORING WEB-BASED WIRELESS CAMERAS
    a. Before any construction activity takes place onsite, Design Build Entity shall install and provide *[four]* web-based wireless cameras including a web-based interface and software that provides construction progress for the entire construction duration.
    b. System will archive one time-lapse snapshot per camera every 5 minutes and include 24/7 live view and progress reports for duration of project.
    c. Design Build Entity shall mount each camera on a *[35]*-foot-high pole. Locate cameras’ poles at opposite corners for cameras to view two full different building elevations.
    d. Cameras shall be connected to a website with capability to pan, tilt, and zoom with monitoring accessible on a webpage via passwords.
    e. Internet Connection: Provide dedicated *[T1]* connection (or better) for cameras with separate static or dynamic IP addresses.

4.

1.2 TEMPORARY FACILITIES:

[Judicial Council and Design Build Entity to define Big Room requirements during design and other site office requirements. Preliminary parameters have been provided below. Each project will have unique requirements and staffing, and the DBE shall confirm what facilities are required at each phase of the project.]

A. Unless otherwise indicated in the Contract Documents, Design Build Entity shall provide the following facilities, offices, furniture, and services for use by the Design Build Entity, Judicial Council, and Judicial Council Representatives:

1. Field Office: The Design Build Entity shall establish a temporary construction site office and "Big Room" on site or within *[¼-mile]* of the site's primary access. The Design Build Entity shall be responsible for interior development and furnishings, including removal at the completion of the project.
2. Design Build Entity shall submit plans and specification for all temp facilities to the appropriate AHJs for approval.
3. Big Room shall have ample room to allow for conference rooms, huddle spaces and a mix use of meeting spaces.
4. Amply large format TV's with HDMI connectivity shall be throughout Big Room to allow for electronic media presentations in all meeting spaces.
5. Big Room is encouraged to have no hard walled offices to maintain a collaborative atmosphere.
6. Big Room is encouraged to have sufficient space for appropriate Design Build Entity designers and consultants.
7. Big Room shall have color plotter that has ability to be connect to Judicial Council's computers. Paper and toner for plotter shall be maintained by Design Build Entity.
8. Furnishings: new furnishings for *[ten (10) persons]* shall be provided as follows:
    a. Ten (10) modular work stations (7' x 7' or larger) fully fit out with sit stand capable work surfaces, file cabinets, and other MSF accessories.
    b. Ten (10) swivel chairs with casters, steel, with arms.
    c. Ten (10) task lights.
    d. Three (3) bookcases (BC) with five shelves, 59" H x 34 ½" W x 12 5/8" D.
    e. One (1) Conference Room table large enough to fit approximately twenty-five (25) persons.
    f. One (1) Dual wall-mounted monitor configuration with a resolution of 1920 x 1080 connected to a video input & output that allows display from local computers (approximately 50" per monitor)
    g. Four (4) 18" W x 60" L sturdy folding tables.

h. One (1) 18” W x 48” L sturdy folding table.

i. Twenty-five (25) sturdy conference room chairs.

j. Three (3) lateral file cabinets (LFC), steel, locking, legal size, 5 drawers, 59 ¼” H x 36” W x 19 ¼” D for Judicial Council.

k. Six (6) file cabinets (FC), steel, locking, legal size, 2 drawers for offices, 29” H x 18 ½” W x 25” D.

l. Two (2) file cabinets (FCI), steel, locking, legal size, 52” H x 18 ¼” W x 25 “D for inspectors.

m. One (1) storage cabinet (SC), 72” H x 18” D x 36” W

n. One (1) hot and cold drinking water dispenser and provide bottled water service.

o. Two (2) built-in custom plan tables, 38” X 60” approximately.

p. Three (3) drafting stools with casters for plan tables.

q. Two (2) hanging plan racks to accommodate 24 sticks, full size drawings.

r. One (1) auto-drip twelve (12) cup coffee pot or coffee pod machine.

s. One (1) coat rack.

t. Nine (9) 6’ x 4’ white board with various colors of dry-erase markers. Installed as directed by the Judicial Council.

u. One (1) First Aid Station including one (1) defibrillator. Design Build Entity to refill and maintain as required.

v. Wall mounted fire extinguishers and exit signage. Quantity as required by AHJ.

w. Provide one (1) hard walled 240 SF office area for OSFM. Area shall have lockable door, cabinets, two (2) desks and desk chairs, small conference table and chairs to accommodate four (4) people.

x. Provide minimum one (1) teleconference speaker phone for conference room

y. Provide one (1) 1.2 cubic foot, 1200 watt countertop microwave

z. Provide one (1) 25 cubic foot refrigerator/freezer, connect to water with an ice maker and water dispenser

aa. Provide 2 lockable restrooms with a toilet and a sink in each

bb. Office equipment and furnishings shall remain property of Design Build Entity; removed from site upon completion of Contract.

1.3 BARRIERS AND ENCLOSURES

A. Design Build Entity shall obtain Judicial Council’s written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Design Build Entity shall provide and maintain for the duration of construction, a six (6) foot high, chain link perimeter fence with posts driven into the ground and fabric screen as a security barrier around construction area. Design Build Entity shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises. Design Build Entity shall remove temporary fence, barriers and enclosure upon Completion of the Work.

C. Design Build Entity shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

1.4 TEMPORARY CONTROLS

A. Noise Control:

1. Design Build Entity acknowledges that adjacent facilities may remain in operation during all or a portion of the Work, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.
2. Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to CM or Judicial Council a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

1. Equipment and impact tools shall have intake and exhaust mufflers.
2. Design Build Entity shall cooperate with Judicial Council to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

1. Design Build Entity shall conduct demolition and construction operations in compliance with any required grading permits and consistent with the SWPPP for the Project. In addition, Design Build Entity shall minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
2. Design Build Entity shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
3. Design Build Entity shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
4. Design Build Entity shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water Control:

1. Design Build Entity shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Design Build Entity shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

1. No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

2. Design Build Entity shall comply with applicable regulatory requirements and antipollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting

1. If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.5 JOB SIGN(S)

A. General:

1. Design Build Entity shall provide, maintain and locate a project identification sign with the design, text, and colors designated by Judicial Council.

2. Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the Judicial Council.

B. Materials:

1. Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.

2. Sign Surface: Minimum 3/4-inch exterior grade plywood.

3. Rough Hardware: Galvanized.

4. Paint: Exterior quality, of type and colors selected by the Judicial Council.

C. Fabrication:

1. Design Build Entity shall fabricate to provide smooth, even surface for painting.

2. Size: 4'-0" x 8'-0", unless otherwise indicated.

3. Design Build Entity shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.

4. Text and Graphics: As indicated.

1.6 PUBLICITY RELEASES

A. Design Build Entity shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s).

END OF SECTION 015000

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. *[Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]*

1. 01 33 00 Submittals
2. 01 50 00 Temporary Facilities and Controls
3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions unless noted otherwise in this section.

B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

E. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

F. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

G. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of seventy-five percent (75%) by weight of total construction and demolition material waste generated by the Work. Diverted materials must include at least four material streams.

B. Salvage/Recycle Requirements: Judicial Council’s goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:

1. Demolition Waste; and

2. Construction Waste.

C. Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle one hundred percent (100%) of the following uncontaminated packaging materials:

   1. Paper
   2. Cardboard
   3. Boxes
   4. Plastic sheet and film
   5. Polystyrene packaging
   6. Wood crates
   7. Plastic pails

1.4 SUBMITTALS

A. Waste Management Plan: Submit three (3) copies of plan within thirty (30) calendar days after the starting date on the Notice to Proceed.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three (3) copies of report. Include separate reports for Demolition and Construction Waste. Include the following information:

   1. Material category
   2. Generation point of waste
   3. Total quantity of waste in tons
   4. Quantity of waste salvaged, both estimated and actual in tons
   5. Quantity of waste recycled, both estimated and actual in tons
   6. Total quantity of waste recovered (salvaged plus recycled) in tons
   7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste

C. Waste Reduction Calculations: Before request for final inspection, submit three (3) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them.

Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. LEED Submittal: Submit LEED letter template for Credit MR 2.1 and/or 2.2 (as applicable), signed by Design Build Entity, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met. Use Judicial Council approved format for documentation

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

B. Refrigerant Recovery Technician Qualifications: Certified by EPA approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Conference: Conduct conference at Project Site to comply with requirements in Document “Coordination and Project Meetings.” Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade

1.6 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project Site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:

   1. Total quantity of waste
   2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste
   3. Total cost of disposal (with no waste management)
   4. Revenue from salvaged materials
   5. Revenue from recycled materials
   6. Savings in hauling and tipping fees by donating materials
   7. Savings in hauling and tipping fees that are avoided
   8. Handling and transportation costs. Include cost of collection containers or each type of waste
   9. Net additional cost or net savings from waste management plan

END OF SECTION 017419

SECTION 017700 - CONTRACT CLOSEOUT AND FINAL CLEANING

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 78 23 Operation and Maintenance Data
3. 01 78 36 Warrantees
4. 01 78 39 Record Documents
5. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 LIST OF ITEMS IN NEED OF CORRECTION (PUNCH LIST)

A. Punch list and walkthrough activities shall be performed consistent with the requirements of Article 21.4.

B. When Design Build Entity believes the construction Work is substantially complete, Design Build Entity (including their Architect and Engineers) shall create a list of any remaining corrective work from the rolling punch list. Design Build Entity shall then notify Judicial Council and schedule an initial walkthrough to be attended by Judicial Council Representative(s), Project Inspector, and other project stakeholders as needed to determine whether and to what extent the Construction Work is complete.

C. Punch list shall be hosted within the project management software, visible to all stakeholders and available for input. Judicial Council and its representatives and consultants may add omitted or missing items as work is being completed. This punch list is intended to be a live document, updated continuously and collaboratively to make the closeout process more efficient. Design Build Entity to follow the punch list requirements outlined in Article 24 of the General Conditions (Closeout, Final Completion, Final Payment & Release of Retention).

D. Design Build Entity shall comply with Punch List procedures as provided herein and consistent with Article 24 of the General Conditions and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Design Build Entity demobilize its forces prior to completion of the Punch List. Upon receipt of Design Build Entity’s written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and acceptance, Judicial Council and its Representatives will inspect the Work and shall submit to Design Build Entity a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

E. Punch List shall be considered complete only upon the Judicial Council's determination that all items on the Punch List, and all updates to the Punch List, are complete.

1.4 FINAL CLEANING

A. Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Design Build Entity shall use cleaning methods and procedures that reduce the overall impact on human health and the natural environment by reducing the amount of disposed waste, pollution and environmental degradation. If Project is subject to LEED certification, Design Build Entity shall ensure compliance with the applicable LEED requirements for final cleaning of the Site.

B. Design Build Entity shall employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.

1. Complete the following cleaning operations before requesting final inspection:

    a. Clean Project Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

    c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

    d. Remove tools, construction equipment, machinery, and surplus material from Project Site.

    e. Remove snow and ice to provide safe access to building.

    f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

    g. Clean all surfaces and other work in accordance with recommendations of the manufacturer.

    h. Remove spots, mortar, plaster, soil, and paint from ceramic tile, stone, and other finish materials.

    i. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

    j. Sweep concrete floors broom clean in unoccupied spaces.

k. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.

l. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

m. Remove labels that are not permanent.

n. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

o. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

p. Replace parts subject to unusual operating conditions.

q. Clean ducts, blowers, and coils if units were operated without filters during construction.

r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

s. Leave Project Site clean and ready for occupancy.

2. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests.

3. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Judicial Council's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project Site and dispose of lawfully.

1.5 ATTIC STOCK

A. [Design Build Entity to coordinate with Judicial Council to identify and compile the list of all required attic stock during the Pre-GMP Services. Do not provide a separate attic stock requirement in individual specification sections. All requested attic stock shall be entered and provided in the table below.]

B.

Material	Material % or Amount	Manufacturer

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Judicial Council for designated portions of the Work where commencement of warranties other than date of Completion is indicated.

B. Organize warranty documents into an orderly sequence as required by Section 017836 “Warranties”.

1.7 PROCEDURES PRIOR TO FINAL INSPECTION/DETERMINATION OF COMPLETION

A. Before submitting a written request for inspection to determine the date of Completion, complete the following items. Identify any items below that are incomplete in the request.

1. Prepare a final list of items to be completed and corrected (punch list).
2. Advise Judicial Council of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit completed LEED Action Plan Materials Log.
5. Obtain and submit releases permitting Judicial Council unrestricted use of the Work and access to services and utilities. Include certificate of occupancy, operating certificates, and similar releases, if required.
6. Prepare and submit Project Record Documents, operation and maintenance manuals, Completion construction photograph prints and electronic files, damage or settlement surveys, property surveys, and similar final record information.
7. Deliver tools, spare parts, extra materials, and similar items (Attic Stock) to location designated by Judicial Council. Label with manufacturer's name and model number where applicable
8. Make final changeover of permanent locks and deliver keys to Judicial Council. Advise Judicial Council’s personnel of changeover in security provisions.
9. Complete startup testing of systems
10. Submit test/adjust/balance records.
11. Terminate and remove temporary facilities from Project Site, along with mockups, construction tools, and similar elements.
12. Advise Judicial Council of changeover in utilities.
13. Submit changeover information related to Judicial Council’s occupancy, use, operation, and maintenance.

14. Complete final cleaning requirements, including touchup painting.
15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
16. Complete the following administrative requirements:
    a. Submit a final Application for Payment according to the Contract Documents.
    b. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
    c. Submit pest control final inspection report and warranty.
    d. Instruct Judicial Council's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
    e. Submit demonstration and training videos as required.

END OF SECTION 017700

SECTION 017823 OPERATION AND MAINTENANCE DATA

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 78 39 Record Documents
3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINTIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 QUALITY ASSURANCE

A. Design Build Entity shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.4 FORMAT

A. All documents required herein shall be submitted in compliance with the formatting and numbering requirements of Section 013120 “Documentation Requirements.”

B. Design Build Entity shall prepare data in the form of an instructional manual entitled“OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS” (“Manual”).

1. Binders: Design Build Entity shall use commercial quality, 8-1/2 by 11 inch, three side rings, with durable plastic covers; two-inch maximum ring size. When multiple binders are used, Design Build Entity shall correlate data into related consistent groupings approved in advance by Judicial Council.
2. Cover: Design Build Entity shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
3. Design Build Entity shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
4. Design Build Entity shall provide tabbed fly leaf for each separate Product and system, with typed description of Product and major component parts of equipment.

5. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 lb. paper.

C. In addition to the physical copies of warranty information described above, one copy of these documents will be provided in digital format, transferred to the Judicial Council's Construction Manager either on portable media or via File Transfer Protocol.

D. Drawings: Design Build Entity shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.5 CONTENTS, EACH VOLUME

A. Table of Contents: Design Build Entity shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants, Subcontractor(s), and Design Build Entity with name of responsible parties; and schedule of Products and systems, indexed to content of the volume.

B. For Each Product or System: Design Build Entity shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.

C. Product Data: Design Build Entity shall mark each sheet to clearly identify specific Products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Design Build Entity shall supplement Product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Design Build Entity shall not use Project Record Documents as maintenance drawings.

E. Text: The Design Build Entity shall include any and all information as required to supplement Product data. Design Build Entity shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

1.6 MANUAL FOR MATERIALS AND FINISHES

A. Building Products, Applied Materials, and Finishes: Design Build Entity shall include Product data, with catalog number, size, composition, and color and texture designations. Design Build Entity shall provide information for reordering custom manufactured Products.

B. Instructions for Care and Maintenance: Design Build Entity shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Design Build Entity shall include Product data listing applicable reference standards, chemical composition, and details of installation. Design Build Entity shall provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: Design Build Entity shall include all additional requirements as specified in the Specifications.

E. Design Build Entity shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.7 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Each Item of Equipment and Each System:

1. Design Build Entity shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Design Build Entity shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

B. Panelboard Circuit Directories:

1. Design Build Entity shall provide electrical service characteristics, controls, and communications.

C. Design Build Entity shall include color coded wiring diagrams as installed.

D. Operating Procedures:

1. Design Build Entity shall include startup, break-in, and routine normal operating instructions and sequences. Design Build Entity shall include regulation, control, stop ping, shutdown, and emergency instructions. Design Build Entity shall include summer, winter, and any special operating instructions.

E. Maintenance Requirements:

1. Design Build Entity shall include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
2. Design Build Entity shall provide servicing and lubrication schedule, and list of lubricants required.
3. Design Build Entity shall include manufacturer's printed operation and maintenance instructions.
4. Design Build Entity shall include sequence of operation by controls manufacturer.
5. Design Build Entity shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
6. Design Build Entity shall provide control diagrams by controls manufacturer as installed.
7. Design Build Entity shall provide Design Build Entity 's coordination drawings, with color coded piping diagrams as installed.
8. Design Build Entity shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
9. Design Build Entity shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
10. Additional Requirements: Design Build Entity shall include all additional requirements as specified in Specification(s).
11. Design Build Entity shall provide a listing in Table of Contents for

design data, with tabbed fly sheet and space for insertion of data.

1.8 SUBMITTAL

Concurrent with the Schedule of Submittals as indicated in the General Conditions and Section 013300 “Submittals”, Design Build Entity shall submit to the Judicial Council for review two (2) copies of a preliminary draft of proposed formats and outlines of the contents of the Manual.

A. For equipment, or component parts of equipment put into service during construction and to be operated by Judicial Council, Design Build Entity shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

B. On or before the Design Build Entity submits its final application for payment, Design Build Entity shall submit two (2) copies of a complete Manual in final form. The Judicial Council will provide comments to Design Build Entity and Design Build Entity must revise the content of the Manual as required by Judicial Council prior to Judicial Council's approval of Design Build Entity’s final Application for Payment.

C. Design Build Entity must submit two (2) copies of revised Manual in final form within ten (10) days after receiving Judicial Council’s comments. Failure to do so will be a basis for the Judicial Council withholding funds sufficient to protect itself for Design Build Entity’s failure to provide a final Manual to the Judicial Council.

END OF SECTION 017823

SECTION 017836 – WARRANTIES

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 78 39 Record Documents
3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 FORMAT

A. All documents required herein shall be submitted in compliance with the formatting and numbering requirements of the document “Documentation Requirements.”

B. Binders: Design Build Entity shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two-inch maximum ring size.

C. Cover: Design Build Entity shall identify each binder with typed or printed title "WARRANTIES” and shall list title of Project.

D. Table of Contents: Design Build Entity shall provide title of Project; name, address, and telephone number of Design Build Entity and equipment supplier, and name of responsible principal. Design Build Entity shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the Product or work item is specified.

E. Design Build Entity shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information, and using separate typed sheets as necessary. Design Build Entity shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

F. In addition to the physical copies of warranty information described above, one copy of these documents will be provided in digital format, transferred to the Judicial Council’s CM either on portable media or via File Transfer Protocol.

G. In addition to all warranty documentation and information required herein, Design Build Entity shall provide its Guarantee as required by the Contract Documents.

1.4 PREPARATION

A. Design Build Entity shall obtain warranties, executed in duplicate by each applicable and/or responsible Subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with Judicial Council's permission, Design Build Entity shall leave date of beginning of time of warranty until the date of completion is determined.

B. Design Build Entity shall verify that warranties are in proper form, contain full information, and are notarized, when required.

C. Written warranties, except manufacturer's standard printed warranties, shall be on Contractor's, subcontractor's, material supplier, or manufacturer's own letterhead, addressed to the Judicial Council.

D. Design Build Entity shall co-execute submittals when required.

E. Design Build Entity shall retain warranties until time specified for submittal.

1.5 TIME OF SUBMITTALS

A. Schedule of Warranties. Design Build Entity shall provide Judicial Council with a schedule of warranties with the submittal register as required by the technical specifications and outlined in the California Trial Court Facilities Standards. This will provide Judicial Council the opportunity to review the anticipated warranties and extended warranty periods the Judicial Council may require.

B. For equipment or component parts of equipment put into service during construction with Judicial Council's permission, Design Build Entity shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.

C. On or before the Design Build Entity submits its final application for payment, Design Build Entity shall submit all warranties and related documents in final form. Design Build Entity shall indicate any warranty related work that is being performed and incomplete at the time it submits its final application for payment. The Judicial Council will provide comments to Design Build Entity and Design Build Entity must revise the content of the warranties as required by Judicial Council prior to Judicial Council's approval of Design Build Entity's final Application for Payment.

D. For items of Work that are not completed until after the date of Completion, Design Build Entity shall provide an updated warranty for those item(s) of Work within ten (10) days after the item is put into service, listing the date of acceptance as start of warranty period.

**END OF SECTION
017836**

SECTION 017839 - RECORD DOCUMENTS

[Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.]

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 31 20 Documentation Requirements
2. 01 33 00 Submittals
3. 01 35 54 Building Information Modeling
4. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 GENERAL

A. All documents required herein shall be submitted in compliance with the formatting and numbering requirements of Section 01 31 20, “Documentation Requirements.”

B. Design Build Entity shall maintain at each Project Site, (i) the final, permitted Working Drawings that were approved and stamped by the Authorities Having Jurisdiction; (ii) Marked-up drawings that shall ultimately become the As-Built Drawings; (iii) any annotated Performance Criteria Documents; and (iv) provisions for viewing and referencing the current (BIM) building model.

1. Maintain documents in a clean, dry, legible condition and in good order.

C. Maintaining As-Builts: Design Build Entity shall maintain one (1) set of marked-up Drawings, ultimately becoming the as-Built Drawings, indicating any revisions or deviations for the original design intent. Design Build Entity shall transfer all changes and information to those marked-up Drawings and/or specifications, as often as required in the Contract Documents, but in no case less than once each month.

1. Design Build Entity shall submit to the Project Inspector one set of the As-Builts showing all changes incorporated into the Work since the preceding monthly submittal.

2. The Design Build Entity shall submit reproducible As-Built documents at the conclusion of the Project. One set of hard copy reproducible documents will be submitted, and one digital file, .pdf or dwg format, of that set will be prepared and submitted.

3. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by Change Orders, RFI's, and Addenda, shall be accurately and legibly recorded by Design Build Entity.

4. Locations and changes shall be done by Design Build Entity in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

D. Maintaining Annotated Performance Criteria: Design Build Entity shall produce one (1) set of annotated (marked-up) Performance Criteria Documents indicating all changes, deviations, or additions to the Performance Criteria as agreed to by the Judicial Council.
    1. Such mark-ups and changes to the Performance Criteria shall be documented as they occur and submitted to the Project Inspector for verification accompanying the monthly submittal of as-built mark-ups.

E. Maintaining Updated (BIM) Building Model: Updates to the Building Model shall be made quarterly in accordance with section 01 35 54.

F. Design Build Entity shall provide in an electronic format (.pdf, .dwg, or format as indicated in the Contract Documents) a copy of the Drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."

1.4 MARK-UP INFORMATION

A. Design Build Entity markups shall record, but are not limited to, the following information:
    1. Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.
    2. Actual numbering of each electrical circuit.
    3. Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Drawings.
    4. Locations of all items, not necessarily concealed, which vary from the Contract Documents.
    5. Installed location of all cathodic protection anodes.
    6. Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
    7. Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
    8. Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

B. In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

C. Design Build Entity shall provide additional drawings or documents as necessary for clarification.

1.5 RECORD DOCUMENTS

A. Design Build Entity shall submit the following Record Documents during closeout of the project:

1. Final As-Built BIM drawings in (.dwg format) as identified in Section 01 35 54.
2. A copy of the permitted Technical Specifications annotated to indicate any changes in electronic format.
3. A copy of the annotated Performance Criteria Documents.
4. Set of Record Drawings in an electronic format (pdf or .dwg format) as generated form the updated model in accordance with 01 35 54 and consistent with all revisions recorded in the mark-ed as-built drawings maintained onsite.
5. Final marked-up as-built documents as maintained onsite.

B. Label and date each as "RECORD DOCUMENT", and indicate the document type (i.e.: “RECORD DOCUMENT MM/DD/YYYY Annotated Performance Criteria)

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END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING – GENERAL

[Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.]

1.1 RELATED DOCUMENTS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 78 23 Operation and Maintenance Data
2. 01 91 13 General Commissioning Requirements
3. 01 91 19 Building Enclosure Commissioning Requirements
4. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions.

1.3 SUMMARY

A. This Document includes administrative and procedural requirements for on-site instruction of Judicial Council's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Videos documenting the Demonstration and Training sessions.

1.4 SUBMITTALS

A. Instruction Program: For each system, sub-system, or piece of equipment, submit three (3) copies of an instructional program outline for demonstration and training. Include the learning objective for each session and provide a schedule of proposed dates & times, length of instruction time, and instructors' names for each training module.

B. Attendance Record: For each training session, list the participants in attendance and length of instruction time.

C. Evaluations: For each participant and for each training module, include results and documentation of performance-based test.

D. Demonstration and Training videos: Submit electronic copies to Judicial

Council within seven (7) days of the end of each training module. Coordinate with Judicial Council on the preferred format.

1. The Training video must include the following information:
   a. Name of Project and Judicial Council Project Number.
   b. Name and address of videographer.
   c. Name of Judicial Council's Representative(s).
   d. Name of Design Build Entity.
   e. Date video was recorded.

E. Transcript: Prepared on 8-1/2-by-11-inch (215-by-280-mm) paper, punched and bound in heavy-duty, 3-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video file. Include name of Project and date of video on each page.

F. At the completion of training, submit two (2) complete hardcopy sets and one electronic file of training manual(s) for Judicial Council's use. Training Manual(s) shall include outline and transcript/written instructions for all topics presented in Demonstration and Training sessions.

1.5 COORDINATION

A. Coordinate training schedule with Judicial Council. Adjust schedule as required to minimize disrupting Judicial Council's operations. Notify Judicial Council of proposed training at least fourteen (14) days in advance of scheduled sessions.

B. Coordinate instructors, including providing notification of training dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Judicial Council.

1.6 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master.

1.7 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and organize into training modules covering topics for a particular system, subsystem, or piece of equipment. Assemble training modules into a combined training manual complete with a table of contents. Provide hardcopies of materials to all attendees of training sessions

B. Set up any instructional equipment at instruction location.

1.8 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Design Build Entity and Judicial Council for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Judicial Council’s personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Judicial Council will furnish Design Build Entity with names and positions of participants.

D. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

    1. Schedule training with Judicial Council, with at least fourteen (14) days' advance notice.

E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

[Design Build Entity shall use the template provided to complete this section. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.]

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council. Related sections to be listed here without limitation.]

1. 01 33 00 Submittals
2. 01 78 23 Operation and Maintenance Data
3. 01 78 36 Warrantees
4. 01 79 00 Demonstration and Training
5. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 SUMMARY

A. Commissioning is a systematic process of verifying that the building systems perform interactively according to the Construction Documents and the Judicial Council's operational needs. The Commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the Post-GMP Phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that the applicable equipment and systems are installed in accordance with the Contact Documents and according to the manufacturer's recommendations.

2. Verify and document proper integrated performance of equipment and systems.

3. Verify that Operations & Maintenance documentation is complete.

4. Verify that all components requiring servicing can be accessed, serviced, and removed without disturbing nearby components including ducts, piping, cabling, or wiring.

5. Verify that the Judicial Council's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.

6. Document the successful achievement of the Commissioning objectives

listed above.

B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the technical sections of these specifications are intended to be provided in coordination with the Commissioning services and are not intended to duplicate services. The Design Build Entity shall coordinate the Work required by individual specification sections with the Commissioning services requirements specified herein.

C. The Commissioning process does not take away from or reduce the responsibility of the Design Build Entity to provide a finished and fully functioning product.

1.3 DEFINITIONS

A. Capitalized terms shall mean that term as defined in the General Conditions unless otherwise noted in this section.

B. Basis of Design (BoD) document: A document that records concepts, calculations, decisions, and product selections used to meet the Performance Criteria and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

C. Control System: A component of environmental, HVAC, security, and/or fire systems for reporting, monitoring, and issuing of commands.

D. Deficiency or Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components.

E. CxA: Commissioning Agent. The entity identified by the Judicial Council who leads, plans, and schedules and coordinates the commissioning team to implement the Commissioning process.

F. Functional Testing: Generally, refers to testing of a complete system and demonstrates control of equipment and the interaction of equipment or systems. Performed by the Design Build Entity and witnessed by the CxA.

G. Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the Contract Documents and to industry accepted best practices.

H. Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.

I. Issues Log: A formal and ongoing record of problems or concerns and their resolution that have been raised by members of the Commissioning team during the course of the Commissioning process. Maintained by the CxA.

J. Pre-functional Checklists (PFC): Refers to checklists prepared by the CxA and provided to the Design Build Entity to document the complete installation of equipment or systems. Pre-functional checklists are completed by the Design Build Entity prior to start-up.

K. Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.

L. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.

M. Seasonal Performance Tests: Functional Tests that are deferred until the system(s) will experience conditions closer to their design conditions.

N. Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.

O. Start-up: The initial starting or activating of dynamic equipment or the initial energization and programming of control systems.

P. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.

Q. Test and Balance (TAB): A systematic process or service applied to heating, ventilating and air- conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.

R. Training Plan: A written document that details the expectations, schedule and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users, and occupants.

S. Trending: The monitoring by a building management system or other electronic

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

data gathering equipment and analyzing of the data gathered over a period of time to verify proper equipment or systems sequence of operations.

T. Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Judicial Council. Warranty phase Commissioning includes follow-up on verification of system performance, measurement and verification tasks and assistance in identifying warranty issues and enforcing warranty provisions of the Contract Documents.

U. Warranty Visit: A Commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

1.4 COMMISSIONING TEAM

A. A project team created to coordinate the Commissioning effort that coordinates and communicates with the rest of the project team, attend meetings, and solve problems. This team may include representatives from the Design Build Entity, Subcontractors, Judicial Council and/or representatives such as the Construction Manager, Project Inspector(s), and Criteria Architect.

B. The Design Build Entity shall in addition to their representative also appoint a representative from each subcontractor involved in commissioned systems including mechanical, electrical, controls, TAB, plumbing, building envelope, low voltage systems,

C. With these fundamental practices in mind, the Commissioning process described herein has been developed to recognize that, in the execution of Commissioning, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Construction Manager. Thus, the procedures outlined in this specification must be executed within the following limitations:

1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the Judicial Council and the Design Build Entity.
2. Commissioning Issues identified by the Commissioning Agent will be delivered to the Judicial Council Representative and copied to the designated representatives for the Design Build Entity and subcontractors on the commissioning team for information only to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
3. All parties to the Commissioning process shall be individually responsible for alerting the Judicial Council Representative of any issues that they deem to constitute a potential contract change prior to acting on these issues.

1.5 JUDICIAL COUNCIL RESPONSIBILITIES

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

A. Participate in resolution of issues that may occur as a result of the Commissioning process.

B. Assign operation and maintenance personnel and schedule them to participate in Commissioning team activities including, but not limited to, the following:

1. Coordination meetings.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Testing meetings.
4. Demonstration of operation of systems, subsystems, and equipment.

1.6 CONTRACTOR'S AND SUBCONTACTOR'S RESPONSIBILITIES

A. Provide utility services required for the Commissioning process.

B. Design Build Entity is responsible for construction means, methods, job safety, or management function related to Commissioning on the job site.

C. Design Build Entity and designers of record are responsible for developing the Construction Documents and clarifying the design intent during the Work including through construction of the Project.

D. Design Build Entity shall assign representatives with expertise and authority to act on behalf of the Design Build Entity and schedule them to participate in and perform Commissioning team activities including, but not limited to, the following:

1. Participate Commissioning meetings, including controls coordination meetings, to review and resolve any issues with the sequence of operations.
2. Participate in maintenance orientation and inspection.
3. Participate in operation and maintenance training sessions.
4. Certify that Work is complete, and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
5. Perform quality control of all Work and certify it is complete prior to request for inspection.
6. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.

E. Design Build Entity shall integrate all Commissioning activities into Design Build Entity's master Contract Schedule.

F. Design Build Entity shall provide a means to effectively commission the Building Management System (BMS) including the following at minimum:

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

1. Schedule the controls contractor to perform programming of the building BMS

2. Run tests to verify appropriate response and operation of the BMS

3. Provide a table with chairs for use during programming and testing,

4. Provide a 17" 1080p monitor with cables for connection to the controls contractor's laptop.

G. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform Commissioning team activities including, but not limited to, the following:

1. Participate in coordination meetings during the Construction.
2. Participate in maintenance orientation and inspection.
3. Complete pre-functional checklists for all equipment. Submit completed forms with start- up reports immediately after start up.
4. Schedule and perform duct air leakage testing as specified in the technical specification sections with CxA as witness.
5. Provide flushing plans, disinfection reports and water treatment reports to the CxA for review.
6. Participate in pre-TAB meeting and jobsite inspections to verify TAB readiness.
7. Provide draft completed TAB report to CxA for review. CxA will identify up to 20% of TAB report for Sampling.TAB contractor to demonstrate compliance to the completed TAB report.
8. Participate in procedures meeting for testing.
9. Perform point-to-point, calibration and checkout of the building automation system and provide completed report to the CxA for review.
10. Participate in final review at acceptance meeting.
11. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
12. Provide information to the CxA for developing the Commissioning plan.
13. Participate in training sessions for operation and maintenance personnel.
14. Verify that all systems function correctly by testing each mode of operation, alarm, and system function.
15. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified.

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

16. Perform quality control of all work and certify it is complete prior to request for observation and or testing.

17. Complete and sign Systems Functional Testing Readiness Certification and Notification Letter for Commissioning and provide to CxA (See EXHIBIT B of this specification section).

18. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

19. Perform seasonal testing, at the direction of the CxA, to prove functional performance of the HVAC and controls in the opposite season.

1.7 CXA'S RESPONSIBILITIES

A. Organize and lead the Commissioning team.

B. Prepare a Commissioning Plan. Collaborate with design team, Judicial Council, Design Build Entity, and subcontractors to develop test and inspection procedures. Identify Commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.

C. Work with the Design Build Entity to schedule Commissioning activities. The Design Build Entity shall integrate all Commissioning activities into the Contract Schedule. All parties will address scheduling issues in a timely manner in order to expedite the Commissioning process.

D. Review and comment on submittals for compliance with the approved project documents and identify any potential conflicts.

E. Conduct Commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the Commissioning processes. The CxA shall prepare and distribute minutes to Commissioning team members and attendees within five (5) workdays of the Commissioning meeting.

F. At the beginning of the Construction Work portion of the Post-GMP Phase, conduct an initial coordination meeting for the purpose of reviewing the Commissioning activities and establishing tentative schedules for permanent power; operation and maintenance data submittals; operation and maintenance training sessions; TAB Work; and Project Completion.

G. Periodically observe and inspect construction and report progress and deficiencies. In addition to compliance with the Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.

H. Prepare Project-specific pre-functional checklists and functional test procedures checklists.

I. Compile test data, inspection reports, and certificates and include them in the systems manual and Commissioning report.

J. Review and comment on operation and maintenance documentation for compliance with the Contract Documents.

K. Review Design Build Entity's operation and maintenance training program.

L. Prepare Commissioning status reports.

M. Assemble the final commissioning documentation, including the Commissioning Report including applicable Project Record Documents.

1.8 COMMISSIONING DOCUMENTATION

A. Commissioning Plan: A document, prepared by CxA, that outlines the process, schedule, allocation of resources, and documentation requirements of the commissioning effort, and shall include, but is not limited to the following:

1. Description of the organization, layout, and content of Commissioning documentation to be provided along with identification of responsible parties.
2. Identification of systems and equipment subject to Commissioning.
3. Description of the level of Commissioning for each system
4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
5. Identification of items that must be completed before the next operation can proceed.
6. Description of responsibilities of Commissioning team members.
7. Description of observations to be made.
8. Description of requirements for operation and maintenance training, including required training materials.
9. Provide a schedule for Commissioning activities with specific dates coordinated with overall Contract Schedule.
10. Define the process for completing pre-functional and startup checklists for systems, subsystems, and list of specific equipment requiring these checklists.
11. Include Step-by-step procedures for Functional testing systems, subsystems, and equipment with descriptions for methods of

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.

B. Pre-Functional Checklists: CxA shall develop pre-functional checklists for all equipment to be commissioned. Pre-Functional Checklists shall be completed and signed by the Design Build Entity, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent may spot check Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Design Build Entity for correction and resubmission.

C. Site Visit Reports: CxA shall record test data, observations, and measurements on site visit forms. Updated Issues Log, photographs and other means appropriate for the application shall be included with Report.

D. Start-Up Reports: Design Build Entity/Manufacturer created forms that document that factory start-up procedures have been followed for all equipment and systems subject to Commissioning. Provided by sub-contractors.

E. Functional Performance Testing: CxA shall develop functional performance test procedures for all equipment and systems subject to Commissioning. Site Visit Reports: CxA shall record test data, observations, and measurements on site visit forms. Photographs and other means appropriate for the application shall be included with data.

F. Test and Inspection Reports: CxA shall compile test and inspection reports and test and inspection certificates and include them in Systems Manual and Commissioning report.

G. Commissioning Schedule: CxA shall review and provide input to the Contract Schedule for Commissioning activities.

H. Issues Log: CxA shall prepare and maintain an issues log that describes installation, and performance issues that are at variance with the Contract Documents. CxA will identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.

1. Creating an Issues Log Entry:

    a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.

    b. Assign a descriptive title of the issue.

    c. Identify issue date.

    d. Identify test number of tests being performed at the time of the observation, if applicable, for cross-reference.

    e. Identify system, subsystem, and equipment to which the issue applies.

    f. Identify location of system, subsystem, and equipment.

g. Include information that may be helpful in diagnosing or evaluating the issue.

h. Note recommended corrective action.

i. Identify Commissioning team member responsible for corrective action.

j. Identify expected date of correction.

k. Identify person documenting the issue.

2. Documenting Issue Resolution:

a. Log date correction is completed, or the issue is resolved.

b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.

c. Identify changes to the Contract Documents that may require action, if any.

d. State that correction was completed, and system, subsystem, and equipment are ready for retest, if applicable.

e. Identify person(s) who corrected or resolved the issue.

f. Identify person(s) documenting the issue resolution.

I. Commissioning Report: CxA shall document results of the Commissioning process including performance of systems, subsystems, equipment, and issues. The Commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the Performance Criteria, BoD and Contract Documents. The Commissioning report shall include, but is not limited to, the following:

1. Discussion of performance of commissioned systems including any variance from Performance Criteria, BoD, and the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Judicial Council occupancy and operation. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.

2. Commissioning Plan.

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

3. Testing plans and reports.

4. Issues log.

5. Completed test checklists.

6. Listing of off-season test(s) not performed and a schedule for their completion.

J. Systems Manual: CxA shall gather required information and compile Systems Manual. Systems manual shall include, but is not limited to, the following:

1. As-built system narratives, schematics, and list of installed equipment

2. Operation and maintenance data

1.9 CXA SUBMITTALS

A. Commissioning Plan: CxA shall submit a draft Commissioning plan. Deliver one copy to Design Build Entity and one to Judicial Council. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final commissioning plan.

B. Prefunctional Checklists: CxA shall submit sample checklists and forms to Design Build Entity and subcontractors for review, comment, and approval. Design Build Entity completed prefunctional checklists are required to be submitted for review and approved prior to proceeding with functional performance testing.

C. Functional Test Plan: CxA shall submit draft Functional Test Plan and checklists for comment. The final Functional Test Plan will be submitted and used for functional testing.

D. Site visit reports: CxA shall submit site visit reports as they are created.

E. Final Commissioning Report: CxA shall submit the draft Commissioning report. One copy, with review comments, will be returned to the CxA for preparation of final submittal. The final report submittal must address previous review comments.

F. The CxA will provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires facilitating the Commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum the request will include the manufacturer and model number, the manufacturer printed installation and detailed start-up procedures, sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details. In addition, the factory checkout sheets, or field technicians shall be submitted for review

[Text in red to be edited by Design Build Entity. Design Build Entity must coordinate with Judicial Council's Commissioning Agent to finalize this section.]

1.10 COORDINATION

A. Scheduling: The Design Build Entity shall work with the Commissioning Agent to incorporate the Commissioning activities into the Contract Schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations, and predecessors) on Commissioning activities to allow the Design Build Entity to schedule Commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the Commissioning process. The Design Build Entity shall update the Contract Schedule as directed by the Judicial Council.

B. Coordinating Meetings: CxA shall conduct coordination meetings of the Commissioning team as needed to review progress on the Commissioning plan, to discuss scheduling conflicts, and to discuss upcoming Commissioning process activities.

C. Pretesting Meetings: CxA shall conduct pretest meetings with the Commissioning team to review startup reports, coordinate controls sequence of operations, review pretest inspection results, review testing and balancing procedures, review testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.

D. Testing Coordination: CxA shall coordinate with the Judicial Council and Design Build Entity to plan the sequence of testing activities to accommodate required quality- assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

  1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

PART 3 – EXECUTION (To be developed by the Judicial Council PM in conjunction with the selected Commissioning Agent)

END OF SECTION 019113

SECTION 019119 – BUILDING ENCLOSURE COMMISSIONING REQUIREMENTS

Design Build Entity shall use the templates provided to complete the select Division 01 sections. Incorporate the requirements provided by the Judicial Council below, complete the section, and submit for approval. Remove all instructional notes prior to submitting.

1.1 RELATED DOCUMENTS AND PROVISIONS

A. [Design Build Entity shall review all Contract Documents for applicable provisions related to the topic and/or any provisions provided by the Judicial Council . Related sections to be listed here without limitation.]

1. 01 91 13 General Commissioning Requirements
2. 01 40 00 Quality Requirements
3. *[List additional divisions and sections relevant to specific requirements of the Work]*

1.2 SUMMARY

A. Enclosure Commissioning

1. A systematic process of ensuring that all building envelope systems perform interactively according to the Designer's Basis of Design (BOD) and Judicial Council 's Performance Criteria and specific Project requirements. This is to be achieved through actual verification of systems performance during the construction period.

B. This Section includes building envelope environmental separation Commissioning procedures, including substructure, superstructure, exterior enclosure, and roofing construction and associated components, assemblies, and sub-assemblies that protect climate-controlled interior spaces from unconditioned spaces and the exterior environment, as follows:

1. Below-grade construction including foundations and slab-on-grade that functions as part of the building envelope system but excluding structural systems and components.
2. Superstructure floor, wall, and roof construction that functions as part of the building envelope system.
3. Exterior building envelope construction, above grade, including exterior opaque walls, windows and doors, including sheathing, framing, and insulation, and interior finish materials attached to the exterior wall.
4. Roofing, including roofing system, roofing insulation, and skylights, hatches, penetrations, and other roof openings.
5. Waterproofing, including waterproofing system, penetrations, hatches, and other associated opening

1.3 GENERAL REQUIREMENTS

A. The requirements of this Section shall in no way relieve the Design Build Entity and other parties to this project of their respective contractual obligations to the Judicial Council for meeting the specified performance levels in the design and construction of this project.

B. General: Comply with the applicable provisions of the referenced standards except as modified by governing codes and the Contract Documents. Where a recommendation or suggestion occurs in the referenced standards, such recommendation or suggestion shall be considered mandatory. In the event of a conflict between referenced standards, this specification or within themselves, the more stringent standard or requirement shall govern.

1.4 SCOPE OF WORK

A. This Section includes the following requirements for nonstructural Commissioning of the building enclosure, including, but not limited to, the following:

1. Roofing systems, fenestration systems, facade systems, below-grade and horizontal waterproofing, and all materials and components forming a part of these systems and interfaces with accessory systems, including, but not limited to, plumbing, electrical, and mechanical equipment.
2. Interface conditions including flashing, expansion joints, and sealant joints installed as part of the work outlined in the Contract Documents.

B. The materials, components, systems, and assemblies installed as part of the work outlined in the Contract Documents that comprise the building enclosure will be evaluated and performance tested as outlined in this Section and related sections. All testing specified herein shall be in accordance with each of the Technical Sections associated with the design and construction of the building enclosure. Discrepancies between this Section and other Technical Sections shall be brought to the attention of the Designer of Record and Building Enclosure Commissioning Provider.

C. Testing and other work specified herein do not replace, reduce, or alter the scope of similar requirements specified in other specification sections.

D. An Enclosure Commissioning Plan will be created and managed by the Building Enclosure Commissioning Provider. The Enclosure Commissioning Plan will include all requirements for Commissioning of the building enclosure work.

E. Related Work: Refer to other Sections of these Specifications to determine the type and extent of work therein affecting the work of each trade whether or not such work is specifically mentioned in this Section.

1.5 BUILDING ENCLOSURE COMMISSIONING TEAM

A. A representative of each of the following parties shall be designated as a member of the Building Enclosure Commissioning Team:

1. Judicial Council Project Manager and/or other Judicial Council Representatives
2. Construction Manager (CM)
3. Design Build Entity (DBE)
4. Exterior Enclosure Designer
5. Architect of Record (AOR)
6. Designer of Record (DOR)
7. Mechanical/Electrical/Plumbing (MEP) Engineer
8. LEED Consultant
9. MEP Commissioning Provider (CxP)
10. Building Enclosure Commissioning Provider (BECxP)
11. Testing Agent (TA)

1.6 DEFINITIONS AND ABBREVIATIONS

A. Capitalized terms shall mean that term as defined in the General Conditions unless specifically listed otherwise within this section.

B. Performance Criteria: Shall mean that term as it is defined in the General Conditions.

C. Basis of Design (BOD): A document or documents that records concepts, calculations, decisions, and product selections used to meet the Performance Criteria including but not limited to the current version of the California Trial Court Facilities Standards and any supplementary information. and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

D. Building Enclosure, Building Envelope, Exterior Enclosure, or Exterior Envelope: Materials, components, systems, and assemblies collectively intended to provide shelter or environmental separation between interior and exterior, or between two or more environmentally distinct interior spaces in a building.

E. Building Enclosure Commissioning (BECx): The process that endeavors to confirm the exterior enclosure and those elements intended to provide environmental separation within a building or structure meet or exceed the expectations of the Judicial Council as defined in the Performance Criteria.

F. Building Enclosure Commissioning Provider (BECxP): An individual or firm retained by the Judicial Council to develop, manage, and be in responsible charge of the BECx process.

G. Building Enclosure Commissioning Issue: A condition in the installation or operation of a commissioned component, assembly, or system that does not comply with the Contract Documents or Performance Criteria.

H. Water Leakage: Uncontrolled water penetrating assemblies, water appearing on assemblies' normally exposed interior surfaces, water that is not contained and drained to the exterior, or water that may damage materials or interior finishes.

1.7 REFERENCED STANDARDS

A. Comply with the California Building Standards Code, the Contract Documents, and the applicable provisions and recommendations of the following standards, except as modified herein:

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE): Guideline 0: The Commissioning Process, 2013 Edition.
2. ASHRAE Standard 202 – The Commissioning Process for Buildings and Systems.
3. American Society for Testing and Materials (ASTM): E2813: Standard Practice for Building Enclosure Commissioning, 2012e1 Edition.
4. Leadership in Energy and Environmental Design (LEED): Version 4, 2013.
5. National Institute of Building Sciences (NIBS): Guideline 3: Exterior Enclosure Technical Requirements for the Commissioning Process, 2012 Edition

1.8 SUBMITTALS

A. All technical submittals and shop drawings related to the building enclosure shall be forwarded by the DOR to the BECxP for review and comment after the GC and DOR's initial review. The DOR shall review and address and/or respond to all BECxP comments during their final review process, before return to the Design Build Entity .

B. Submit a systems manual that includes all test reports, inspection reports and certificates, manufacturer operation instructions for all operable elements of the building enclosure, and recommended maintenance frequency and maintenance requirements for each major building exterior enclosure system.

1.9 ROLES AND RESPONSIBILITES

A. Judicial Council Project Manager’s BECx Responsibilities:

1. Facilitate and support the Commissioning process and provide final approval for the Commissioning work, including authorizing the BECxP to participate in meetings, conduct BECx project meetings, or conduct site visits. Any changes to the Contract Documents arising

out of the Commissioning plan or process must be submitted, reviewed, and accepted in writing by the OPM.

B. Design Build Entity's BECx Responsibilities

1. Coordinate and lead a construction kick-off meeting to discuss construction sequencing, trade coordination, and the Design Build Entity's site-specific Quality Control program, to be implemented during construction of the building enclosure.

2. Provide submittals required herein and by other divisions of the Specifications.

3. Participate in all BECx project meetings with the various members of the design and construction team, including, but not limited to, the Judicial Council PM, CM, DOR, BECxP, suppliers, manufacturer technical representatives, and enclosure designer. BECx requirements and progress shall be included on the agenda at each BECx project meeting. The Design Build Entity, with the appropriate project team members in attendance, shall review, update, and discuss any issues and concerns identified during the previous week by the DOR, the BECxP, the Judicial Council, or the CM.

4. Coordinate and lead pre-installation conferences with the building enclosure designer to discuss field installation procedures, details, construction sequencing, coordination, standards, and Commissioning activities. Design Build Entity, the enclosure designer, installers, site superintendents and/or foreman shall attend.

5. Cooperate with the BECxP including, but not limited to, providing access to work, conducting periodic site visits with the BECxP and DOR, providing an adequate schedule for the Commissioning tasks, and assisting with Commissioning tasks as specified.

6. Coordinate and verify appropriate team members are in attendance at BECx project meetings, building enclosure site observations, and other Commissioning tasks as specified.

7. Provide all quality control testing and documentation outlined in the technical Specification Sections unless otherwise noted (testing to be performed by qualified testing third party testing agency). Refer to other divisions of the Specifications to determine the type and extent of work therein affecting the work of the BECx Requirements, whether or not such work is specifically mentioned in this Specification Section or the Building Enclosure Commissioning Plan.

8. Following a failed test, if any, investigate cause of the failure and submit a proposed plan for follow-up, repair, or corrective action as necessary to meet the design intent. Plan shall be submitted to the DOR and Judicial Council for review and approval.

9. Provide a systems manual that includes all test reports, inspection reports and certificates, manufacturer operation instructions for all operable elements of the building enclosure, and recommended maintenance frequency and maintenance requirements for each major

building exterior enclosure system.

C. BECxP Responsibilities

1. Review and comment on the building enclosure-related sections of the Performance Criteria and BOD documents.
2. Review project drawings and specifications for continuity of the air, water, thermal, and vapor control layers, as well as for general constructability, performance, and building envelope conformance with the Performance Criteria.
3. Review and provide comments on technical submittals and shop drawings related to the building enclosure, concurrent with DOR review, for conformance to the design intent, Performance Criteria, and industry standards. DOR shall review and consolidate all submittal comments made by the BECxP prior to distribution to the Design Build Entity .
4. Conduct periodic BECx project meetings, as directed by the Judicial Council , with the various members of the design and construction teams, including, but not limited to, the Judicial Council PM, CM, DOR, MEP, BECxP, suppliers, and manufacturer’s technical representatives. BECx requirements and progress shall be included on the agenda at each BECx project meeting.
5. Participate in or lead one pre-installation conference with the Judicial Council PM, CM, Design Build Entity, and building enclosure designer to discuss field installation procedures, details, construction sequencing, coordination, standards, and Commissioning activities as directed by the Judicial Council .
6. Conduct periodic site visits as directed by the Judicial Council to review the progress of the Work and evaluate its compliance with the Contract Documents, Judicial Council 's Project Requirements, and industry standards. The BECxP will identify noncomplying work items, report them to the Judicial Council PM, CM, and the DOR, and provide a summary report of observations. The summary report will include a list of noncomplying work items to serve as an ongoing construction issues log, which will be updated after each site visit. BECx coordination meetings, project meetings, and pre-installation conferences shall be coordinated with and conducted in conjunction with site visits whenever possible.
7. Witness or review enclosure Commissioning testing as specified herein, as directed by the Judicial Council . For all tests, the Third Party Testing Agent shall provide a testing report that includes a summary of testing procedures, parameters, and results.
8. Prepare a Commissioning report by providing information pertinent to the exterior enclosure systems as developed throughout the course of the project.

D. Designer of Record's BECx Responsibilities

1. Review and approve submittals, substitutions, change requests, and other Contract Documents that affect the scope of the work. The DOR shall review and respond to BECxP comments on all submittals prior to issuing to the Design Build Entity . The DOR shall provide copies of all approved submittals, change orders, amendments, or other Contract Documents affecting the scope of the work to the BECxP.
2. Attend periodic BECx project meetings with the various members of the design and construction teams, including, but not limited to, the Judicial Council, CM, MEP, BECxP, suppliers, and manufacturer technical representatives. BECx requirements and progress shall be included on the agenda at each BECx project meeting.
3. Conduct periodic site visits with the BECxP to review the progress of the work and evaluate its compliance with the Contract Documents, Judicial Council 's Project Requirements, and industry standards.
4. Provide final resolution of issues and noncomplying work items noted by the BECxP.

E. LEED Consultant's BECx Responsibilities

1. Verify that the BECx scope outlined within the Contract Documents and this Specification meets the requirements for any LEED points solicited for Envelope Commissioning.
2. Complete any reports or forms required to fulfill the Envelope Commissioning LEED criteria.

1.10 COMMISSIONING DOCUMENTATION

A. Provide the following information to the BECxP for inclusion in the Final BECx Report:

1. Submittals, information for systems manuals, and other required documents and reports.
2. Identification of installed building envelope components, assemblies, systems, and equipment, including design changes that occurred during the construction phase, including systems manuals.
3. Test and inspection reports and certificates.
4. Corrective action documents.

B. The BECxP will provide regular reports to the Judicial Council and distribute to other parties as requested by the Judicial Council, as construction Commissioning progresses.

C. A final summary report (including back-up documentation) will be provided by the BECxP to the Judicial Council upon completion of building envelope construction and resolution of unaddressed non-compliant items. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report.

1.11 QUALITY ASSURANCE

A. Quality Assurance and Control: Specific Commissioning quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Specified Commissioning tests, inspections, and related actions do not limit Design Build Entity's obligations under the Contract Documents.

1.12 BUILDING ENCLOSURE TEST PROCEDURES AND STANDARDS

A. AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems. Testing at opaque enclosure areas (as applicable) shall be performed after installation of all air and water barrier penetrations (facade panel attachments, clips, girts, etc.) but prior to installation of exterior insulation and cladding/panel systems.

  1. Acceptance Criteria: No water leakage.

B. AAMA 501.4 – Recommended Static Test Method for Evaluating Window Wall, Curtain Wall and Storefront Systems Subjected to Seismic and Wind-Induced Inter-Story Drift.

  1. Service level displacement: Reference SG001 and 084400, Glazed Framing Systems.
  2. Design level displacement: Reference SG001 and 084400, Glazed Framing Systems.

C. AAMA 501.7 – Recommended Static Test Method for Evaluating Windows, Window Wall, Curtain Wall and Storefront Systems Subjected to Vertical Inter-Story Movements.

  1. Displacement: Reference SG001 and 084400, Glazed Framing Systems.

D. ASTM C794 – Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants. Design Build Entity shall allow a minimum of 21 days or the time period required by the manufacturer, whichever is less, for the sealant to cure fully, then perform sealant adhesion testing.

E. ASTM C1521 – Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints: Destructive "Tail" Procedure Method A (7.3.2). Design Build Entity shall allow a minimum of 21 days or the time period required by the manufacturer, whichever is less, for the sealant to cure fully, then perform sealant adhesion testing.

  1. Acceptance Criteria: Cohesive failure of sealant after an elongation of at least twice the manufacturer's reported design elongation shall be acceptable. Cohesive failure prior to an elongation of at least twice the manufacturer's reported design elongation or adhesive failure at any elongation shall constitute a failure.

F. ASTM D4541 – Standard Test Method for Pull-off Strength for Coatings Using Portable Adhesion Testers. Design Build Entity shall allow the time period required by the manufacturer for the membrane to cure fully prior to testing.

Perform adhesion testing after air and water performance testing.

1. Acceptance Criteria: Measured air barrier adhesion strength shall not be less than 30 psi. The TA shall record the pull-off strength of the membrane for each substrate per ASTM D4541 and provide a written report documenting the results of the testing.

G. ASTM D5957 – Standard Guide for Flood Testing Horizontal Waterproofing Installations. Perform localized flood testing and provide temporary containment assemblies and plug or dam drains, flood with potable water, and let stand for a minimum of 48 hours at roof and overflow drain locations. Design Build Entity shall notify Judicial Council , DOR, and BECxP a minimum 7 days prior to the start of testing and coordinate for access and review by the DOR, BECxP, and/or Judicial Council 's representative after the 48 hours has passed but prior to draining. Design Build Entity and TA shall monitor the interior of the building for water leakage throughout the test. Water leakage observed at any point throughout testing shall constitute a failure of the test. If any leakage occurs, the Design Build Entity shall make permanent repairs to the plaza waterproofing or flashing and repair or replace any material that was damaged or became wet as a result of the leakage. The TA shall provide a written report documenting the results of the testing.

1. Flood Testing of Horizontal Waterproofing Systems: Flood drain sumps and areas around penetrations with potable water to a minimum 1 in., maximum 4 in. height following the procedures outlined in ASTM D5957.

H. ASTM D7877 – Standard Guide for Electronic Methods for Detecting and Locating Leaks in Waterproof Membranes. Perform electronic leak detection testing of new low- slope roofs and waterproofing systems following the procedures outlined in ASTM D7877. The testing shall include, but is not limited to, the actual electronic lead detection testing and verification test cuts to evaluate potential breaches, anomalies, and defects in the roofing and waterproofing systems.

1. Acceptance Criteria: Roofing or waterproofing materials with moisture content above allowable limits provided by the product/roofing manufacturer, or that are visually or tactilely wet, damp, or otherwise defective shall be considered unacceptable. Design Build Entity shall remove all wet or defective materials and replace with new, dry materials in accordance with the specifications at no additional cost to the Judicial Council .

I. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen (laboratory test) and ASTM E783 – Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors (field test). Test shall be conducted with a differential pressure of 6.24 psf for fixed glazing and 1.57 psf for operable glazing. For fixed glazing, the chamber may be positively or negatively pressurized. For operable sashes, the chamber shall be pressurized or depressurized to cause compression of the operable gaskets. Systematically mask enclosure components to provide air leakage values for individual systems.

1. Acceptance Criteria: Individual systems shall not allow more leakage than prescribed in Section 1.13.B.

J. ASTM E330 – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

K. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference (laboratory static test), ASTM E1105 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference (field static test), and AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain walls and Doors Using Dynamic Pressure (lab or field dynamic test). Perform tests at pressures prescribed in Section 1.13.B; no one-third reduction in test pressure shall be allowed. Air pressure chambers on fenestration systems shall be installed such that water leakage through the window perimeter condition is evaluated with the test. Include testing before and after cladding installation as indicated in Section 3.

1. Acceptance Criteria: No water leakage.

1.13 ENCLOSURE PERFORMANCE REQUIREMENTS

A. Reference performance criteria specified herein, as well as the performance criteria specified in each related specification noted above.

B. The performance criteria summary below applies to all mockup and field testing of exterior enclosure components.

Component	**Performance Criteria**	
	Air	**Water**
Glazed Framing Systems (Fixed Glazing)	ASTM E283 / ASTM E783 – Maximum air leakage of 0.06 cfm/sq ft at a static air pressure differential of 6.24 psf.	ASTM E331 / ASTM E1105 / AAMA 501.1 – No water leakage when tested at an applied pressure differential of 20% of positive wind load design pressure, but not less than 15 psf.
Aluminum-Framed Entrances (Operable Glazing)	ASTM E283 / ASTM E783 – Maximum air leakage of 0.3 cfm/sq ft for single doors and 1.0 cfm/sq ft for pairs of doors at a static air pressure differential of 1.57 psf.	ASTM E331 / ASTM E1105 / AAMA 501.1 – No water leakage when tested at an applied pressure differential of the greater of 10 psf, 20% of positive wind load design pressure, or 20% of the positive wind tunnel recorded pressure.

Weather Barriers (Behind Metal Wall Panels) and Precast Architectural Concrete Walls	ASTM E283 / ASTM E783 – Maximum air leakage of 0.06 cfm/ft at an air pressure differential of 6.24 psf.	ASTM E331 / ASTM E1105 / AAMA 501.1 – No water leakage when tested at an applied pressure differential of the greater of 15 psf, 20% of positive wind load design pressure, or 20% of the positive wind tunnel recorded pressure.
	ASTM E1186 (4.2.6) – No major air leaks. Allowable levels of air infiltration shall be determined by the Commissioning Team members during the first instance of testing.	
	ASTM E1186 (4.2.7) – No bubbles observed in the leak detection liquid (applicable to weather barriers only).	AAMA 501.2 – No water leakage when tested under a calibrated water spray at 30 psi.
Low-Slope Roofing Systems	N/A	Electronic Leak Detection Testing: ASTM D7877.
Horizontal Waterproofing Systems	N/A	ASTM D5957 – No water leakage after 48 hrs of 2.5 in. ponded water at drain sump and penetrations. Electronic Leak Detection Testing: ASTM D7877

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 BECX COORDINATION MEETING / PRE-INSTALLATION CONFERENCE

A. The Design Build Entity shall coordinate and participate in a building enclosure coordination meeting/pre-installation conference prior to start of the building enclosure construction. The purpose of this meeting will be to coordinate technical building enclosure details and transitions identified by the design team, as well as discuss performance and testing requirements. This meeting does not replace requirements for the Design Build Entity to submit, for review, fully coordinated shop drawings from individual trades.

B. The BECxP, Judicial Council and/or CM, DOR, enclosure designer, and a qualified representative (foreman, site superintendent, and/or project manager) from Design Build Entity shall attend the BECx Coordination Meeting/ pre-installation conference. Suppliers and manufacturer technical representatives related to the building enclosure work are also required to attend.

3.2 BECX SITE OBSERVATIONS

A. The BECxP will conduct periodic site visits to review the progress of the work and evaluate its compliance with the Contract Documents, Judicial Council 's Project Requirements, and industry standards. Design Build Entity shall coordinate and provide access for the BECxP to review the work.

1. The BECxP will identify noncomplying work items, report them to the OPM and the DOR, and provide a summary report of observations. The summary report will include a list of noncomplying work items to serve as an ongoing construction issues log updated after each site visit. The DOR shall review and provide direction regarding all noncomplying work items.

B. The Design Build Entity shall notify the DOR and the BECxP immediately after any remedial work is completed and before the work is covered for review of the remediated work. Photographic documentation of remediated conditions shall only be acceptable if previously approved by the DOR and the BECxP.

3.3 BUILDING ENCLOSURE PERFORMANCE TESTING

A. General Building Enclosure Testing Requirements

1. The Design Build Entity shall coordinate and/or provide the following:

a. Have a site superintendent or foreman from each trade and/or DOR associated with installing the system present during building enclosure performance testing. The Design Build Entity is responsible for labor, materials, and cost for the testing and testing diagnostics by any means and methods to address the requirements herein.

b. Provide a written protocol and a timeline for repair of any deficiencies noted during the performance testing and/or a written report from the third-party agency performing the tests indicating what repairs are required.

c. Provide a repair and remediation protocol for any failures, identified by the performance testing and diagnostic investigative testing performed by the Design Build Entity , including a timeline for repair of all affected elements. Repaired elements shall not be covered without review by the BECxP and DOR.

2. If a specimen fails testing, the failed specimen shall be remediated, and that specimen shall be tested for compliance with the specification. Additionally, implement repairs to all elements of similar construction and for each failed specimen test a minimum of two additional specimens of similar installation for compliance with the specification. All repair, remediation, retesting, and BECxP costs associated with communication, review, and observations and reporting of repairs and retesting shall be at the Design Build Entity 's expense.

3. The Design Build Entity shall assume responsibility of all testing outlined below and as identified in the corresponding Technical Sections. The Design Build Entity shall appoint, employ, and pay services of qualified independent firm(s) to perform testing as outlined below and as specified herein, in individual Sections, and as additionally required by the DOR. Where testing requirements contradict, the Design Build Entity shall bring the contradiction to the attention of the DOR, BECxP, and Judicial Council , and the Design Build Entity shall assume the more rigorous requirement applies.

4. Notification: Design Build Entity shall notify DOR, Judicial Council , and BECxP a minimum 7 days prior to any BECx performance testing.

5. If it is determined that a system is constructed according to the Contract Documents but is not performing as intended, the Judicial Council will decide whether modifications are required to bring the performance of the system to a level where the noted failure or deficiency is eliminated. If corrective work is performed, the Judicial Council shall decide whether additional tests are required. All modifications and additional tests performed at the Judicial Council 's and OPM's direction will be eligible for additional compensation.

6. If tests cannot be completed because of a deficiency outside the scope of the repair work, the deficiency shall be documented and reported to the Judicial Council , OPM, and DOR, who shall collectively determine how to resolve these deficiencies.

3.4 ACCEPTANCE PHASE AND PROJECT CLOSEOUT

A. As part of the project record closeout documentation at the completion of the work, the Design Build Entity shall provide a systems manual that includes all test reports, inspection reports and certificates, manufacturer operation instructions for all operable elements of the building enclosure, and recommended maintenance frequency and maintenance requirements for each major building exterior enclosure system.

B. At the completion of construction, the BECxP will provide a final Commissioning report that includes a summary of the Commissioning activities, all outstanding noncompliance items, and all relevant reports and documentation.

3.5 LABORATORY PERFORMANCE MOCKUP TESTING

A. Reference 084400, Glazed Framing Systems for laboratory performance mockup and testing requirements. Laboratory performance mockup testing specimen to include typical glazed curtain wall and precast architectural concrete assemblies.

B. In general the mockup performance test sequence shall include:

1. Structural: ASTM E330 at 50 percent of the positive wind load design pressure
2. Air infiltration: ASTM E283
3. Static Pressure Water Penetration: ASTM E331
4. Dynamic Pressure Water Penetration: AAMA 501.1
5. Structural: ASTM E330 at 100% of positive and negative wind load design pressure
6. Repeat Static Pressure Water Penetration: ASTM E331
7. Vertical Interstory Movement: AAMA 501.7
8. Repeat Static Pressure Water Penetration: ASTM E331
9. Interstory Drift: AAMA 501.4 at service level drift
10. Repeat Static Pressure Water Penetration: ASTM E331
11. Structural: ASTM E330 at 100 percent of positive and negative wind load design pressure
12. Repeat Static Pressure Water Penetration: ASTM E331
13. Structural: ASTM E330 at 150% of positive and negative wind load design pressures
14. Interstory Drift: AAMA 501.4 at design level drift

3.6 FIELD PERFORMANCE TESTING

A. Joint Sealant and Membrane Adhesion Testing During Construction

[Text in red to be edited by Design Build Entity.]

1. Sealant Adhesion Testing: ASTM C1521, Destructive “Tail” Procedure Method A.
    a. TA to perform testing at the rate of one test per 100 lf of installed sealant for the first 1,000 ft of joint. If no test failure is observed in the first 1,000 lf, perform one test per 1,000 lf thereafter, or once per floor per elevation.
2. Membrane Adhesion Testing: ASTM D4541
    a. TA shall record the pull-off strength of the membrane at a minimum of three locations for each substrate (testing on mockup only is acceptable).

B. Perform the following tests upon completion of each system/area

1. Single-ply Low-slope Roofing
    a. Electronic Leak Detection Testing: ASTM D7877
2. Horizontal Waterproofing
    a. Flood Testing Drains and Penetrations: ASTM D5957
    b. Electronic Leak Detection Testing: ASTM D7877

C. Building Enclosure Water Penetration Testing

1. Static Water Penetration Testing: ASTM E1105
    a. Fenestration: Test three areas for each unique fenestration assembly (e.g., CW-1, CW-2, etc.) upon 10% completion, 35% completion, and 70% completion. Each test specimen shall include three curtain wall bays wide by one story high. At least one specimen at each percentage completion shall include an interface with an adjacent assembly (e.g., curtain wall to precast, curtain wall to horizontal waterproofing, curtain wall to air barrier, etc.).
2. Nozzle Water Testing: AAMA 501.2
    a. In conjunction with fenestration water penetration testing at 10% completion, 35% completion, and 70% completion described above, perform nozzle testing as directed by the BECxP and DOR. Testing can include up to 150 lf at up to two locations for each round of testing and can include fenestration system joints and interfaces, system perimeter condition, transitions between systems, and air barrier penetrations.

3.7 COMMISSIONING TASK MATRIX

A. The following table summarizes Commissioning tasks outlined in this specification. Refer to Specification Sections outlined in Section 1.2 above for specific Section- related requirements beyond what is noted herein.

[Text in red to be edited by Design Build Entity.]

TASKS	**RESPONSIBLE**	**ASSIST / PARTICIPATE**	**DELIVERABLE**	**SCHEDULE MILESTONE**
General				
Submittals and Shop Drawings	Design Build Entity	DOR, BECxP	Approved Shop Drawings and Submittals	Prior to start of construction of every enclosure related system
Site Observations	DOR, BECxP	Design Build Entity	Site Visit Report	Periodically during construction
Sealant compatibility and adhesion tests	Manufacturer	Design Build Entity	Written test report and approval letter	Prior to the installation of sealant at each substrate type on the project.
Air Barrier Adhesion Testing	TA	Design Build Entity	Written test report and approval letter	Prior to installation of cladding systems.
Mockup (as applicable) and In Situ Performance Tests				
Flood Test at Drains and Penetrations of Horizontal Waterproofing ASTM D5957	TA	Design Build Entity / Manufacturer	Written Test Report	At completion of roofing and drain installation at low-slope roof and terrace waterproofing
ELD Test of Low-Slope Roof and Horizontal Waterproofing ASTM D7877	TA	Design Build Entity	Written Test Report	At completion of roofing assembly

[Text in red to be edited by Design Build Entity.]

TASKS	RESPONSIBLE	ASSIST / PARTICIPATE	DELIVERABLE	SCHEDULE MILESTONE
Sealant Adhesion Testing (ASTM C1521 Method A)	TA	Design Build Entity	Written Test Report	On exterior performance mockup and periodically during construction In situ (as described above)
Membrane Adhesion and Durability Testing ASTM D4541	TA	Design Build Entity	Written Test Report	On exterior performance mockup and periodically during construction In situ (as described above)
Static Water Penetration Testing ASTM E1105	TA	Design Build Entity , **BECxP	Written Test Report	On exterior performance mockup and periodically during construction In situ for each unique fenestration (as described above)
AAMA Nozzle Testing AAMA 501.2	TA	Design Build Entity , **BECxP	Written Test Report	On exterior performance mockup and periodically during construction In situ for each unique fenestration (as described above)
Fenestration Air Leakage Testing ASTM E783	TA	Design Build Entity , **BECxP	Written Test Report	On exterior performance mockup.

** Denotes BECxP will witness, at a minimum, the first test.

END OF SECTION

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5 March 2014
Project No. 731563902

LANGAN TREADWELL ROLLO

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GEOTECHNICAL INVESTIGATION
LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Langan Treadwell Rollo, for the planned Lakeport Courthouse at 675 Lakeport Boulevard in Lakeport, California. This investigation was performed in accordance with our proposal dated 20 January 2015. Previously, we performed a geotechnical investigation for the project and submitted the results in a report dated 10 February 2012. Since that time, the location of the building has been modified and additional information was requested for design of the building foundations. This report supersedes the 2012 report.

The site is irregularly shaped and is bound by Lakeport Boulevard on the north, retail buildings and parking lots on the east, the Lake County Chamber of Commerce visitor center and vista point on the west, and undeveloped property and businesses on the south, as shown on Figure 1. The western shoreline of Clear Lake is approximately 1/2 mile to the east. The site has maximum plan dimensions of approximately 520 by 560 feet, and is currently vegetated with low weeds and grass. The ground surface elevation at the site ranges from about 1343 to 1413 feet.[1] The western two-thirds of the site is relatively level, with ground surface elevations generally between approximately 1392 and 1395 feet, except near the western boundary, where the site slopes up to Elevation 1413 feet. The eastern one-third of the site slopes down toward the north and east at a maximum inclination of about 1.8:1 (horizontal to vertical) to approximate Elevation 1343 feet.

We understand the courthouse will be two stories. The lower level will be cut into the north and east slopes with a finished floor elevation at Elevation 1380 feet. The upper level will have a finished floor at Elevation 1394 feet. A parking lot will be located south of the courthouse.

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[1] Elevations discussed in this report are based on National Geodetic Vertical Datum of 1929.

Additional improvements will include a new access road from Lakeport Boulevard, a driveway to access lower-level of the building from the north side of the courthouse, an equipment enclosure, hardscaping, and landscaping. Retaining walls will be required to support portions of the eastern and northern edges of the building and the north side of the driveway. The approximate locations of the planned improvements are shown on Figure 2.

Based on information provided by the project structural engineer, Forell/Elsesser Engineers, Inc., we anticipate dead plus live column loads will be on the order of 376 kips if the building is framed using steel or 548 kips for concrete construction.

2.0 SCOPE OF SERVICES

Our scope of services, as outlined in our proposal dated 20 January 2015, consisted of further exploring the subsurface conditions at the site and performing supplemental engineering analyses to develop geotechnical conclusions and recommendations regarding:

- soil, rock, and groundwater conditions at the site
- site seismicity and seismic hazards
- site geology and geologic hazards
- presence of naturally-occurring asbestos in bedrock
- the most appropriate foundation type(s) for the proposed courthouse
- design criteria for the recommended foundation type(s), including vertical and lateral capacities
- estimates of building settlement, including total and differential settlements
- excavation
- cut slopes and temporary shoring
- basement and retaining walls

- concrete flatwork and flexible pavement
- site grading, including criteria for fill quality, fill placement, and compaction
- slope stability
- subgrade preparation and moisture protection for floor slabs
- corrosion potential of near-surface soil
- underground utilities
- seismic design parameters in accordance with the 2013 California Building Code
- construction considerations.

3.0 FIELD INVESTIGATION

3.1 Previous Investigation

In 2011, we investigated the site by drilling six borings and excavating three test pits at the site. The approximate locations of the borings and test pits are presented on Figure 2. Prior to performing the field investigation permits were obtained from Lake County Health Services Department and Lake County Air Quality Management District, and Underground Service Alert was notified to check that the locations of exploratory points were clear of existing utilities.

The borings, designated B-1 through B-6, were drilled on 28 and 29 November 2011 by Clear Heart Drilling of Santa Rosa, California using a truck-mounted drill rig equipped with hollow-stem augers. Three of borings, B-1 through B-3, were drilled at the location of the planned courthouse to depths ranging from about 40-1/2 to 60-1/2 feet below the existing ground surface (bgs). The remaining three borings, B-4 through B-6, were drilled in the planned parking lot to depths ranging from 5-1/2 to 6-1/2 feet bgs. The test pits, designated TP-1 through TP-3, were excavated on 28 and 29 November 2011 using a backhoe by Ryan Villanueva Construction of Lakeport, California. The test pits were excavated to depths of approximately 2-1/2 to 17 feet bgs. Our geologists logged the borings and test pits and obtained representative samples of the soil and rock encountered for classification and laboratory testing. The boring logs are presented in Appendix A on Figures A-1 through A-6. The test pit logs are presented in Appendix A on Figures A-7 through A-9. The soil and rock encountered during our investigation were classified in accordance with the classification systems presented on Figures A-10 and A-11, respectively.

Soil samples were obtained during drilling of the borings using the following sampler types:

- Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch-outside diameter and a 1.5-inch-inside diameter, without liners
- Sprague and Henwood (S&H) split-barrel sampler with a 3.0-inch-outside diameter and a 2.5-inch-inside diameter lined with brass or stainless steel tubes with an inside diameter of 2.43 inches.

The samplers were driven with a 140-pound automatic hammer falling 30 inches. The samplers were driven up to 18 inches and the hammer blows required to drive the samplers every six inches of penetration were recorded and are presented on the boring logs. A "blow count" is defined as the number of hammer blows per six inches of penetration or 50 blows for six inches or less of penetration. The driving of samplers was discontinued if the observed (recorded) blow count was 50 for six inches or less of penetration. The blow counts required to drive the S&H and SPT samplers were converted to approximate SPT N-values using factors of 0.7 and 1.2, respectively, to account for sampler type and hammer energy and are shown on the boring logs. The blow counts used for this conversion were: 1) the last two blow counts if the sampler was driven more than 12 inches, 2) the last one blow count if the sampler was driven more than six inches but less than 12 inches, and 3) the only blow count if the sampler was driven six inches or less.

Upon completion of the field investigation, the boreholes were backfilled with cement grout in accordance with Lake County requirements. Soil cuttings generated from the borings were scattered onsite adjacent to each borehole. The test pits were backfilled with the excavated material, which was tamped in place using the backhoe bucket. The disturbed soil surfaces were misted with water and covered with hay to control dust.

3.2 Supplemental Investigation

To further evaluate the depths of bedrock and develop bedrock elevation contours, we retained Norcal Geophysical Consultants Incorporated (NCGI) to perform six seismic refraction surveys at the site. At one of the seismic lines, a multichannel analysis of surface waves (MASW) evaluation was also performed to measure shear wave velocities of the subsurface strata. The locations of the seismic lines were determined at the site by our geologist and are shown on Figure 2. The surveys were performed on 28 and 29 January 2015. The methodology and results of the surveys are presented in the NGCI report in Appendix B.

4.0 LABORATORY TESTING

4.1 Geotechnical Laboratory Testing

The soil and rock samples obtained from the borings and test pits were re-examined in our office to confirm the field classifications and to select representative samples for geotechnical laboratory testing. Soil samples were tested to measure moisture content, Atterberg limits, resistance value (R-value), and corrosion potential. The geotechnical laboratory test results are presented on the boring logs and in Appendix C.

4.2 Analytical Laboratory Testing for Asbestos

Four samples of fill, soil, and serpentinite-type rock collected from the test pits were submitted to an analytical laboratory for evaluation of naturally-occurring asbestos content. The test results are presented in Appendix D. The samples were analyzed using the Polarized Light Microscopy method, with sample preparation in accordance with California Air Resources Board Method 435, to evaluate the presence and quantity of asbestos (particularly chrysotile-type fibers) for the purpose of disposal. The laboratory results indicated that asbestos fibers were detected in one of the samples; however, the concentration was less than 0.25 percent chrysotile fibers by weight, as shown in Appendix D. Serpentinite material with less than 0.25 percent chrysotile fibers may be disposed offsite or used onsite as backfill without restriction.

5.0 SITE AND SUBSURFACE CONDITIONS

5.1 Site Conditions

The site is located on the northeast flank of a northwest-southeast trending, serpentinite bedrock ridge. The site is characterized by relatively steep, north-, east- and south-facing slopes throughout most of the site, with relatively level topography within the vicinity of the planned parking area and adjacent portions of the new courthouse, as shown on Figure 2. Based on subsurface information and observations made during the 2011 field investigation, it appears that previous grading activities have resulted in an extensive cut/fill pad at the top of the site. Slopes associated with the fill prism underlying the pad extend radially from the pad from the northeast to the south, with inclinations of approximately 1.8:1 (horizontal to vertical). A cut at the same approximate inclination was excavated into the slope below the Lakeport Community Center property, located immediately west of the planned site improvements. Steep cuts were also made downslope to the north of the planned development, most likely in association with Lakeport Boulevard construction. Along the eastern and southern edges of the site, cuts were graded at the base of the fill prism to create an unpaved access road from Lakeport Boulevard to the top of the fill pad. It appears that the access road is supported on the outboard edge by fill throughout its length. A new access road is depicted as being roughly within the same alignment of the existing road, as shown on Figure 2.

5.2 Site Geology and Subsurface Conditions

According to published geologic maps of the area (Regional Geologic Map, Figure 3), the site is underlain at depth by serpentinite bedrock materials of the Franciscan Assemblage. An engineering geologic map of the site is shown on Figure 4. Our generalized interpretations of the subsurface conditions at the site are depicted on Figures 5 and 6, Idealized Subsurface Profiles A-A' and B-B', respectively.

As much as 18 feet of fill overlying serpentinite bedrock was encountered in boring B-2, located on the northeastern crest of the fill pad. Fill up to 15-1/2 feet thick was encountered in test pit TP-2, located approximately 50 feet downslope of boring B-2. A small wedge of fill was identified in boring B-5 underlying the southwestern section of the pad, within the vicinity of the planned parking lot. Fill in this area is at least six feet thick; drilling was not advanced to bedrock in this boring. The fill is generally comprised of cobble- to boulder-sized serpentinite clasts, loose to dense clayey gravel to gravel with sand, stiff to very stiff clay with variable sand and gravel content, and hard sandy silt with gravel. Approximately two to three feet of fill, consisting of sandy to silty clay with gravel, appears to have been placed on the pad to the west of the main fill prism, likely to construct a level pad. Based on the results of an Atterberg limits test, the fill at the site has a high expansion potential.[2]

In general, the cut and fill slopes at the site appear to be in good condition. However, the existence of a buried topsoil layer under the fill in test pit TP-1 indicates that it is unlikely that the fill was placed in accordance with accepted engineering standards. During our site visit to conduct subsurface exploration activities, we noted several areas of topographic depressions on the fill pad, potentially resulting from fill settlement.

The fill is underlain by bedrock that consists of serpentinite. The condition of the serpentinite bedrock encountered during the field investigation was observed to be variable throughout the site and within the individual borings and test pits. Bedrock conditions are characterized as ranging from soft and deeply weathered to very hard with little weathering, with areas intact (few fractures) to intensely crushed. Bedrock was well-exposed in site cuts. The approximate depth to the top of the bedrock, as measured from the existing ground surface in our borings and test pits, and the corresponding elevation are summarized in Table 1. Bedrock was not

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[2] Highly expansive soil undergoes large volume changes with changes in moisture content.

encountered in borings B-5 and B-6. Top of bedrock contours based on the results of the Norcal seismic refraction surveys are presented on Figure 7.

TABLE 1

Approximate Depths and Elevations of Bedrock

Boring/ Test Pit No.	Approximate Depth to Bedrock (feet bgs)	Approximate Bedrock Elevation (feet)
B-1	2.75	1388
B-2	18	1376
B-3	17.5	1378
B-4	2.5	1390
TP-1	1.5	1368
TP-2	16	1365
TP-3	1	1350

Groundwater was encountered in borings B-1 and B-3 at approximately 60 feet below ground surface, corresponding to Elevations 1331 feet and 1335 feet, respectively. The groundwater level at the site is expected to vary with seasonal rainfall.

6.0 REGIONAL GEOLOGY

The site is approximately 1/2 mile west of Clear Lake. The property is located within the Geysers-Clear Lake geologic region, within the northern California Coast Ranges geomorphic province. The Geysers-Clear Lake region lies within the Maacamas Mountains, between the San Andreas fault system to the southwest and the Coast Range thrust system to the northeast. The Coast Range thrust fault system offsets accretionary wedge rocks of the Franciscan assemblage from rocks of the Great Valley Sequence. The regional geology of the site vicinity is shown on Figure 3.

The Franciscan assemblage is a heterogeneous assemblage that consists largely of dismembered sequences of greywacke, shale, and lesser amounts of mafic volcanic rocks, thinly-bedded chert, and limestone. These rocks also occur with serpentinite and tectonic pods of blueschist in localized areas. The assemblage also contains many areas of sheared heterogenous mixes of these rocks, classified as mélange. The sedimentary and volcanic Franciscan rocks were formed in a marine environment, as attested by the abundance of foraminifers in the limestone and by radiolarians in the chert. Most of these rocks are probably Late Jurassic and Cretaceous in age (Bailey and others, 1964), but some of the chert and associated volcanic rocks are as old as Early Jurassic (Irwin and others, 1977; Blome and Irwin, 1983). In the northern Coast Ranges, some of the rocks assigned to the coastal belt of the Franciscan assemblage are as young as late Tertiary and are thought to have accreted to North America during post-middle Miocene time (McLaughlin and others, 1982). The Franciscan assemblage consists of mélange units and less disturbed sedimentary, meta-sedimentary, and meta-volcanic rocks that were scraped off the subducting plate in the Jurassic and Cretaceous time.

The Great Valley sequence consists of interbedded marine mudstone, sandstone, and conglomerate that range from Late Jurassic to Cretaceous in age (Bailey and others, 1964). It crops out as thick, monotonously bedded sections of strata that generally are markedly less deformed and more coherent than sedimentary sections of the Franciscan and also have greater lateral continuity. Where most fully developed, such as along the west side of the northern Great Valley, the aggregate stratigraphic thickness of Great Valley sequence is at least 12 kilometers (km). The strata normally lie depositionally on Coast Range ophiolite, except where disrupted by faults, but at the north end and along the east side of the Great Valley they overlie the Nevadan and older basement terranes of the Klamath Mountains and Sierra Nevada. This enormous thickness of clastic detrital material probably represents submarine fans and turbidity deposits that formed as a result of rapid erosion of the ancestral Klamath Mountains and Sierra Nevada.

Overlying the Franciscan assemblage within the site vicinity are localized younger deposits comprised of the early Holocene to late Pliocene (approximately 10,000 to 2.25 million years old) Clear Lake Volcanic rocks. The Clear Lake Volcanics are mostly silica-rich volcanic rocks (such as obsidian) located in and around Clear Lake, but also include some basaltic rocks. For the past million years or so, the main center of volcanic activity has been south and east of Clear Lake. Interbedded with the Clear Lake Volcanics is a Pliocene-Pleistocene sequence of lake and stream bed deposits up to approximately 2 km thick.

7.0 REGIONAL SEISMICITY AND FAULTING

The western margin of California is recognized by geologists and seismologists as one of the most active seismic regions in the United States. The three major faults that pass through the region, trending northwest-southeast, have produced approximately 12 earthquakes per century strong enough to cause structural damage. The faults causing such earthquakes are part of the San Andreas and Coast Range thrust fault systems. The major active fault systems in the vicinity of the project site are the Collayomi, Maacama-Garberville, Bartlett Springs and Huntington Creek-Berryessa fault zones. These and other faults of the region are shown on Figure 8. For each of the active faults within 100 kilometers of the particular site, the distance from the site and estimated mean characteristic Moment magnitude[3] event [2007 Working Group on California Earthquake Probabilities (WGCEP) (2008) and Cao et al. (2003)] are summarized in Table 2.

TABLE 2

Regional Faults and Seismicity

Fault Segment	Approx. Distance from fault (km)	Direction from Site	Mean Characteristic Moment Magnitude
Collayomi	6.8	Southeast	6.70
Maacama-Garberville	15	West	7.40
Bartlett Springs	24	Northeast	7.30
Hunting Creek-Berryessa	38	East	7.10
Rodgers Creek	52	South	7.07

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[3] Moment magnitude is an energy-based scale and provides a physically meaningful measure of the size of a faulting event. Moment magnitude is directly related to average slip and fault rupture area.

Fault Segment	Approx. Distance from fault (km)	Direction from Site	Mean Characteristic Moment Magnitude
Total Hayward-Rodgers Creek	52	South	7.33
Great Valley 2	55	East	6.50
N. San Andreas - North Coast	55	Southwest	7.51
N. San Andreas (1906 event)	55	Southwest	8.05
Great Valley 3, Mysterious Ridge	56	East	7.10
Great Valley 1	62	East	6.80
N. San Andreas - Offshore	81	West	7.37
Great Valley 4a, Trout Creek	81	East	6.60
West Napa	84	Southeast	6.70

Figure 8 also shows the earthquake epicenters for events with magnitude greater than 5.0 from January 1800 through December 2000. Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836, an earthquake with an estimated maximum intensity of VII on the Modified Mercalli (MM) scale (Figure 9) occurred east of Monterey Bay on the San Andreas Fault (Toppozada and Borchardt 1998). The estimated Moment magnitude, M_w, for this earthquake is about 6.25. In 1838, an earthquake occurred with an estimated intensity of about VIII-IX (MM), corresponding to a M_w of about 7.5. The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista approximately 470 kilometers in length. It had a maximum intensity of XI (MM), a M_w of about 7.9, and was felt 560 kilometers away in Oregon, Nevada, and Los Angeles. The Loma Prieta Earthquake of 17 October 1989, in the Santa Cruz Mountains with a M_w of 6.9, approximately 240 kilometers from the site.

In 1868, an earthquake with an estimated maximum intensity of X on the MM scale occurred on the southern segment (between San Leandro and Fremont) of the Hayward Fault. The estimated M_w for the earthquake is 7.0. In 1861, an earthquake of unknown magnitude (probably a M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake (M_w = 6.2). The most recent earthquake felt in the vicinity of the site occurred on 24 August 2014 and was located on the West Napa Fault, approximately 100 kilometers southeast of the site, with a M_W of 6.0.

The 2007 WGCEP at the U.S. Geologic Survey (USGS) predicted a 30-year probability of a Magnitude 6.7 or greater earthquake on one of the active faults in the San Francisco Bay Area to be about 63 percent. The Hayward-Rodgers Creek and North San Andreas faults are estimated to have 30-year probabilities of a magnitude 6.7 or greater earthquake of 31 percent and 21 percent, respectively (WGCEP, 2008).

In addition to the active faults listed in Table 2, the site is mapped as being located within close proximity of two potentially active fault traces, as discussed in a geological hazards screening evaluation performed by Fugro-William Lettis & Associates (FWLA), dated 19 May 2010. The West Margin fault is located approximately 0.8 miles to the west of the site and is considered to be active within the Quaternary period, 1.8 million years ago to present). The western trace of the Big Valley fault is mapped approximately 700 feet east of the site. Portions of this fault located east/southeast of the site exhibited displacement within the Late Quaternary period (about 700,000 years ago to present). Based on our review of the Lake County General Plan Background Report, dated February 2003, we understand that Lake County considers faults with Quaternary displacement as potentially active. These faults are not considered to be potential seismic sources for large earthquakes; however fault rupture on these faults could occur as sympathetic movement during a large earthquake on one of the other fault traces in the region.

8.0 DISCUSSION AND CONCLUSIONS

On the basis of the results of our subsurface investigation and geologic reconnaissance, we conclude that from a geotechnical engineering standpoint, the site can be developed as planned. The primary geotechnical concerns for the project include:

- the presence of variable subsurface conditions, including shallow bedrock in the western portion of the site, highly expansive soil, and up to 18 feet of fill in the eastern portion of the site
- support of the planned courthouse on the existing fill
- proper design and construction of below-grade and/or retaining walls to support the existing fill slopes, new fill, and rock.

These and other geotechnical concerns, and their impact on foundation design, excavation, and construction, are discussed in the following sections.

8.1 Seismic and Geologic Hazards

During a major earthquake on a segment of one of the nearby faults, strong to very strong shaking is expected to occur at the project site. Very strong shaking during an earthquake can result in ground deformation associated with seismically-induced slope instability, soil liquefaction[4], lateral spreading[5], and cyclic densification[6]. Soil most susceptible to liquefaction, lateral spreading, and cyclic densification is loose, clean, uniformly graded sand and silt of low plasticity that is relatively free of clay.

We conclude the primary geologic hazards that may affect the site are the potential for strong to very strong shaking associated with a large-magnitude earthquake on a major active fault in the region and ground deformation associated with sympathetic movement of a nearby

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[4] Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits.

[5] Lateral spreading is a phenomenon in which surficial soil displaces along a shear zone that has formed within an underlying liquefied layer. Upon reaching mobilization, the surficial blocks are transported downslope or in the direction of a free face by earthquake and gravitational forces.

[6] Cyclic densification is a phenomenon in which non-saturated, cohesionless soil is compacted by earthquake vibrations, causing differential settlement.

potentially-active fault during such an event. These and other geologic hazards are discussed in the following sections.

8.1.1 Strong Ground Shaking

The intensity of the earthquake ground motion at the site will depend upon the type of source fault (i.e. reverse, strike-slip), distance of the earthquake epicenter, magnitude and duration, as well as site geologic conditions. We conclude that the site will be subjected to strong to very strong ground shaking from a major earthquake on at least one of the nearby active faults during the design life of courthouse.

8.1.2 Surface Fault Rupture

Historically, ground surface ruptures closely follow the traces of geologically young faults. The property is not mapped as being within an Alquist-Priolo Zone and no known active or potentially active faults exist on the site. In their fault rupture hazard evaluation, FWLA concluded a moderate potential for fault rupture exists for the site, likely associated with the potentially active, western trace of the Big Valley fault or a potentially unknown, active fault trace.

Based on our review of the FWLA report, and the California Fault Activity Map (Figure 7) and associated report (Jennings and Bryant, 2010), we understand that ground ruptures were mapped approximately one mile southeast of the site on the Big Valley fault following the 1906 earthquake, possibly as a result of sympathetic fault movement with the San Andreas fault.

We did not observe evidence for faulting in the borings or test pits; however, our field investigation did not include a specific geologic hazards evaluation for fault rupture potential, which would include continuous fault trenching and/or seismic refraction surveys across the entire site.

On the basis of our review of the regional geologic map of the area, it appears that the serpentinite outcrops that penetrate up through the overlying younger lake and terrace deposits within this area are part of a north to northwest trending, steeply dipping bed of serpentinite. The serpentinite all appears to be located west of the western trace of the Big Valley fault, and the eastern edge of the serpentinite may actually lie in faulted contact (along the western trace of the Big Valley Fault) with the underlying basement rock beneath the Tertiary lake deposits. Thus, areas such as our site which appears to be entirely underlain by serpentinite would be located west of the western trace of the Big Valley fault.

On the basis of our not observing any fault features in our test pits or borings, and our observations of continuity of bedrock (serpentinite) across the site, we conclude that the potential for surface fault rupture at the site is low, but not negligible. We recommend that our geologist observe the foundation excavations for the building during construction to confirm our conclusions that that no active faulting is observed beneath the structure.

8.1.3 Liquefaction and Lateral Spreading

Groundwater was encountered at approximately 60 feet bgs in bedrock, between Elevations 1331 and 1335 feet. Based on our observations of the subsurface conditions, we conclude that the potential for seismically-induced liquefaction and liquefaction-induced ground failures such as lateral spreading at the site is very low.

8.1.4 Cyclic Densification

Seismically-induced compaction or cyclic densification of non-saturated cohesionless soil (sand, silt, and gravel above the groundwater table) caused by earthquake vibrations may result in settlement. Approximately 2-1/2 to 3-1/2 feet of loose gravel with sand and medium dense gravel with clay were encountered above the groundwater in borings B-2 and B-3. We compute that shallow foundations and surface improvements bearing within these non-saturated granular layers may settle as much as 1/4 inch due to strong shaking from a large earthquake, with a possibility of abrupt differential settlements of as much as 1/4 inch.

8.1.5 Landslides and Slope Stability

On the basis of our observations, we conclude the existing fill slopes at the site are stable and the potential for deep-seated landslides to develop at the site is low. However, we conclude there is a moderate potential for sloughing or raveling of the fill on the surfaces of the slopes, especially when subjected to prolonged wet weather. Where not retained by new walls, a possibility exists that the fill slopes may creep. The risks associated with these hazards can be reduced by flattening slopes, implementing proper drainage control, and maintaining vegetation on the slopes.

We anticipate site grades will generally be maintained in their current condition, except where retaining walls are planned and where a cut on the order of 15 feet will be excavated into the slope to accommodate the lower level of the courthouse. We conclude the planned development should not adversely affect the stability of the slopes, provided the proposed grading, fill placement, retaining walls, and drainage are designed and constructed in accordance with our recommendations.

8.1.6 Subsidence

Subsidence typically occurs as a result of subsurface fluid extraction (e.g. groundwater, petroleum) or compression of soft, geologically young sediments from vertical loads. Groundwater extraction for municipal and agricultural use has the potential to cause ground subsidence. The groundwater at the site was encountered within bedrock. Based on our observations, we judge the potential for subsidence at the site due to groundwater extraction to be low. We expect that subsidence resulting from future extraction of groundwater would be negligible.

8.1.7 Expansive Soil

Expansive soils are those that shrink or swell significantly with changes in moisture content. The clay content and porosity of the soil also influence the change in volume. The shrinking and swelling caused by expansive clay-rich soil often results in damage to overlying structures. Based on the field observation and test results, it appears that fill materials encountered on the pad are highly expansive with a plasticity index (PI) of 32.

8.1.8 Flood Inundation

Our review of Lake County Special Flood Hazard Area Maps and FEMA Digital Flood Insurance Rate Maps indicate that the site is not located within an area subject to flooding.

8.1.9 Seiches

Seiches are large waves that occur within enclosed bodies of water as a result of ground shaking caused by seismic activity. Seiches can cause damage by flooding caused by wave run-up on the shore, or if they overtop a dam or berm. The site is located approximately 1/2 mile inland of the western shore of Clear Lake, with an elevation difference of approximately 14 feet between the lake and lowest point of the property. The elevation difference between the lake and the proposed development at the top of the site is 51 feet; consequently, we conclude that the potential for damage to site improvements as a result of a seiche from Clear Lake is negligible.

8.2 Corrosion Potential

We performed corrosivity tests on soil samples collected from boring B-3 at depths of 3 and 16 feet bgs. The soil samples were tested in accordance with Caltrans and ASTM protocols by Environmental Technical Services (ETS) of Petaluma, California. The corrosivity test results are presented on Figure C-4 in Appendix C.

8.3 Settlement of Existing and New Fill

As much as 18 feet of fill is present at the site, and we anticipate on the order of 5 to 10 feet of new engineered fill will be placed at the northeast corner of the building pad and for the planned driveway, where retaining walls are planned. It is not known whether the existing fill at the site was placed in a controlled manner. SPT blowcounts recorded during our field investigation indicate the fill is generally stiff to very stiff (for clays and silts) and loose to dense (for gravels), as discussed in Section 5.2. Based on the extent and variability of the fill at the site, as well as topographic depressions observed on the fill pad, we conclude that settlement of the existing fill may occur under new loads.

We estimate that near-surface site improvements supported on fill may experience erratic settlements on the order of 1-1/2 percent of the total thickness of existing fill and on the order of 1/2 percent of the total thickness of proposed fill, resulting in settlements of about 3-1/4 inches for the 18 feet of existing fill and between about ¼ and ¾ inch for the 5 to 10 feet of planned engineered fill.

8.4 Foundation Support and Settlement

The proposed building location is underlain by:

- variable subsurface conditions, with as much as 18 feet of existing hetergeneous fill at the eastern portion of the site and bedrock depths ranging from about 3 to 15 feet bgs within the planned building footprint
- highly expansive near-surface fill.

Expansive soil is subject to high volume changes during seasonal fluctuations in moisture content, which can cause cracking of foundations and floor slabs. \The detrimental effects of near-surface expansive soil can be mitigated by moisture-conditioning the expansive soil below slabs, placing non-expansive fill below slabs, supporting foundations below the zone of severe moisture change, and/or designing foundations to resist the movements associated with the volume changes.

The variable depth to bedrock and thickness of existing fill within the building footprint can result in differential settlement of soil underlying the planned building; the settlement is expected to be erratic. To reduce the potential for differential movement of foundations resulting from fill settlement and expansive soil, we conclude foundations for the proposed courthouse should gain support in the bedrock underlying the fill. Where rock is encountered at or near the subgrade level, the structure can be supported on spread footings. Where shallow rock is encountered on the lower portions of the existing slopes at the northern and eastern edges of the building (below the existing fill prism), we conclude spread footings can be used provided that adequate vertical and lateral support on the slopes can be achieved. Where bedrock depth or slope renders footings impractical, drilled piers bearing in rock may be used to support the structure. We anticipate that footings and drilled piers bottomed in rock will settle less than an inch.

Approximate top of bedrock contours were developed using the results of our field investigation and our supplemental investigation and are shown on Figure 7. Additional investigation consisting of exploratory pits, borings, or piers can be performed during the initial stages of construction to further confirm the depths to bedrock. It is therefore important that the foundation design and construction documents allow for switching from one foundation type to the other as field conditions dictate.

Where the northern and eastern edges of the building will extend over the existing fill slopes, we have assumed that drilled piers or footings installed on the slope will be capped with a continuous grade beam supporting a formed wall backfilled with engineered fill to support the building slab. Footings behind retaining walls will need to be deepened below the zone of influence of the wall, or drilled piers be used, to reduce the potential for surcharging the wall.

8.5 Floor Slabs

The floor slab will be underlain by bedrock or fill consisting of very stiff sandy clay, hard sandy silt, or medium dense clayey gravel, and we conclude the floor slab will need to be designed as a structural slab to span between footings and piers and not rely on the ground for support. For the upper level floor slab, if movement of water vapor through the slab is undesirable, a capillary moisture break and water vapor retarder (recommended in Section 9.3) can be installed beneath the slab to reduce water vapor transmission through the slab. We conclude the lower level floor slab will need to be waterproofed.

8.6 Excavation and Shoring

We understand the lower level of the courthouse will be cut into the fill slope with a finished floor elevation at 1380 feet, approximately 15 feet below the existing grade at the top of the slope. Additional excavations are planned to be cut into the existing bedrock and fill slopes to construct the driveway along the northern side of the courthouse; these excavations will be up to approximately 6 feet deep. The excavations at the site will need to be permanently retained.

The soil to be excavated consists predominantly of clay, sand, silt, and gravel, which can be excavated with conventional earth-moving equipment such as loaders and backhoes. We anticipate that bedrock will be encountered within the excavations, especially at the western portion of the site outside the zones of existing fill. Where bedrock is present within the planned depth of excavation, the contractor will need to select equipment that is capable of excavating and removing rock from the site. Excavations deeper than five feet that will be entered by workers should be shored or sloped in accordance with the Occupational Safety and Health Administration (OSHA) standards (29 CFR Part 1926).

If there is insufficient space to slope the sides of the excavations, shoring will be required. Considering the anticipated excavation depths and the expected soil/rock conditions, we conclude that soldier-pile-and-lagging shoring systems are suitable for this project. A soldier-pile-and-lagging system consists of steel soldier beams placed in vertical predrilled holes that are backfilled with concrete and wood lagging between the soldier beams as the excavation proceeds.

Depending on the height of the shoring system, lateral restraint such as tiebacks may be required. Tiebacks will extend significant distances into the soil and rock behind the wall, and if they will be incorporated into a permanent retention system, use of deep foundations, utilities, and trees may need to be restricted or used cautiously in areas behind the wall. For permanent retention systems, double-corrosion protection will be required for tiebacks and all other system components.

9.0 RECOMMENDATIONS

Our recommendations regarding earthwork, foundations, basement and retaining walls, pavement design, and other geotechnical aspects of this project are presented in this section.

9.1 Earthwork

9.1.1 Site Preparation

Any vegetation and organic topsoil should be stripped in areas to receive new fill or site improvements. Voids resulting from demolition activities should be properly backfilled with engineered fill as described in Section 9.1.3. Topsoil with an organic content greater than three percent should not be reused as compacted fill; however, this material may be stockpiled onsite and reused in landscaped areas if approved by the project architect.

9.1.2 Subgrade Preparation

In areas to receive fill or near-surface site improvements, the exposed subgrade soil should be properly scarified, moisture-conditioned, and recompacted. Expansive subgrade soil should be scarified to a depth of at least eight inches, moisture-conditioned to at least three percent above optimum moisture content, and compacted to at least 90 percent relative compaction.

Where lean clay, granular soil, or rock with a low to moderate expansion potential (defined as material with a plasticity index less than 25) is exposed during the subgrade preparation process, the scarified surface should be moisture-conditioned to above the optimum moisture content and compacted to at least 90 percent relative compaction. The soil subgrade should be kept moist prior to placing new fills, pavements, or near-surface improvements. An exception to this general procedure occurs within the proposed pavement areas, where the upper six inches of low to moderately expansive pavement subgrade soil should be compacted to at least 95 percent relative compaction.

If areas of weak soil are encountered during subgrade preparation, we recommend the areas be repaired by either: 1) removing and replacing the weak soil with engineered fill, 2) over-excavating the weak material and filling the excavation with a reinforcing geotextile (Mirafi 500X or equivalent) overlain by granular fill, or 3) using lime- or cement-based admixtures to strengthen the weak soil.

9.1.3 General Fill Placement and Compaction

We anticipate fill placement during construction of the planned courthouse will consist primarily of backfill behind and around retaining walls and for utility trenches. The soil excavated during construction will be acceptable for use as general site fill and backfill provided it is free of organic material, is non-hazardous, and contains no rocks or lumps larger than three inches in greatest dimension. If the onsite expansive clay is to be used as fill or backfill, it should be moisture-conditioned to at least three percent above optimum moisture content, placed in lifts not exceeding eight inches in uncompacted thickness, and compacted to between 88 and 92 percent relative compaction for fill thickness equal to or less than five feet and 92 percent relative compaction for fill thickness greater than five feet. Granular soil used as fill should be moisture-conditioned to above optimum moisture content, placed in horizontal lifts not exceeding eight inches in uncompacted thickness, and compacted to at least 90 percent relative compaction for fill thickness equal to or less than five feet and 95 percent compaction for fill thickness greater than five feet. Clean sand or gravel (defined as soil with less than

10 percent fines by weight) used as backfill should be compacted to at least 95 percent relative compaction.

All fill material should be submitted to the Geotechnical Engineer for approval at least 72 hours before it is to be used on site. Where imported fill is required, the grading subcontractor should provide analytical test results or other suitable environmental documentation at least three days before use at the site indicating that the proposed fill material is free of hazardous materials. If this data is not provided, up to two weeks may be required to perform any required analytical testing on proposed import soil.

9.1.4 Fill Slopes

Where fill is planned along existing slopes, such as behind and around new retaining walls, the fill should be keyed and benched into the slope to reduce the potential for differential settlement and movement of the fill. Prior to placement of fill, the exposed subgrade should be scarified, moisture-conditioned, and compacted as previously discussed in Section 9.1.2. If the final fill surface will be sloped, we recommend the fill slope be overbuilt by placing and compacting horizontal lifts of fill as described in Section 9.1.3. Subsequently, the fill slope should be cut back to achieve the proper slope inclination.

We recommend that fill slopes be designed to have a maximum slope inclination of 2:1 (horizontal to vertical). At the toe of the proposed fill slope, a keyway should be installed to interconnect the new fill material into the existing strata. The keyway should be at least five feet wide at the base and extend at least two feet into competent soil or rock or at least 15 percent of the overall slope height, whichever is greater. The side slopes of the keyways should not be steeper than 1:1.

Where new fill is placed over existing slopes that are steeper than 5:1, the fill should be benched as the fill operation proceeds upslope. These benches will provide horizontal surfaces for the placement and compaction of the fill and reduce the effects of downward creeping of the soil. Benches should be a maximum of five feet high and should expose competent soil or rock along the base of the bench.

The face of fill slopes should be planted with deep-rooted vegetation and covered by an erosion control blanket to reduce the potential for surface erosion. We recommend using a biodegradable erosion control blanket (North American Green SC150 or equivalent erosion control material that is acceptable to the Geotechnical Engineer) on the slope face that has been disturbed by grading. The biodegrable erosion control blanket should be installed in accordance with the manufacturer’s specifications.

To limit the concentration of surface water on slopes, areas upslope of the cut or fill slope should be graded to drain away from these slopes. As an alternative, V-ditches or curbs and gutters should be placed at the crest of these slopes to capture and control surface water and re-direct it away from the slope.

9.1.5 Cut Slopes

We recommend that temporary cut slopes in fill or native soil over five feet high be graded no steeper than 1:1. Temporary cuts in bedrock may be made vertical; however, the height of any vertical segment should not exceed six feet unless shoring is used. If poor rock quality or adverse bedding is present, cuts in rock should be flattened and/or retained using temporary shoring. The safety of workers and equipment in or near excavations is the responsibility of the contractor. The contractor should be familiar with the most recent OSHA Trench and Excavation Safety standards.

If cut slopes will be permanent, the fill and native soil should be graded no steeper than 2.5:1 (horizontal to vertical). Unretained cuts in bedrock may be graded as steep as 1:1, depending on the rock fracturing, hardness, and weathering. If poor rock quality or adverse bedding is present, rock slopes should be flattened and/or retained using rock bolts.

We should review plans for temporary and permanent cut slopes prior to construction. During construction, we should observe cut slopes to verify the inclinations are appropriate for the conditions encountered. It is the responsibility of the contractor to maintain safe and stable slopes during construction. During wet weather, runoff should be prevented from running across slopes and from entering excavations.

9.1.6 Utility Trenches

Excavations for utility trenches in clay, sand, silt, and gravel can be readily made with a backhoe. Where bedrock is present within utility trenches, the contractor should select equipment that is capable of excavating and removing rock. All trenches should conform to the current CAL-OSHA requirements for slopes, shoring, and other safety concerns.

To provide uniform support, pipes or conduits should be bedded on a minimum of four inches of sand or fine gravel. After the pipes and conduits are tested, inspected (if required), and approved, they should be covered to a depth of six inches with sand or fine gravel, which should be mechanically tamped. Backfill for utility trenches is also considered fill, and should be placed and compacted according to the recommendations previously presented. Jetting of trench backfill should not be permitted. Special care should be taken when backfilling utility trenches in pavement areas. Poor compaction may cause excessive settlements, resulting in damage to the pavement section.

Where utility trenches enter the building pad, an impermeable plug consisting of lean concrete, at least five feet in length, should be installed where the trenches enter the building footprint. Furthermore, where sand- or gravel-backfilled trenches cross planter areas and pass below asphalt or concrete pavements, a similar plug should be placed at the edge of the pavement. The plug should extend from the bottom of the trench to the subgrade elevation. The purpose of these recommendations is to reduce the potential for water to become trapped in trenches beneath the building or pavements. This trapped water can cause heaving of soils beneath slabs and softening of subgrade soil beneath pavements.

9.2 Foundation Support

We recommend the proposed courthouse be supported on spread footings where bedrock is encountered at or near the subgrade level, and on drilled piers extending into bedrock where bedrock is too deep to be practically reached by the footings. The following sections present our recommendations for footing and pier foundations.

9.2.1 Spread Footings

Where it is practical to reach bedrock by excavating for the footings (we estimate this to be a depth of up to about 5 feet), the proposed structure can be supported on spread footings. Footings should be embedded at least three feet below the lowest adjacent grade where fill or soil are present and a minimum of one foot into bedrock. Footings bearing on bedrock may be designed for a maximum allowable bearing pressure of 10,000 pounds per square foot (psf) for dead plus live loads, which can be increased by one-third for total loads, including wind and/or seismic loads. These values include factors of safety of at least 2.0 and 1.5 for dead plus live loads and total loads, respectively.

To design footings using the modulus of subgrade reaction method, we recommend a modulus of 240 kips per cubic foot (kcf) be used. This modulus is representative of the anticipated settlement under the building loads provided.

Lateral loads on footings can be resisted by a combination of passive resistance acting against the vertical faces of the footings and friction along the bases of the footings. Passive resistance may be calculated using uniform pressures of 1,800 psf for fill and 6,000 psf for bedrock. The upper foot of soil or rock should be ignored unless it is confined by slabs or pavement. Frictional resistance at the base of the footings should be computed using a friction coefficient of 0.4. These values include a factor of safety of about 1.5. Passive resistance should not be used for foundation elements on the existing slope unless the face of the footing is at least 7 feet from the slope face, measured horizontally.

Uplift loads may be resisted by the weight of the footing and any overlying soil. If footings are inadequate to provide the necessary uplift resistance, drilled piers or tiedowns may be used. Recommendations for design of drilled piers are provided in the following section; recommendations for tiedowns can be provided upon request.

The footing excavations should be free of standing water, debris, and disturbed materials prior to placing concrete. If disturbed, highly weathered, or decomposed bedrock is encountered at the bottom of footing excavations, the excavations should be deepened to expose more competent bedrock, as determined by the geotechnical engineer. We should check foundation excavations prior to placement of reinforcing steel to confirm suitable bearing material is present.

If overexcavation is required to reach bedrock or to remove unsuitable rock, the overexcavation may be backfilled to the design bottom of footing using lean concrete. The lean concrete should have a minimum unconfined compressive strength of 50 pounds per square inch.

9.2.2 Drilled Piers

Drilled piers bottomed in bedrock should be designed to derive their axial capacity from end bearing and skin friction. To compute the axial compressive capacity of drilled piers, we recommend using an allowable end bearing of 17,000 psf (provided the bottoms of the pier shafts can be cleaned) and allowable skin friction values of 375 psf for dead plus live loads in fill and 1,200 psf for dead plus live loads in bedrock. The allowable skin friction values may also be used to resist temporary uplift loads. For temporary compressive total loads, including wind and/or seismic loads, these values can be increased by one third. For design of the drilled piers using the subgrade modulus method, we recommend using spring constants of 255 kips/inch for 22-inch-diameter piers and 395 kips/inch for 30-inch-diameter piers. Piers installed in a group should be spaced at least three diameters on center.

Piers will provide lateral resistance from passive pressure acting on the upper portion of the piers and from their structural rigidity. Lateral resistance of piers will depend on the pier diameter, pier head condition (restrained or unrestrained), allowable deflection of the pier top, and the bending moment resistance of the piers. We have performed lateral load analyses for isolated, 22- and 30-inch-diameter piers for a deflection of 0.5 inch at the pier head. We assumed a cracked section at the pier head and used 30 percent of the elastic modulus for concrete in our analyses, based on discussion with the project structural engineer. In addition, we assumed that the pier head is at the ground surface and considered both a level ground surface and a ground surface inclined at approximately 1.8:1 (horizontal to vertical) for piers on the existing fill slope. The results of our analyses are presented in Tables 3 and 4 for level and sloped ground surface conditions, respectively. Plots of deflection and bending moment versus depth are presented on Figures 10 and 11.

TABLE 3

Results of Lateral Load Analyses
Drilled Pier, Level Ground Surface

Pile Diameter (inches)	Pile Top Condition	Pile Head Deflection (inches)	Applied Lateral Load (kips)	Computed Maximum Bending Moment (kip-feet)	Depth to Maximum Bending Moment (feet)
22	Unrestrained	0.5	24.7	78.1	5.8
22	Restrained	0.5	50.4	196	0
30	Unrestrained	0.5	41.6	163	7.3
30	Restrained	0.5	83.3	411	0

TABLE 4

Results of Lateral Load Analyses Drilled Pier, Ground Surface Sloped at 1.8:1 (Horizontal to Vertical)

Pile Diameter (inches)	Pile Top Condition	Pile Head Deflection (inches)	Applied Lateral Load (kips)	Computed Maximum Bending Moment (kip-feet)	Depth to Maximum Bending Moment (feet)
22	Unrestrained	0.5	17.9	64.4	6.2
22	Restrained	0.5	37.0	160	0
30	Unrestrained	0.5	30.4	134	8.1
30	Restrained	0.5	61.4	337	0

The lateral resistances tabulated in Tables 3 and 4 are for piers with a spacing of at least six pier diameters. If piers are installed in a group of two with a spacing of three pier diameters, the lateral capacities should be reduced by 15 percent. However, the design bending moments should be taken as the same as those for single piers. If larger pier groups are needed to support the building, we should be contacted to provide the reduction factors for these groups.

Additional lateral load resistance can be obtained by passive resistance acting against the face of pier caps and grade beams. To calculate passive resistance, we recommend using an allowable uniform pressure of 1,800 psf in fill. The upper foot of soil should be ignored unless it is confined by slabs or pavement. Passive resistance should not be used for foundation elements on the existing slope unless the face of the footing is at least 7 feet from the slope face, measured horizontally.

Drilled piers should be installed by a qualified contractor with demonstrated experience in this type of foundation. It is likely that pier shafts will need to be cased during construction to prevent caving and to allow for inspection of the bottoms. Any water present at the bottom of the pier should be removed by pumping. Loose soil and rock encountered at the bottom of the pier should also be removed; if proper clean-out is not possible, the piers will need to be deepened and their end-bearing capacity ignored. Steel and concrete placement should start immediately upon completion of inspection and clean-out.

9.3 Concrete Floor Slabs

The floor slab will be underlain by fill, and we anticipate settlement of the fill will occur. Therefore, the floor slab should be designed to span between footings or piers and not rely on the ground for support. The subgrade soil should be scarified, moisture-conditioned, and recompacted to reduce the potential for detrimental effects of highly expansive soil, as discussed in Section 9.1.2. If the previously compacted soil subgrade is disturbed during foundation and utility excavation, the subgrade should be scarified, moisture-conditioned, and rerolled to provide a firm, unyielding surface prior to construction of the floor slab.

Because it will be below the ground surface, we recommend the lower level floor of the building be waterproofed. For the upper level of the building, where moisture on the floor slab is undesirable, we recommend installing a capillary moisture break and water vapor retarder beneath the floor to reduce water vapor transmission through floor slabs. A capillary moisture break consists of at least four inches of clean, free-draining gravel or crushed rock. The vapor retarder should meet the requirements for Class C vapor retarders stated in ASTM E1745-97. The vapor retarder should be placed in accordance with the requirements of ASTM E1643-98. These requirements include overlapping seams by six inches, taping seams, and sealing penetrations in the vapor retarder. The vapor retarder should be covered with two inches of sand to aid in curing the concrete and to protect the vapor retarder during slab construction. The particle size of the gravel/crushed rock and sand should meet the gradation requirements presented in Table 5.

TABLE 5

Gradation Requirements for Capillary Moisture Break

Sieve Size	Percentage Passing Sieve
Gravel or Crushed Rock	
1 inch	90 – 100
3/4 inch	30 – 100
1/2 inch	5 – 25
3/8 inch	0 – 6
Sand	
No. 4	100
No. 200	0 – 5

The sand overlying the membrane should be moist at the time concrete is placed; however, there should be no free water present in the sand. Excess water trapped in the sand could eventually be transmitted as vapor through the slab. If rain is forecast prior to pouring the slab, the sand should be covered with plastic sheeting to avoid wetting. If the sand becomes wet, concrete should not be placed until the sand has been dried or replaced.

Concrete mixes with high water/cement (w/c) ratios result in excess water in the concrete, which increases the cure time and results in excessive vapor transmission through the slab. Therefore, concrete for the floor slab should have a low w/c ratio – less than 0.50. If approved by the project structural engineer, the sand can be eliminated and the concrete can be placed directly over the vapor retarder, provided the w/c ratio of the concrete does not exceed 0.45 and water is not added in the field. If necessary, workability should be increased by adding plasticizers. In addition, the slab should be properly cured. Before the floor covering is placed, the contractor should check that the concrete surface and the moisture emission levels (if emission testing is required) meet the manufacturer's requirements.

9.4 Temporary Shoring

If the planned excavations cannot be sloped because of space limitations, shoring will be required to retain the excavation sides. We estimate excavations for the planned courthouse may be as deep as about 15 feet. If the shoring will be used as part of a permanent retention system, all system components should be double-corrosion protected and the shoring design should incorporate a factor of safety consistent with permanent structures.

Cantilevered shoring should be designed for an active earth pressure defined as an equivalent fluid weight of 42 pounds per cubic foot (pcf). This value is considered appropriate for an active condition, which assumes that some movement of the supported soil is tolerable. If movement of the soil is not acceptable, an at-rest pressure of 63 pcf should be considered. For shoring consisting of soldier beams and lagging, the active and at-rest earth pressures should be assumed to act over the full width of the shoring above the excavation and over one soldier beam width below the excavation. The foregoing earth pressures assume the ground surface at the top of the shoring wall will be level; if sloping ground surface conditions are anticipated, we should be contacted to provide additional recommendations.

If traffic is anticipated within a distance equal to the shoring depth, a uniform surcharge load of 100 pounds per square foot (psf) acting on the upper 10 feet should be used in the design. An increase in lateral design pressure for the shoring may be required where heavy construction equipment or stockpiled materials will be within a distance equal to the shoring depth. The increase in pressure should be determined after the surcharge loads are known. If this condition exists, we should be consulted and the additional pressure increment can be computed on a case-by-case basis.

Passive resistance can be computed using a uniform pressure of 1,800 psf plus an equivalent fluid weight of 80 pcf. This passive pressure value includes a factor of safety of about 1.5 for temporary shoring design. For beams spaced at least three shaft diameters, center-to-center, the passive resistances can be assumed to act over three soldier beam[7] widths.

The shoring designer should evaluate the required penetration depth of the soldier piles. The soldier piles should have sufficient axial capacity to support the vertical load component of the tiebacks and the vertical load acting on the piles, if any. To compute the axial capacity of the piles, we recommend using an allowable friction of 500 psf on the perimeter of the piles below the excavation level, which includes a factor of safety of 1.5. Vertical support from end bearing is neglected.

Where excavation depths exceed approximately 12 feet, tiebacks or internal bracing will likely be required. Figure 12 presents the lateral pressures we recommend for design of a tied-back or internally-braced soldier beam and lagging wall. Design criteria for tiebacks are also presented on Figure 12. As shown, tiebacks should derive their load-carrying capacity from the soil behind an imaginary line sloping upward from a point H/5 feet away from the bottom of the excavation at an angle of 60 degrees from horizontal, where H is the wall height in feet. The minimum stressing and bond lengths should be 15 feet each.

Tiebacks will generally be installed in fill consisting of cobble-to boulder-sized serpentinite clasts, loose to dense clayey gravel to gravel with sand, stiff to very stiff clay with variable sand and gravel content, and hard sandy silt with gravel. Allowable capacities of the tiebacks will depend upon the drilling method, shaft diameter, grout pressure, and workmanship. Because of the tendency of granular soil layers to cave, augers should not be used in these materials. We recommend a smooth-cased method (such as a Klemm rig) be used to install tiebacks in these materials. For estimating purposes, we recommend using the skin friction value for pressure-grouted tiebacks given on Figure 12.

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[7] The soldier beam width is defined as the diameter of the drilled hole for beams backfilled with structural concrete with an unconfined compressive strength of at least 50 pounds per square inch (psi).

The shoring designer should be responsible for determining the actual length of tieback required.

The determination should be based on the designer's familiarity with the installation method to be used. The computed bond length should be confirmed by a performance- and proof-testing program. The first two production tiebacks and two percent of the remaining tiebacks should be performance-tested to 1.5 times the design load for the proposed temporary shoring system. The remaining tiebacks should be confirmed by a proof-test to 1.25 times the design load for the proposed temporary shoring system. If any tiebacks fail to meet the proof-testing requirements, additional tiebacks should be added to compensate for the deficiency, as required by the shoring designer. We should review the shoring design prior to issuing bid documents for construction.

The movement of each tieback should be monitored with a free-standing, tripod-mounted dial gauge during proof and performance testing. The maximum test load should be held for a minimum of 10 minutes, with readings taken at 0, 1, 3, 6, and 10 minutes. If the difference between the 1- and 10-minute readings is more than 0.04 inches, the load should be held for an additional 50 minutes. If the deflection is more than 0.08 inches between the 6- and 60-minute readings, the tieback design loading should be re-evaluated. If any tieback fails to meet the performance- and proof-testing requirements, additional tiebacks should be added to compensate for the deficiency, as directed by the shoring designer. After testing, the tiebacks should be loaded to the design load (less if specified by the shoring designer) and locked off. The tiebacks should be checked 24 hours after initial lock off to ensure that stress relaxation has not occurred. The bottom of the excavation should not extend more than two feet below a row of unsecured tiebacks.

The anticipated deflections of the shoring system should be estimated to check if they are acceptable. The shoring system should be sufficiently rigid to prevent detrimental movement of the temporary shoring and possible damage to improvements adjacent to the site. In our experience, the deflection of a properly designed shoring system should generally be held to one inch or less. The shoring system should be designed so that it does not conflict with nor damage planned project improvements, such as underground utilities or deep foundations.

The shoring system should be installed by an experienced shoring specialty contractor The contractor should be familiar with applicable local, state, and federal regulations for temporary shoring, including the current OSHA Excavation and Trench Safety Standards. The contractor should be solely responsible for the design of temporary shoring. We should review the final shoring plans to check that they are consistent with the recommendations presented in this report. In addition, we recommend a representative from our office observe the installation of the temporary shoring system as part of our special inspection services.

9.5 Basement and Retaining Walls

The below-grade walls and any retaining walls planned for the site should be designed to resist lateral pressures imposed by the soil and any adjacent surcharges. In addition, because the site is in a seismically active area, all below-grade walls and retaining walls should be designed to resist pressures associated with seismic forces. For walls free to deflect (unrestrained) and restrained walls, we recommend the lateral pressures be calculated using the parameters shown in Table 6. Restrained walls should be designed for the more critical of the static and seismic loading conditions.

TABLE 6

Lateral Earth Pressures (Fully Drained Walls)

Loading Condition	Backfill Material	Unrestrained Walls	Restrained Walls
Static	Fill	Active pressure corresponding to equivalent fluid weight of 42 pcf for level backfill and 78 pcf for backfill sloped at 1.8H:1V	At-rest pressure corresponding to equivalent fluid weight of 63 pcf for level backfill and 85 pcf for backfill sloped at 1.8H:1V
Seismic	Fill	Active pressure plus an equivalent fluid weight of 5 pcf for seismic load	Active pressure plus an equivalent fluid weight of 5 pcf for seismic load
Static	Bedrock	Active pressure corresponding to equivalent fluid weight of 24 pcf for level rock behind wall and 32 pcf for rock sloped at 1.8H:1V	At-rest pressure corresponding to equivalent fluid weight of 41 pcf for level rock behind wall and 66 pcf for rock sloped at 1.8H:1V
Seismic	Bedrock	Active pressure plus an equivalent fluid weight of 5 pcf for seismic loading	Active pressure plus an equivalent fluid weight of 5 pcf for seismic loading

Lateral pressures from traffic or surcharges should be added to the static design pressures. If traffic loads are expected within 10 feet of the walls, an additional design load of 100 psf (rectangular distribution) should be applied over the full height of the wall. Footings adjacent to walls should be bottomed below an imaginary line drawn upward at an inclination of 1.5:1 (horizontal to vertical) from the base of the wall. Adjacent piers, if located within 10 feet of the wall, may impose a surcharge pressure on the wall. We should evaluate potential surcharge pressures if this occurs.

The recommended design pressures are for fully drained walls; hydrostatic pressures are not included. One acceptable method of backdraining below-grade walls is to place a prefabricated drainage panel against the back of the wall. Where shoring is used, the drainage panel may be attached to the shoring and the wall cast directly against it. The panel should extend down to a perforated PVC collector pipe at the base of the wall. The perforated pipe should be bedded on and covered by at least four inches of Class 2 permeable material (per Caltrans Standard Specifications) or by drain rock that is surrounded by filter fabric (Mirafi 140NC or equivalent). An acceptable alternative is to backdrain the wall with Caltrans Class 2 permeable material at least one foot wide, extending down to the base of the wall. A perforated PVC pipe should be placed at the bottom of the gravel, as described for the first alternative. The perforated collection pipe in either alternative should redirect the water to a solid pipe that is sloped to drain to a suitable outlet.

If moisture migration through the walls or effervescence is a concern, the walls should be waterproofed and water stops should be placed at all construction joints. Foundations for basement and retaining walls can be designed using the recommendations presented in Section 9.2. During placement of backfill behind basement and retaining walls, the walls should be braced, or hand compaction equipment should be used, to prevent unwanted surcharges on the walls or foundations (as determined by the structural engineer).

9.6 Asphalt Concrete Pavement Design

The State of California resistance value (R-value) method for flexible pavement design was used to develop recommendations for asphalt concrete pavement sections. We anticipate the final soil subgrade in areas to receive asphalt concrete pavement will generally consist of clay with varying amounts of sand and silt. Based on R-value test results, the clayey and silty soil at the site has approximate R-values ranging from 28 to 43. For our calculations, we used an R-value of 28.

We assumed traffic indices (TI) of 5.0, 6.0, and 7.0 for our calculations; these TIs should be confirmed by the project civil engineer. We can provide pavement section recommendations for other TIs upon request. Table 7 presents our recommendations for asphalt pavement sections.

TABLE 7

Asphaltic Concrete Pavement Section Design
Design R-Value of Subgrade Soil = 28

TI	Asphaltic Concrete (inches)	Class 2 Aggregate Base (inches)
5.0	3.0	6.0
6.0	3.5	8.0
7.0	4.0	10.0

Pavement components should conform to the current Caltrans Standard Specifications. The soil subgrade should be prepared as discussed in Section 9.1.2. The soil subgrade should be kept moist until it is covered with AB. Class 2 AB should be compacted to at least 95 percent relative compaction.

9.7 Concrete Flatwork

Exterior concrete flatwork that will not receive vehicular traffic (i.e., sidewalks) should be underlain by at least four inches of Class 2 AB compacted to at least 95 percent relative compaction. Prior to placement of the aggregate base, the upper six inches of subgrade soil should be scarified, moisture-conditioned to above the optimum moisture content (or at least three percent above the optimum moisture content for expansive soil), and compacted to at least 90 percent relative compaction. Within decorative concrete flatwork areas, 12 inches of aggregate base should be used beneath the exterior slabs to further reduce the potential for cracking due to shrinking and swelling of the underlying expansive soil. Thickening the slabs and adding reinforcement will also control cracking to some degree. The soil subgrade beneath the 12 inches of Class 2 AB should be prepared as discussed in Section 9.1.2.

9.8 Seismic Design

The closest active fault to the site is the Collayomi Fault, which is about 6.8 kilometers from the site. The foundation of the courthouse will bear on weak to moderately hard bedrock and we conclude that site class B (as defined by the 2013 CBC) is appropriate for the site on the basis of the results of the geophysical studies performed at the site. For design in accordance with the 2013 CBC, we recommend the following parameters be used:

- site class B
- site coefficient values F_a and F_v of 1.0 and 1.0, respectively
- mapped site class D short (S_s) and one-second (S_1) spectral acceleration values for the Risk Targeted Maximum Considered Earthquake (MCE_R) of 1.500g and 0.600g, respectively
- spectral acceleration values S_{Ms} and S_{M1} for the MCE_R of 1.500g and 0.600g, respectively
- spectral acceleration values for the Design Earthquake (DE) of S_{Ds} and S_{D1} of 1.000g and 0.400g, respectively.

10.0 ADDITIONAL GEOTECHNICAL SERVICES

Prior to construction, Langan Treadwell Rollo should review the project plans and specifications to check their conformance with the intent of our recommendations. During construction, our field engineer should provide on-site observation and testing services during excavation, installation of temporary shoring, fill and backfill placement and compaction, subgrade preparation, permanent wall construction, and footing and drilled pier installation. These observations will allow us to compare the actual with the anticipated soil conditions and to check that the contractor's work conforms with the geotechnical aspects of the plans and specifications.

11.0 LIMITATIONS

The conclusions and recommendations presented in this report result from limited engineering studies based on our interpretation of the geotechnical conditions existing at the time of the investigation. Actual subsurface conditions may vary. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that described in this report, Langan Treadwell Rollo should be notified to make supplemental recommendations, if necessary.

REFERENCES

Bailey, E.H, Irwin, W.P, and Jones, D.L. (1964). "Franciscan and Related Rocks, and Their Significance in the Geology of Western California," California Division of Mines, Bulletin 183: California Division of Mines and Geology, Sacramento.

Blome, C.D., and Irwin, W.P. (1983). "Tectonic Significance of Late Paleozoic to Jurassic Radiolarians from the North Fork Terrane, Klamath Mountains, California," in Stevens, C.H., ed., Pre-Jurassic Rocks in North American Suspect Terranes: Los Angeles, Pacific Section, Society of Economic Paleontologists and Mineralogists, p. 77-89.

Cao, T., Bryant, W.A., Rowshandel, B., Branum, D., and Willis, C.J. (2003). "The Revised 2002 California Probabilistic Seismic Hazard Maps."

Fugro-William Lettis & Associates (2010). "Earthquake-related Geologic Hazards Screening Evaluation, Lake County Courthouse Sites." 19 May.

Irwin, W.P., Jones, D.L., and Pessagno, E.A., Jr. (1977). "Significance of Mesozoic Radiolarians from the Pre-Nevadan rocks of the Klamath Mountains," Geology, v. 5 p. 557-562.

Jennings, C.W. and Bryant, W.A. (2010). Fault Activity Map of California: California Geological Survey Geologic Map No. 6, map scale 1:750,000.

Lew, M., Sitar, N. Al Atik, L. Pourzanjani, M., Hudson, M.B. (2010). "Seismic Earth Pressures on Deep Building Basements," SEAOC 2010 Conference Proceedings.

McLaughlin, R.J., Kling, S.A., Poore, R.Z., McDougall, K., and Beutner, E.C. (1982). "Post-middle Miocene Accretion of Franciscan Rocks, Northwestern California," Geological Society of America Bulletin, v. 93 p. 595-605.

McNitt, J.R. (1967). Geology of the Lakeport Quadrangle, Lake County, California, California Division of Mines and Geology, Map Sheet 10, 1:62,500 scale.

National Center for Earthquake Engineering Research (1997), Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, Technical Report NCEER-97-0022, Youd, T.L. and Idriss, I.M, eds.

Toppozada, T. R. and Borchardt G. (1998). "Re-Evaluation of the 1836 'Hayward Fault' and the 1838 San Andreas Fault earthquakes." *Bulletin of Seismological Society of America*, 88(1), 140-159.

Townley, S. D. and Allen, M. W. (1939). "Descriptive catalog of earthquakes of the Pacific coast of the United States 1769 to 1928." *Bulletin of the Seismological Society of America*, 29(1).

REFERENCES
(Continued)

Wells, D. L. and Coppersmith, K. J. (1994). "New empirical relationships among magnitude, rupture length, rupture width, rupture area, and surface displacement." *Bulletin of the Seismological Society of America*, 84(4), 974-1002.

Wesnousky, S. G. (1986). "Earthquakes, quaternary faults, and seismic hazards in California." *Journal of* Geophysical Research, 91(1312).

Working Group on California Earthquake Probabilities (WGCEP) (2008). "The Uniform California Earthquake Rupture Forecast, Version 2." Open File Report 2007-1437.

Youngs, R. R., and Coppersmith, K. J. (1985). "Implications of fault slip rates and earthquake recurrence models to probabilistic seismic hazard estimates." Bulletin of the Seismological Society of America, 75, 939-964.

FIGURES

DRAFT

Reference: Google Earth Pro, 2011.

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

SITE LOCATION MAP

Date 03/04/15 | Project No. 731563902 | Figure 1

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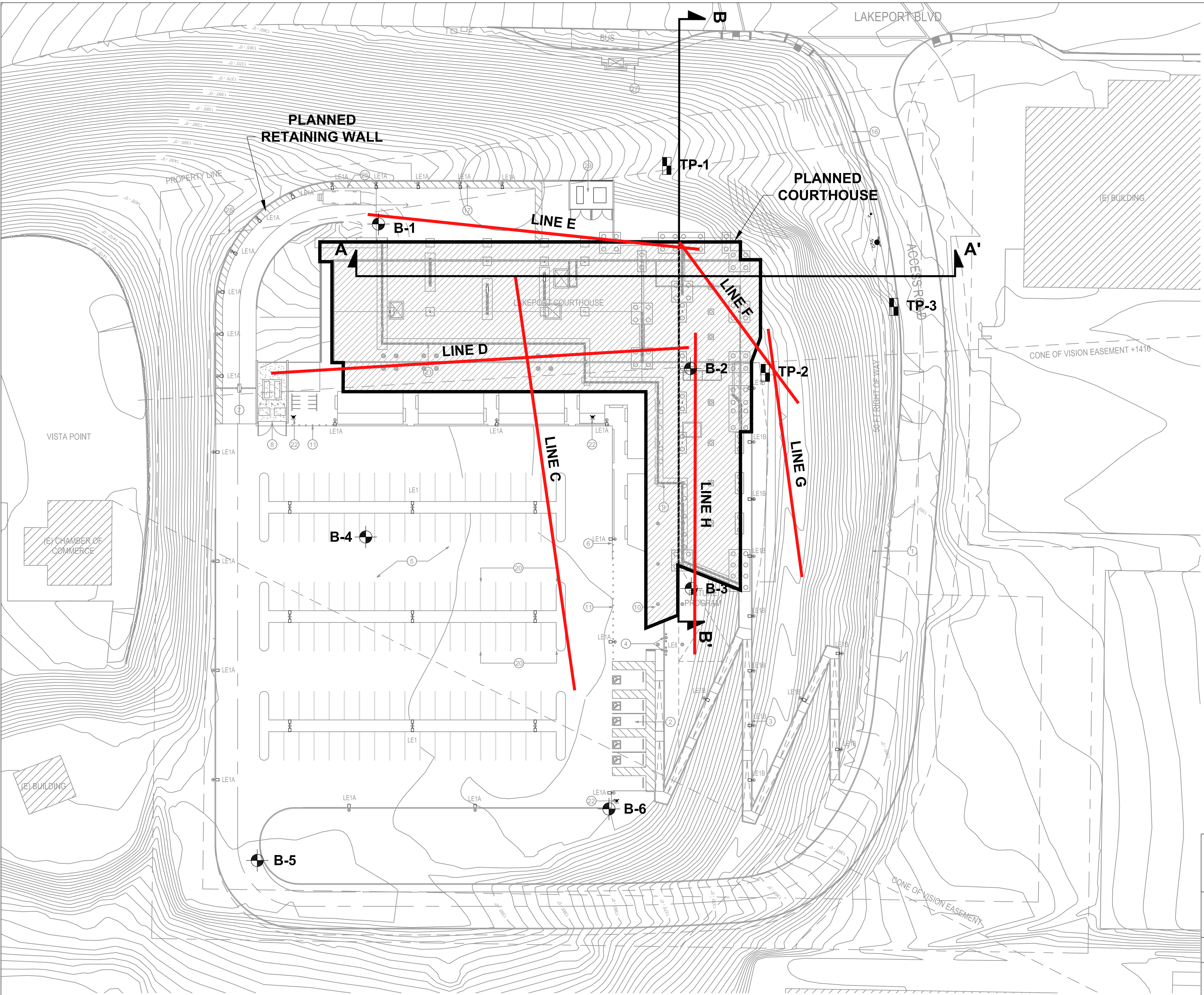

Reference: Base map from a drawing titled "Architectural Site Plan, Lakeport Courthouse, Lakeport, CA," by Mark Cavagnero Associates, 100% Schematic Design, dated 19 December 2011.

EXPLANATION

B-1 ⊕ Approximate location of boring by Treadwell & Rollo, November 2011

TP-1 ▚ Approximate location of test pit by Treadwell & Rollo, November 2011

— Seismic refraction line by Langan Treadwell Rollo, January 2015

A A' Idealized subsurface profile

0 60 Feet

Approximate scale

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

SITE PLAN

Date 03/04/15	Project No. 731563901	Figure 2

LANGAN TREADWELL ROLLO

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Reference: MS-010, “Geology of Lakeport Quadrangle, Lake County, California,” California Division of Mines and Geology, 1;62,000, by James R. McNitt, 1967.

0 3,000 6,000 Feet

Approximate scale

N

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

REGIONAL GEOLOGIC MAP

Date 03/04/15 | Project No. 731563902 | Figure 3

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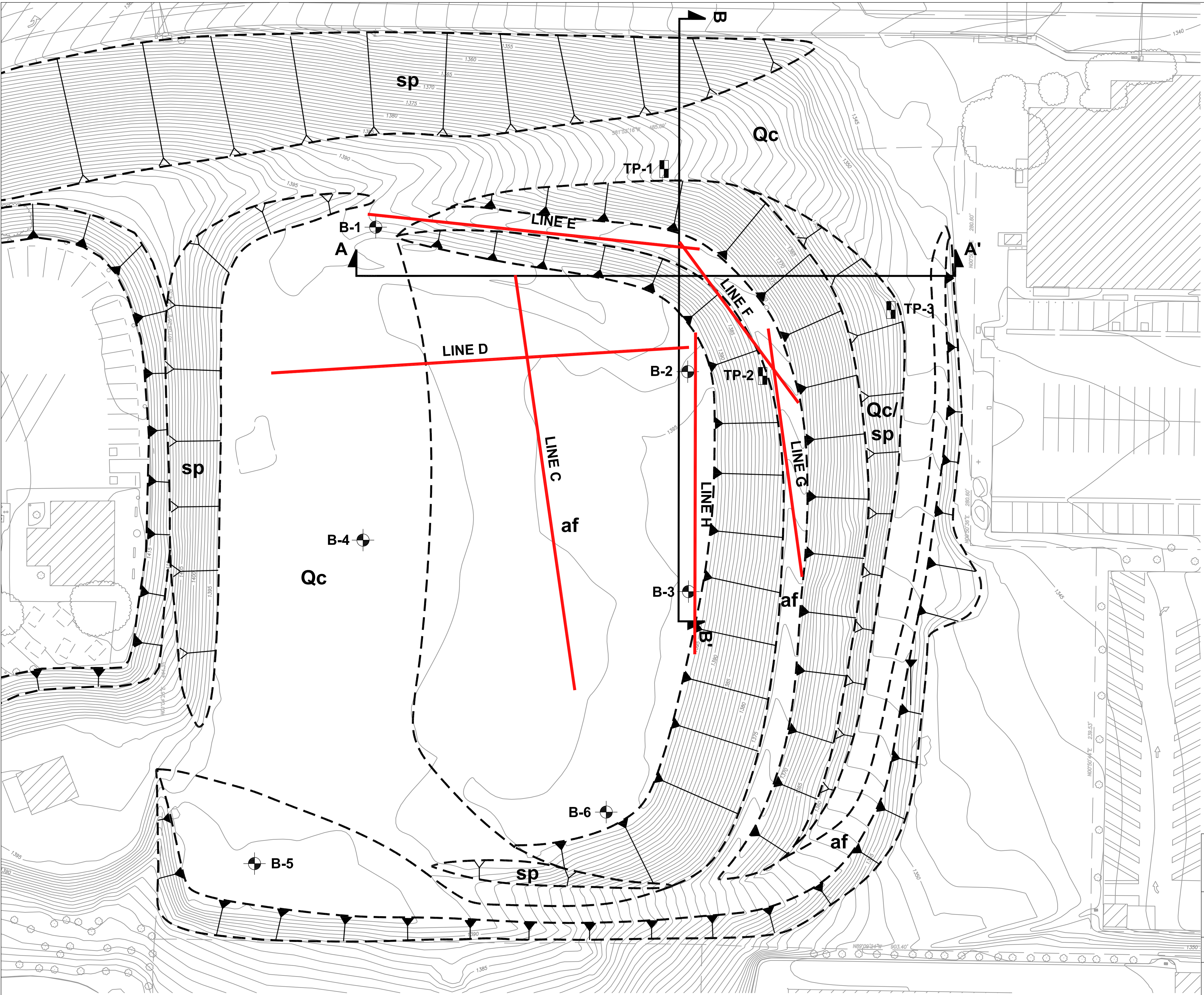

EXPLANATION

B-1 ⊕	Approximate location of boring by Treadwell & Rollo, November 2011
TP-1 ▚	Approximate location of test pit by Treadwell & Rollo, November 2011
—	Seismic refraction line by Langan Treadwell Rollo, January 2015
A A'	Idealized subsurface profile
af	Artificial fill
Qc	Colluvium/topsoil
sp	Serpentinite bedrock
– – –	Geologic contact, dashed where approximate
▼▼▼	Fill slope
▽▽▽	Cut slope

0 60 Feet

Approximate scale

Reference: Base map from a drawing titled "Architectural Site Plan, Lakeport Courthouse, Lakeport, CA," by Mark Cavagnero Associates, 100% Schematic Design, dated 19 December 2011.

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LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

ENGINEERING GEOLOGIC MAP

Date 03/04/15 | Project No. 731563902 | Figure 4

LANGAN TREADWELL ROLLO

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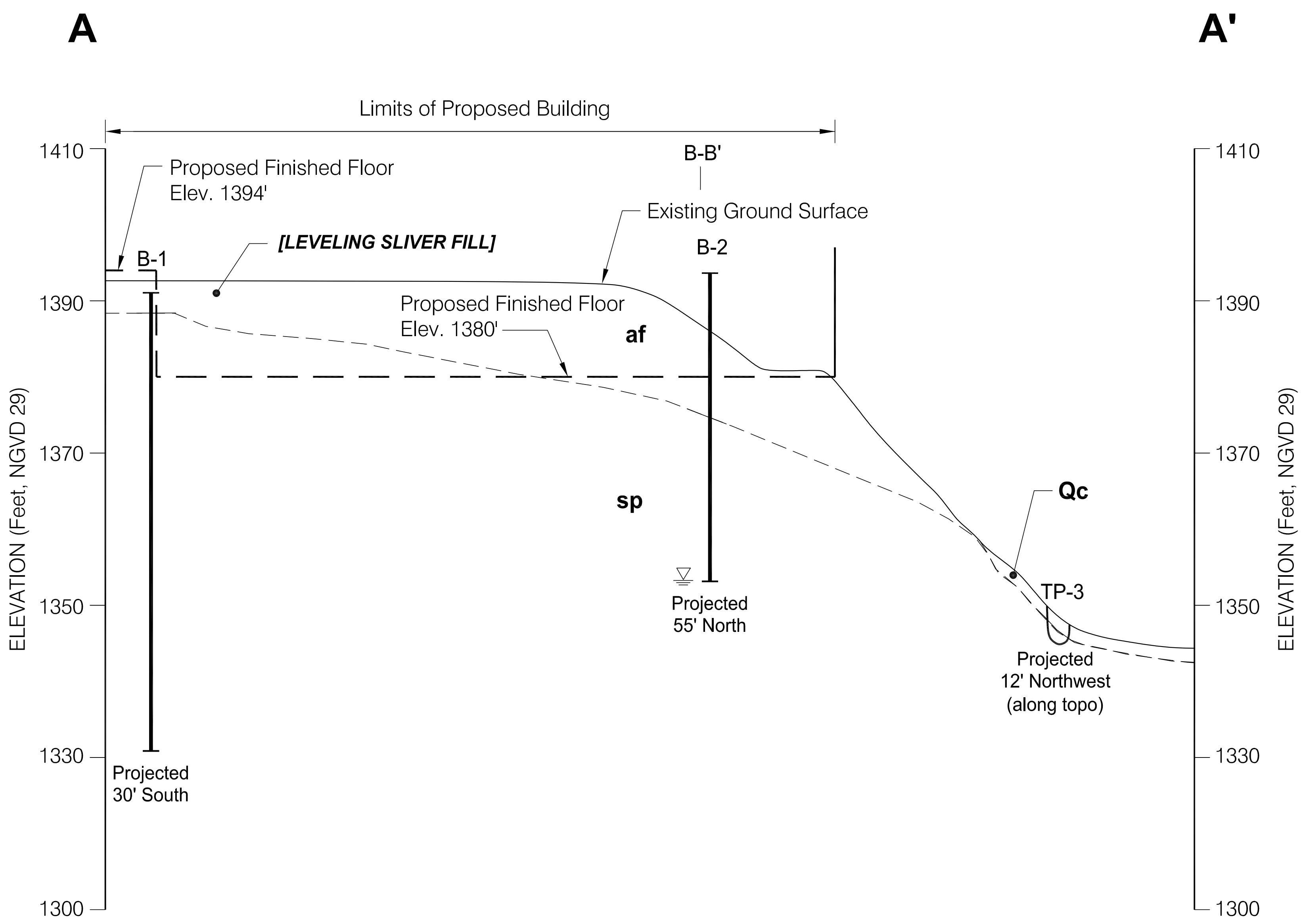
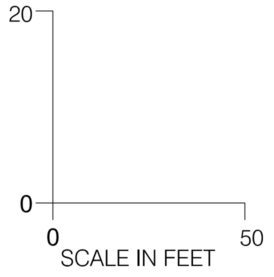


EXPLANATION

af	Artificial fill (CLAYEY GRAVEL (GC), GRAVEL with SAND (GP), and GRAVEL with CLAY (GP-GC), loose to dense, SANDY CLAY (CL), SANDY CLAY with GRAVEL (CL), GRAVELLY CLAY (CL), CLAY with GRAVEL (CL), SANDY SILT (ML), and SANDY SILT with GRAVEL (MH), stiff to hard)
Qc	Colluvium/topsoil (SANDY CLAY (CL) and SANDY SILT (ML), stiff)
sp	Serpentinite bedrock
— — — —	Geologic contact; solid where certain, dashed where approximate
B-2 I	Approximate location of boring by Treadwell & Rollo, November 2011
TP-3 ∪	Approximate location of test pit by Treadwell & Rollo, November 2011



Notes:
1. The above profile represents a generalized cross section interpreted from widely spaced borings. Earth materials may vary in type, strength, and other important properties between points of exploration.

LAKEPORT COURTHOUSE
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Lakeport, California

IDEALIZED SUBSURFACE PROFILE
A-A'

Date 03/04/15	Project No. 731563902	Figure 5

LANGAN TREADWELL ROLLO

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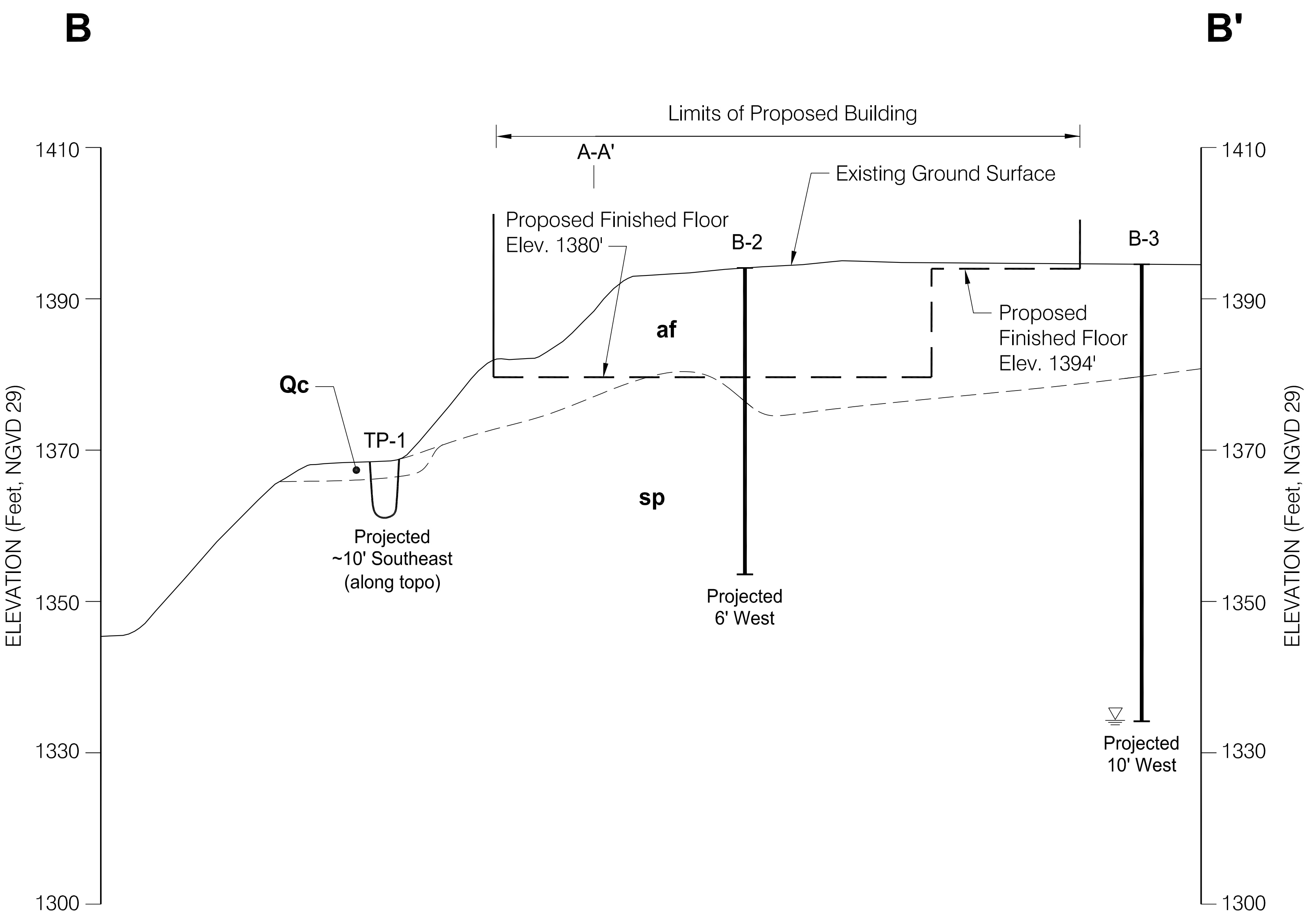
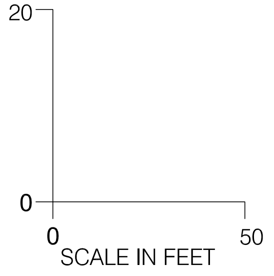


EXPLANATION

af	Artificial fill (CLAYEY GRAVEL (GC), GRAVEL with SAND (GP), and GRAVEL with CLAY (GP-GC), loose to dense, SANDY CLAY (CL), SANDY CLAY with GRAVEL (CL), GRAVELLY CLAY (CL), CLAY with GRAVEL (CL), SANDY SILT (ML), and SANDY SILT with GRAVEL (MH), stiff to hard)
Qc	Colluvium/topsoil (SANDY CLAY (CL) and SANDY SILT (ML), stiff)
sp	Serpentinite bedrock
– – – –	Geologic contact; solid where certain, dashed where approximate
B-2 I	Approximate location of boring by Treadwell & Rollo, November 2011
TP-1 U	Approximate location of test pit by Treadwell & Rollo, November 2011



Notes:
1. The above profile represents a generalized cross section interpreted from widely spaced borings. Earth materials may vary in type, strength, and other important properties between points of exploration.

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

IDEALIZED SUBSURFACE PROFILE B-B'

Date 03/04/15 | Project No. 731563902 | Figure 6

LANGAN TREADWELL ROLLO

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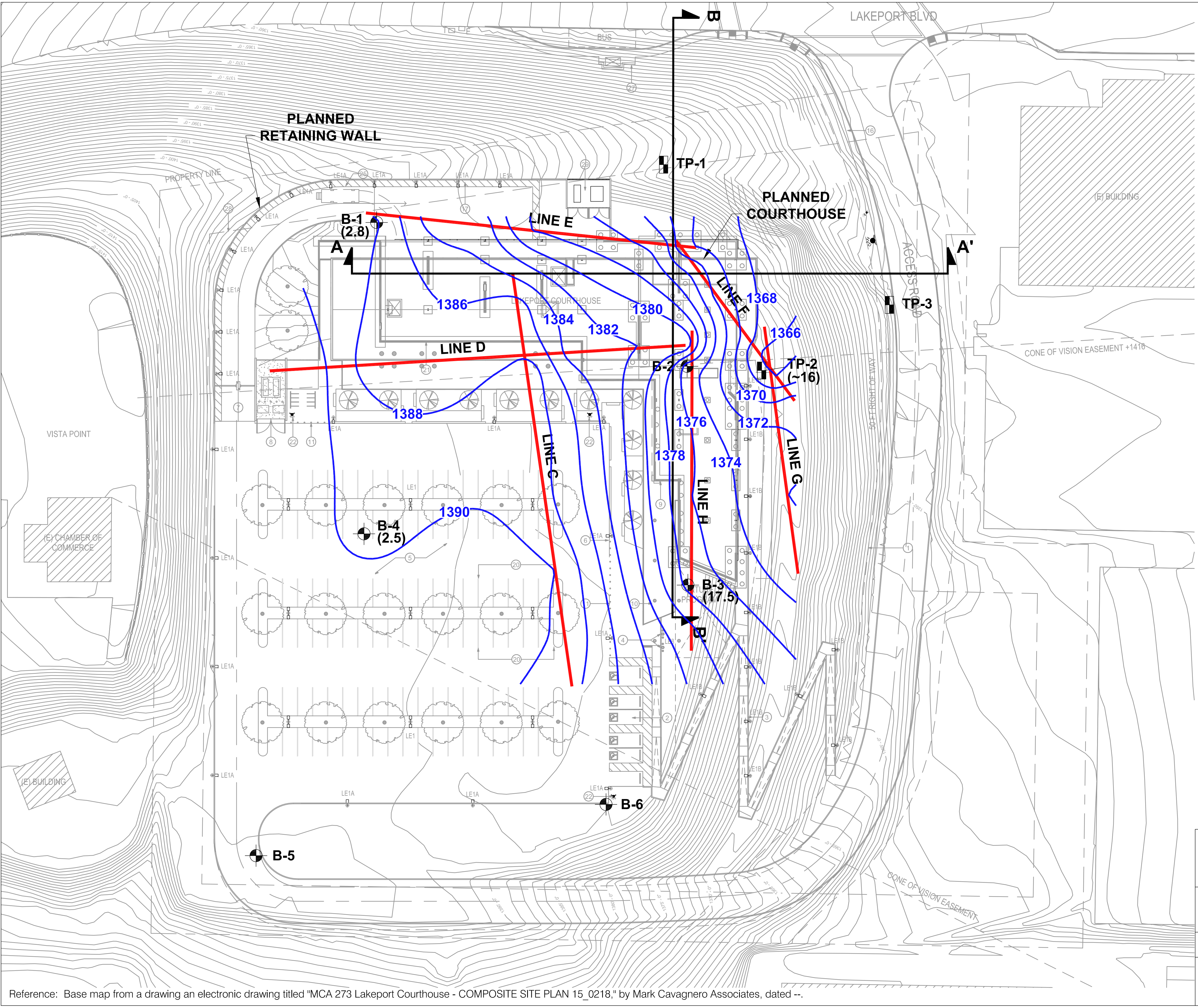

Reference: Base map from a drawing an electronic drawing titled "MCA 273 Lakeport Courthouse - COMPOSITE SITE PLAN 15_0218," by Mark Cavagnero Associates, dated --.

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EXPLANATION

B-1 ⊕	Approximate location of boring by Treadwell & Rollo, November 2011
TP-1 ▚	Approximate location of test pit by Treadwell & Rollo, November 2011
🟥	Seismic refraction line by Langan Treadwell Rollo, January 2015
A A'	Idealized subsurface profile
—1390—	Top of bedrock contour elevation (feet, NGVD 29 datum)
(2.5)	Depth to bedrock (feet)

0 60 Feet

Approximate scale

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

TOP OF BEDROCK CONTOURS

Date 02/19/15	Project No. 731563902	Figure 7

LANGAN TREADWELL ROLLO

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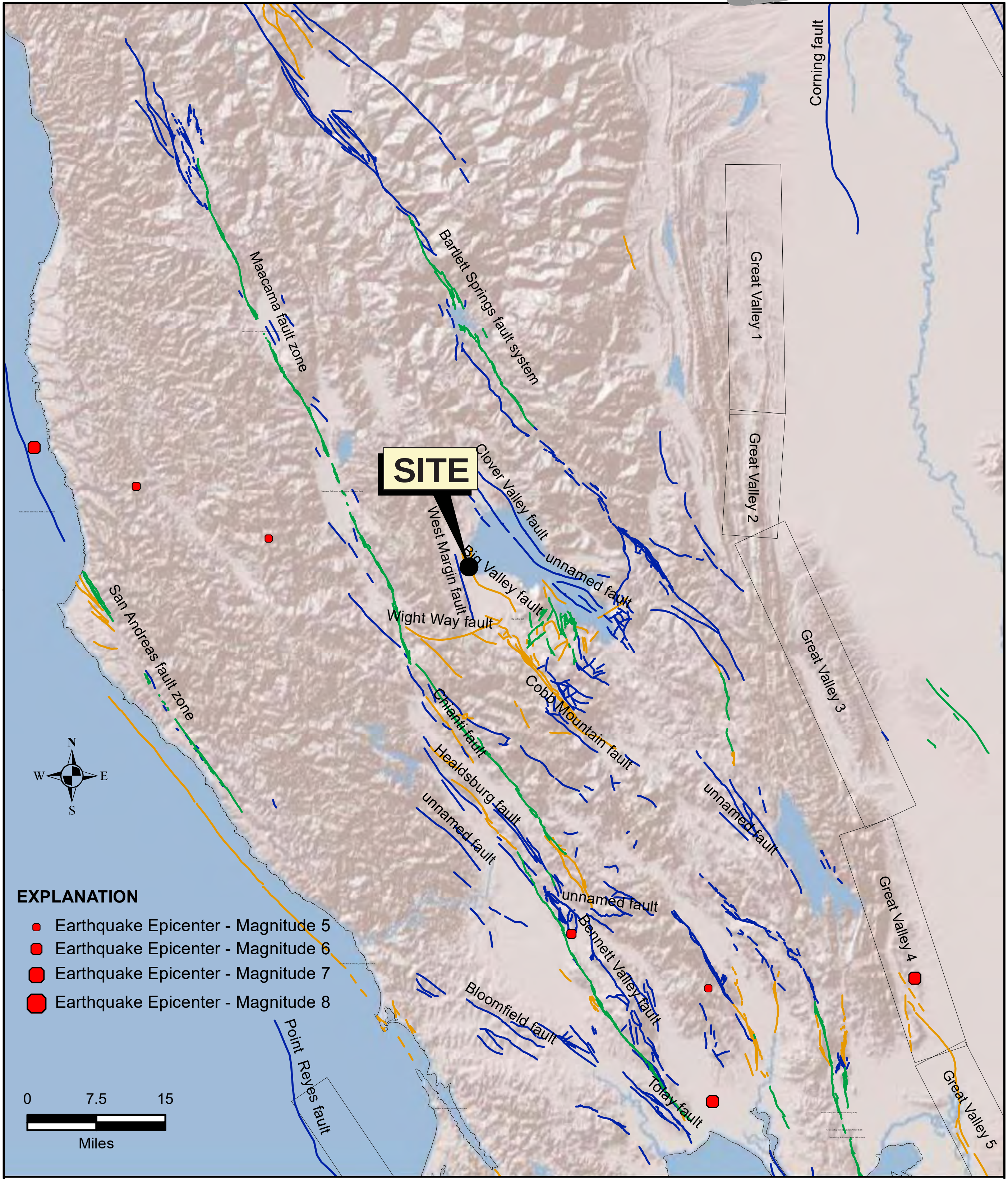

NOTES:
Digitized data for fault coordinates and earthquake catalog was developed by the California Geological Survey.
The historic earthquake catalog includes events from January 1800 to December 2000.

LAKEPORT COURTHOUSE
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Lakeport, California

LANGAN TREADWELL ROLLO

MAP OF MAJOR FAULTS AND EARTHQUAKE EPICENTERS IN THE SAN FRANCISCO BAY AREA

Date 03/04/15	Project No. 731563902	Figure 8

I **Not felt by people, except under especially favorable circumstances. However, dizziness or nausea may be experienced.**

Sometimes birds and animals are uneasy or disturbed. Trees, structures, liquids, bodies of water may sway gently, and doors may swing very slowly.

II **Felt indoors by a few people, especially on upper floors of multi-story buildings, and by sensitive or nervous persons.**

As in Grade I, birds and animals are disturbed, and trees, structures, liquids and bodies of water may sway. Hanging objects swing, especially if they are delicately suspended.

III **Felt indoors by several people, usually as a rapid vibration that may not be recognized as an earthquake at first. Vibration is similar to that of a light, or lightly loaded trucks, or heavy trucks some distance away. Duration may be estimated in some cases.**

Movements may be appreciable on upper levels of tall structures. Standing motor cars may rock slightly.

IV **Felt indoors by many, outdoors by a few. Awakens a few individuals, particularly light sleepers, but frightens no one except those apprehensive from previous experience. Vibration like that due to passing of heavy, or heavily loaded trucks. Sensation like a heavy body striking building, or the falling of heavy objects inside.**

Dishes, windows and doors rattle; glassware and crockery clink and clash. Walls and house frames creak, especially if intensity is in the upper range of this grade. Hanging objects often swing. Liquids in open vessels are disturbed slightly. Stationary automobiles rock noticeably.

V **Felt indoors by practically everyone, outdoors by most people. Direction can often be estimated by those outdoors. Awakens many, or most sleepers. Frightens a few people, with slight excitement; some persons run outdoors.**

Buildings tremble throughout. Dishes and glassware break to some extent. Windows crack in some cases, but not generally. Vases and small or unstable objects overturn in many instances, and a few fall. Hanging objects and doors swing generally or considerably. Pictures knock against walls, or swing out of place. Doors and shutters open or close abruptly. Pendulum clocks stop, or run fast or slow. Small objects move, and furnishings may shift to a slight extent. Small amounts of liquids spill from well-filled open containers. Trees and bushes shake slightly.

VI **Felt by everyone, indoors and outdoors. Awakens all sleepers. Frightens many people; general excitement, and some persons run outdoors.**

Persons move unsteadily. Trees and bushes shake slightly to moderately. Liquids are set in strong motion. Small bells in churches and schools ring. Poorly built buildings may be damaged. Plaster falls in small amounts. Other plaster cracks somewhat. Many dishes and glasses, and a few windows break. Knickknacks, books and pictures fall. Furniture overturns in many instances. Heavy furnishings move.

VII **Frightens everyone. General alarm, and everyone runs outdoors.**

People find it difficult to stand. Persons driving cars notice shaking. Trees and bushes shake moderately to strongly. Waves form on ponds, lakes and streams. Water is muddied. Gravel or sand stream banks cave in. Large church bells ring. Suspended objects quiver. Damage is negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Plaster and some stucco fall. Many windows and some furniture break. Loosened brickwork and tiles shake down. Weak chimneys break at the roofline. Cornices fall from towers and high buildings. Bricks and stones are dislodged. Heavy furniture overturns. Concrete irrigation ditches are considerably damaged.

VIII **General fright, and alarm approaches panic.**

Persons driving cars are disturbed. Trees shake strongly, and branches and trunks break off (especially palm trees). Sand and mud erupts in small amounts. Flow of springs and wells is temporarily and sometimes permanently changed. Dry wells renew flow. Temperatures of spring and well waters varies. Damage slight in brick structures built especially to withstand earthquakes; considerable in ordinary substantial buildings, with some partial collapse; heavy in some wooden houses, with some tumbling down. Panel walls break away in frame structures. Decayed pilings break off. Walls fall. Solid stone walls crack and break seriously. Wet grounds and steep slopes crack to some extent. Chimneys, columns, monuments and factory stacks and towers twist and fall. Very heavy furniture moves conspicuously or overturns.

IX **Panic is general.**

Ground cracks conspicuously. Damage is considerable in masonry structures built especially to withstand earthquakes; great in other masonry buildings - some collapse in large part. Some wood frame houses built especially to withstand earthquakes are thrown out of plumb, others are shifted wholly off foundations. Reservoirs are seriously damaged and underground pipes sometimes break.

X **Panic is general.**

Ground, especially when loose and wet, cracks up to widths of several inches; fissures up to a yard in width run parallel to canal and stream banks. Landsliding is considerable from river banks and steep coasts. Sand and mud shifts horizontally on beaches and flat land. Water level changes in wells. Water is thrown on banks of canals, lakes, rivers, etc. Dams, dikes, embankments are seriously damaged. Well-built wooden structures and bridges are severely damaged, and some collapse. Dangerous cracks develop in excellent brick walls. Most masonry and frame structures, and their foundations are destroyed. Railroad rails bend slightly. Pipe lines buried in earth tear apart or are crushed endwise. Open cracks and broad wavy folds open in cement pavements and asphalt road surfaces.

XI **Panic is general.**

Disturbances in ground are many and widespread, varying with the ground material. Broad fissures, earth slumps, and land slips develop in soft, wet ground. Water charged with sand and mud is ejected in large amounts. Sea waves of significant magnitude may develop. Damage is severe to wood frame structures, especially near shock centers, great to dams, dikes and embankments, even at long distances. Few if any masonry structures remain standing. Supporting piers or pillars of large, well-built bridges are wrecked. Wooden bridges that "give" are less affected. Railroad rails bend greatly and some thrust endwise. Pipe lines buried in earth are put completely out of service.

XII **Panic is general.**

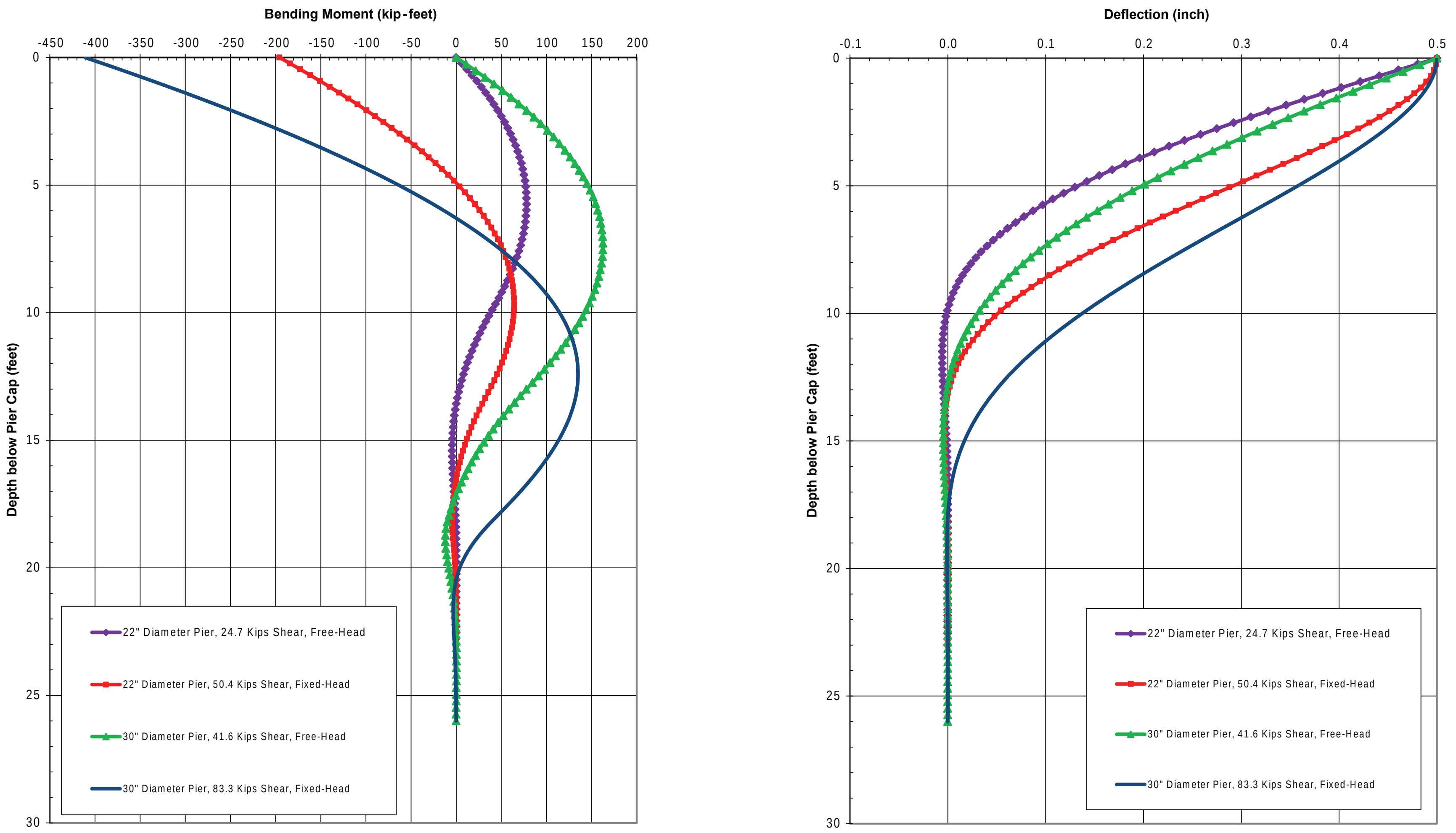
Damage is total, and practically all works of construction are damaged greatly or destroyed. Disturbances in the ground are great and varied, and numerous shearing cracks develop. Landslides, rock falls, and slumps in river banks are numerous and extensive. Large rock masses are wrenched loose and torn off. Fault slips develop in firm rock, and horizontal and vertical offset displacements are notable. Water channels, both surface and underground, are disturbed and modified greatly. Lakes are dammed, new waterfalls are produced, rivers are deflected, etc. Surface waves are seen on ground surfaces. Lines of sight and level are distorted. Objects are thrown upward into the air.

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

MODIFIED MERCALLI INTENSITY SCALE

Date 03/04/15 | Project No. 731563902 | Figure 9



Notes:

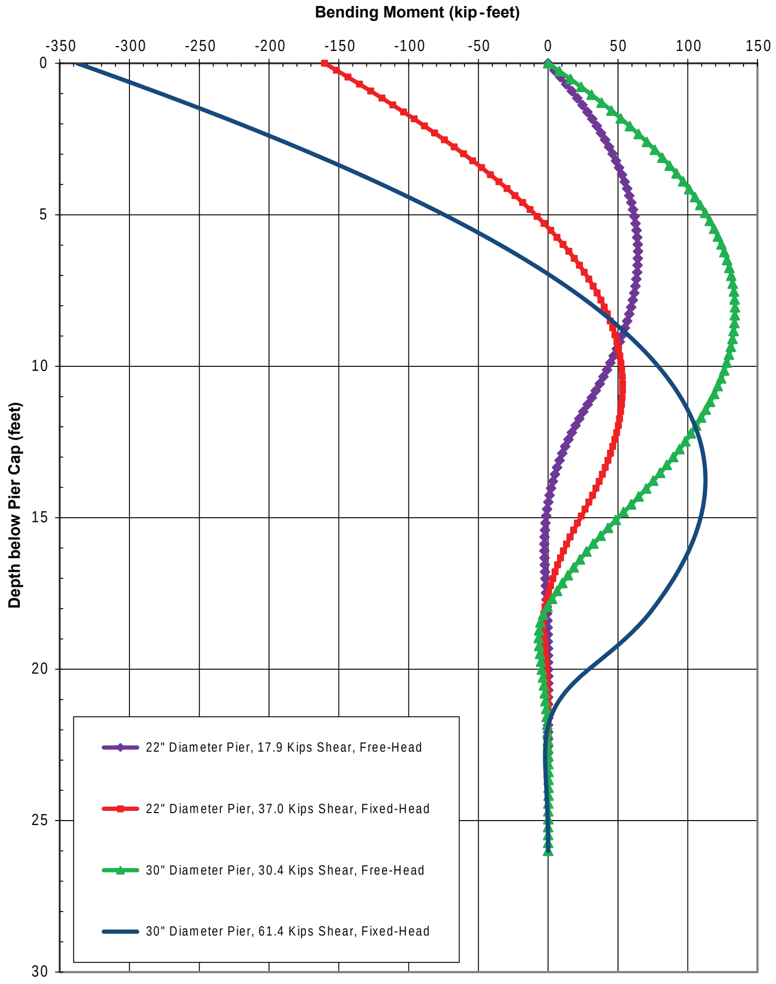
1. The profiles shown are for a single pier with an axial compressive load of 275 kips.
2. To account for group effects, the lateral load capacity of pier groups should be multiplied by a reduction factor. However, moment profile used to check individual piers in a group should be for the unfactored load.
3. Assumes there is no applied moment at the pier head.
4. Passive resistance of pier caps has not been included.

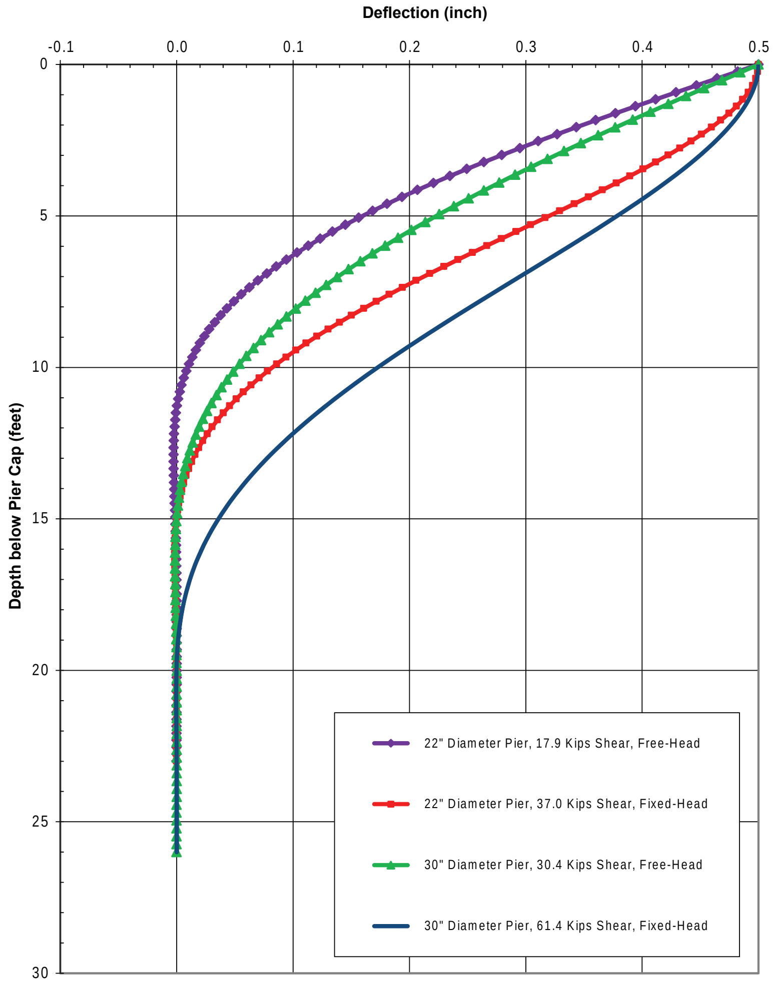
LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

MOMENT AND DEFLECTION PROFILES
DRILLED PIER
LEVEL GROUND SURFACE

Date 03/04/15	Project No. 731563902	Figure 10

LANGAN TREADWELL ROLLO





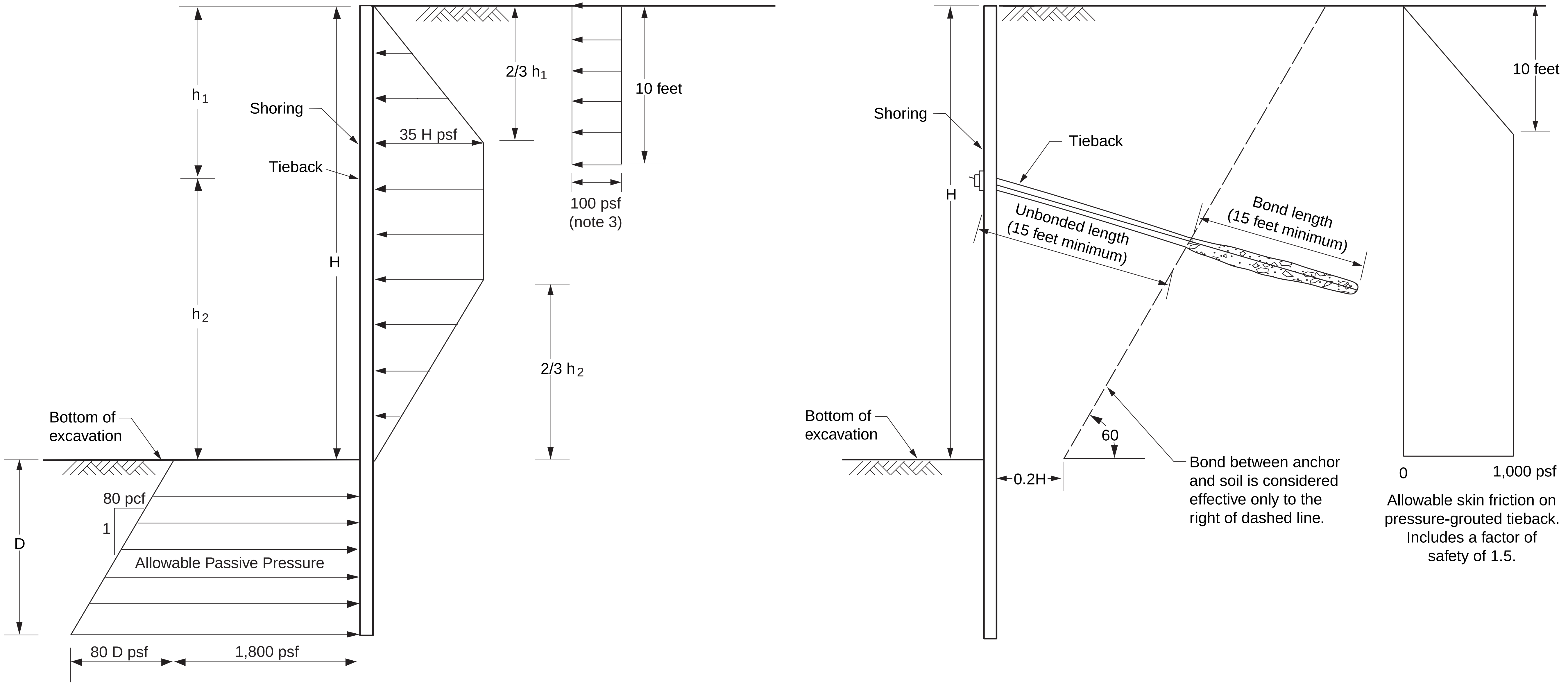
Notes:
1. The profiles shown are for a single pier with an axial compressive load of 275 kips.
2. To account for group effects, the lateral load capacity of pier groups should be multiplied by a reduction factor. However, moment profile used to check individual piers in a group should be for the unfactored load.
3. Assumes there is no applied moment at the pier head.
4. Passive resistance of pier caps has not been included.

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

MOMENT AND DEFLECTION PROFILES
DRILLED PIER
SLOPED GROUND SURFACE

Date 03/04/15 | Project No. 731563902 | Figure 11

LANGAN TREADWELL ROLLO



Notes:
1. The above pressure diagram assumes that the shoring walls consist of pervious soldier-pile-and-lagging system.
2. Passive pressure values include a factor of safety of about 1.5 and can be applied over a width of three soldier pile diameters or pile spacing, whichever is smaller.
3. Pressure due to vehicle surcharge (heavy equipment should come no closer than 5 feet to face of excavation).
4. D and H in feet.

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

TYPICAL LATERAL EARTH PRESSURES AND TIEBACK CRITERIA FOR TEMPORARY SHORING SYSTEM

Date 03/04/15 | Project No. 731563902 | Figure 12

LANGAN TREADWELL ROLLO

APPENDIX A

LOGS OF BORINGS AND TEST PITS

DRAFT

PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-1

PAGE 1 OF 3

Boring location: See Site Plan, Figure 2
Logged by: M. Mascorro
Date started: 11/29/11
Date finished: 11/29/11
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Automatic
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)

	SAMPLES					MATERIAL DESCRIPTION		LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	Ground Surface Elevation: 1391 feet[2]		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
						SANDY CLAY with GRAVEL (CL) dark reddish-brown, moist, with roots, abundant serpentinite rock fragments	LEVELING SLIVER FILL						
1													
2	BULK	☒			CL								
3	S&H	▨	50/ 5"	35/ 5"		SERPENTINITE BEDROCK olive-gray to black, very hard, weak to moderately strong, little weathered, moist							
4													
5	S&H SPT	▨	50/ 3" 50/ 3"	60/ 3" 60/ 3"									
6													
7													
8	SPT	▨	50/ 2.5"	60/ 2.5"		dark green to black, very hard, fresh fracture surfaces							
9													
10	SPT	▨	50/ 3"	60/ 3"		green and yellow-brown to black, hard with fragments of moderately hard rock, weak, foliated, soapy fracture surfaces							
11													
12													
13													
14													
15	SPT	▨	50/ 2"	60/ 2"		moisture on fracture surfaces, some oxidation, in foliated fragments							
16													
17													
18						increased moisture content in cuttings from 15 to 18 feet							
19													
20	SPT	▨	50/ 4"	60/ 4"		green-gray to black, very hard, weak to moderately strong, foliated							
21													
22													
23													
24													
25	SPT	▨	50/ 2"	60/ 2"		black, moderately hard, moderately strong, blocky and foliated fracturing							
26													
27													
28													
29													
30													

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-1a

DRAFT

PROJECT:

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-1

PAGE 2 OF 3

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]			Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT		50/ 1"	50/ 1"		SERPENTINITE BEDROCK (continued) dark green to black, very hard, with thin veins of low hardness, foliated fracturing, primarily along vein planes						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40	SPT		50/ 6"	60/6"		blue-green to black, low hardness to moderately hard, weak, soapy fracture surfaces, highly foliated						
41												
42												
43												
44												
45												
46												
47												
48												
49												
50	SPT		50/ 6"	60/ 6"		dark green to black, low hardness to very hard, friable to moderately strong, angular fracturing, fresh, polished fracture surfaces						
51												
52												
53												
54												
55												
56												
57												
58												
59												
60						▽						

LANGAN TREADWELL ROLLO

Project No.: 731563902

Figure: A-1b

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PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-1

PAGE 3 OF 3

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT	▨	50/ 3"	50/ 3"		SERPENTINIITE BEDROCK (continued)						
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
75												
76												
77												
78												
79												
80												
81												
82												
83												
84												
85												
86												
87												
88												
89												
90												

Boring terminated at a depth of 60.25 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 60 feet below ground surface during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.

[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902

Figure: A-1c

TEST GEOTECH LOG 731563901 FOR 102.GPJ TR.GDT 3/4/15

DRAFT

PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-2

PAGE 1 OF 2

Boring location: See Site Plan, Figure 2
Date started: 11/28/11
Date finished: 11/28/11
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Automatic
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: M. Mascorro

LABORATORY TEST DATA

Ground Surface Elevation: 1394 feet[2]

DEPTH (feet)	Sampler Type	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION		Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
0				GC	CLAYEY GRAVEL (GC) dark brown, medium dense, moist, black to brown to bluish-green angular serpentinite gravel, abundant cobble- to boulder-sized clasts in fill	FILL						
3	S&H	14 18 21	27									
6	S&H	13 17 22	27		reddish-brown sandy clay, increased moisture content, serpentinite rock fragments friable to moderately strong and deeply weathered (with iron staining)							
8	S&H	10 20 22	29									
11	S&H	23 20 18	27									
14.5				GP	GRAVEL with SAND (GP) greenish-black to black gravel, olive sand, loose, moist							
16	S&H	9 6 5	8									
18					SERPENTINITE BEDROCK olive-brown to dark gray, intensely fractured, soft to hard, weak to strong, moderately weathered							
21	S&H	22 43 50	65									
25	S&H SPT	50/ 2" 50/ 2"	35/ 2" 60/ 2"		black to bluish-green, seam of soft deeply weathered (oxidized) rock							
30												

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-2a

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PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-2

PAGE 2 OF 2

DEPTH (feet)	SAMPLES				LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA					
	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]			Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT	◩	50/ 5"	60/ 5"		SERPENTINITE BEDROCK (continued) increased rock hardness, fresh fractures, fractures into angular fragments						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40	SPT	◩	50/ 5"	60/ 5"		intensely crushed, soft to moderately hard, friable to weak, deeply weathered (oxidized fracture surfaces)						
41												
42												
43												
44												
45												
46												
47												
48												
49												
50												
51												
52												
53												
54												
55												
56												
57												
58												
59												
60												

Boring terminated at a depth of 40.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.
[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-2b

TEST GEOTECH LOG 731563901 FOR 102.GPJ TR.GDT 3/4/15

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PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-3

PAGE 1 OF 3

Boring location: See Site Plan, Figure 2
Date started: 11/28/11
Date finished: 11/28/11
Drilling method: Hollow Stem Auger
Hammer weight/drop: 140 lbs./30 inches
Hammer type: Automatic
Sampler: Sprague & Henwood (S&H), Standard Penetration Test (SPT)
Logged by: M. Mascorro

Ground Surface Elevation: 1395 feet[2]

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1						SANDY CLAY with GRAVEL (CL) dark brown mottled with yellow, very stiff, moist						
2					CL							
3	S&H		17 20 23	30		very stiff to hard, decreased clay content, increased sand content, with abundant fragments of serpentinite Corrosion Test, see Figure B-4						
4												
5												
6	S&H		12 20 35	39		GRAVEL with CLAY (GP-GC) reddish-brown clay, olive-gray and brown serpentinite fragments, dense, moist						
7					GP-GC							
8	S&H		16 10 7	12		dark gray serpentinite fragments, medium dense, decreased clay content						
9						FILL						
10						GRAVELLY CLAY (CL) reddish-brown clay, stiff, moist, gravel consists of serpentinite fragments						
11	S&H		4 7 8	11								
12					CL							
13												
14												
15						CLAY with GRAVEL (CL) dark reddish-brown, gray gravel mottled with reddish-orange iron staining, stiff, moist to wet, friable to strong angular serpentinite gravel increase in moisture content Corrosion Test, see Figure B-4						
16	S&H		6 9 11	14	CL							
17												
18						SERPENTINITE BEDROCK mottled olive-gray and black, moderately hard, little to moderately weathered, weak to moderately strong, moderately foliated, polished fractured surfaces, moist						
19												
20	S&H SPT		50/ 2" 50/ 2"	60/ 2" 60/ 2"								
21												
22												
23												
24												
25	SPT		50/ 2"	60/ 2"								
26												
27												
28												
29												
30												

TEST GEOTECH LOG 731563901 FOR 102.GPJ TR.GDT 3/4/15

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-3a

PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-3

	SAMPLES						LABORATORY TEST DATA					
DEPTH (feet)	Sampler Type	Sample	Blows/ 6"	SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
	SPT	◩	50/ 4"	60/ 4"		SERPENTINITE BEDROCK (continued) black to dark green, soft to hard, friable to weak, moist						
31												
32												
33												
34												
35												
36												
37												
38												
39												
40	SPT	◩	50/ 6"	60/ 6"		black, polished fractured surfaces, fresh, some slickenside, foliated, variable hardness and strength, moist						
41												
42												
43												
44												
45												
46												
47												
48												
49												
50	SPT	◩	50/ 3"	60/ 3"								
51												
52												
53												
54												
55												
56												
57												
58												
59												
60						▽						

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-3b

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PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-3

PAGE 3 OF 3

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION	LABORATORY TEST DATA: Type of Strength Test	LABORATORY TEST DATA: Confining Pressure Lbs/Sq Ft	LABORATORY TEST DATA: Shear Strength Lbs/Sq Ft	LABORATORY TEST DATA: Fines %	LABORATORY TEST DATA: Natural Moisture Content, %	LABORATORY TEST DATA: Dry Density Lbs/Cu Ft
	SPT	◪	50/ 5"	60/ 5"		SERPENTINITE BEDROCK (continued) hard, fresh, wet, foliated fracturing						
61												
62												
63												
64												
65												
66												
67												
68												
69												
70												
71												
72												
73												
74												
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83												
84												
85												
86												
87												
88												
89												
90												

Boring terminated at a depth of 60.4 feet below ground surface.
Boring backfilled with cement grout.
Groundwater encountered at 60 feet below ground surface during drilling.

[1] S&H and SPT blow counts for the last two increments were converted to SPT N-Values using factors of 0.7 and 1.2, respectively to account for sampler type and hammer energy.
[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902
Figure: A-3c

TEST GEOTECH LOG 731563901 FOR 102.GPJ TR.GDT 3/4/15

PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-4

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Date started: 11/29/11 Date finished: 11/29/11

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches Hammer type: Automatic

Sampler: Sprague & Henwood (S&H)

Logged by: M. Mascorro

DEPTH (feet)	SAMPLES Sampler Type	Sample	Blows/ 6"	SPT N-Value^1	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 1392 feet^2		LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1					CL	SANDY CLAY with GRAVEL (CL) dark reddish-brown, moist, abundant angular serpentinite gravel	LEVELING SLIVER FILL						
2													
3	S&H	▨	50/ 6"	35/ 6"		SERPENTINITE BEDROCK olive and dark yellowish-brown to black, highly mottled, intensely crushed, soft to low hardness, very weak, weathered to soil-like consistency, seam of highly plastic red clay							
4													
5	S&H	▨	50/ 6"	35/ 6"									
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 5.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H blow counts for the last two increments were converted to SPT N-Values using a factor of 0.7, to account for sampler type and hammer energy.

[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902

Figure: A-4

PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-5

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: M. Mascorro

Date started: 11/28/11

Date finished: 11/28/11

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Automatic

Sampler: Sprague & Henwood (S&H)

DEPTH (feet)	SAMPLES Sampler Type	SAMPLES Sample	SAMPLES Blows/ 6"	SAMPLES SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 1393 feet[2]	LABORATORY TEST DATA Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1	BULK	☒				SANDY SILT with GRAVEL (MH) dark reddish-brown, hard, moist, serpentinite cobbles yellowish-brown to dark greenish black, intensely crushed, soft to moderately hard, very weak, deeply weathered LL = 66, PI = 32, see Figure B-1 Resistance Value Test, see Figure B-2					10.1	
2												
3	S&H	▨	35 50/ 5"	35/ 5"	MH	FILL						
4												
5	S&H	▨	30 50/ 5"	35/ 5"		yellowish-brown						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												
29												
30												

Boring terminated at a depth of 5.9 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H blow counts for the last two increments were converted to SPT N-Values using a factor of 0.7, to account for sampler type and hammer energy.

[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902

Figure: A-5

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PROJECT: **LAKEPORT COURTHOUSE**
675 LAKEPORT BOULEVARD
Lakeport, California

Log of Boring B-6

PAGE 1 OF 1

Boring location: See Site Plan, Figure 2

Logged by: M. Mascorro

Date started: 11/28/11

Date finished: 11/28/11

Drilling method: Hollow Stem Auger

Hammer weight/drop: 140 lbs./30 inches

Hammer type: Automatic

Sampler: Sprague & Henwood (S&H)

DEPTH (feet)	SAMPLES: Sampler Type	SAMPLES: Sample	SAMPLES: Blows/ 6"	SAMPLES: SPT N-Value[1]	LITHOLOGY	MATERIAL DESCRIPTION Ground Surface Elevation: 1394.5 feet[2]		LABORATORY TEST DATA: Type of Strength Test	Confining Pressure Lbs/Sq Ft	Shear Strength Lbs/Sq Ft	Fines %	Natural Moisture Content, %	Dry Density Lbs/Cu Ft
1	BULK	☒				SANDY CLAY with GRAVEL (CL) dark reddish-brown clay, stiff, moist, abundant yellowish-brown to greenish-brown and black serpentinite gravel and cobbles of variable strength, hardness, and weathering	FILL						
2													
3	S&H	■	11 9 6	11	CL	Resistance Value Test, see Figure B-3							
4													
5													
6	S&H	■	12 16 23	27		very stiff							
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													
27													
28													
29													
30													

Boring terminated at a depth of 6.5 feet below ground surface.
Boring backfilled with cement grout.
Groundwater not encountered during drilling.

[1] S&H blow counts for the last two increments were converted to SPT N-Values using a factor of 0.7, to account for sampler type and hammer energy.

[2] Elevations based on National Geodetic Vertical Datum 1929.

LANGAN TREADWELL ROLLO

Project No.: 731563902

Figure: A-6

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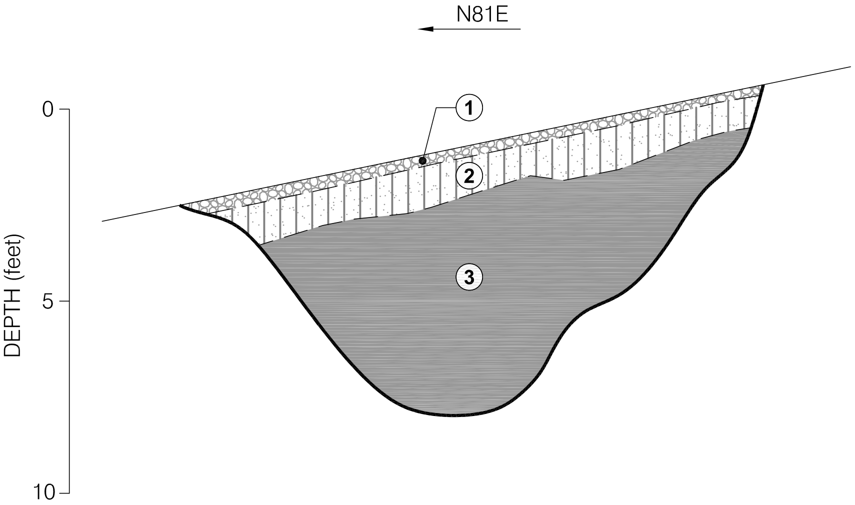

① GRAVEL (GP)
gray to greenish-gray, loose, angular to subangular, poorly sorted, 1/4-inch to 1 1/2-inch, scattered grass and organics *[FILL]*

② SANDY CLAY (CL)
very dark brown, stiff, moist, moderately plastic, poorly sorted, 20-25% fine- to coarse-grained subrounded to subangular sand and scattered gravel to 1/2-inch in diameter, scattered roots and organics *[BURIED TOPSOIL]*

③ SERPENTINITE
white to dark gray, very strong, slightly weathered, angular fractures, fractures lithified/cemented, hard, moist *[BEDROCK]*

LAKEPORT COURTHOUSE
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LANGAN TREADWELL ROLLO

LOG OF TEST PIT
TP-1

Date 12/13/11 | Project No. 731563902 | Figure A-7

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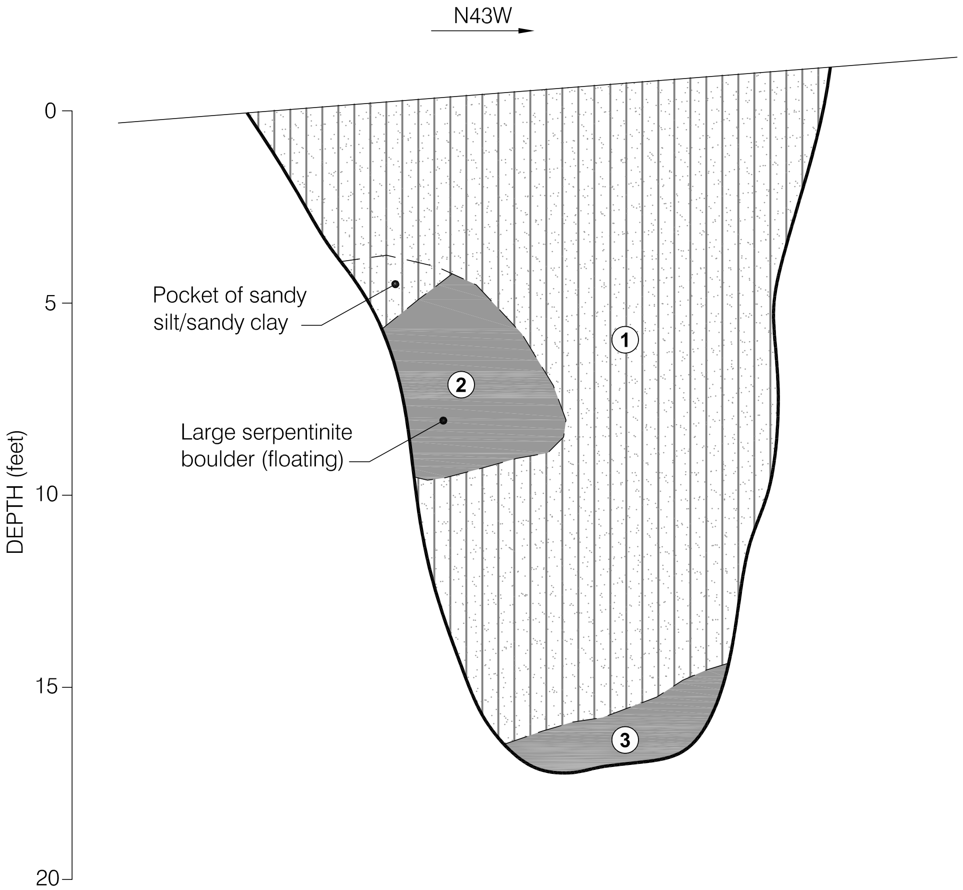

① SILTY SAND with GRAVEL (SM)
dark brown, medium dense to dense, moist, poorly sorted, fine- to coarse-grained, with 10-15% angular to subangular gravels to 1-inch in diameter, slightly to moderately oxidized *[FILL]*

② SERPENTINITE
white with brown oxidation staining, moderately weathered, hard, subrounded to subangular fractures, highly fractured, moist
[DISPLACED BEDROCK BOULDER]

③ SERPENTINITE
olive, olive-yellow, and black, slightly weathered, oxidation staining along fracture surfaces, moist, very hard, slightly fractured
[*BEDROCK]*

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LANGAN TREADWELL ROLLO

LOG OF TEST PIT
TP-2

Date 12/13/11	Project No. 731563902	Figure A-8

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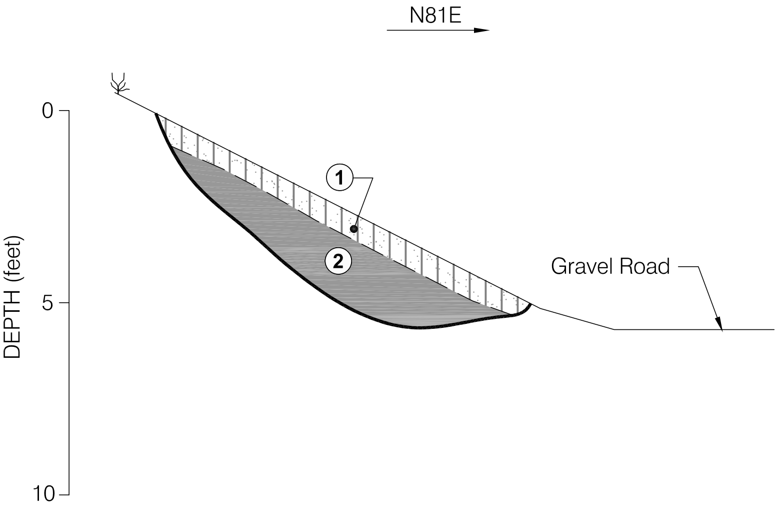

① SANDY SILT (ML) to SANDY CLAY (CL)
dark reddish-brown, moist, 10-20% very fine- to medium-grained sand with scattered gravel, scattered roots and decaying organics *[TOPSOIL]*

② SERPENTINITE
gray to black, slightly weathered, very hard, slightly fractured, moist, oxidized, angular fractures [*BEDROCK]*

LAKEPORT COURTHOUSE
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LANGAN TREADWELL ROLLO

LOG OF TEST PIT
TP-3

Date 12/13/11	Project No. 731563902	Figure A-9

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UNIFIED SOIL CLASSIFICATION SYSTEM

Major Divisions		Symbols	Typical Names
Coarse-Grained Soils (more than half of soil > no. 200 sieve size	**Gravels** (More than half of coarse fraction > no. 4 sieve size)	**GW**	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	Sands (More than half of coarse fraction < no. 4 sieve size)	**SW**	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
Fine -Grained Soils (more than half of soil < no. 200 sieve size)	**Silts and Clays** LL = < 50	**ML**	Inorganic silts and clayey silts of low plasticity, sandy silts, gravelly silts
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	Silts and Clays LL = > 50	**MH**	Inorganic silts of high plasticity
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic silts and clays of high plasticity
Highly Organic Soils		**PT**	Peat and other highly organic soils

GRAIN SIZE CHART

Classification	**Range of Grain Sizes**	
	U.S. Standard Sieve Size	**Grain Size in Millimeters**
Boulders	Above 12"	Above 305
Cobbles	12" to 3"	305 to 76.2
Gravel	3" to No. 4	76.2 to 4.76
coarse	3" to 3/4"	76.2 to 19.1
fine	3/4" to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.075
coarse	No. 4 to No. 10	4.76 to 2.00
medium	No. 10 to No. 40	2.00 to 0.420
fine	No. 40 to No. 200	0.420 to 0.075
Silt and Clay	Below No. 200	Below 0.075

▽ Unstabilized groundwater level

▼ Stabilized groundwater level

SAMPLE DESIGNATIONS/SYMBOLS

⬒	Sample taken with Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter. Darkened area indicates soil recovered
◩	Classification sample taken with Standard Penetration Test sampler
◨	Undisturbed sample taken with thin-walled tube
⊠	Disturbed sample
⊡	Sampling attempted with no recovery
◫	Core sample
▣	Analytical laboratory sample
▥	Sample taken with Direct Push sampler

SAMPLER TYPE

C	Core barrel
CA	California split-barrel sampler with 2.5-inch outside diameter and a 1.93-inch inside diameter
D&M	Dames & Moore piston sampler using 2.5-inch outside diameter, thin-walled tube
O	Osterberg piston sampler using 3.0-inch outside diameter, thin-walled Shelby tube
PT	Pitcher tube sampler using 3.0-inch outside diameter, thin-walled Shelby tube
S&H	Sprague & Henwood split-barrel sampler with a 3.0-inch outside diameter and a 2.43-inch inside diameter
SPT	Standard Penetration Test (SPT) split-barrel sampler with a 2.0-inch outside diameter and a 1.5-inch inside diameter
ST	Shelby Tube (3.0-inch outside diameter, thin-walled tube) advanced with hydraulic pressure

LAKEPORT COURTHOUSE
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LANGAN TREADWELL ROLLO

CLASSIFICATION CHART

Date 12/13/11 | Project No. 731563902 | Figure A-10

I FRACTURING

Intensity	Size of Pieces in Feet
Very little fractured	Greater than 4.0
Occasionally fractured	1.0 to 4.0
Moderately fractured	0.5 to 1.0
Closely fractured	0.1 to 0.5
Intensely fractured	0.05 to 0.1
Crushed	Less than 0.05

II HARDNESS

1. **Soft** - reserved for plastic material alone.
2. **Low hardness** - can be gouged deeply or carved easily with a knife blade.
3. **Moderately hard** - can be readily scratched by a knife blade; scratch leaves a heavy trace of dust and is readily visible after the powder has been blown away.
4. **Hard** - can be scratched with difficulty; scratch produced a little powder and is often faintly visible.
5. **Very hard** - cannot be scratched with knife blade; leaves a metallic streak.

III STRENGTH

1. **Plastic** or very low strength.
2. **Friable** - crumbles easily by rubbing with fingers.
3. **Weak** - an unfractured specimen of such material will crumble under light hammer blows.
4. **Moderately strong** - specimen will withstand a few heavy hammer blows before breaking.
5. **Strong** - specimen will withstand a few heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.
6. **Very strong** - specimen will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments.

IV WEATHERING - The physical and chemical disintegration and decomposition of rocks and minerals by natural processes such as oxidation, reduction, hydration, solution, carbonation, and freezing and thawing.

D. Deep - moderate to complete mineral decomposition; extensive disintegration; deep and thorough discoloration; many fractures, all extensively coated or filled with oxides, carbonates and/or clay or silt.

M. Moderate - slight change or partial decomposition of minerals; little disintegration; cementation little to unaffected. Moderate to occasionally intense discoloration. Moderately coated fractures.

L. Little - no megascopic decomposition of minerals; little of no effect on normal cementation. Slight and intermittent, or localized discoloration. Few stains on fracture surfaces.

F. Fresh - unaffected by weathering agents. No disintegration of discoloration. Fractures usually less numerous than joints.

ADDITIONAL COMMENTS:

V CONSOLIDATION OF SEDIMENTARY ROCKS: usually determined from unweathered samples. Largely dependent on cementation.

U = unconsolidated
P = poorly consolidated
M = moderately consolidated
W = well consolidated

VI BEDDING OF SEDIMENTARY ROCKS

Splitting Property	Thickness	Stratification
Massive	Greater than 4.0 ft.	very thick-bedded
Blocky	2.0 to 4.0 ft.	thick bedded
Slabby	0.2 to 2.0 ft.	thin bedded
Flaggy	0.05 to 0.2 ft.	very thin-bedded
Shaly or platy	0.01 to 0.05 ft.	laminated
Papery	less than 0.01	thinly laminated

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

PHYSICAL PROPERTIES CRITERIA
FOR ROCK DESCRIPTIONS

Date 12/13/11 | Project No. 731563902 | Figure A-11

APPENDIX B

RESULTS OF GEOPHYSICAL SURVEYS

DRAFT

NORCAL GEOPHYSICAL CONSULTANTS, INC.

NORCAL

February 24, 2015

Langan Treadwell Rollo
555 Montgomery Street, Suite 1300
San Francisco, California 94111

Subject: Seismic Refraction Investigation
675 Lakeport Boulevard
Lakeport, California

NORCAL Job No: 15-243.110

Attention: Ms. Marina Mascorro

This report presents the findings of a seismic refraction (SR) investigation performed by NORCAL Geophysical Consultants at the subject address. This investigation is in conjunction with the planned improvements to the site and the construction of the proposed Lakeport Courthouse. The survey was performed on January 28th and 29th, 2015 by NORCAL Professional Geophysicist David T. Hagin PGp 1033 and Staff Geophysicist Hunter S. Philson. Logistical support and safety information were provided onsite by Ms. Jane Elliot of Langan Treadwell Rollo.

1.0 SITE DESCRIPTION and PURPOSE

The site is composed of an approximate 320 X 280 ft empty building pad with large fill slopes on the northern and eastern sides, where a descending access road is located (Plate 1, base map supplied by Langan Treadwell Rollo). Based on the fill slopes and the surrounding terrain, we expect the fill to be thickest on the eastern portion of the pad. As the building pad is visible in an aerial photograph taken in 1993, it was constructed over 20 years ago. The site is accessed via a small gravel paved road off of Bevins Street. At the time of the survey the ground was dry and the weather fair.

The purpose of this investigation was to evaluate the shallow sub-surface conditions in the location of the planned structure by measuring the seismic p-wave velocity values using the seismic refraction (SR) method. These data are used to evaluate the thickness of the fill and possible underlying colluvium over serpentinite bedrock. Additionally, an MASW (Multichannel Analysis of Surface Waves) sounding was performed to measure s-wave velocities and aid in the evaluation of ground stiffness.

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2.0 METHODOLOGY

2.1 Seismic Refraction

The SR method is used to determine the compressional acoustic primary wave velocity (seismic velocity) of subsurface materials. The seismic velocity of fill, sediments, and rock are dependent on physical properties such as compaction, density, and induration (hardness). However, other factors such as bedding, fracturing, and saturation also affect seismic velocity. Typically, low velocities are indicative of loose, dry soils, poorly compacted fill material, poorly to semi-consolidated sediments, or alternatively, deeply weathered and/or highly fractured rock. Moderate velocities usually indicate dense and highly compacted or saturated sedimentary deposits or fill, and/or moderately weathered and fractured rock. High velocities typically represent slightly weathered to unweathered (fresh) rock with little fracturing. A more detailed description of the SR methodology is provided in Appendix A.

2.2 MASW

When seismic waves are generated at or near the ground surface, both body and surface waves are generated; these are commonly referred to as ground roll in seismic surveys. Surface waves have dispersion properties that body waves lack. By analyzing the dispersion of surface waves it is possible to obtain a near-surface s-wave velocity profile. A more detailed description of the MASW methodology is provided in Appendix B.

3.0 FIELD SURVEY AND DATA PROCESSING

3.1 Data Acquisition

The geophysical survey entailed the acquisition of six SR lines extending over the surface of the pad and along the descending access road near the area of the planned structure, as shown on Plate 1; the placement of the lines was determined by Langan Treadwell Rollo personnel. The seismic lines each consisted of a single geophone spread comprised of 24 geophones and 7 shot points distributed in a collinear array. The geophones were coupled to the ground surface at 5 to 10 foot intervals for total line lengths between 125 and 250 feet. The two end shot points were located one or one-half station beyond each end of the geophone spread and the remaining shot points were evenly spaced within the spread.

The MASW sounding was performed in the location of SR Line II. The sounding employed 24 geophones coupled to the ground at 6-ft intervals. Shot points were located at 12, 24 and 36 feet off of each end of the line.

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3.2 Instrumentation

The SR data were recorded using a ***Geometrics Geode***, 24-bit digital seismic recording system and ***Oyo Geospace*** digital-grade geophones with a natural frequency of 10 Hz. We produced seismic energy at each shot point by striking an aluminum plate placed on the ground surface with a 16-pound sledge hammer. An accelerometer attached to the hammer transmitted a triggering pulse to the seismograph to begin recording each time the plate was struck. Several strikes were performed and stacked at each shot point to ensure an acceptable signal to noise ratio. The locations and elevations of the geophones and shot-points were determined using GPS locating and the topographic map supplied by Langan Treadwell Rollo.

3.3 Data Processing

The refraction data were processed in-house using ***SeisImager***, specialized software developed by Geometrics, Inc. of San Jose, California. We then used the program ***Surfer 12*** by Golden Software to graphically illustrate the subsurface distribution of seismic velocities. This consisted of generating a color-contoured seismic velocity cross-section (profile) for each seismic line, as shown on Plates 2, 3 and 4.

The MASW data were also processed in-house using ***SurfSeis 3***, dispersion-curve inversion software developed by the Kansas Geological Survey. The resulting model is a one dimensional sounding; depth intervals and their associated s-wave velocity values are presented in Table A.

4.0 RESULTS AND INTERPRETATIONS

The results of the seismic refraction survey are illustrated by the seismic velocity profiles shown on Plates 2, 3 and 4. The vertical axes represent elevation in feet (above mean sea level) and the horizontal axes represent survey stationing in feet (distance along the line). The profiles show the ground surface and color contours representing the distribution of seismic velocity values according to the color scale shown at the bottom of each plate.

4.1 Seismic Velocities

Low seismic velocity values of less than about 4,500 feet per second (ft/s) are generally interpreted to represent the overburden, consisting of fill and/or underlying colluvial material (brown, yellow). Moderate seismic velocity values ranging from 4,500 to 6,000 ft/s are interpreted to likely represent a transition zone to moderately weathered and/or fractured rock (green, blue). High seismic velocity values are greater than 6,000 ft/s; they are interpreted to represent less weathered and/or fractured rock (maroon). The maximum seismic velocity values measured were under 8,000 ft/s.

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4.2 Seismic Refraction Profiles

The SR profiles provide a general characterization of the fill/colluvium over bedrock. Inspection of the SR lines reveals undulating contours on many of the profiles, suggesting that the original ground surface may have been tortuous. On the building pad, SR line D suggests a wedge of fill material on the building pad thickening toward the east, as expected. Line C indicates only five or six feet of overburden, whereas Line H shows nearly 20 feet of overburden. The lines correlate well at the tie points and maximum velocity values are similar on all of the profiles.

On the access road, Lines E and F indicate a wedge of overburden that thickens toward the east to approximately 12 feet; however, Line G shows the low velocity wedge pinching out against higher velocities below at the southern end of the line. This is in agreement with the observation of a rising "knob" of bedrock visible in the cut/fill slope below the southern portion of the line (also visible in the aerial photographs). Again, the lines correlate well at the tie points and maximum velocity values are comparable on all of the profiles.

4.3 SR Limitations

It should be noted that the seismic refraction technique is based on the assumption that seismic velocity increases with depth. Any layers representing a decrease in velocity with depth, otherwise known as a velocity inversion, will not be defined and will result in the over-estimation of the depth of deeper, higher velocity layers. In addition, relatively thin layers might not be individually resolved and might, instead, be lumped together with other layers. Hard and soft zones within a given seismic layer will tend to be averaged into the velocity of that layer. Finally, there is not necessarily a one-to-one relationship between lithologic layers and seismic layers. It is entirely possible that two different types of material could have the same seismic velocity. Alternatively, a change in velocity can occur within a single lithologic unit. A more detailed discussion of the limitations with regard to the seismic refraction method is presented in Appendix A.

4.4 MASW Sounding

We acquired a single MASW sounding located at the center of Line H, where the SR profiles indicate that fill extends to a depth of approximately 20 feet. The results of the sounding are presented by Table A, providing depth intervals and their associated s-wave velocity values.

DRAFT

Table A

DEPTH INTERVAL (FT)	S-WAVE VELOCITY (FT/S)
0 – 2.5	1448
2.5 - 5	1444
5 - 10	1448
10 - 15	855
15 - 20	1158
20 - 25	2082
25 - 35	2564
35 - 45	2917
45 - 60	3425
60 - 75	5583

We interpret the sharp rise in the s-wave velocity values in the 20-25 ft depth interval to indicate the presence of bedrock; this correlates well with the results of Line II. The s-wave velocity values associated with the interpreted bedrock are greater than 2,000 ft/s.

5.0 STANDARD OF CARE

The scope of NORCAL's services for this project consisted of using geophysical methods to characterize the subsurface. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the standard of care ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

Thank you for the opportunity to participate on this project.

Sincerely,

NORCAL Geophysical Consultants, Inc.

David T. Hagin
Professional Geophysicist PGp 1033

DTH/KGB/tt

Enclosures: Plates 1 through 4
Appendix A - Seismic Refraction Survey
Appendix B - MASW Survey

Appendix A

SEISMIC REFRACTION SURVEY

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Appendix A

SEISMIC REFRACTION (SR)

METHODOLOGY

The seismic refraction method provides information regarding the seismic velocity structure of the subsurface. An impulsive (mechanical or explosive) source is used to produce compressional (P) wave seismic energy. The P-waves propagate into the earth and are refracted along interfaces caused by an increase in velocity. A portion of the P-wave energy is refracted back to the surface where it is detected by sensors (geophones) that are coupled to the ground surface in a collinear array (spread). The detected signals are recorded on a multi-channel seismograph and are analyzed to determine the shot point-to-geophone travel times. These data can be used along with the corresponding shot point-to-geophone distances to determine the depth, thickness, and velocity of subsurface seismic layers.

The seismic refraction technique is based on several assumptions. Paramount among these are:

- seismic velocity increases with depth, and,
- the velocity of each seismic layer is uniform over the length of the given spread.

In cases where these assumptions do not hold, the accuracy of the technique decreases. For example, if a low velocity layer occurs between two layers of higher velocity, the low velocity layer will not be detected and the depth to the underlying high velocity layer will be erroneously large. Also, if the velocity of a seismic layer varies laterally within a spread, those variations will be interpreted as fluctuations in the elevation of the underlying seismic layer.

It should be noted that apparent velocities can be affected by the orientation of bedding planes with respect to the direction of the seismic profile. Apparent velocities of rock are typically slower when measured along lines oriented perpendicular to bedding planes of steeply dipping rock than those measured along lines oriented parallel.

INSTRUMENTATION

Data acquisition is initiated along each SR line by producing seismic energy using a mechanical source. Mechanical sources produce energy by impacting a metal strike plate on the ground surface with either a 12-16 pound sledge hammer or an elastic-band driven weight drop. The resulting seismic wave forms are recorded using a Geometrics 24-channel engineering seismograph and Mark Products geophones with a natural frequency of 10 Hz. The data are recorded on hard copy records (seismograms) as well as on computer disks for future processing. The seismograms display the amount of time it takes for a compression (P) wave to travel from a given shot point to each geophone in a spread.

DATA ANALYSIS

The seismic data are downloaded to a computer and processed using the software ***Seisimager*** by Geometrics, Inc. This is an interactive program that is used to determine the shot point to geophone travel times, and to compute a 2D model based on those times. Once the travel times for a given line are determined, the programs time-term algorithm is used to compute a preliminary 2D seismic model. This model is then used as input for the programs tomographic routine. Using this procedure, the program divides the starting model into a network of cells and assigns velocities to those cells based on the starting model. The program then traces the refracted seismic travel paths through those cells and computes the associated travel times. It then compares the computed travel times with the measured times and adjusts the velocities of the appropriate cells to improve the fit. The software is programmed to continue this procedure for twenty iterations. Typically, at the end of the twenty iterations the travel times associated with the computed model match the observed travel times to an accuracy of one milli-second (mS) or better. Once a satisfactory model is computed, the software contours the model velocities to produce seismic velocity vs. depth and distance cross-sections (profiles).

LIMITATIONS

In general, there are limitations unique to the SR method. These limitations are primarily based on assumptions that are made by the data analysis routine. First, the data analysis routine assumes that the velocities along the length of each spread are uniform. If there are localized zones within each layer where the velocities are higher or lower than indicated, the analysis routine will interpret these zones as changes in the surface topography of the underlying layer. A zone of higher velocity material would be interpreted as a low in the surface of the underlying layer. Zones of lower velocity material would be interpreted as a high in the underlying layer.

Second, the data analysis routine assumes that the velocity of subsurface materials increase with depth. Therefore, if a layer exhibits velocities that are slower than those of the material above it, the slower layer will not be resolved. Also, a velocity layer may simply be too thin to be detected. Due to these and other limitations inherent to the SR method, the results of the SR survey should be considered only as approximations of the subsurface conditions. The actual conditions may vary locally.

Appendix B

MASW SURVEY

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Appendix B

1-D MULTI-CHANNEL ANALYSIS OF SURFACE WAVES (MASW)

Methodology

When seismic waves are generated at or near the ground surface, both body and surface waves are generated. Body waves consist of both compressional (P) and shear (S) waves. Surface waves (e.g., Rayleigh, Love, etc.) propagate at velocities that are proportional to shear wave velocity (Vs). If a vertical energy source is used, Rayleigh type surface waves are produced. These are commonly referred to as ground roll in seismic surveys. Rayleigh waves are retrograde elliptical and travel at approximately 0.9 times the velocity of S-waves.

MASW data are gathered in much the same way as high-resolution reflection data. Seismic energy - generated by vertical impacts on the ground surface - is detected by an array of closely spaced geophones. The primary differences are that the surface wave technique requires an energy source that is capable of producing ground roll and geophones that are capable of detecting low frequency (<10 Hz) signals.

Surface waves account for more than two-thirds of the energy produced by vertical seismic energy sources. As a result, surface waves are the most prominent signal on multi-channel seismic records. In addition, surface waves have dispersion properties that body waves lack. That is, different wavelengths have different penetration depths and, therefore, propagate at different velocities. By analyzing the dispersion of surface waves it is possible to obtain a near-surface S-wave velocity profile. Since s-wave velocity is directly proportional to shear modulus, this provides a direct indication in the variation of stiffness (or rigidity) of subsurface materials.

Data Acquisition and Analysis

The MASW data are recorded using a Geometrics Geode 24-channel seismograph and 24 8-Hz geophones. Typically, the geophones are distributed at 6-ft intervals along the seismic line, and shot points are located at 12, 24 and 36 feet off each end of the active geophone spread. Seismic energy is typically produced at each shot point using a 16-pound sledgehammer striking a metal plate on the ground surface: and excellent source of surface wave energy.

The surface wave measurements were converted to Vs versus depth models using a technique known as multi-channel analysis of surface waves (MASW). The raw seismic wave-traces (shot gathers) produced at the near and far offset shot points were input to the computer program ***SURFSEIS*** developed by the Kansas Geological Survey (Version 2.0, 2007). This program analyzes the data by identifying the ground-roll portion of the seismic wave traces, computing the frequency and velocity of the wavelets, and constructing a dispersion curve representing the variation in surface wave velocity versus frequency. The program then inverts the dispersion curve to compute a one-dimensional (1D) layered model indicating shear-wave velocity (Vs) versus depth beneath the center of the geophone array for each shot gather. In all cases the MASW modeling was iterated until the dispersion curve generated from the S-wave velocity model closely matched that calculated from the shot gathers. The 1D models inverted from all four shot gathers were then entered into a spread sheet which computed average Vs versus depth values. Since the inversion of the dispersion curve into a shear wave velocity profile is a non-unique process, the software will produce a shear wave profile containing 10 distinct subsurface velocity intervals at various depths.

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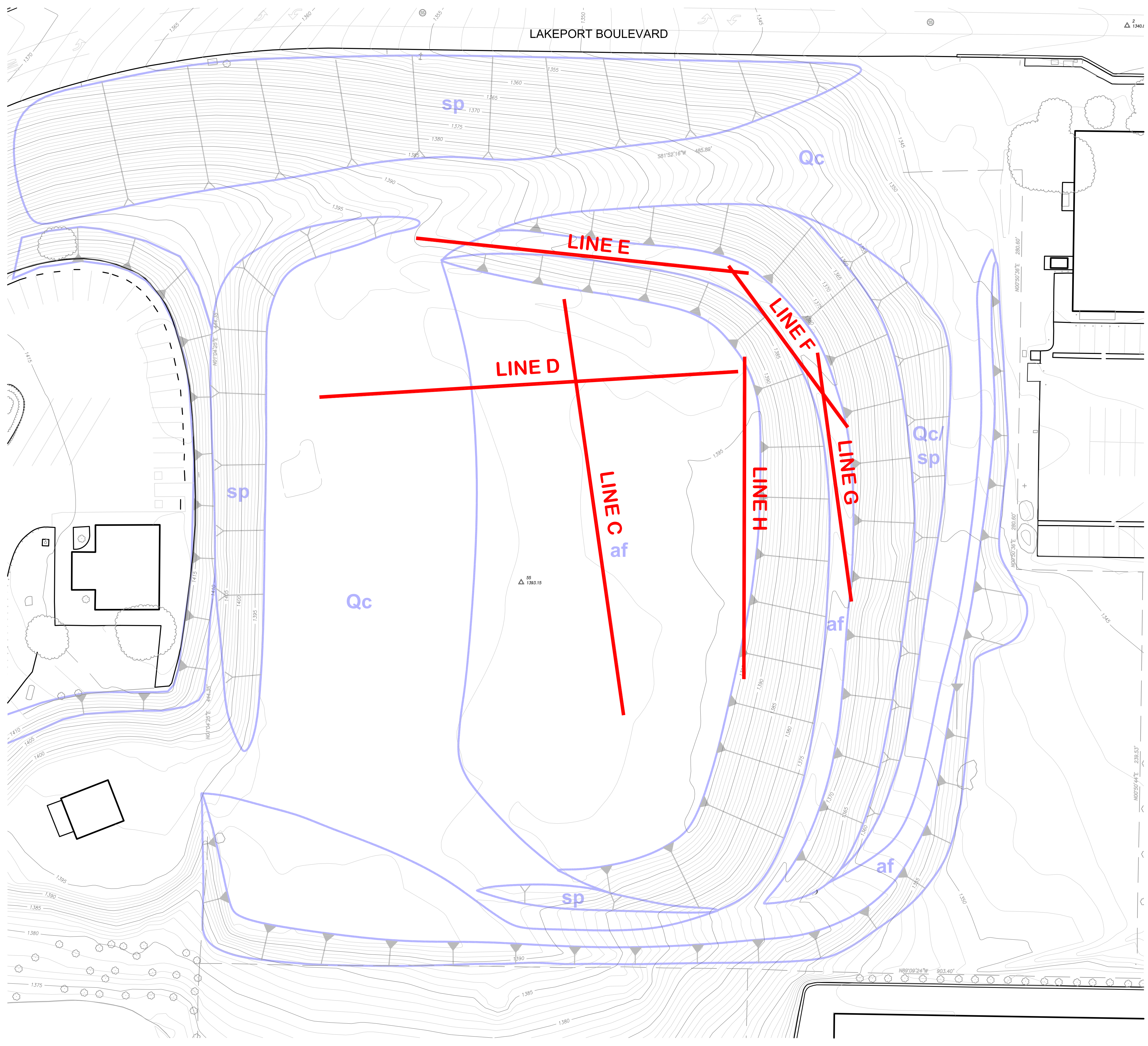
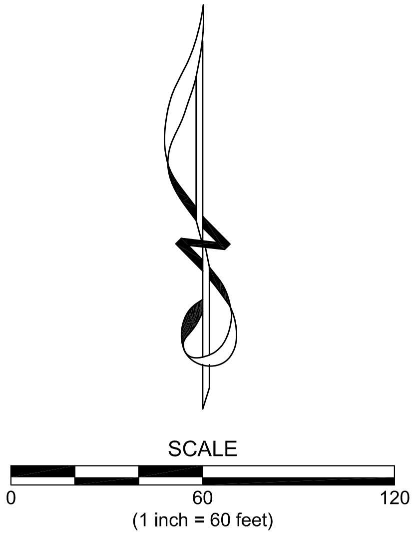


VICINITY MAP



LEGEND

🟥	SEISMIC REFRACTION LINE
af	ARTIFICIAL FILL
Qc	COLLUVIUM/TOPSOIL
sp	SERPENTINE BEDROCK

NOTE: BASE MAP PROVIDED BY LANGAN TREADWELL ROLLO

NORCAL

SITE LOCATION MAP
SEISMIC REFRACTION SURVEY
LAKEPORT COURTHOUSE

LOCATION: 675 LAKEPORT BOULEVARD, LAKEPORT, CALIFORNIA

CLIENT: LANGAN TREADWELL ROLLO

JOB #: 15-243.110

NORCAL GEOPHYSICAL CONSULTANTS INC.

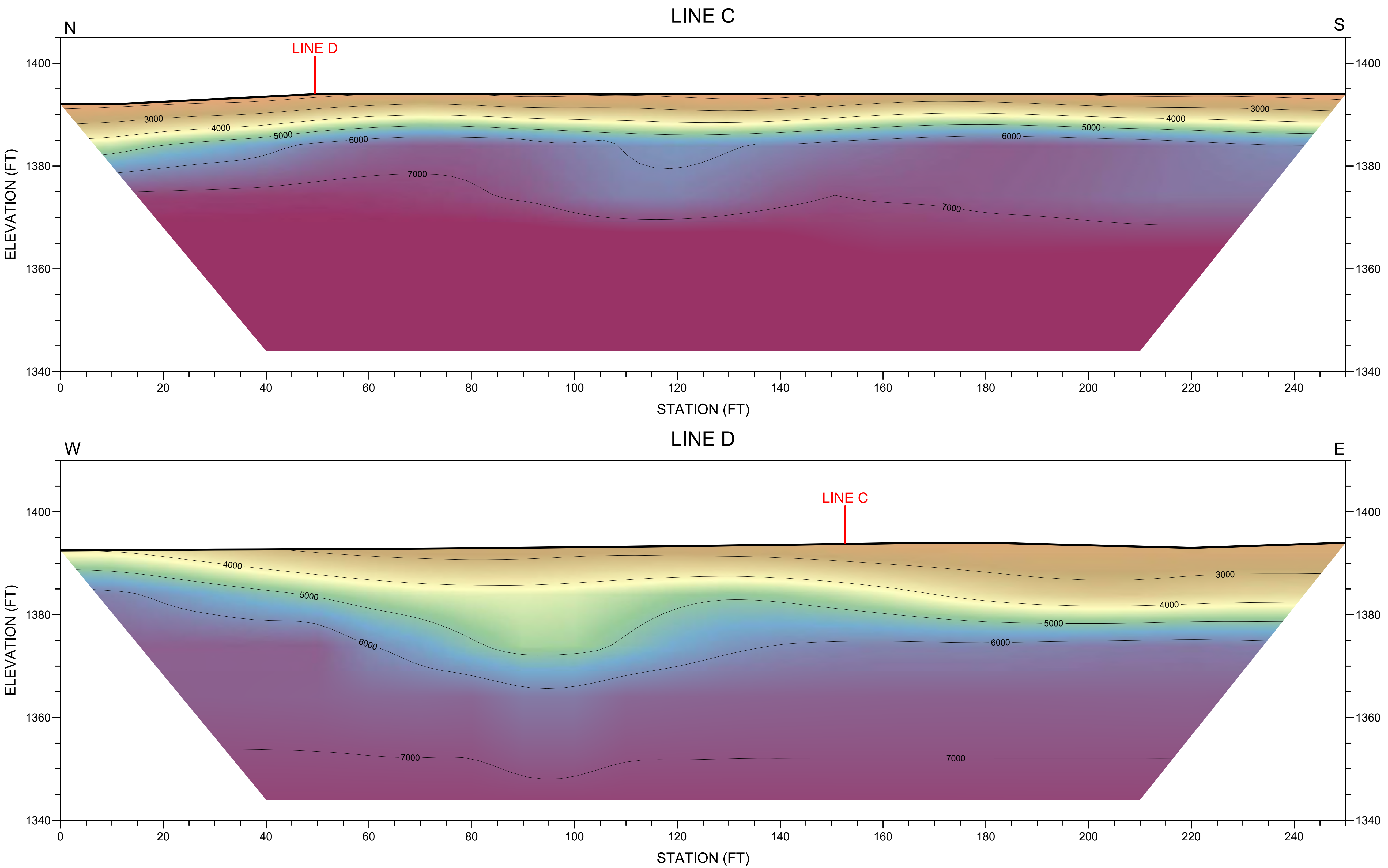
DATE: FEB. 2015

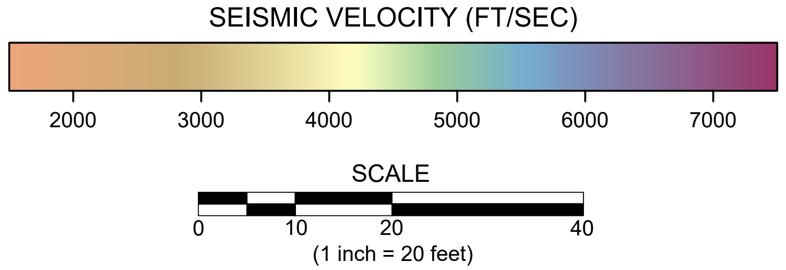
DRAWN BY: G.RANDALL

APPROVED BY: DTH

PLATE
1

DRAFT





NORCAL

SEISMIC REFRACTION PROFILES
LINES C & D
LAKEPORT COURTHOUSE

LOCATION: 675 LAKEPORT BOULEVARD, LAKEPORT, CALIFORNIA

CLIENT: LANGAN TREADWELL ROLLO

JOB #: 15-243.110

NORCAL GEOPHYSICAL CONSULTANTS INC.

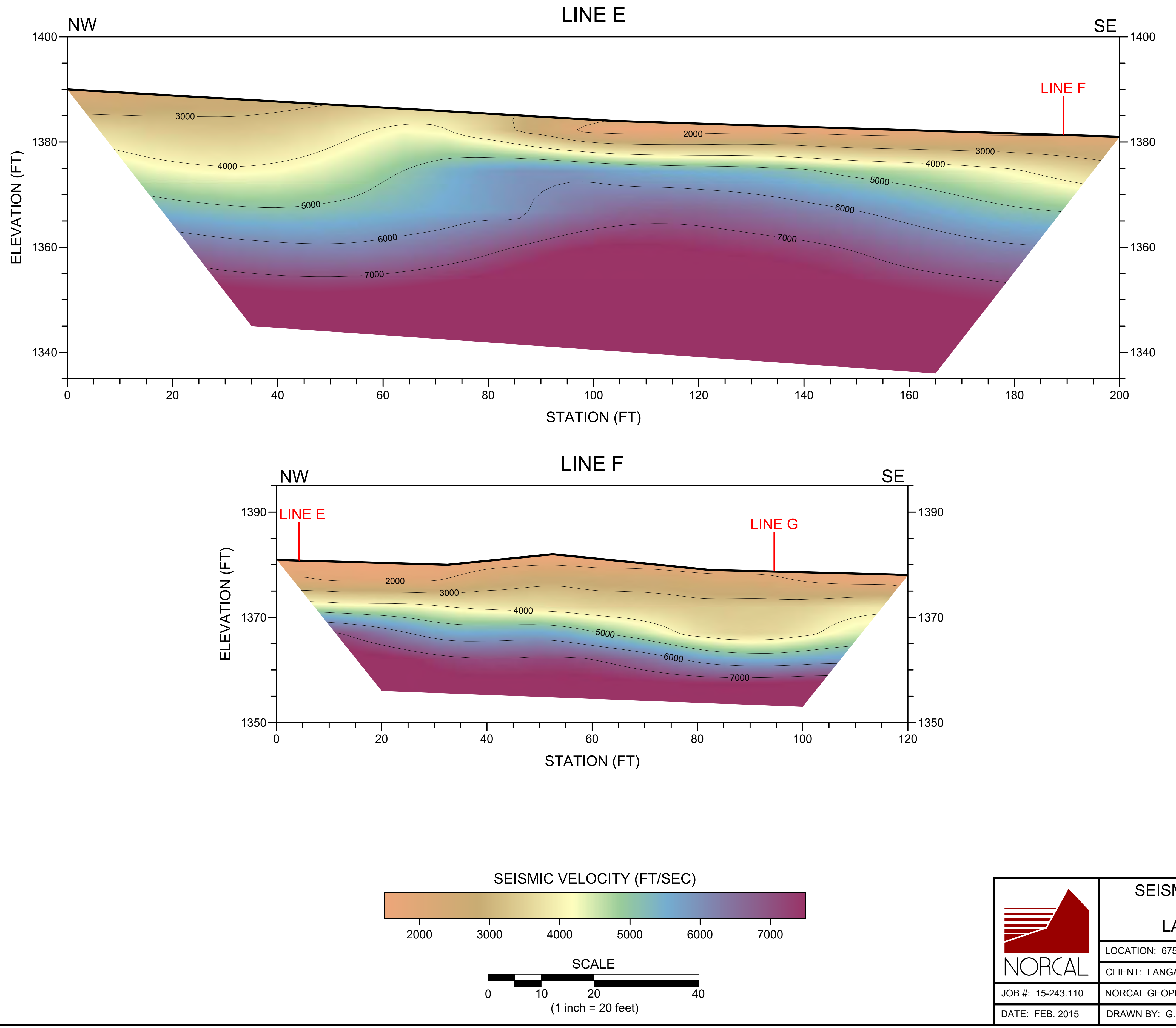
DATE: FEB. 2015

DRAWN BY: G.RANDALL

APPROVED BY: DTH

PLATE
2

DRAFT



SEISMIC REFRACTION PROFILES
LINES E & F
LAKEPORT COURTHOUSE

LOCATION: 675 LAKEPORT BOULEVARD, LAKEPORT, CALIFORNIA

CLIENT: LANGAN TREADWELL ROLLO

NORCAL GEOPHYSICAL CONSULTANTS INC.

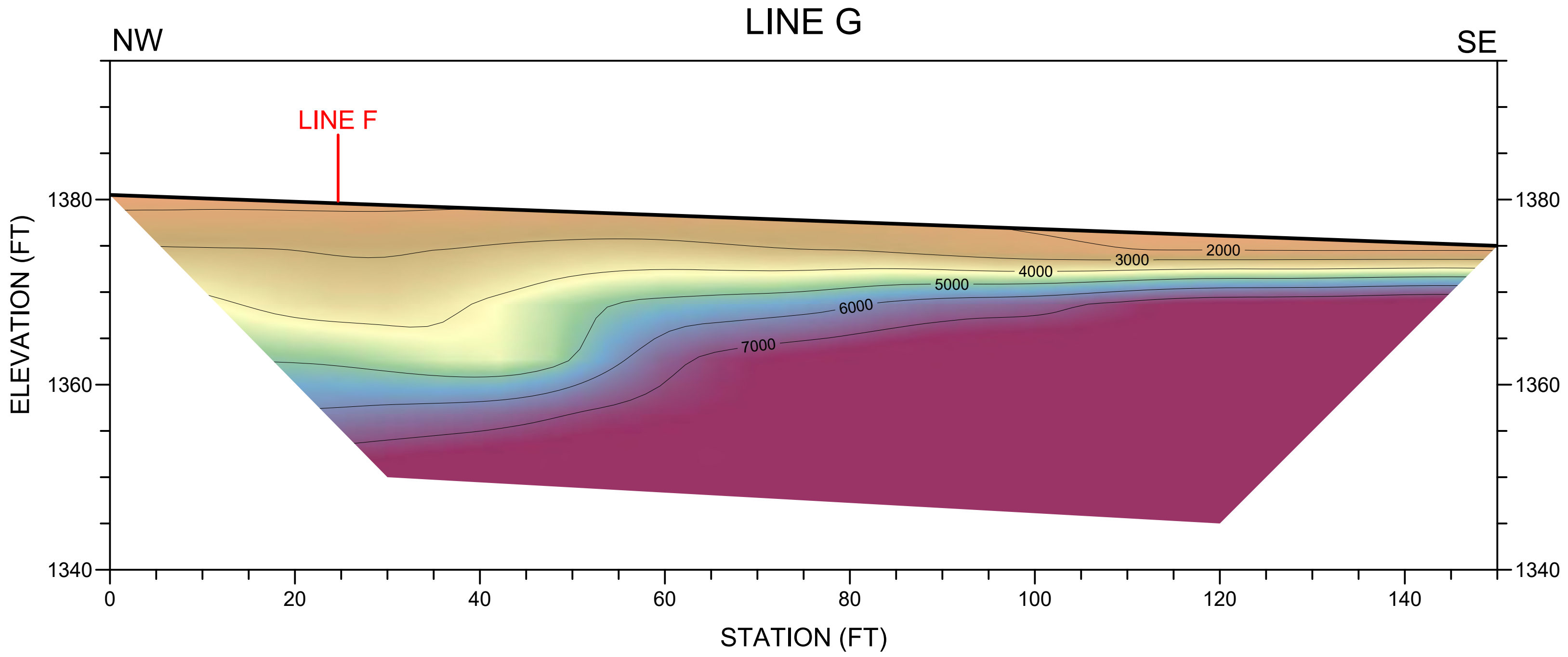
JOB #: 15-243.110

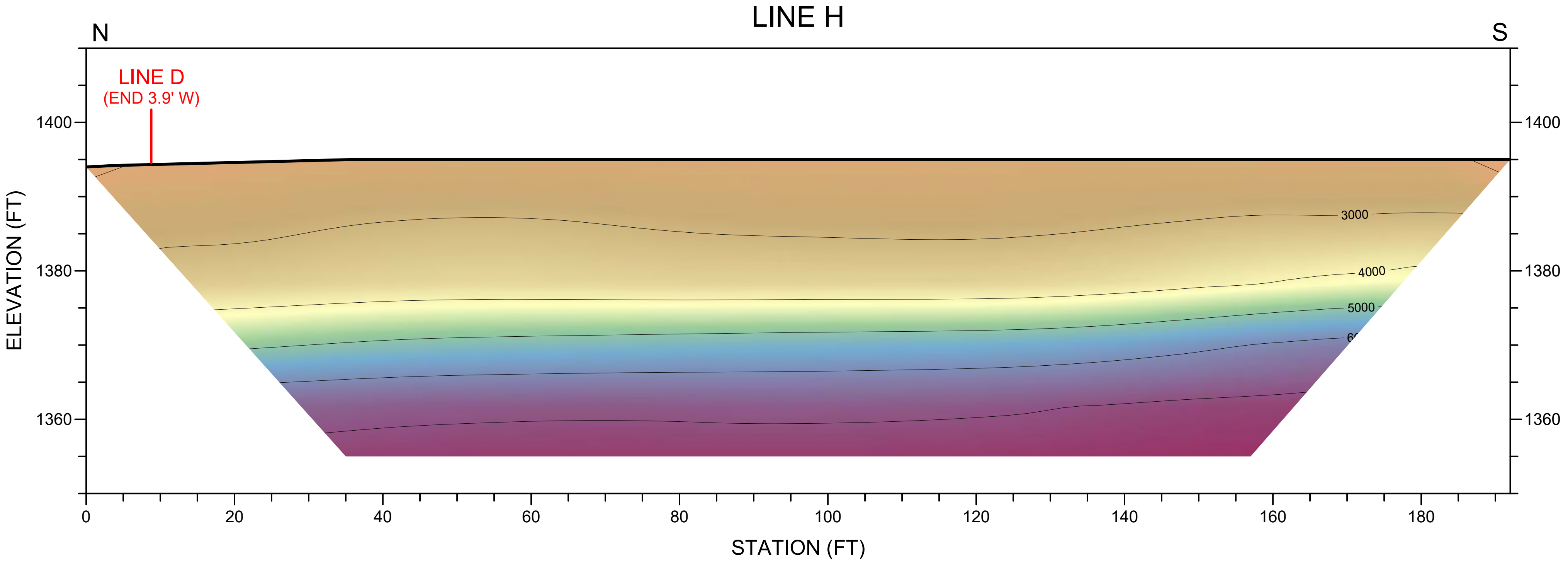
DATE: FEB. 2015

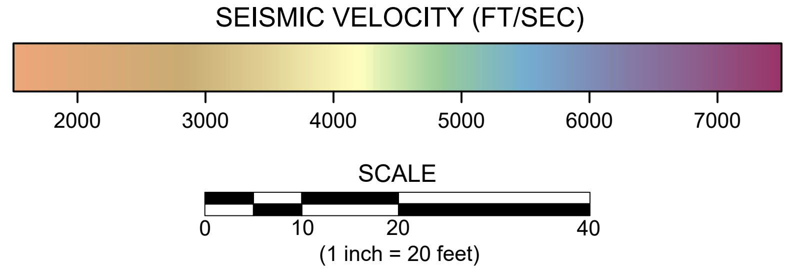
DRAWN BY: G.RANDALL

APPROVED BY: DTH

PLATE
3







NORCAL

SEISMIC REFRACTION PROFILES
LINES G & H
LAKEPORT COURTHOUSE

LOCATION: 675 LAKEPORT BOULEVARD, LAKEPORT, CALIFORNIA

CLIENT: LANGAN TREADWELL ROLLO

JOB #: 15-243.110

NORCAL GEOPHYSICAL CONSULTANTS INC.

DATE: FEB. 2015

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APPROVED BY: DTH

PLATE
4

APPENDIX C

GEOTECHNICAL LABORATORY TEST RESULTS

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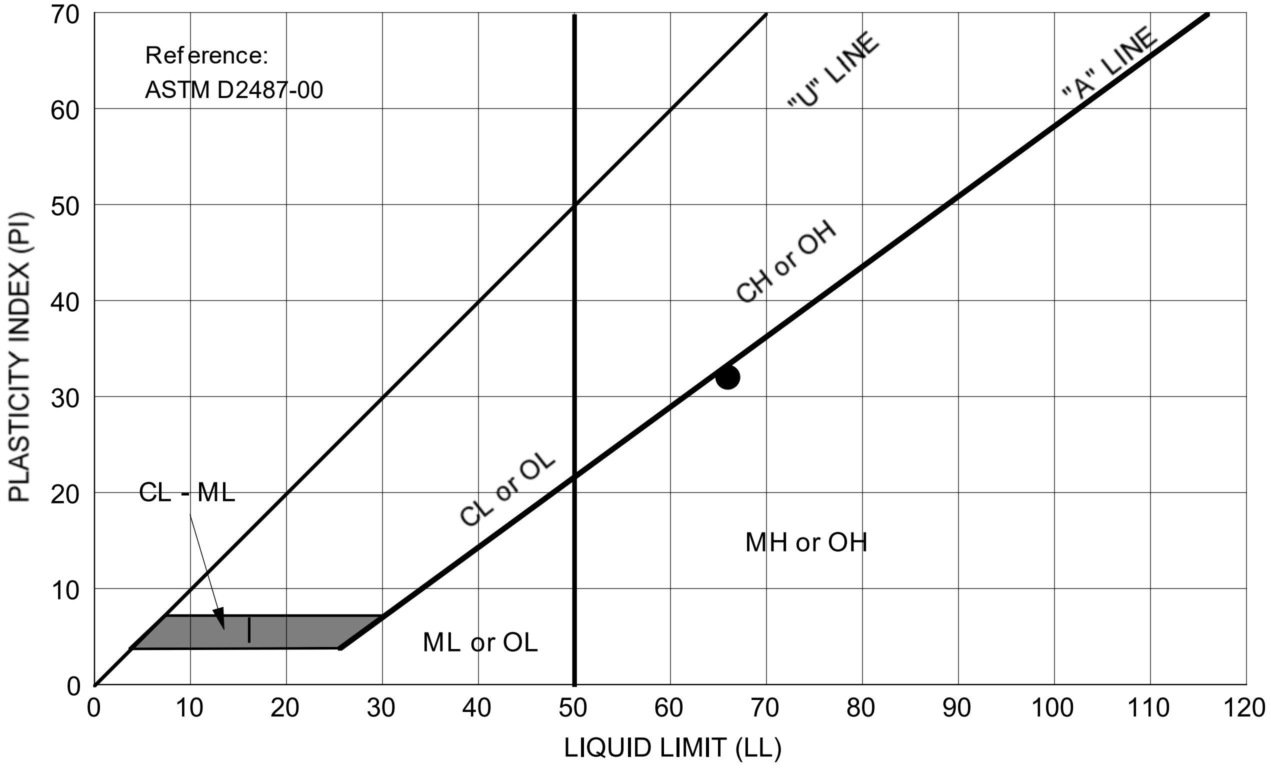


Symbol	Source	Description and Classification	Natural M.C. (%)	Liquid Limit (%)	Plasticity Index (%)	% Passing #200 Sieve
●	B-5 at 0 to 5 feet	SANDY SILT with GRAVEL (MH), dark reddish-brown	10.1	66	32	--

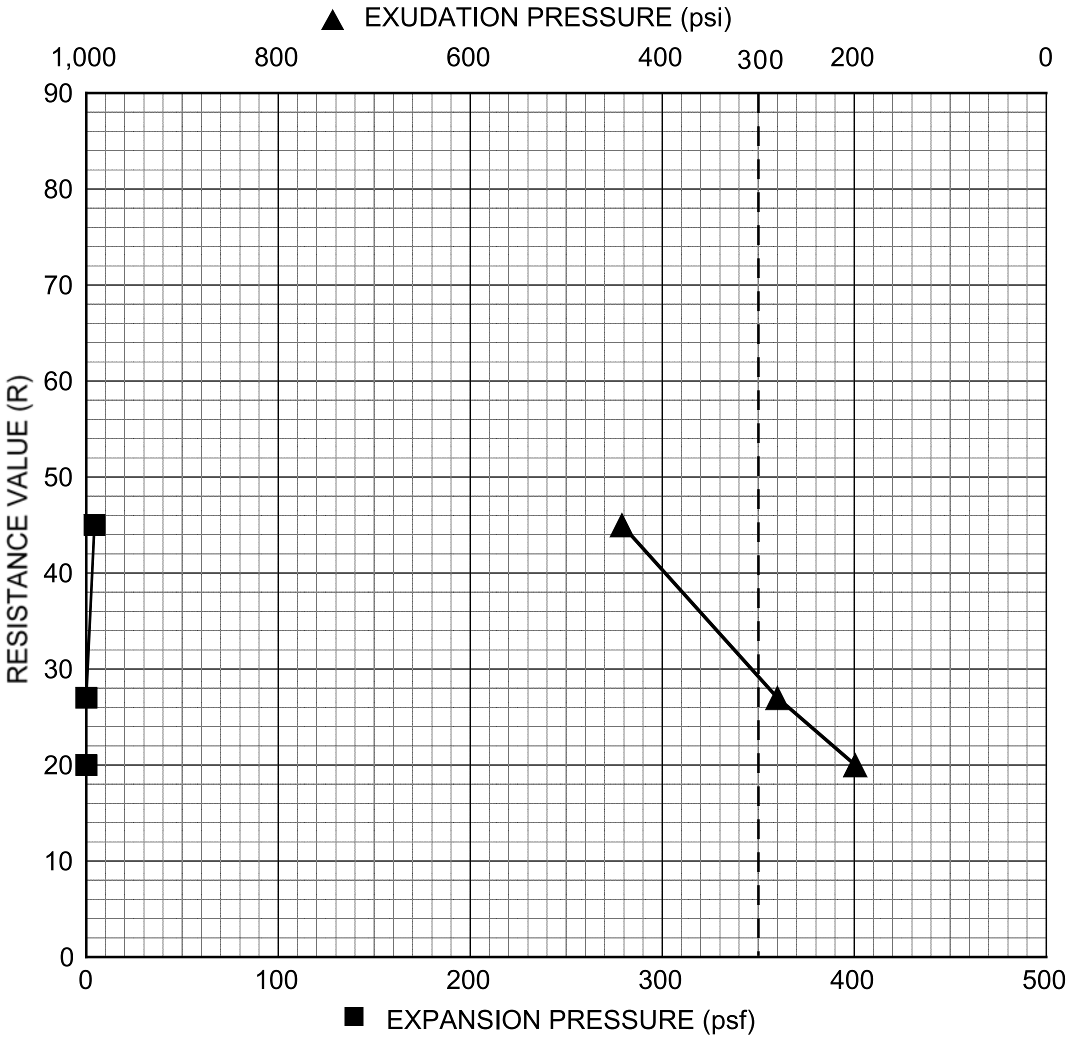
LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

PLASTICITY CHART

Date 03/04/15 | Project No. 731563902 | Figure C-1

DRAFT



Specimen ID:	A	B	C	D
Water Content (%)	24.0	22.2	23.1	--
Dry Density (pcf)	95.2	98.0	96.2	--
Exudation Pressure (psi)	199	442	280	--
Expansion Pressure (psf)	0	4.3	0	--
Resistance Value (R)	20	45	27	--

Sample Source	Sample Description	Sand Equivalent	Expansion Pressure	R value
B-5 at 0 to 2.5 feet	SANDY SILT with GRAVEL (MH), dark reddish-brown	--	--	28

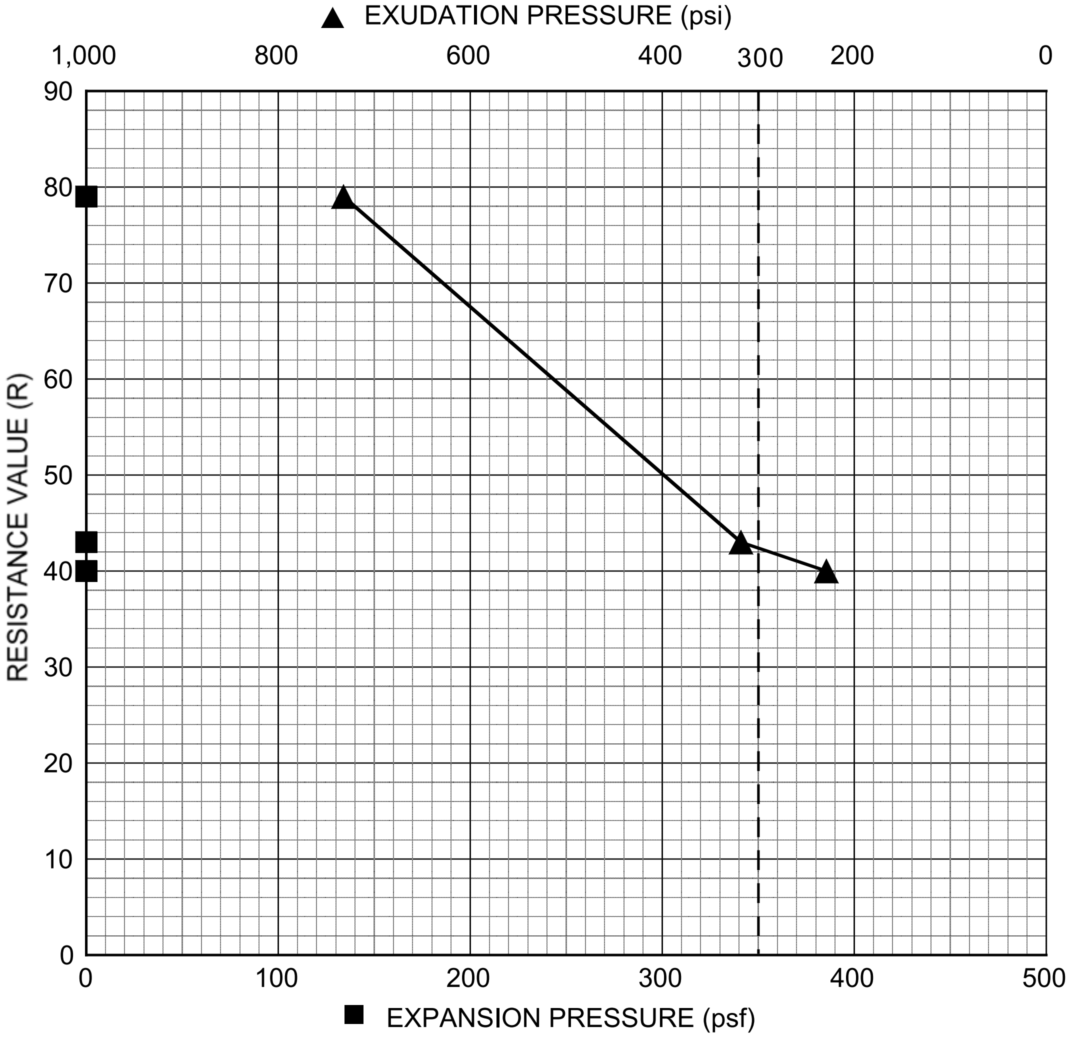
LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

RESISTANCE VALUE TEST DATA

Date 03/04/15 | Project No. 731563902 | Figure C-2

DRAFT



Specimen ID:	A	B	C	D
Water Content (%)	16.3	18.0	18.5	--
Dry Density (pcf)	109.1	106.3	105.1	--
Exudation Pressure (psi)	732	318	229	--
Expansion Pressure (psf)	0	0	0	--
Resistance Value (R)	79	43	40	--

Sample Source	Sample Description	Sand Equivalent	Expansion Pressure	R value
B-6 at 0 to 2.5 feet	SANDY CLAY with GRAVEL (CL), dark reddish-brown	--	--	43

LAKEPORT COURTHOUSE
675 LAKEPORT BOULEVARD
Lakeport, California

LANGAN TREADWELL ROLLO

RESISTANCE VALUE TEST DATA

Date 03/04/15 | Project No. 731563902 | Figure C-3

DRAFT

E T S

Environmental Technical Services

975 Transport Way, Suite 2
Petaluma, CA 94954
(707) 778-9605/FAX 778-9612
e-mail: entech@pacbell.net

-Soil, Water & Air Testing & Monitoring
-Analytical Labs
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COMPANY: Treadwell & Rollo, 501 14th Street, 3rd Floor, Oakland, CA 94612
ATTN: Elena Ayers
JOB SITE: Lakeport Courthouse, Lakeport, California
JOB #: 731563901

DATE RECEIVED	DATE of COMPLETION	ANALYST(S)	SUPERVISOR
12/7/2011	12/15/2011	D. Salinas S. Santos	D. Jacobson
			LAB DIRECTOR G.S. Conrad PhD

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SOIL pH -log[H+]	NOMINAL RESISTIVITY ohm-cm	ELECTRICAL CONDUCTIVITY µmhos/cm	SULFATE SO4 ppm	CHLORIDE Cl ppm
04716-1	LPC1/L	B-3-1 @ 3.0'	**7.83**	**3,680**	**[272]**	**9**	**18**
04716-2	LPC2/L	B-3-10 @ 16.0'	**7.10**	**409**	**[2445]**	**111**	**36**
Method	Detection	Limits --->	---	1	0.1	1	1

LAB SAMPLE NUMBER	SAMPLE ID	DESCRIPTION of SOIL and/or SEDIMENT	SALINITY ECe mmhos/cm	SOLUBLE SULFIDES (S=) ppm	SOLUBLE CYANIDES (CN=) ppm	REDOX mV	PERCENT MOISTURE %
04716-1	LPC1/L	B-3-1 @ 3.0'				**+281.3**	
04716-2	LPC2/L	B-3-10 @ 16.0'				**+296.8**	
Method	Detection	Limits --->	---	0.1	0.1	-400 -> +800	0.1

** COMMENTS **

Resistivities are well above and below 1,000 ohm-cm, i.e., fair and poor; soil reactions (i.e., pHs) are mildly to very mildly alkaline; sulfates and chlorides are low enough; soils are only mildly reduced. The standard CalTrans times to perforation for these soils are as follows: for LPC1 and 18 ga steel the time is >43 yrs, and for 12 ga it goes up to >93 yrs; and for LPC2 perf times are only <14 yrs for 18 ga, and just ≈30.5 yrs for 12 ga. For gray/ductile/mild steel & cast iron a calculated average pitting rate for LPC1 is at ≈0.045 mm/yr, thus pitting to 2 mm depth is >44 yrs, and to a 4 mm depth is >88 yrs; but for LPC2 the pitting rate is at 0.37 mm/yr putting the 2 mm depth time at ≈5.4 yrs, and the 4 mm depth time is <11 yrs. Chloride levels are very low thus there would be no adverse impact on steel reinforcement; likewise, sulfates are both low enough that there should be no significant adverse impact on concrete, cements, grouts and mortars. Soil redoxes do not appear to be an issue. In principle, the LPC2 soil could benefit from alkaline treatment in that raising its pH to the 7.5-8.5 range would increase the 18 ga time to 17 yrs, but this increase is quite minimal; and the improvement in pitting rate would be completely negligible. Therefore, this would not be a practical approach. On the other hand, metals longevity in these soils can be improved by upgrading (e.g. increased gauge or more resistant steels, etc.). Indeed, often times structural strength considerations will require much thicker steel than used in the presented examples such that perf & pitting times would be well beyond specified life span. On the other hand, cathodic protection along with coating or wrapping steel pipe can be of use where this is not true (requiring very different numbers and/or sizes of sacrificial anodes and little to no impressed current). Other alternatives include increased or specialized engineering fill, and/or use of plastic, fiberglass or concrete pipe, etc. Last, standard concrete mixes should be fine in both of these soils based on these results

\\\\NOTES: Methods are from following sources: extractions by Cal Trans protocols as per Cal Test 417 (SO4), 422 (Cl), and 532/643 (pH & resistivity); &/or by ASTM Vol. 4.08 & ASTM Vol. 11.01 (=EPA Methods of Chemical Analysis, or Standard Methods); pH - ASTM G 51; Spec. Cond. - ASTM D 1125; resistivity - ASTM G 57; redox - Pt probe/ISE; sulfate - extraction Title 22, detection ASTM D 516 (=EPA 375.4); chloride - extraction Title 22, detection ASTM D 512 (=EPA 325.3); sulfides - extraction by Title 22, and detection EPA 376.2 (= SMEWW 4500-S D); cyanides - extraction by Title 22, and detection by ASTM D 4374 (=EPA 335.2).

Figure C-4

APPENDIX D

ANALYTICAL LABORATORY TEST RESULTS

EMSL Analytical, Inc
2235 Polvorosa Ave , Suite 230, San Leandro, CA 94577
Phone: (510) 895-3675 Fax: (510) 895-3680 Email: sanleandrolab@emsl.com

DRAFT

Attn: **Elena Ayers**
Treadwell & Rollo
501 14th Street
3rd Floor
Oakland, Ca 94612

Fax: (510) 874-4507 Phone: (510) 874-4500
Project: **731563901 / Lakeport Courthouse, Lakeport, CA**

Customer ID: TREAD80
Customer PO: 731563901
Received: 12/07/11 9:00 AM
EMSL Order: 091113755

EMSL Proj:
Analysis Date: 12/20/2011

Test Report: PLM Analysis of Bulk Samples for Asbestos via EPA 600/R-93/116 Method with CARB 435 Prep (Milling) Level A for 0.25% Target Analytical Sensitivity

			Non-Asbestos				Asbestos	
Sample	**Description**	**Appearance**	**%**	**Fibrous**	**%**	**Non-Fibrous**	**%**	**Type**
1 *091113755-0001*	Test pit TP-1 : Serpentinite rock	Brown Non-Fibrous Homogeneous			100.00%	Non-fibrous (other)		**None Detected**
2 *091113755-0002*	Test pit TP-2 : Fill	Brown Non-Fibrous Homogeneous			100.00%	Non-fibrous (other)	**<0.25%**	**Chrysotile**
3 *091113755-0003*	Test pit TP-3 : Soil	Brown Non-Fibrous Homogeneous			100.00%	Non-fibrous (other)		**None Detected**
4 *091113755-0004*	Test pit TP-3 : Serpentinite rock	Brown Non-Fibrous Homogeneous			100.00%	Non-fibrous (other)		**None Detected**

Initial report from 12/20/2011 16:51:21

Analyst(s)

Rui Cindy Geng (4)

Baojia Ke, Laboratory Manager
or other approved signatory

THIS IS THE LAST PAGE OF THE REPORT.

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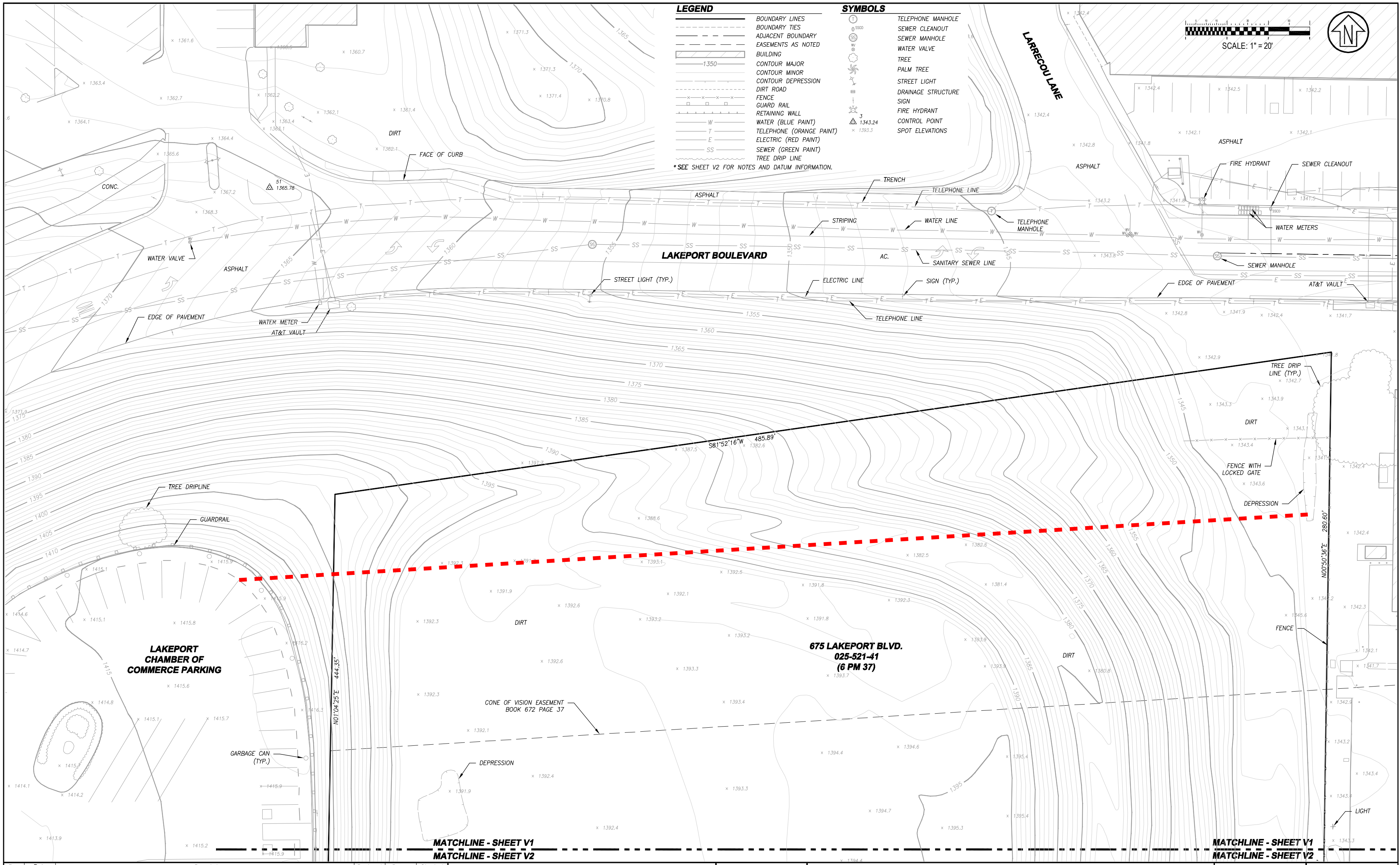
DRAFT

Lori A. Simpson
Geotechnical Engineer



Rev	Date	Description	Designed	Drawn	Checked
0	07/30/10	SUBMITTED FOR REVIEW		JLW	TWP

CSW | ST2

CSW/Stuber-Stroeh Engineering Group, Inc.

Civil & Structural Engineers | Surveying & Mapping | Environmental Planning
Land Planning | Construction Management

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http://www.cswst2.com

City: Lakeport
County: Lake
State: California

675 LAKEPORT

TOPOGRAPHIC AND BOUNDARY MAP

APN: 025-521-41

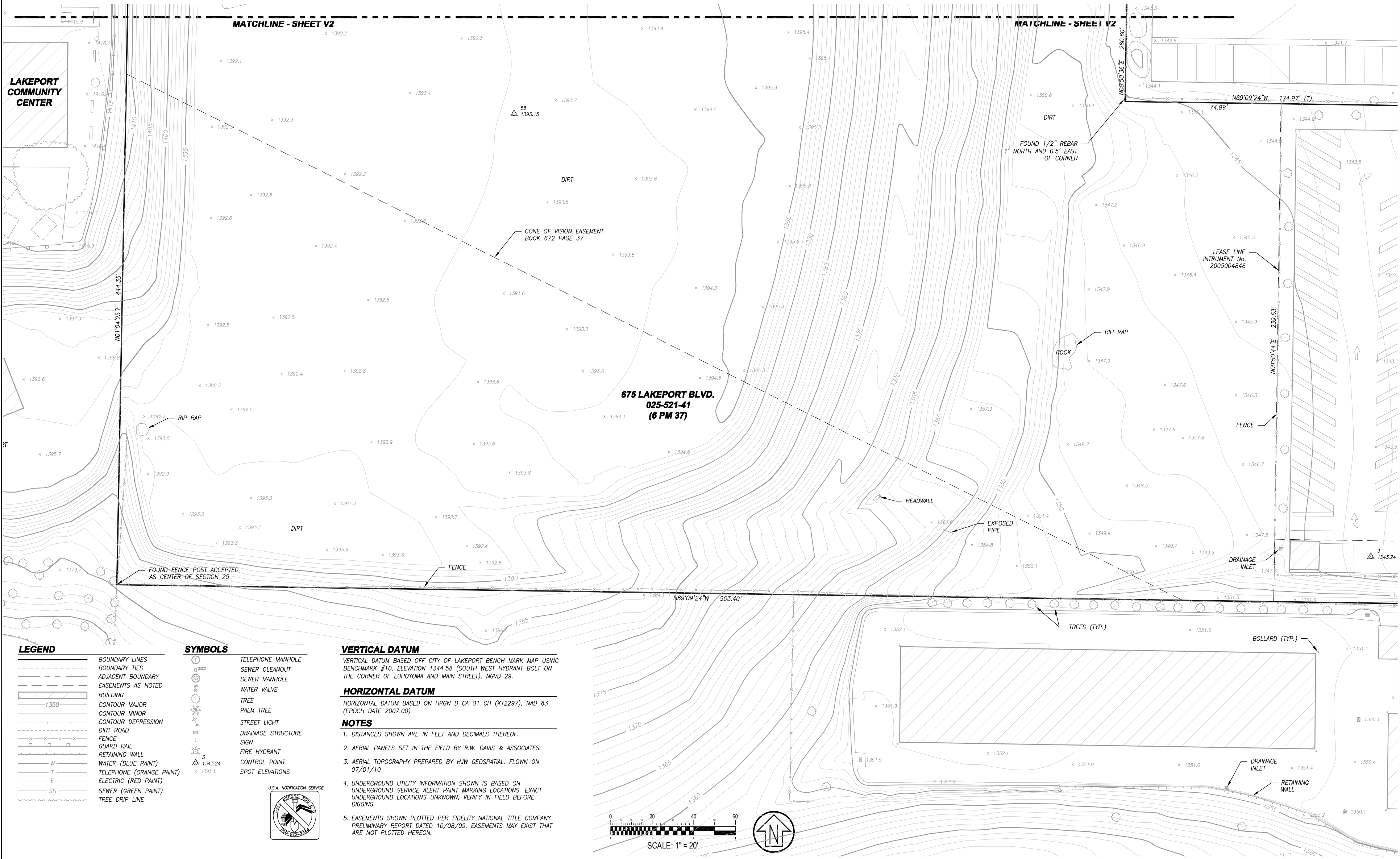
Prepared Under the Direction of:

TRACY W. PARK
No. 8176
Exp. 12/31/10

Sheet
V1

Scale: 1" = 20'
Date: 07/30/10
Project Number: 4114100
Plan File: D-4968

P:\04\4114100\DWG_2010\Sheet_Drawings\V1-V2-TOPO-MAP.dwg 10/01/2010 - 10:10 AM woejl 1:3.349



LEGEND

▬	BOUNDARY LINES
- - -	BOUNDARY TIES
— - - —	ADJACENT BOUNDARY
— — —	EASEMENTS AS NOTED
▨	BUILDING
—1350—	CONTOUR MAJOR
—	CONTOUR MINOR
	CONTOUR DEPRESSION
- - -	DIRT ROAD
—x—x—	FENCE
—□—□—	GUARD RAIL
	RETAINING WALL
— W —	WATER (BLUE PAINT)
— T —	TELEPHONE (ORANGE PAINT)
— E —	ELECTRIC (RED PAINT)
— SS —	SEWER (GREEN PAINT)
	TREE DRIP LINE

SYMBOLS

Ⓣ	TELEPHONE MANHOLE
○ SSCO	SEWER CLEANOUT
Ⓢ	SEWER MANHOLE
WV ⊗	WATER VALVE
	TREE
	PALM TREE
	STREET LIGHT
▤	DRAINAGE STRUCTURE
	SIGN
	FIRE HYDRANT
3 △ 1343.24	CONTROL POINT
× 1393.3	SPOT ELEVATIONS

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VERTICAL DATUM

VERTICAL DATUM BASED OFF CITY OF LAKEPORT BENCH MARK MAP USING BENCHMARK #10, ELEVATION 1344.58 (SOUTH WEST HYDRANT BOLT ON THE CORNER OF LUPOYOMA AND MAIN STREET), NGVD 29.

HORIZONTAL DATUM

HORIZONTAL DATUM BASED ON HPGN D CA 01 CH (KT2297), NAD 83 (EPOCH DATE 2007.00)

NOTES

1. DISTANCES SHOWN ARE IN FEET AND DECIMALS THEREOF.
2. AERIAL PANELS SET IN THE FIELD BY R.W. DAVIS & ASSOCIATES.
3. AERIAL TOPOGRAPHY PREPARED BY HJW GEOSPATIAL. FLOWN ON 07/01/10
4. UNDERGROUND UTILITY INFORMATION SHOWN IS BASED ON UNDERGROUND SERVICE ALERT PAINT MARKING LOCATIONS. EXACT UNDERGROUND LOCATIONS UNKNOWN, VERIFY IN FIELD BEFORE DIGGING.
5. EASEMENTS SHOWN PLOTTED PER FIDELITY NATIONAL TITLE COMPANY PRELIMINARY REPORT DATED 10/08/09. EASEMENTS MAY EXIST THAT ARE NOT PLOTTED HEREON.

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0	07/30/10	SUBMITTED FOR REVIEW		JLW	TWP

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675 LAKEPORT

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