LOS ANGELES COMMUNITY COLLEGE DISTRICT

CITY / EAST / HARBOR / MISSION / PIERCE / SOUTHWEST / TRADE-TECHNICAL / VALLEY / WEST

DESIGN GUIDELINES & STANDARDS

VOLUME 1
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VOLUME 1 - DESIGN GUIDELINES & STANDARDS

BuildLACCD

Introduction

East Los Angeles College

INTRODUCTION

Introduction

Intent

The Los Angeles Community College District (LACCD) Facilities Design Guidelines and Standards (Standards) has been developed with input and feedback from the LACCDs Facilities, Planning and Development Department for use by Design Teams and District personnel who participate in design and construction processes District-Wide. The information presented here is to be used as Standards for all projects undertaken within the District, with the goal to provide long lasting, sustainable buildings that can be maintained in a way that extends building lifespan and enhances user satisfaction. Provisions in Volumes 1, 2, and 3 are intended to establish a set of minimum Standards for new and renovation projects for LACCD, and are based on experiences with existing campus buildings, systems, and maintenance and operations.

The minimum criteria for establishment of these standards are quality, maintenance, cost, location, energy efficiency, life cycle costs, and safety. LACCDs Standards are for standardization on all nine campuses and satellite locations. In most cases, current District Specifications are incorporated into this document. However, there may be differences between the standards included herein with those produced by each College.

In the event of conflicting information within the Design Guidelines & Standards the following precedence shall prevail:

1. Volume 2 District Specifications
2. Volume 1 Design Guidelines and Standards
3. Volume 2 Campus Specifications Matrix

Conflicts shall be brought to the attention of the Director of College Facilities (DOCF), Office of Information Technology (OIT), College Project Team (CPT) and District Project Manager (DPM).

Format

This format will allow anticipated updates of Standards in the future as new information is acquired and developed. The District shall continue to implement existing provisions of its design standards which address the selection of materials and products. The District will continue to refine and update the standards to help ensure that these elements are adequately addressed during renovation and construction of new facilities on a campus-wide basis; and as a guide for what is universally accepted throughout all nine campuses.

Therefore, each design professional using these Volumes shall only do so for minimum performance purposes and shall not simply rely on the products, materials, and systems indicated as the correct application and use for a specific building project. All design professionals are assumed responsible for their designs and specifications.

Systems and materials incorporated into buildings shall be selected on the basis of long-term operations and maintenance costs. The design shall incorporate ease and efficiency of operation and allow for easy and cost effective maintenance and repair. Standardization of equipment and parts is key to reducing maintenance costs and allows for restocking of common replacement parts.

The **Volume 2 | Campus Specification Matrix** provides the individual college's preferences and their list of approved manufacturers. Please be advised that the Standards are a living document; therefore please check with the respective DOCF to verify the version posted is the most recent.

How To Use LACCD's Design Guidelines & Standards

LACCD's Standards are contractual, and these documents are provided to familiarize all users with requirements for consultants regarding building elements and systems as required by LACCD. Each of the three Volumes contains both qualitative and quantitative provisions that shall be understood as minimum requirements to be met or exceeded, except as specifically approved by the District. Volumes 1, 2, and 3 are intended to be complementary as follows:

- **Volume 1 | District Guidelines and Standards** provides overall guidelines and minimum requirements for project components and systems, with references to more detailed information in Volume 3.
- **Volume 2 | District Specifications and Campus Specifications Matrix** are a set of guide specifications in CSI MasterFormat, with a consolidated list of preferred products for all nine campuses.
- **Volume 3 | Appendices** is an expanded set of detailed requirements and standards plus a continuously updated series of Bulletins covering specific provisions and requirements.

Design Teams shall become generally familiar with the intent, resources, and requirements of Volume

1, using it as a reference and guide to further information in Volumes 2 and 3.

Specifications in Volume 2 provide a resource of approved types and examples of materials, systems, and products. While they provide minimum standards, their use as a reference does not replace the responsibility of design professionals on each project to produce specifications that comply with the requirements of their Multiple Award Task Order Contract (MATOC) and respective Task Orders, as well as Federal, State and local codes and regulations for completeness and appropriateness for each project.

The outline developed in Volume 2 for each MasterFormat division is intended to convey the basic information for architects, engineers, and design professionals to specify campus standard products, materials, and building systems. This information includes a summary of the section scope, reference standards, the materials and criteria for specification, special issues (if any), and special warranty information.

Volume 3 provides a resource of reference material and requirements, and serves as a framework to support the design and construction initiatives on the campuses. The Volume includes various Standards, Bulletins, and Directives to establish a consistent representation of quality standards and requirements for use by the Project and Design Teams.

Bulletins are published to highlight specific responses and/or clarifications to on-going issues or updates, and are to be followed for projects whose Notice to Proceed occurs on or after the inception date of each Bulletin.

In the rare case, when there is a valid need to deviate from the standards, a written request needs to be submitted to—and a formal written approval needs to be received from—the DOCF or OIT Office. Furthermore, these Design Standards are not to be deviated from for the purpose of value engineering unless formally approved by the DOCF or OIT.

Acronyms, Titles & Terms

Refer to **Volume 3 | Appendices - Acronyms, Titles & Terms.**

CHAPTER 1

Codes & Regulations

Los Angeles Harbor College

CHAPTER 1 - CODES & REGULATIONS

CHAPTER 1 - CODES & REGULATIONS

1 Codes & Regulations

All district work shall be performed according to the applicable building codes, ordinances and laws as stipulated by the Authority Having Jurisdiction (AHJ). Minimum permissible design and construction codes and applicable referenced standards are listed below.

Codes and standards must be thoroughly reviewed and examined for project applicability. Project Design Teams (DT), Design Build Entity (DBE), and Contractors are responsible for verifying and conforming to the applicable codes and standards as adopted by:

- The Division of the State Architect
- Local Fire Authority Having Jurisdiction (Hydrant and Access Compliance)
- The State of California

Understanding, conformance and compliance with interpretation of regulations, informational bulletins, and additional guidance provided by such AHJ's and industry best practice shall be required, including site specific requirements such as:

- Seismic Risk Area
- Very High Fire Severity Zone
- Wildfire State Responsibility Areas
- Applicable flood zone requirements

These are applicable on a project basis and it is the responsibility of Design Teams, DBE, and Contractors to understand and conform to such requirements.

1.1 Applicable Codes

Most current versions of the following:

- California Building Code (CBC)
- California Code of Regulations (CCR)
- California Mechanical Code
- California Plumbing Code
- California Electrical Code
- California Energy Code
- California Green Building Standards (CALGREEN)
- California Fire Code
- California Existing Building Code
- California Historic Building Code
- California Building Energy Efficiency Standards for Residential and Nonresidential Buildings, Title 24
- State Elevator Safety Orders
- CAL OSHA
- Americans With Disabilities Act
- ADA Standards for Accessible Design
- National Fire Protection Association (NFPA)
- South Coast Air Quality Management District (SCAQMD)

1.2 LACCD Design Standards & DSA Publications

These LACCD Design Standards and DSA Bulletins relevant to new construction and renovation, modification, and renewal projects based on project scope, applicability, and conditions must be understood and applied.

Provisions in DSA Publications, including:

- Bulletins (BUs)
- Guidelines (GLs)
- Interpretation of Regulations (IRs)
- Policies (PLs)
- Procedures (PRs)

shall be followed and can be found at www.dgs.ca.gov/DSA/Publications.

1.3 Referenced Standards

Additional referenced standards appear in later chapters based on scope and applicability.

1.4 Accessibility Compliance & Regulations

1.4.1 Compliance

Compliance with all current applicable Codes, Regulations, and Terms is mandatory. As a public entity, LACCD is required to meet the Title II of the American with Disabilities Act (ADA), a federal civil rights law, which mandates all programs, activities, and services provided or operated by or on behalf of LACCD be accessible. In addition to the federal ADA, CBC, and in specific cases local Los Angeles County code amendments, require accessibility compliance. Codes, Regulations, and Terms are subject to change.

It is the responsibility of the DT to ensure compliance. It is important to understand that accessibility compliance is based on space requirements and a facility's use and function. When designing and constructing facilities, spaces or elements the goal of compliance is to ensure that individuals with disabilities can independently access and use a facility, participate in activities,

and engage with public spaces in an integrated way that is as close to that of individuals without disabilities.

1.4.2 Universal Design

In addition to mandatory compliance and reasonable accommodations, LACCD is committed to investing in and incorporating universal design into all campus facilities. Universal design is characterized by creating environments, products, and services that are inherently usable by people of all abilities, ages, genders, and backgrounds. Design Teams are also encouraged to be sensitive to cognitive, sensory, and cultural differences of users. The focus is to create environments that are accessible and usable by everyone, where accessibility is inherent, and services, programs, and activities are offered in the most integrated setting.

Accessibility Application

In order to create inclusive, accessible design and construction, proactive measures to identify and eliminate barriers to physical spaces, digital resources, and communication methods must occur. Therefore, existing facilities must be inspected and a plan implemented to address non-conforming elements. Any new construction must be integrated to address accessibility compliance in a cohesive and holistic approach to the campus facility design.

1.4.3 Transition Plan & Program Accessibility

Under Title II of the ADA, where structural modifications are required to achieve program accessibility, LACCD is required to establish and maintain a Transition Plan in order to provide for the removal of existing physical barriers in existing facilities as expeditiously as possible. The Transition Plan is a formal document which provides a structured framework to identify, address, and continually improve accessibility compliance of the facilities. A list of existing physical barriers, a schedule for removing the barriers, and a detailed outline of the methods to be utilized to remove the barriers are some of the information that are found in the Transition Plans. Transition Plans may be used as reference and tool for any and all LACCD facilities projects, but they do not replace the responsibility of the planning and design professionals to conduct their own site assessment.

1.4.4 New Construction

All new construction is required to comply with the federal law and current CBC code cycle, regardless of surrounding or contextual existing conditions. In addition, all temporary new structures and facilities must also comply.

1.4.5 Accessibility Scope

In order to ensure LACCD campus facilities fully address accessibility compliance, it is required to follow the **ADA, CBC, and LACCD Accessibility Standards** when creating, reviewing, and constructing any and all projects. The DT is required to determine the applicable code cycle. In cases where there is a conflict between Federal, State, and DSA requirements, the most stringent must be followed.

Campus Specific Requirements

Each LACCD campus is unique in its geographical features, layout, and building programs. All new projects are required to design for the specific campus needs and physical limitations and barriers to ensure accessibility compliance is met.

Project Specific Requirements

Just as each LACCD campus is unique, every new project will have specific program requirements in order to meet accessibility compliance. The DT is responsible for designing to the applicable laws and code requirements and seeking out necessary expert advice, such as a Certified Access Specialist (CASp), to ensure accessibility laws and codes are accurate and interpretations are reasonable in-line with DSA requirements.

Fixtures, Furniture & Equipment (FFE)

FFE is an essential element in any project. It supports the programs, services, and activities accessible to individuals with disabilities. Relevant portions of the accessibility standards must be applied to the selection and layout of furniture, furnishings, and equipment. Refer to the latest edition of the LACCD Transportation and Accessibility Standards for compliance requirements.

1.5 Landscape Design Statewide Standards & Codes

Projects submitted to DSA for review, as a single project or as increments, must comply with both the Title 24, Part II, CBC, Code CALGREEN, and Model Efficient Landscape Ordinance (MWELO). While not required by regulation, the California Stormwater BMP Handbook Portal Construction (July 2012), LACCD Green Papers for Rainwater Harvesting (March 2009), and Water Conservation (March 2009) provide additional guidance for achieving the goals and priorities of the District.

Key features of CALGreen include:

- Light pollution reduction for outdoor lighting
- Grading and paving management of surface

water to keep water away from buildings and aid in groundwater recharge

- Shade trees installed to provide shade over 50% of surface parking areas within 15 years
- Shade trees installed to provide shade over 20% of landscape and hardscape areas within 15 years

The Model Water Efficient Landscape Ordinance (MWELO) is a California law that promotes efficient water use in new and retrofitted landscapes. It applies to any landscaping projects 500 square feet or greater that require a permit, plan check, or design review. The ordinance sets minimum standards for soil, plants, irrigation, stormwater, and non-potable water supplies. It also requires compost and mulch for soil health and water retention. MWELO is enforced by local agencies or water providers, and may vary depending on local conditions and ordinances. MWELO is updated every three years and encourages sustainable landscapes that use less water, maintenance, and yard waste.

1.6 Structural Regulatory Requirements

All work performed shall comply with the latest currently adopted editions of all Codes and References listed in Section 1.6.1 below, including applicable local municipal and/or DSA codes and ordinances.

The structural system shall be designed under the supervision of a State of California licensed Structural Engineer. All drawings, specifications, and structural calculations submitted to the AHJ prepared under the supervision of the SEOR shall be stamped and signed by the SEOR.

1.6.1 Structural Codes & References

Projects shall conform to the codes and references listed below at a minimum as may be applicable to the project in question.

The specific version of each listed code to be utilized on a project shall conform to Chapter 35 of the CBC.

- California Building Code - Volumes 1 and 2, California Existing Building Code, California Green Building Standards Code
  - The version of this code to be used on any project shall be that which is projected to be enforced by DSA at the time of project submission to DSA unless otherwise specified/directed by LACCD.
  - Projects under DSA jurisdiction shall be designed using only the code provisions adopted by DSA-SS. DSA-SS/CC provisions shall not be utilized.
- ASCE 7 – Minimum Design Loads and Associated Criteria for Buildings and Other Structures
- AISC 341 – Seismic Provisions for Structural Steel Buildings
- AISC 360 – Specification for Structural Steel Buildings
- AISC 358 – Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications, including Supplements No. 1 and No. 2
- ACI 117 – Specification for Tolerances for Concrete Construction and Materials
- ACI 301 – Specification for Structural Concrete
- ACI 318 – Building Code Requirements for Structural Concrete
- TMS 402 – Building Code for Masonry Structures
- TMS 602 – Specification for Masonry Structures
- AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Members, with Supplement 2
- AISI S202 – Code of Standard Practice for Cold-formed Steel Framing
- AISI S220 – North American Standard for Cold-Formed Steel Nonstructural Framing
- AISI S240 – North American Standard for Cold-Formed Steel Structural Framing
- AISI S400 – North American Standard for Seismic Design of Cold-Formed Steel Structural Systems
- All relevant DSA Bulletins (BUs), Guidelines (GLs), Interpretation of Regulations (IRs), Policies (PLs), and Procedures (PRs)

1.7 Mechanical Regulatory Requirements

Regulatory Compliance: All work performed shall comply with the latest currently adopted editions of all codes and regulations, including local municipal codes and ordinances. The entire installation shall comply with the requirements of all AHJ. These are the minimum acceptable requirements.

Qualifications of Designer: All mechanical systems shall be designed by a State of California licensed professional Mechanical Engineer.

1.7.1 Mechanical Code Compliance

Comply with adopted applicable sections of national, state, and local codes; laws; ordinances;

rules and regulations enforced by the authorities having jurisdictions. Conformance with Campus Design Standards will be applicable.

All mechanical work will comply with the latest adopted editions of all codes, including, but not limited to, the following codes and standards:

- National Fire Protection Association (NFPA)
- Fire Department having jurisdiction

1.7.2 Mechanical Standards & Regulations Compliance

All mechanical work will be in compliance with the latest editions of applicable regulations and standards including, but not limited to, the following:

- ASHRAE Handbook, Fundamentals
- ASHRAE Handbook, HVAC Systems and Equipment
- ASHRAE Handbook, HVAC Applications
- ASHRAE Handbook, Refrigeration
- ASHRAE 55, Thermal Environmental Conditions for Human Occupancy
- ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality
- ASHRAE 90.1, Energy Standard for Buildings except Low-Rise Residential Buildings
- Underwriter's Laboratories Inc. (UL)

1.8 Electrical Regulatory Legal Requirements

Regulatory Compliance: All work performed shall comply with the latest currently adopted editions of all Code & Regulations, including local municipal codes and ordinances. The entire installation shall comply with the requirements of all Authority Having Jurisdiction. These are the minimum acceptable requirements.

Qualifications of Designer: All electrical systems shall be designed by a State of California licensed professional electrical engineer.

1.8.1 Electrical Codes & Standards

Codes, Regulations and Requirements: Comply with adopted applicable sections of national, state, and local codes, laws, ordinances, rules and regulations enforced by the authorities having jurisdictions. Conformance with Campus Design Standards shall be applicable.

All electrical work shall comply with the latest adopted editions of all codes, including, but not limited to, the following codes:

- National Fire Protection Association (NFPA) including NFPA 70 (National Electrical Code, NEC) and Life Safety Code 101
- Fire Department having jurisdiction
- Federal Aviation Authority (FAA)

1.8.2 Electrical Standards and Regulations Compliance

All electrical work shall be in compliance with the latest editions of applicable regulations and standards including, but not limited to, the following:

- American National Standards Institute (ANSI)
- Institute of Electrical and Electronic Engineers (IEEE)
- Insulated Cable Engineers Association (ICEA)
- National Bureau of Standards (NBS)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Contractors Association (NECA)
- National Electrical Testing Association
- Underwriter's Laboratories Inc. (UL)

1.9 Fire Protection Codes & Standards

Fire suppression system water supply must be designed based on a 10% Factor of Safety for the working pressure of the system.

Hydrants and their locations shall be coordinated with DSA and the AHJ requirements.

Secondary fire water storage tanks, fire pump systems and appurtenances must be designed and provided in accordance with:

- NFPA 20
- NFPA 22

1.9.1 Fire Alarm System

Fire alarm system design and installation includes all required labor, materials, equipment, permit and inspection fees, and Contractor's services for complete installation of Fire Alarm System. Work shall be in full conformance with the requirements of all AHJ's including DSA and Local Fire Authority Requirements including the following:

- CBC
- CFC
- NFPA 72
- DSA GL-2
- DSA IR A-21

1.10 Technology & Audiovisual Codes & Standards

All current applicable standards and codes shall be followed for design and for submission to DSA. The following codes and standards are to be followed at a minimum:

- ANSI/TIA-568-C.0 – Generic Telecommunications Cabling for Customer Premises
- ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
- ANSI/TIA-568-C.2 – Balanced Twisted-Pair Telecommunication Cabling and Components Standard
- ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard
- ANSI/TIA-568-C.4 – Broadband Coaxial Cabling and Components Standard
- ANSI/TIA-568-D – Series Generic Telecommunications Cabling for Customer Premises
- TIA-569-E – Telecommunications Pathways and Spaces
- ANSI/TIA-598-C – Optical Fiber Cable Color Coding
- ANSI/TIA-606-C – Administration Standard for Telecommunications Infrastructure
- ANSI/TIA-607-D – Generic Telecommunications Grounding and Bonding for Customer Premises
- ANSI/TIA-758-C – Customer-Owned Outside Plant Telecommunications Infrastructure Standard
- ANSI/TIA-526-7 – Measurement of Optical Power Loss of Installed Single mode Fiber Cable Plant
- ANSI/TIA-526-14 – Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
- ANSI/TIA-942-B – Telecommunications Infrastructure Standard for Data Centers
- ASHRAE 9.9 Thermal Guidelines for Data Processing Environments
- NFPA-70 – National Electrical Code
- Federal Communications Commission (F.C.C.), Part 15 and Part 68
- BICSI Standards (current version)

1.10.1 Technology & Audiovisual Relevant Standards

The Technology and Audiovisual Systems shall follow the following standards:

- **Volume 3 Appendices | Section 16 - Technology & Audiovisual Design | Design Requirements & Standards**. These include the facility standards for spaces as well as the telecommunication and security where it is applicable to instructional and meeting space.

Refer also to the District Specifications and individual Campus Facility Specifications found:

- **Volume 2 District Specifications and Campus Specifications Matrix**

The Audiovisual Standards and Design guidelines included in the Appendix also refer to specific communications, industry, building, and federal standards that are to be adhered to.

1.11 Security Design Codes & Standards

The following industry codes and standards are integral to all security sections, extending beyond the specifics outlined in this document:

- ASCII – American Standard Code for Information Interchange
- ASTM – American Society for Testing and Materials
- EIA – Electronic Industry Association
- NEMA – National Electrical Manufacturers' Association
- NFPA 3000 (PS) – Standard for Active Shooter/Hostile Event Response (ASHER) Program
- NEC – National Electrical Code, NFPA 70
- CEC – National Electrical Code with CA Amendments
- CBC – International Building Code with CA Amendments
- CFC – International Fire Code with CA Amendments
- UL – Underwriters Laboratories, Inc.

1.12 Whole Building Commissioning & Warranties Regulations

Commissioning standards and references used to develop commissioning specifications shall meet or exceed the latest editions of applicable regulations and standards including, but not limited to the following:

- American National Standards Institute (ANSI)/American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)/Illuminating Engineering Society (IES) Standard 202
- ASHRAE Guideline 0, the Commissioning Process
- ASHRAE Guideline 1.1, the Heating, Ventilating, Air Conditioning and Refrigerating (HVAC&R) Technical Requirements for the Commissioning Process
- ASHRAE Guideline 4, Preparation of Operating and Maintenance Documentation for Building Systems
- ASHRAE Guideline 14, Measurements of Energy and Demand Savings
- National Institute of Building Sciences (NIBS) Guideline 3 – Exterior Enclosure Technical Requirements for the Commissioning Process
- Total Building Commissioning (NIBS)
- International Performance Measurement and Verification Protocol

CHAPTER 2

Accessibility & Universal Design

Los Angeles Trade Tech College

CHAPTER 2 - ACCESSIBILITY & UNIVERSAL DESIGN

2 Accessibility & Universal Design

LACCD is committed to inclusive and accessible design of each college campus. The goal to foster equity and diversity is achieved by creating an environment where all members of the education community, regardless of their physical disabilities, cultural backgrounds, or learning styles are able to thrive. This involves thoughtfully planned infrastructure with building elements such as elevators, ramps, and braille signage so that disabled individuals may easily navigate and interact on campus. In addition to accessible design, LACCD is committed to investing in universal design, such as gender neutral restrooms and lactation rooms, to help everyone feel welcome, valued, and empowered in their pursuit of knowledge.

2.1 Accessibility Intent

All LACCD campuses are required to comply with federal law, as well as the state and local accessibility codes. Therefore, all physical facilities shall be designed, constructed, or altered to be accessible to and usable by persons with disabilities. Mandatory compliance with accessibility standards and regulations will eliminate discrimination, promote inclusion, reduce stigma and potential embarrassment, and combat isolation, segregation, and second-class citizenship of individuals with disabilities.

2.2 Accessibility Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code, and regulations related to accessibility.

- 1.4 Accessibility Compliance and Regulations
- 1.4.1 Compliance
- 1.4.2 Universal Design
- 1.4.3 Transition Plan & Program Accessibility
- 1.4.4 New Construction
- 1.4.5 Accessibility Scope

it is critical that all existing elements in circulation areas, program areas, and paths to site arrival points as defined by accessibility regulations, and Path Of Travel (POT) elements applicable to alteration projects as defined by regulations, be reviewed and evaluated for compliance. Transitions, intersections, and interfaces between the existing and newly proposed conditions must be evaluated, carefully considered and intentionally designed. New construction shall not create new accessibility deficiencies, and or violate accessibility regulations for existing surrounding facilities.

The scope of site assessment for all projects shall be clearly identified in the Programming and Project Criteria (PPC) and is required to be included in the design. In new construction projects, at least one accessible route shall be provided from site arrival points, including accessible parking spaces, accessible passenger drop-off and loading zones provided within the campus, public streets and sidewalks, and public transportation stops to the accessible building or facility entrance they serve. Where more than one route is provided, all routes must be accessible. If a passenger loading zone is not provided, the Design Team (DT) is required to confirm that the existing accessible POT is part of another project scope.

2.3.2 Programming & Design

During the programming and design phases of a project, it is critical that all spaces and elements covered under the Americans with Disabilities Act (ADA) and the California Building Code (CBC) be integrated into the design of the project. It is imperative that a thorough accessibility compliance review of the plans, drawings, reports, and specifications occur by an expert, such as a Certified Access Specialist (CASp). The DT shall factor in construction tolerances into the project design to avoid in-field issues of non-complying elements. A CASp is required for TAI/barrier removal projects. It is recommended that a CASp consultant is hired as part of the design team on all projects.

2.3.3 Permitting

LACCD is required to submit a permit application to the Division of the State Architect (DSA) for demolition, if required, and/or building construction approval. DSA will review and provide comments regarding accessibility compliance and identify access barriers during the back check process. The DT shall ensure the proposed design meets full code compliance and address any corrections DSA requests in the back check review. DSA

approval does not relieve the project team from the responsibility of achieving full compliance with the ADA. Prior to the official permit application submission, DSA will address preliminary questions regarding accessibility compliance concerns or interpretations through a formal application process.

2.3.4 Construction

After DSA review and approval, the construction phase is allowed to commence. It is imperative that all dimensional and slope requirements are accurately constructed; there are no code exclusions or exceptions for construction tolerance errors. Often the construction of finishes, thickness of wall and floor materials, lavatory offsets, toilet/shower accessory mounting locations, shower clear widths, handrail extensions, and floors sloped to drain require built-in tolerances to account for practical limitations of materials, equipment, and workmanship.

During the different stages of construction, upon notification by the Campus Project Team that the site is ready to be reviewed, Build-LACCD CASp representatives will visit the construction sites and document observed instances of non-compliance and those that appear to be on track to be in violation of regulation. A Field Observation Log (FOL) will be issued to assist the project team of the needed corrections. The FOL will also be shared with the project DSA Inspector of Record (IOR). If the CASp FOL identifies barriers or areas of non-compliance, the contractor will be required to make adjustments to bring the project into compliance. The project will need to meet all accessibility code requirements prior to the issuance of the Certificate Of Occupancy.

2.4 Accessibility Support Resources

To set the design and construction team up for success, LACCD has provided a variety of resources for accessibility compliance information, education, and expert advice.

2.4.1 Contact Information

If specific accessibility questions arise on a project, please contact BuildLACCD, DSA, or the U.S. Access Board:

- BuildLACCD Certified Access Specialist (CASp)
- BuildLACCD PMO Design Manager
- DSA Access Technical Assistance: 916-445-5827
- U.S. Access Board Technical Assistance: 202-272-0080, ext #3; ta@access-board.gov; https://www.access-board.gov/ta/

2.4.2 Online Resources

Below is a list of online resources that will aid the design and construction team in accessibility compliance:

- LACCD Accessibility Standards, current edition.
- BuildLACCD Audio-Visual Standards, current edition.
- DSA Access Compliance Reference Materials: https://www.dgs.ca.gov/DSA/Resources/Page-Content/Resources-List-Folder/Access-Compliance-Reference-Materials
- U.S. Access Board Technical Guides: https://www.access-board.gov/ada/guides/

CHAPTER 3

Sustainable Design

Los Angeles Pierce College

CHAPTER 3 - SUSTAINABLE DESIGN

CHAPTER 3 - SUSTAINABLE DESIGN

3 Sustainable Design

3.1 Clean Energy and Sustainability Resolution

In 2020, the LACCD Board of Trustees adopted the Clean Energy and Sustainability Resolution, establishing the target of carbon-free energy consumption at all campuses by 2040. The Resolution includes electrification, Zero Net Energy (ZNE) buildings, and renewable energy generation, among other sustainability targets. These sustainable design criteria reflect the LACCD BOT's adopted resolutions and commitment to sustainability.

3.2 LACCD Program Sustainability Requirements Overview

3.2.1 New Construction Projects

A New Construction (NC) project is defined for the purposes of the Sustainable Design chapter as a project meeting all of the following criteria:

- The building is an occupied structure.
- The building area greater is than 7,500 SF.
- More than 50% of the project funding is from Bond Proceeds.

It is required that:

- All NC projects shall comply with the minimum LEED certification requirements of Section 3.4. Individual projects may stipulate LEED goals that exceed the minimum requirement.
- All NC projects shall comply with the California Energy Code (Title 24, Part 6) using the Performance Compliance path.
- The building energy use intensity (EUI), before accounting for renewable generation, shall be below the maximum allowable target listed in Table 3.5.11 based on the applicable building type.
  - Exception: fossil fuel burning equipment may be installed as required for academic purposes (e.g., laboratory and culinary equipment).
- The minimum amount of PV required shall be based on the amount required for Title 24 compliance.
- Whole-building performance energy modeling shall be performed in accordance with Section 3.3.4.
- All new NC Projects shall comply with the (Measurement and Verification) M&V requirements in Section 3.5.11.

LACCD Division 1 General Conditions contains a section on Sustainable Design. Division 1 shall be provided with project documentation.

3.2.2 Major Renovation

A Major Renovation (MR) project is defined for the purposes of the Sustainable Design chapter as a project meeting all of the following criteria:

- The building is an occupied structure.
- The building area is greater than 7,500 SF.
- More than 50% of the exterior envelope is renovated. The exterior envelope is defined as defined as exterior walls, roofs, and fenestration systems both vertical (e.g., windows) and horizontal (e.g., skylights).
- The project scope includes upgrading any major building systems. Major building systems are defined as mechanical, electrical, and/or plumbing systems.

It is required that:

- All MR projects shall comply with the minimum LEED certification requirements of Section 3.4. Individual projects may stipulate LEED goals that exceed the minimum requirement.
- All MR projects shall comply with the California Energy Code (Title 24, Part 6) using the Performance Compliance path.
- Whole-building performance energy modeling shall be performed in accordance with Section 3.3.4.
- All new MR Projects shall comply with the metering and M&V requirements in Section 3.5.11. The metering and M&V requirements shall only apply to those systems within the scope of the MR project.
- No new fossil fuel burning assets shall be installed as a part of any MR project. Exception: equipment required for academic purposes (e.g., laboratory and culinary equipment).
- Sustainable design compliance shall be monitored using the Sustainable Checklist for Renovation Projects.

3.2.3 All Other Projects

These are projects that do not align with the definition for NC or MR projects. These projects must meet all of the following criteria:

Design/Bid/Build and Lease/Leaseback Renovation (not Major Renovation) Projects

The LACCD Sustainable Checklist for Renovation Projects shall be completed in the Schematic Design phase and receive approval of sustainable features incorporated in the Design Development phase by the CPT and/or DPM.

Design/Build

For Design Build, the Program and Project Criteria (PPC) Design Team shall complete the Sustainable Checklist for Renovation Projects and this shall be included in the programming document included in the Request for Proposal (RFP).

Non-LEED Buildings

If a building does not meet the District's criteria for NC or MR projects, it is then considered a non-LEED project. These projects shall comply with the Sustainable Checklist for Renovation Projects. These projects will continue to incorporate sustainable features that complement the program for the project, however, Non-LEED buildings need not pursue official LEED certification through Green Building Certification Institute (GBCI).

3.2.4 Utility Incentives

The Design-Build Entity (DBE) shall apply for available incentive and/or rebate programs and coordinate with the utility company on behalf of the end-user when embarking on a new construction, renovation, or retrofit project. Incentives can be offered through the Southern California Gas Company, Southern California Edison Company, or Los Angeles Department of Water and Power. It is mandatory that the DBE maximizes the incentives and/or rebates for the end-user by using the customized methodology rather than the prescriptive methodology where feasible and applicable. The DBE shall select the program methodology (customized or prescriptive) that maximizes that incentives and/or rebates to the end-user. Either selected methodology shall be communicated to the LACCD Director of Energy and Sustainability and/or Energy Program Manager, and LACCD Utility Manager.

3.3 Procedural Requirements for Achieving Sustainability

3.3.1 Sustainable Design Process Summary

Sustainable building design will be achieved through execution of the following:

- Design Teams shall utilize an integrated design delivery by closely coordinating with Master Planning, Programming, BIM modeling, Facility Management, Energy Modeling, Commissioning, Warranties, Handover, and Post Occupancy Evaluation.
- During early stages of design, calibrating the cost model to choose sustainable design features in line with program requirements.
- Consideration and understanding of operation and maintenance requirements, and resources of the building systems.
- Compliance with all the LEED rating system requirements and processes to deliver the agreed level of LEED certification.
- Integrated design through timely coordination between various disciplines to ensure a quality sustainable design delivery. Details of the coordination meetings required, who they are chaired by, goals and outcomes of the meeting, and each party's responsibility are listed in **Volume 3 Appendices | Section 3 Sustainablility - Coordination and Deliverables**.

3.3.2 Sustainable Design Deliverables by Project Phase

An outline of documents related to sustainable design and construction deliverables is provided in **Volume 3 Appendices | Section 3 Sustainable Design - Coordination and Deliverables** . At various stages of programming, pre-planning, design, construction, commissioning, and post construction, the CPT and/or DPM is responsible to ensure that quality sustainable design deliverables are produced by the design team. Timely review and comment on the sustainable submittals will ensure a quality project.

3.3.3 Facilities Master Planning & Oversight Committee (FMP&OC) Approval of LEED Projects

All projects more than five million dollars are reviewed by the Facilities Master Planning & Oversight Committee (FMP&OC).

A Presentation to the FMP&OC subcommittee shall occur prior to completion of the Schematic Design

Phase, and must occur prior to proceeding to the Design Development Phase.

3.3.4 Whole Building Energy Modeling

All NC and MR projects shall create a Whole Building Energy Model to analyze and demonstrate predicted building energy performance.

The Whole Building Energy Model shall be used to estimate annual building energy consumption, estimate annual energy costs, perform life cycle cost (LCC) studies, and size renewable energy systems for ZNE operations. The energy model shall also be used to demonstrate compliance with all applicable LEED perquisites and credits.

The energy model shall be completed using a full 8,760-hour annual simulation run in a dedicated energy and loads modeling software (EnergyPlus, IESVE, eQUEST, Trane TRACE, etc.). Exceptional calculations may be completed outside of the simulation software if proposed building systems are not able to be modeled directly in the energy software.

Annual weather data (or weather file) for the Whole Building Energy Model shall be based on source data best representing the expected weather conditions at the building location. It is recommended to use the applicable Typical Meteorological Year 3 (TMY3) or TMYx dataset of the most representative weather station. A climate analysis shall be submitted in Schematic Design justifying the weather data inputs to the energy model. Climate conditions for mechanical equipment sizing are defined separately in the Mechanical Design standards (**See Chapter 11 Mechanical Design**).

Refer to **Volume 3 Appendices | Section 3 Sustainable Design - Coordination and Deliverables** for Whole Building Energy Modeling milestone deliverables. All energy model deliverables shall include the Energy Modeling Cover Sheet.

Each Whole Building Energy Model deliverable shall include an Energy Model Report summarizing all major inputs and assumptions. These inputs and assumptions include, but are not limited to:

- Energy simulation program
- Occupancy loads and schedules
- Lighting loads and schedules
- Plug/process loads and schedules
- Envelope performance values
- HVAC system inputs
- Domestic Hot Water (DHW) inputs
- Exceptional calculations

3.4 LEED Certification

3.4.1 Minimum LEED Certification

For projects requiring LEED certification, the project shall achieve a minimum of LEED Certified in the most current rating system by United States Green Building Council (USGBC). Depending on the delivery method selected at project initiation, a higher certification goal shall be targeted during the project's programming phase. The driver for certification level shall always be the program intent and LEED certification updates shall reflect intent of sustainable features and criteria for the project.

See Sample LEED Gold Scorecard in **Volume 3 Appendices | Section 3 Sustainablility** illustrating the potential pathway to attaining a higher level of sustainable performance for LACCD projects.

3.4.2 LEED Certification Process

For GBCI coordination, the Program Management Office (PMO) will assign registration numbers for all LEED projects on LEED Online at project initiation when the LEED certification requirement for the project is established.

GBCI certification and LEED management will be provided by the design team. The LEED consultant must be a LEED accredited professional for the rating category the project is pursuing. Throughout the design and construction process the LEED Consultant, who is part of the design team, is responsible for managing the LEED certification process and submits all documentation to the GBCI/USGBC for evaluation.

Note: LACCD does not require hiring of a separate LEED consultant. If the architect takes on this role, the architect is required to perform the duties of LEED management with GBCI. Refer to the Division 1 Specification for more on this topic.

The LEED consultant shall obtain campus specific information for project setup from the PMO Energy and Sustainability Director.

Issuance of a Credit Interpretation Request (CIR) to GBCI must be approved by the Sustainability Manager. The Sustainability Manager shall be advised and copied on all communication to the GBCI/USGBC as related to LACCD projects.

The use of the Green Building Education innovation credit is at the discretion of the Design Team. The Sustainability Consultant on the Project Team shall coordinate early in design with the Owner to confirm how sustainable education will be incorporated into the project. Written approval is required of all owner items and on scorecard.

the design and construction process the LEED Consultant, who is part of the design team, is responsible for managing the LEED certification process and submits all documentation to the GBCI/USGBC for evaluation.

Note: LACCD does not require hiring of a separate LEED consultant. If the architect takes on this role, the architect is required to perform the duties of LEED management with GBCI. Refer to the Division 1 Specification for more on this topic.

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The use of the Green Building Education innovation credit is at the discretion of the Design Team. The Sustainability Consultant on the Project Team shall coordinate early in design with the Owner to confirm how sustainable education will be incorporated into the project. Written approval is required of all owner items and on scorecard.

The Commissioning Authority (CxA) on the project, hired by LACCD, is responsible for submitting the fundamental and enhanced Commissioning (Cx) credit to the LEED consultant for submission to GBCI/USGBC.

The program requirements will specify the LEED version to be pursued. When it does not, it shall be assumed that the latest version of LEED applies.

LACCD projects fall under the realm of New Construction and Major Renovation. However, if a Design Team wants to pursue a different LEED certification model (Schools, Commercial Interiors, Core and Shell etc.), it must be approved in writing during procurement.

3.5 Mandatory Sustainability Features

LACCD projects shall include energy efficiency and other sustainable features. Table 3.5 provides mandatory sustainability features related to LEED credits. Deviations from this list are only allowed in writing and shall be approved by the CPT and/or DPM. Refer to the LEED reference guide for additional strategies and sustainable features to incorporate in the building projects.

The sustainability features listed below align with LEED v4 and v4.1. Where v4.1 is referenced, the credit language has typically become easier to achieve and therefore it is recommended to substitute in v4.1. When GBCI upgrades to LEED v5, the Design Team must pursue the credit pathway outlined below as closely as possible by pursuing related, applicable credits.

3.5.1 Access to Quality Transit

Where possible, the project shall pursue the LEED credit Access to Quality Transit. Depending on the project's location, the project shall enhance mass transit, active transportation, and alternative transportation options by locating the project within walking distance to existing or planned public transportation stops, stations, and terminals.

3.5.2 Bicycle Facilities

The project shall strive to pursue the LEED credit Bicycle Facilities. Provide short-term bicycle storage for peak visitors and long-term bicycle storage for regular building occupants. Cyclists shall have access to a shower and changing facility.

3.5.3 Electric Vehicle Supply Equipment

The project shall obtain the LEED credit Green Vehicles and strive to meet the below requirements.

Provide electric vehicle charging stations (EVCS) for at least 25% of all parking spaces. Clearly identify and reserve these parking spaces for the sole use by plug-in electric vehicles.

The Electric Vehicle Supply Equipment (EVSE) must:

- Provide a Level 2 charging capacity (208 – 240 volts) or greater for each required space.
- Comply with the relevant regional or local standard for NACS connectors.
- Meet the connected functionality criteria for ENERGY STAR certified EVSE and be capable of responding to time-of-use market signals (e.g., price). Projects pursuing EA credit Grid Harmonization shall incorporate EVCS into any demand response program or load flexibility and management strategies.

3.5.4 Stormwater Design and Management

For Stormwater Design and Management Requirements, refer to **3.6 Stormwater Design & Management.**

Table 3.5 Sustainability Features Related to LEED Points

Location & Transportation
Access to Quality Transit (v4.1)
Bicycle Facilities (v4.1)
Electric Vehicles (v4.1)
Sustainable Sites
Rainwater Management (v4.1)
Heat Island Reduction – Non-Roof & Roof
Light Pollution Reduction
Water Efficiency
Outdoor Water Use Reduction – Reduced Irrigation
Indoor Water Use Reduction – Efficient Plumbing Fixtures
Indoor Water Use Reduction – Appliances and Process Water Use
Optimize Process Water Use (v4.1)
Energy & Atmosphere
Commissioning - Fundamental & Enhanced
Building-Level Energy Metering
Optimize Energy Performance – Whole-Building Energy Simulation
Renewable Energy (v4.1)
Materials & Resources
Storage & Collection of Recyclables
Construction Waste Management Planning
Construction Waste Management
Building Life-Cycle Impact Reduction (v4.1)
Sourcing of Raw Materials (v4.1)
Regional Materials (v4.1)
Material Ingredients (v4.1)
Indoor Environmental Quality
Minimum & Enhanced Indoor Air Quality
Low-Emitting Materials (v4.1)
Construction Indoor Air Quality Management Plan
Indoor Air Quality Assessment
Interior Lighting – Lighting Control (v4.1)
Daylight
Quality Views
Pilot Credits
Comprehensive Composting

NOTE: If a project cannot comply with any of the mandatory measures as provided in this section, please submit a request to CPT and/or DPM. PMO and District approval is required.

3.5.5 Heat Island Reduction

Non-Roof Requirements

The project shall obtain the LEED credit Heat Island Reduction as well as meet the requirements in this section.

Provide any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots):

- Shade (within 5 years of occupancy)
- Paving materials with a three-year aged Solar Reflectance (SR) of at least 0.28 (or initial SR of at least 0.33 at installation)
- Open grid pavement system (50% unbound)

OR

Any structure used to shade or cover parking must have a three-year aged SR of at least 0.28 (or initial SR of 0.33 at installation) or be 100% covered by energy generation systems.

Roof Requirements

The project shall obtain the LEED credit Heat Island Reduction by meeting the requirements in this section.

Use roofing materials having an initial Solar Reflectance Index (SRI) of 82 or a three-year aged SRI equal to or greater than 64 for low sloped roofs, or use roofing materials having an initial SRI of 39 or a three-year aged SRI of 32 for steep sloped roofs.

3.5.6 Light Pollution Reduction

The project shall obtain the LEED credit Light Pollution Reduction. Projects shall install LED luminaires for all campus lighting applications and shall follow the District Facilities standards.

3.5.7 Water Efficient Landscaping

The project shall obtain the LEED credit Outdoor Water Use Reduction as well as meet the requirements in this section.

Incorporate drought-tolerant and native or adaptive plants into the landscape.

Use drip irrigation where possible. When installing new landscaping, irrigation controllers are required for all landscaped areas.

Use harvested greywater or rainwater for irrigation purposes when available and specified in the program documents.

Landscaping over a total of 5,000 SF (continuous) is required to have landscaping water use metered.

Meter shall be network capable and capable of reporting the data to a web-based application.

In order to determine potable water reduction through water efficient landscaping the Landscape Coefficient methodology must be used. This method compares the calculated July irrigation water requirement for the project design with that of a standard design of that same project without the use of water efficient irrigation equipment and the use of native and drought tolerant plants.

3.5.8 Building Water Use Reduction – Plumbing Fixtures

The project shall obtain the LEED credit Indoor Water Use Reduction and achieve a minimum of 30% water savings above baseline water fixtures as well as the requirement in this section.

Meter water use at the building level for all new construction projects over 3,000 SF. For renovation projects, refer to the renovation checklist included in the program for mandatory requirements.

3.5.9 Building Water Use Reduction – Appliances for Process Loads

For all water consuming process loads, use LEED required allowances and requirements per the LEED v4 (or more recent) reference guide.

The following process loads must be included at a minimum:

- **Heat rejection and cooling:** no once-through cooling with potable water for any equipment or appliances that reject heat
- **Cooling towers and evaporative condensers:** equip with makeup water meter, conductivity controllers and overflow alarms, efficient drift eliminators that reduce drift to maximum of 0.0002% of re-circulating water volume for counter flow towers and 0.0005% of re-circulated water flow for cross-flow towers.
- Clothes washers
- Dishwashers
- Pre-rinse spray valves
- Ice machines
- Food Steamers
- Combination Ovens

3.5.10 Commissioning – Fundamental & Enhanced

LACCD requires that LEED prerequisite and credit Fundamental and Enhanced Commissioning be conducted for all new construction and major renovation projects.

CxA shall report directly to the owner's representative (WBCxA).

CxA will at a minimum:

- Assist with development of the Owner Project Requirements (OPR) or develop the OPR.
- Provide at least one commissioning design review of the OPR, Basis of Design (BOD), and design documents, prior to mid-construction documents phase.
- Perform a back check of all subsequent design submissions, to ensure that peer review comments and commissioning comments have been included in the final design.
- Include commissioning requirements into the construction documents (Refer to Division 1 and other specifications).
- Develop and utilize commissioning plan.
- Review contractor submittals for commissioned systems.
- Conduct a review of building's energy-related systems contractor submittals.
- Develop building enclosure testing plan.
- Verify the installation and performance of energy consuming systems and that the thermal envelope meet the Owner Project Requirements (OPR) and Basis of Design (BOD), including:
  - Develop and track startup checkouts/ pre-functional checklists to ensure equipment has been installed and hooked up properly, has been pre-functionally started-up, and has had all applicable leak/pressure tests completed.
  - Develop and conduct functional acceptance test procedures to verify that all equipment runs through the controls sequences of operations properly
  - Keep a log of any issues that are observed during the commissioning process, including methods and dates of resolution, to serve as a chronological report of the commissioning process
- Develop an on-going Commissioning Plan including:
  - Develop a current Facilities Requirements & Operations Maintenance Plan with systems manuals.
  - Functional acceptance test forms

  - Recommended schedule for recommissioning

- Verify that the requirements for training facilities and operating personnel is completed
- Complete a final commissioning report

The programming criteria Architect shall review the OPR during programming (before RFP) to ensure all program requirements listed in the OPR are included in the proposed project. Programming criteria architects cost estimate shall include the OPR requirements.

Compliance with OPR during design and construction and at contract completion will be monitored by the CxA for the project.

Commissioning Process

All projects pursuing LEED will have a third-party Whole Building Commissioning Authority (WBCxA) firm. The WBCxA will be hired by LACCD, to oversee the commissioning process. Commissioning is a systematic quality process for enhancing delivery of a project. The process ensures that all commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet contract documents and LACCD requirements. The WBCxA oversees the CxA and processes. The CxA verifies that building systems perform interactively according to BOD and OPR.

The commissioning process encompasses and coordinates traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing, and training. At a minimum the Commissioning Authority shall perform the following:

- Prepares the OPR using the nominal group technique method as described in ASHRAE Standard 202, The CxA reviews the BOD prepared by the design team against the OPR.
- Review related CxA construction specifications and provide comments and/or observations to the Design Team and WBCxA. Refer to LACCD General Requirements and Technical Specifications for Commissioning.
- Performs all LEED related and Non-LEED commissioning.
- Procure resolution for identified design and construction commissioning-related issues.
- Completes LEED related documentation on LEED Online and attests to successful commissioning efforts for the project.
- Continues commissioning activities approximately 10 months after occupancy. The contractor is required to be available for warranty issues and the Design Team is required to be available for clarifications on design issues.

Commissioning is coordinated by the WBCxA through the CPT and/or DPM. PMO has a WBCxA on staff that manages all WBCxA contracts.

Refer to **Chapter 19 Whole Building Commissioning** for more information.

Owner's Project Requirements (OPR)

OPRs contain specific information to document Building User Group's operational needs. The OPR shall be developed as early as possible in the project's conceptual phase. The development of the OPR document shall include all relevant stakeholders, including representatives from LACCD, PMO, CPT, DPM, Operations and Maintenance, Design Team, etc.

The OPR is required to be generated (in addition to the programming criteria documents) for all new and renovation building projects. The CxA for the project shall prepare the OPR. The OPR shall be developed during the Programming Phase.

The OPR document is critical to the commissioning process and must be prepared in programming because:

- The CxA reviews all BOD narratives generated by the Design/Design-Build teams against the OPR.
- The CxA reviews design drawings for compliance against the OPR.
- The OPR is required to contain sufficient critical technical data that will maximize this process. Without a quality OPR, or if the OPR is not included at the correct time of procurement, this process becomes invalid.
- Any disputes, etc. are to be brought to the attention of the WBCxA. The DPM/ Sustainability Manager (SM) / Regional Design Liaison/Regional Program Liason shall be kept informed.

3.5.11 Energy Performance

Energy Use Intensity (EUI)

All projects shall meet or exceed the following EUIs by building type. Buildings that contain more than one type of space shall calculate the EUI target as a weighted average EUI based on the various uses of the building.

Table 3.5.11 Energy Use Intensity (EUI) Targets

Building Type	Site EUI (kBtu/sf/yr)
Offices	30
Physical Ed – Fitness Rooms	50
Physical Ed – Sports Courts	40
Classroom/Auditorium	30
Food Service	120
Lab/Science	150
Library	30
Performance/Theatre	40
Maintenance Shop/Warehouse	10
Student Housing	58

Metering and Measurement & Verification Requirements

Projects shall include the necessary energy and water meters to achieve the Advanced Energy Metering and Water Metering LEED credits. The design team shall create a M&V plan in the schematic design phase to track building performance and the inclusion of meters throughout the design. Refer to **Volume 3 Appendices | Section 3 Sustainablility - Coordination and Deliverables** for M&V milestones throughout the design

Airside Economizers Requirements

Provide 100% airside economizers with Title 24, Part 6 compliant controls for all cooling systems, including but not limited to the following:

- Central air handling units
- Packaged rooftop units
- Dedicated cooling units serving electrical rooms, server rooms, and elevator machine rooms with cooling loads greater than 4.5 tons.

Provide adequate filtration for sensitive equipment such as computer rooms, server rooms and laboratories.

Demand Control Ventilation Requirements

CO2-based Demand Control Ventilation (DCV) and Occupancy Sensor Ventilation systems shall comply with the requirements in Title 24, Part 6, with the following additional requirements:

- DCV is required in classrooms, regardless of area or expected number of occupants

CO monitoring systems shall be provided for all mechanically ventilated enclosed parking garages. The ventilation rate shall be at least 0.15 cfm/ft2 when the garage is scheduled to be occupied. Exhaust rates shall not be reduced below 0.05 cfm/ft2 during occupied hours.

Motors and Variable Frequency Drives Requirements

Motors shall be National Electrical Manufacturers Association (NEMA) Premium Efficiency.

Small electric motors shall be the Electronically Commutated Motors (ECM). This includes motors in fan-powered boxes and fraction horsepower motors (i.e., motors with a nominal rating < 1 hp).

All Variable Frequency Drives (VFDs) shall have a minimum efficiency of 97% and a minimum fundamental power factor of 0.98 at all speeds. VFDs may also be referred to as Variable Speed Drives (VSDs) and Adjustable Speed Drives (ASDs)

Provide VFDs for all hydronic systems as described in the current CEC Building Energy Efficiency Standards. Balancing valves are not permitted on hydronic system pumps with VFDs.

Daylighting and Daylight-Responsive Controls Requirements

All multi-occupant spaces such as conference rooms, classrooms, and common areas within the building shall incorporate daylight controls. Commission daylighting controls after furniture is in place.

Occupancy Sensors Requirements

Refer to Title 24 requirements for Wall or Ceiling Mounted Lighting Sensors. Commission occupancy sensors after furniture is in place.

Efficient Lighting Systems Requirements

Use Illuminating Engineering Society of North America recommendations for minimum illuminance levels required for task lighting.

Provide separately controlled ambient and task lighting for all office spaces.

Only Use lamps or luminaires of higher efficacy (>100 lumen/watt).

Projects shall install LED luminaires for all campus lighting applications and shall follow the District Facilities standards.

All exit signs shall be LED-type.

Efficient Electrical Distribution Requirements

Provide electrical transformers that are 30% more efficient than the NEMA TP-1 standard (applicable

to transformers < 600V).

Plug Load Management Requirements

The location and mounting method of the occupancy sensor shall be coordinated with the architect, furniture vendor, and client for proper functioning of the device.

For open office areas, the occupancy sensor shall be furniture mounted. It is preferable to mount it in a location that detects hand motion. The occupancy sensor can also be located below the work surface to avoid unnecessary motion detection.

The occupancy sensor shall be located to avoid coverage of open doors or entrances.

Each user shall be provided with instructions as to how to use and adjust the device to suit the needs of the individual workspace.

Commission occupancy sensors after all furniture is in place.

Refer to Illustration 3.5.11 for examples of how to mount the occupancy sensor for proper detection.

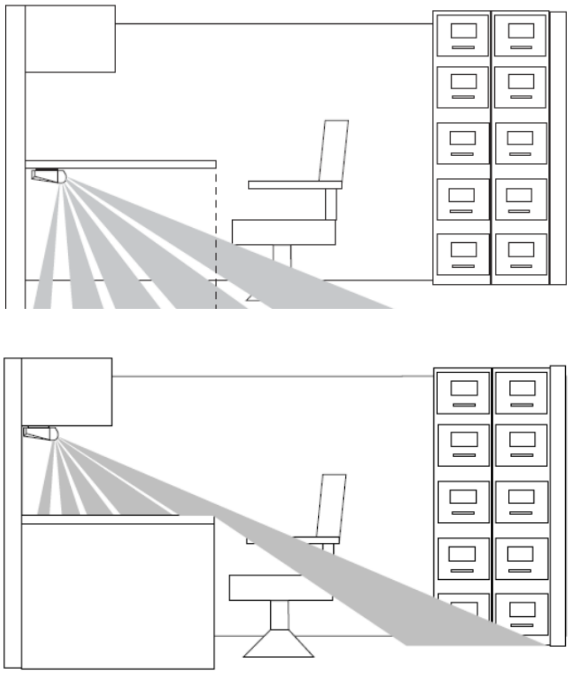
Plug load management of vending machine Vending misers shall be installed in all vending machines.

Energy Efficient Appliance Requirements

Specify energy-efficient appliances that have earned the EnergyStar rating for the following equipment.

- Computers, monitors, and computer accessories
- Copiers
- Printers
- Televisions
- Refrigerators
- Freezers
- Ice Makers
- Commercial Kitchen Equipment
- Vending Machines

Illustration 3.5.11 Options for occupancy sensors in offices to manage plug loads



3.5.12 Material and Resources

Storage & Collection of Recyclables Requirements

The project must obtain the LEED prerequisite Storage & Collection of Recyclables as well as meet the requirements in this section.

Recycling areas shall be designed on each floor of the building and shall have collection services for the following (at a minimum):

- Glass
- Plastic
- Mixed paper
- Metals
- Cardboard
- Organic waste
- Include a signage plan that specifies what materials shall go into which containers
- At least two of the following: batteries, mercury-contain lamps, and electronic waste

Each project shall have a building level (maintenance accessible only) trash collection area that is dedicated to the separation and collection of materials for recycling.

Construction Waste Management Requirements

The project must obtain the LEED prerequisite Construction & Demolition Waste Management Planning as well as meet the requirements in this section.

LACCD has a goal of recycling 100% of demolition and construction waste. Project teams shall strive to maximize percentage of waste diverted.

The project shall obtain the LEED credit Construction & Demolition Waste Management for 75% construction waste recycling. Recycle or salvage at least 75% of construction, demolition, and land clearing waste by weight or volume.

Develop and implement a construction waste management plan that complies with LEED requirements and identifies the materials to be diverted from disposal and whether the materials will be sorted on-site or commingled, hauled off-site and then sorted at the off-site facility.

Building Life-Cycle Impact Reduction (Embodied Carbon)

The project shall comply with the current embodied carbon requirements under the California Green Building Standards (CALGreen), Division 5.4 Material Conservation and Resource efficiency or Division 5.105.2 Reuse of Existing Building.

It is recommended that the project pursues LEED credit Building Life-Cycle Impact Reduction. Meeting the CALGreen requirements align with the LEED credits related to embodied carbon, and will likely achieve these credits.

Sourcing of Raw Materials

The project shall obtain LEED credit Building Product Disclosure and Optimization - Sourcing of Raw Materials. In addition, the project must achieve 10% recycled content at a minimum. Steel construction projects must obtain a minimum of 20% recycled content. Use wood-based materials and products, which are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. The target to achieve is more than 50% FSC Certified Wood.

Regional Materials Requirements

Due to our proximity to the Pacific Ocean, In Los Angeles, a smaller portion of the building materials can be sourced within a 500 mile radius – these include:

- Masonry
- Concrete
- Reinforcing Steel
- Structural Steel
- Glazing
- Casework

Projects must obtain a minimum of 10% regional content which will count as a multiplier towards LEED Building Product Disclosure & Optimization credits.

Projects with a high level of concrete construction must obtain a minimum of 20% regional content.

Projects shall reference LEED for calculation methodology for this requirement.

Red List Building Material Requirements

Red List represents "worst in class" materials, chemicals, and elements known to pose serious risks to human health and the greater ecosystem that are prevalent in the building products industry. For new construction and major renovation projects only, the responsible Design Team will be required to submit in writing that the project complies with the requirements in this section at 100% Construction Documents and at project completion.

The Design Team shall submit written declaration at the end of design and Contractor to submit at the end of construction.

Identify and specify lead and cadmium free products: Solder, flux, pipe, pipe fittings, and fixtures must meet the California AB1953 standard for lead content by specifying ANSI approved third party certification. Compliance with the lead- and cadmium-free standard.

Identify electrical wiring and cabling with lead content less than 300 parts per million (ppm).

Roofing and flashing must not contain any lead.

Lead and cadmium free paints must be specified using Green Seal certification for metal-free paints or equivalent source of lead and cadmium free documentation.

Design plumbing systems to prevent copper corrosion using the following strategies, at a minimum:

- Specify the ASTM B828 standard for making capillary joints by soldering of copper and copper alloy tube and fittings for solder joints.
- Specify correct use of ASTM B813 fluxes or use O-ring gaskets and crimping tools for jointing.
- Use compatible materials (e.g., copper straps for copper pipes) to reduce galvanic corrosion and similar problems.

Specify Persistent Bioaccumulative and Toxic (PBT) source reduction goals for sub-contractors to align with the current LEED credit for PBT source reduction.

Ensure that return lines in a circulating hot water system have the same diameter as the supply lines.

Avoid stagnant sections by minimizing direction and size changes.

Prevent electrical currents by grounding directly to a copper rod driven into the ground. Do not attach a grounding wire to water pipes.

Do not allow galvanized nails to touch copper piping.

Avoid induced stresses, provide enough pipe support, and allow for thermal expansion.

Carefully ream cut ends to reduce turbulence. Unreamed tubing corrodes and fails at a higher rate.

Use stainless-steel piping and components for industrial process water supplies, heat exchangers, chillers, and condensers when operation temperatures exceed 140 degrees F (60 degrees C). Track specified and purchased materials during construction with a material checklist or PBT tracking form. Check the products' material safety data sheets (MSDS) and manufacturers' documentation before installation to ensure that only qualifying materials are used. At a minimum, review the following:

- Roofing and flashing
- Electrical wiring and cabling
- Indoor and outdoor paints
- Flux and solder
- Pipes, pipe fittings, and fixtures

The following information about each product or material is recommended for inclusion in a tracking tool as defined by the LACCD Sustainability Manager (SM):

- Product type
- Manufacturer
- Product name
- Allowable lead, cadmium, and copper content
- Actual lead, cadmium, and copper content, with source of data

Materials containing the following products may not be used in building construction:

- Chlorinated Polyethylene and Chlorosulfonated Polyethylene
- Chlorofluorocarbons (CFCs)
- Chloroprene (Neoprene) – with the exception of MEP equipment
- Formaldehyde (Added)
- Halogenated Flame Retardants
- Hydrochlorofluorocarbons (HCFCs)
- Mercury
- Petrochemical Fertilizers and Pesticides
- Phthalates
- Polyvinyl Chloride (PVC) – with the exception of roofing and piping
- Wood treatments containing Creosote, Arsenic or Pentachlorophenol or added urea formaldehyde
- Endangered Wood Species

Furniture, Fixtures, and Equipment Requirements

All systems furniture/seating introduced into the project space that has been manufactured or refurbished within one year prior to occupancy shall be:

- GreenGUARD certified (or)
- Meet EPA's Environmental verification (ETV) standards for volatile organic compounds (VOC) and formaldehyde emissions (or)
- Meet Business and Institutional Furniture Manufacturers Association (BIFMA) emissions standards.

Domestic appliances and office equipment shall be Energy Star compliant.

Printers and copiers shall be Energy Star compliant in addition to meeting the Restriction of Hazardous Substances Directive (RoHS).

3.5.13 Construction Indoor Air Quality (IAQ) Management Plan

During Construction Requirements

The project shall obtain the LEED credit Construction IAQ Management Plan during Construction. Develop and implement an IAQ Management Plan for the construction and pre-occupancy phases of the building per LEED requirements (applicable version).

Before Occupancy Requirements

The project shall obtain the LEED credit Indoor Air Quality Assessment before or during occupancy. Please reference the applicable LEED reference guide for detailed instructions on flush out procedures and/or IAQ testing protocol.

3.5.14 Low Emitting Materials

The project shall obtain the LEED credit Low-Emitting Materials for adhesives and sealants, paints and coatings, carpet and flooring system, composite wood, and agrifiber products.

The Contractor shall address this requirement for low emitting materials at 5 sub-contractor meetings at a minimum for each year the project is in construction.

3.5.15 Minimum and Enhanced Indoor Air Quality Performance

The project shall obtain LEED prerequisite Minimum Indoor Air Quality Performance.

The project must meet the requirements for LEED credit Enhanced Indoor Air Quality Performance.

3.5.16 Interior Lighting – Lighting Control

The project shall obtain the LEED credit Interior Lighting option 1. Lighting Control and meet the below requirements.

- Workstations within a building project: provide task lighting with workstation-level occupancy sensors in all office spaces.
- Conference rooms and other multi-occupant spaces: provide dimming or multi-level lighting control for all multi-occupant spaces.

3.5.17 Daylight

The project shall obtain the LEED credit Daylight by meeting the below requirements.

The project shall achieve a minimum Spatial Daylight Autonomy of 300 lux for 50% of occupied hours (sDA 300/50%) in a minimum of 75% of all regularly occupied areas.

Regularly occupied spaces include but are not limited to: office spaces, meeting areas, classrooms, laboratories, and cafeterias. Areas that shall not be considered include support areas for copying, storage, mechanical equipment, laundry, and restrooms.

Daylighting shall be provided in the following spaces: classrooms, offices, laboratories, conference rooms, and libraries, unless otherwise required in PPC.

As feasible in new construction projects, daylighting shall be provided in all corridors via clerestory windows or windows for NC projects.

3.5.18 Views

The project shall provide access to views as defined by the LEED Quality Views credit in all the following regularly occupied spaces in the project at a minimum:

- Classrooms
- Offices
- Conference rooms
- Cafeterias
- Libraries

3.5.19 Comprehensive Composting

The project shall provide receptacles for the collection of organic waste for on-site or off-site processing. Projects must ensure space and access are provided to support meeting the LEED pilot credit related to comprehensive composting.

3.6 Stormwater Design and Management

3.6.1 References

- Division 1 Storm water management specification
- Stormwater Best Management Practice Design Guide
- California LID Web Portal including standard bioretention and pervious pavement design plans http://californialid.org
- California Stormwater Quality Association New Development and Redevelopment Handbook https://www.casqa.org/resources/bmp-handbooks/new-development-redevelopment-bmp-handbook

3.6.2 Stormwater Management Requirements

Small Municipal Separate Storm Sewer System (MS4) Permit

LACCD and its nine colleges will be designed under the next Small Municipal Separate Storm Sewer System (MS4) Permit (current permit: State Water Resources Control Board (SWRCB) Water Quality Order No. 2013-001-DWQ), henceforth referred to as the Small MS4 Permit.

The stormwater sizing criteria for LACCD projects is identified in the Small MS4 Permit (SWRCB Order No. 2013-001-DWQ), Section F.5.g.2.b. of the current Small MS4 Permit covers the numeric sizing criteria for structural stormwater retention and treatment systems for Non-Traditional MS4 Permittees.

The stormwater sizing criteria for LACCD projects is identified in the current Small MS4 Permit (SWRCB Order No. 2013-001-DWQ). Section F.5.g.2.b. covers the numeric sizing criteria for structural stormwater retention and treatment systems for Non-Traditional MS4 Permittees.

3.6.3 Stormwater Design Criteria

Project must obtain the LEED credit for stormwater treatment as well as the requirements in this section and meet the sizing requirements of the Small MS4 Permit. The following is specific to the LEED credits for storm water:

Implement a stormwater management plan that reduces impervious cover, promotes infiltration, and captures and retains or, if infeasible, biofilters the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs). Biofiltration systems used to biofilter runoff must be capable of removing 80% of the average annual post-development total suspended solids (TSS) load based on existing monitoring reports. TSS are particles or flocs that are too small or light to be removed from stormwater via gravity settling. Suspended solid concentrations are typically removed via filtration.

Use either non-structural stormwater management measures, structural stormwater management measures, or a combination of the two. As further explained in **Chapter 5 Site Utility Infrastructure Design** Section 5.3 Storm Drainage Design, BMPs are considered to meet these criteria if (1) they are designed in accordance with standards and specifications from a state or local program that has adopted these performance standards, or (2) there exists in-field performance monitoring data demonstrating compliance with the criteria. Data must conform to accepted protocol (e.g., Technology Acceptance Reciprocity Partnership (TARP), Washington State Department of Ecology) for BMP monitoring. Structural stormwater management measures must meet the requirements of the Small Municipal Separate Storm Sewer System (MS4) Permit (current permit: State Water Resources Control Board [SWRCB] Water Quality Order No. 2013-001-DWQ) or current permit.

A stormwater management plan must adhere to requirements of the Small Municipal Separate Storm Sewer System (MS4) Permit (current permit: State Water Resources Control Board [SWRCB] Water Quality Order No. 2013-001-DWQ) or current permit.

In addition, all stormwater elements of a project may have to adhere to additional regulation including Total Maximum Daily Loads (TMDLs), Endangered Species Act, CWA Section 404 Dredge and Fill Permits, and Section 401 Water Quality Certifications.

The following BMPs are considered preferable for LACCD campuses to meet the criteria identified above for the Small MS4 Permit. Strategies to minimize or mitigate impervious surfaces include:

- Low Impact Development (LID) Site Planning and Design
  - Reduce impervious surfaces. Incorporate more pervious paving materials and/or open grid paving.
  - Disconnect impervious surfaces
  - Construct hardscape to drain towards tree planters or vegetated areas
  - Maintain natural depressions and good infiltrating soil, pervious paving materials and/or open grid paving
  - Conserve natural areas
  - Green roofs.
- Stormwater Structural Controls Measures
  - Infiltration basins or underground infiltration systems
  - Bioretention systems
  - Stormwater capture and use
  - Biofiltration systems, if infeasible to infiltrate or capture and use stormwater

These strategies reduce stormwater runoff and promote retention and filtration, thereby reducing the volume and velocity of stormwater and pollutant loading.

Refer to **Chapter 4 Site Design** for related topics.

CHAPTER 4

Site Design

Los Angeles Valley College

CHAPTER 4 - SITE DESIGN

4 Site Design

All site improvement shall be in accordance with applicable codes, the Standard Specifications for Public Works Construction (SSPWC, "Greenbook"), LACCD ("District") specifications, and Campus specifications. The following provides design guidelines for the civil site improvements within the Project limits. Refer to **Volume 2 District Specifications** and **Campus Specifications Matrix** for references to the specification sections made in this chapter.

4.1 Site Project Limits

The Design Team (DT) shall confirm project limits and refer to all available project information, including but not limited to the Programming & Project Criteria (PPC) and the Multiple Award Task Order Contract (MATOC). The DT shall:

- Determine if supplemental surveying or additional field investigations are needed for the design and construction of the project.
- Assess the capacity of existing infrastructure to serve the proposed project.

All existing conditions shall be documented by way of dated photographs to identify any existing damage or problems that existed prior to Project design. Additionally, the Design Team shall recommend areas in need of repair as a result of construction as a part of the scope of work.

4.2 Sustainability

The list below includes mandatory sustainability features related to site design:

- 3.5.1 Access to Quality Transit
- 3.5.4 Stormwater Design and Management
- 3.5.5 Heat Island Reduction
- 3.5.6 Light Pollution Reduction

Refer to **Chapter 3 Sustainable Design** for details on sustainable design features related to site design.

4.3 Access

4.3.1 Accessible Paths of Travel

The Design Team shall meet the most stringent of California Building Code (CBC) requirements, Federal Americans with Disabilities Act (ADA) standards, and the District's "Designing for Accessibility at LACCD". Special care shall be taken to provide pedestrian and vehicular separation per Chapter 11B-250 of the CBC. Grading design and execution of ADA accessibility shall also be in compliance with the Section 31 22 00 Grading and Section 31 23 16 Excavation and Fill for Paving.

Accessible pedestrian pathways shall be provided and corrective work to existing pedestrian pathways shall be implemented as required to link site arrival points to the building entrances per CBC Section 11B-206.2.1. The Design Team shall submit construction plans for pedestrian pathways to site arrival points for College Project Team (CPT) and/or District Project Manager (DPM) approval. Pedestrian pathways shall comply with requirements for slopes, clear areas, surface materials, surface indicators, lighting, etc. The Design Team shall submit plans for path of travel during construction for CPT and/or DPM approval. The Project shall provide an accessible route in compliance with both ADA and CBC to site arrival points. All accessibility related design and construction activities shall be coordinated with the LACCD Certified Access Specialist.

4.3.2 Vehicular Access

All elements of vehicle access and roadway improvements, including size, configuration, vertical and horizontal alignment, lane widths, striping, signage, lighting, and traffic control measures (i.e., stop signs and speed humps) shall be designed and constructed in accordance with County of Los Angeles Public Works Standards, Standard Plans for SPPWC, as applicable. The aesthetics of the vehicle access points shall be integrated with the pedestrian pathways, and landscape design. Grading design and execution of vehicular access shall also be in compliance with

- Section 31 22 00 Grading
- Section 32 12 16 Asphalt Paving
- Section 32 13 13 Site Concrete Work
- Section 26 27 29 Electric Vehicle Charging Stations

Refer to **Volume 2 District Specifications** for related topics.

All crossings at driveways and intersections must meet accessible pedestrian path requirements of CBC 11B-403. Special care shall be taken to provide pedestrian and vehicular separation per Chapter 11B-250 of the CBC.

4.3.3 Emergency Access

Fire department access shall be provided in accordance with the most stringent of the California Fire Code and the code adopted by the responding fire department. Hydrant and access approval shall

be obtained from the local fire department having jurisdiction.

With the exception of the fire apparatus, vehicular traffic shall be prohibited and physically separated from pedestrian paths of travel that are also designated as fire access lanes. All required fire access lanes and accessible pedestrian pathways shall be maintained during construction as a part of the scope of work.

4.4 Signage & Striping

Signage shall include identification, regulatory, direction, egress, and informational signs. Accessible signage and striping shall comply with local, state, and federal regulations. Directional and way-finding signage shall be coordinated with the District. All signage must conform to campus standards. Installation plans, elevations, sign details, and samples must be submitted to the CPT and/or DPM prior to start of any work.

Accessible signage and striping shall be provided within the Project limits and along the path of travel beyond Project boundaries when needed, in accordance with the most stringent local, state and federal guidelines.

The vehicle access points and roadways shall be striped and/or marked to identify pedestrian crossings, drive lanes, centerlines, turn arrows, etc. Striping, pavement markers and traffic signage shall comply with local, state and federal regulations. Directional signage shall include regulatory and informational signs. Directional and way-finding signage shall be coordinated with the District and developed in accordance with the California Manual on Uniform Traffic Control Devices (MUTCD) Standard Specifications, MUTCD Standard Plans, and/or SSPWC. Refer to Section 32 17 23 “Pavement Markings” in the District Facility Design Standards.

4.5 Fire Protection

Fire water service, fire hydrants, Fire Department Connections (FDCs), and Post Indicator Valves (PIVs), as needed to serve the Project, shall be provided within and around the Project site in accordance with the California Fire Code (CFC), and the local fire department Authority Having Jurisdiction (AHJ) standards and requirements. The location of the FDCs and PIVs shall be coordinated by the Design Team and approved by the Fire Department.
Design Team shall be responsible to provide fire hydrants to provide full coverage in compliance with CFC, local fire department AHJ, and Section 33 11 00 Water Utility Distribution Piping. The CPT and/or DPM shall provide a fire flow test to determine available flow rates at required pressures to serve hydrants and sprinkler system.

4.6 Site Improvements Criteria

The Design Team shall refer to the Geotechnical Report provided by the District for grading guidelines, pavement design, stormwater infiltration guidelines, and other pertinent information.

4.6.1 Roadways

Site preparation, excavation, compaction, backfill, and pavement sections for the proposed vehicle access shall be designed in accordance with the Geotechnical Report and constructed to a depth designated by the Geotechnical Engineer or:

- Section 31 10 00 Site Clearing

Curbs, gutters, and integral curb and gutters shall be constructed of Portland cement concrete. All existing drives and curbs must be protected in place during construction. For details of curb and gutter materials, refer to:

- Section 32 13 13 Site Concrete Work

The vehicle access roadway surfaces shall be constructed of asphalt pavement or Portland cement concrete suitable for vehicle loading as directed by the District and Geotechnical Report. For details of vehicle access materials, reference:

- Section 32 12 16 Asphalt Paving

Alternative fire lane pavement materials will require approval by the District. Fire access surfaces to be verified with the local fire department AHJ.

The Design Team shall adhere to the SPPWC, the Greenbook, the Geotechnical Report recommendations, and as noted in subsequent sections.

- Flexible roadway pavement:
  - Pavement sections shall be per the Geotechnical Report. Use the recommendation for Heavy Trucks & Fire Lane for all roadways, and the recommendations for Passenger Cars for parking lots only, if so delineated in the Project Geotechnical Report.
  - Aggregates and binder for base course and wearing course shall comply with Section 32 12 16 Asphalt Paving.
  - Base material and compaction shall be as recommended by the Geotechnical Report.
  - Native subgrade material shall be scarified, moistened as required to obtain optimum moisture content, and

compacted to relative compaction as determined by ASTM D1557, as recommended by the Geotechnical Report.

- Rigid roadway pavement:
  - Pavement section per the Geotechnical Report.
  - Reinforcement per the Geotechnical Report.
  - PCC shall comply with SSPWC and Section 32 13 13 Site Concrete Work.
  - Base material shall be CAB or CMB per SSPWC and Section 32 13 13 Site Concrete Work, compacted as recommended by the Geotechnical Report.
  - Fire lanes concrete pavement shall be per the Geotechnical Report.
- Roadway curbs and gutters:
  - PCC curbs and gutters shall be in compliance with SSPWC and the following sections in the District Facility Design Standards: 32 13 13 Site Concrete work, and 32 13 73 Concrete Pavement Joint Sealants.
  - Base material and compaction shall be as recommended by the Geotechnical Report.
- Roadway appurtenances:
  - Pavement markings: Lane striping, directional arrows, and fire lane markings shall comply with SSPWC, and the CA MUTCD. Refer to Section 32 17 23 Pavement Markings.
  - Traffic signage: Shall comply with the CA MUTCD.
  - Truncated domes where required shall be embedded in cast-in-place on concrete substrate.
- Drainage:
  - Refer to the Chapter 5 Site Utility Infrastructure Design.

4.6.2 Parking Lots

The Design Team shall adhere to the District Specifications and the Geotechnical Report recommendations.

- Flexible parking lot pavement:
  - Asphalt concrete paving over compacted subgrade as recommended by the Geotechnical Report.
  - Aggregates and binder for base course and wearing course shall comply with SSPWC and Section 32 12 26 Asphalt Paving.
- Parking lot curbs and gutters:
  - Portland cement concrete curbs and gutters, hand formed and/or machine extruded/slip formed, shall be designed and installed to comply with the District Facility Design Standards Section 32 13 13 Site Concrete Work.
- Parking lot appurtenances:
  - For Wheel Stops, refer to Part 2.03.B of Sections 32 12 26 Asphalt Paving and Section 3.02 A of Section 32 13 13 Site Concrete Work.
  - Parking lot signs: Aluminum signs per the CA MUTCD, CBC, County of Los Angeles standards, and Campus Sign Standards.
  - Pavement markings: Lane striping, directional arrows, and fire lane markings shall comply with the CA MUTCD, SSPWC, DOT Standard Plans, and City of Los Angeles Standard Plans. Striping for accessible parking stalls and the universal symbol for accessibility shall comply with the most stringent local, state, and federal guidelines. Refer to Section 32 17 23 Pavement Markings.
  - Traffic signage: Shall comply with the CA MUTCD.
- Drainage:
  - Refer to the **Chapter 5 Site Utility Infrastructure Design** Section 5.3 Storm Drainage Design in for requirements.

6.6.3 Pedestrian Paving

The Design Team shall adhere to the SSPWC requirements and the Geotechnical Report recommendations.

- Rigid pedestrian pavement:
  - Pavement section per the Geotechnical Report.
  - PCC shall comply with SSPWC and Section 32 13 13 Site Concrete Work.
  - Base material shall be CAB or CMB per SSPWC, compacted to the requirements outlined in Section 31 23 16 Excavation and Fill for Paving, and as recommended by the Geotechnical Report.
- Drainage:
  - Refer to the **Chapter 5 Site Utility Infrastructure Design** Section 5.3 Storm

Drainage Design for requirements.

4.7 Site and Building Demolition

For site demolition, refer to **Volume 2 District Specifications**, Section 31 10 00. For building demolition refer to Section 02 41 16 Structure Demolition. For waste diversion, refer to **Chapter 3 Sustainable Design** Section 3.5.12 Construction Waste Management Requirements.

For demolition or protection of existing utilities within the Project limits, refer to Part 3.4 of Section 31 10 00, Site Clearing. The Design Team shall do the following, unless otherwise noted:

- Protect-in-place/reroute existing utilities required to maintain operation to existing District Facilities.
- Safe-off/cap/abandon existing utilities deeper than 3 feet and services in place.
- Remove all existing utilities within minimum 5 feet of new construction or as necessary to perform new construction requirements.
- Document all abandoned utilities and services in as-built drawings for the campus' future reference including:
  - Type of service
  - Material
  - Size
  - Depth and orientation
  - Any additional distinguishing characteristics foreseen to be important for future insight.

Refer to **Chapter 6 Landscape Design** and Section 31 10 00 for protection/relocation of protected tree species, if applicable.

The Contractor shall submit a demolition plan and a Method of Procedure for all demolition work that could potentially impact campus operations, main utilities and infrastructure, existing facilities, and the safety of staff and students. The demolition plan shall indicate all wrecking and demolition, including the removal and disposal of items, and all items to be protected in place or salvaged for relocation. Notes and specifications for proper disposal of debris shall be provided. Additionally, the Contractor shall submit a phasing plan and a shoring plan, as required.

Demolition of structures and elements containing hazardous or regulated waste, such as lead paint or friable/non-friable asbestos, shall be handled, transported and disposed of in accordance with appropriate reports, and shall be indicated on the demolition plan. Disposal of hazardous materials shall comply with Federal and State codes and regulations for handling and disposal.

All clearing and grubbing to be completed shall be indicated on the plans. Plans and specifications shall clearly indicate mitigation measures for protecting the public, dust control, noise control, etc., and shall comply with the District requirements.

All existing conditions are to be documented prior to starting work, and all existing infrastructure damaged during construction is to be repaired.

All existing operational buildings, utilities, and infrastructure on the campus shall not be impacted by any demolition or construction required by the scope of work. All existing buildings will remain in full operation at all times.

4.8 Excavation & Grading

The Design Team shall design grading that will meet the adjacent existing conditions to remain or provide accessible transition in hardscape and maximum 3:1 slope landscape transition as required per site condition. The Design Team shall submit a paving and grading plan, horizontal control plan, paving and grading details, notes and specifications to adequately identify all site improvements. The plans shall show the building location, project limits, accurate 1-foot contours of existing ground, and details of terrain and area drainage.

4.8.1 Grading Plans

Include elevations and finish 1-foot contours to be achieved by the grading, proposed drainage channels, and related construction. Detailed plans shall indicate all surface and subsurface drainage devices and other protective devices to be constructed. Refer to Sections 31 22 00 Grading, 31 23 16 Excavation and Fill for Paving, and 31 23 23 Excavation and Fill for Utilities.

4.8.2 Earthwork - Cut & Fill

Earthwork requirements for the project include the regrading of the site within the project limits.

Earthwork is to be balanced to the extent possible; but import of required volumes of suitable material and export of unsuitable material shall be anticipated. In addition, plans shall show running and cross slopes at pedestrian circulation paths in percentage format. If applicable, refer to the EIR mitigation measures for haul route requirements. Mitigation measures and logistic plans are to be submitted to the CPT and/or DPM for approval.

4.8.3 Geotechnical Criteria

Recommendations provided in the site-specific Geotechnical Report shall be incorporated in the grading and paving plans and specifications. Excavation and fill related activities shall comply with the recommendations provided in the Geotechnical Report, as well as the California Building Code (CBC). A grading permit from the local jurisdiction is not required, but the plans shall be reviewed and approved by a licensed Geotechnical Engineer based on the compliance with the geotechnical recommendations. Further, the plans shall be reviewed and approved by the California Division of the State Architect (DSA).

4.8.4 Drainage

Precise grading shall be performed to blend with the existing grades and join at the pedestrian and vehicular access points. Positive surface drainage away from proposed and existing buildings shall be implemented and ponding areas shall be avoided. Provide overflow relief for all proposed sump conditions designed to prevent flooding of proposed or existing buildings.

4.9 Paving

Site paving shall be graded per the District's "Designing for Accessibility at LACCD," **Volume 3 Appendices | Section 2 Accessibility & Universal Design**, and the California Building Code, whichever is more stringent. Refer to Section 31 22 00.

4.9.1 Geotechnical Considerations

The Design Team shall follow recommendations of a Geotechnical Report of the site, including over-excavation, reuse of on-site materials, backfill, compaction, pavement design, etc.

4.10 Site Drainage Stormwater Quality

4.10.1 Stormwater Management During Construction

Stormwater management is required for compliance with the Federal Clean Water Act National Pollutant Discharge Elimination System (NPDES) program. Construction phase stormwater management must comply with the State of California Water Resources Control Board Construction General Order 2022-0057-DWQ or the current Construction General Permit.

Construction related erosion and sediment control Best Management Practices (BMPs) are to be implemented during construction per the required Stormwater Pollution Prevention Plan (SWPPP), erosion control plan, and the construction site monitoring program.

The SWPPP must include a plan to address erosion control, non-storm water discharge, temporary sediment control, waste management and material pollution control, wind erosion control, equipment tracking control, and post construction BMP's. For projects greater than one acre, the SWPPP is to be prepared by a Qualified SWPPP Developer (QSD), certified by the State of California. For projects greater than one acre, a Notice of Intent (NOI) is required to be filed through the California Regional Water Control Board's SMARTS system.

For projects greater than one acre, the Legally Responsible Person (LRP) will need to be selected to file the NOI. During construction a Qualified SWPPP Practitioner (QSP) is required to implement the site specific SWPPP. The QSP will oversee the installation, regular reporting, maintenance, and possible replacement of the temporary construction BMP's; and will be responsible for the stormwater quality for the site.

The preparation of a SWPPP (including Sediment and Erosion Control Plan and Construction Site Monitoring Plan [CSMP]); filing of a Notice of Intent with the State Water Resources Control Board; water quality monitoring; Annual Certification (as described in the SWRCB General Permit No. 2022-0057-DWQ or the current Construction General Permit); SWPPP site monitoring, inspection, testing, and program implementation reporting (as described in the SWPPP); and maintenance of or update to the SWPPP shall be the responsibility of the Contractor.

For all projects, refer to Division 1 of the Project Specifications for additional SWPPP requirements, which shall be provided in project documents. Also refer to Contract Bulletins No. 2022-001.

CHAPTER 5

Site Utility Infrastructure Design

West Los Angeles College

CHAPTER 5 - SITE UTILITY INFRASTRUCTURE DESIGN

5 Site Utility Infrastructure Design

All site utility infrastructure shall be in accordance with applicable codes, regulations, and in compliance with local authorities having jurisdiction. For references to specification sections, refer to V**olume 2 District Specifications** and **Campus Specifications Matrix**.

5.1 Survey Project Requirements

For the purposes of this chapter, "designate" and "designating" mean to establish by engineering, surveying, and drafting practices the presence, horizontal and vertical location of subsurface utilities and their major laterals to the existing buildings and/or structures using geophysical prospecting techniques, including, without limitation, electromagnetic and sonic techniques.

- Where required, obtain all necessary permits from city, county, or other municipal jurisdictions to allow the Consultant to work in existing streets, roads and/or on adjacent rights-of-way, vaults, maintenance holes, etc., including landowner permission.
- Notify the District and utility companies in writing a minimum of 48 hours (two working days) prior to beginning work, and to coordinate work that may affect use of utilities.
- Designate the location of existing underground utility systems including their major laterals, service yard, powerhouses, and any overhead utilities that are within the parcel/site limits. Consultant shall record any empty or abandoned utilities, vault, or maintenance holes.
- Designate and record the location of existing Points of Connection (POC's) for all underground utility systems entering the site from the public utility service lines.
- Record and mark the horizontal location of existing poles for overhead utility systems. Consultant shall note the location and type of overhead crossing existing roadway.
- Prepare a survey map at a scale of 1' = 10' over the site shown on attached Exhibit 1.F and 1.G, delivered in both hard and AutoCAD format (including Digital Terrain Model (DTM)). The survey map will include the following:

5.1.1 Scope of Services Requirements

Each underground utility system must be electronically designated, surveyed and mapped to within a 6-inch horizontal tolerance and ±10% vertical tolerance at 50-foot intervals maximum when parallel to benchmark or baseline, at all direction changes and all closures, cabinets and huts.

- Survey all markings and determine depth of all utilities as determined by the underground utilities designating techniques. Invert information is required for storm drain and sewer system.
- Maps and records provided by the District or others for use on the project are intended to serve as a guide. The Consultant has the responsibility to properly locate property lines and utilities, and must exhaust all reasonable means of electronically and visually locating all underground utility systems.
  - Visible signs of utilities located by field crew
  - Utilities: Gas mains, service lines (plastic or metal) and meters, power, water meters, and sewer
  - Easements: access, utility, easement, etc.
- Horizontal location, size, and description of buildings, driveways, walks, curbs, walks, fences, walls, signs, power poles, fire hydrant locations, exposed rock, trees 6" or greater in diameter (more importantly, large trees and the canopy footprint), street location and street centerline's, and other permanent surface visible features.
- Location of all existing public right-of-way improvements, walls, fences, landscaping, utilities, meters, power poles, light standards, structures, etc.
- Footprint of all existing building(s) and other structures such as sheds, and location, type, dimensions, and easement holder of all existing easements, or state on survey that there are no easements on the site. Document height of existing buildings, floor level of existing buildings.
- Detail of any retaining walls, fences, and other structures within five feet of a property corner and related grade spot elevations.
- Topography at a one-foot contour interval and spot elevations on a grid pattern in level areas.
- Elevations of precise property line corners (all), to the nearest hundredth of a foot.

- Elevations on driveways, walks, curbs, gutters, and walks, including at back of walk, top of curb, flow line, edge of gutter, finish floor where applicable, and centerline every 25 feet along abutting streets.
- Inverts for sewer and storm drain with pipe sizes will be obtained for manholes, catch basins, and drain inserts where accessible.
- Storm Drain System including inlets, catch basin, area drain, field drain, maintenance holes (manhole covers, catch basins, and drainage at street.)
- Potable Water Distribution System consists of force mains and service lines (plastic or metal), valves and other components that transport water from the source to the building envelope including firewater, irrigation, hydrants, post indicator valves, yoke valves, pumping stations, and meters.
- Sanitary Sewer System including chemical sewer, clarifiers, lift stations, and maintenance hole.
- Primary electric (high voltage — 12 KVA), powerhouses, duct banks, vaults, transformers, and switches; and Secondary electric (480 volt/220/110) conduits, site lighting, signage, fire alarm, parking lot/ structure lighting, and walkway lights.
- Telecommunication System including fiber optic, data, cable TV, phones, copper communication cables.
- Utility tunnels without survey and mapping of the interior.
- Property corner monuments information (if none exist surveyor is required to place monuments in accordance with the professional land surveyors act).
- Spot elevations of abutting adjacent private property grade, within 5 feet of the site shown at intervals of every 15 feet, including locations at the front and rear property corners.
- Spot elevations of adjacent curb (use street pavement, if no curb is existing).
- Spot elevations of existing grade at 10 foot intervals around the perimeter of the existing building(s) and around the perimeter of the lot.

5.1.2 Responsibilities of Civil Engineering Consultant

- Provide all equipment, personnel, survey, safety supervision, traffic control, and supplies required to perform locating services. Consultant shall determine which equipment, personnel, and supplies are required to perform such services.
- Conduct appropriate records research to identify the utility source and the size of the facility, verify site conditions noting any obstacles or limitations to utility access, and employ district approved project limits.
- Notify in writing the District and any utility company minimum 48 hours (2 working days) in advance of the subsurface investigation.
- Where required, obtain all necessary permits from the city, county, or other municipal jurisdictions to allow Consultant to work on existing streets, roads, and right-of-way for the purpose of marking (traffic control plans may be required if scope extends into the public right-of-way), measuring, and recording the location of existing underground utilities. Obtain permission of District first, if any permissions are required of private property owners.
- At the minimum, the following methods are expected to be used by the Consultant:
  - Designate Underground Utility Systems — EM (Electromagnetic): Using electromagnetic (with standard pipe and cable locating equipment) locating equipment and direct connection, induction, and passive sweep methods, Consultant shall designate conductive underground utilities systems. Consultant shall mark the location of utilities using the American Public Works Association (APWA) industry recognized painting scheme indicated herein. All locating shall be performed in accordance with Levels A, B, C & D of the guidelines identified herein. This includes comprehensive examination of the available campus as-built drawings to verify known existing locations and all the underground utility systems delineated by the District and College staff. Note that the District has electronic repository for all available as-built drawings for all building and facilities at each campus. Electronic access with "Read Only" rights may be granted to the Consultant.
  - Designate Underground Utility Systems - Indirect: When Consultant is not able to locate the underground utilities and structures by electromagnetic (EM)

methods or by the use of available utility records provided by the district and college personnel, Consultant shall locate nonmetallic structures & utilities by indirect methods including the use of ground penetrating radar (GPR), Ram Rods, Robotic Cameras, and other investigation tools. These tools complement standard electromagnetic techniques in the field, allowing Consultant the ability to potentially detect both metallic and non-metallic material types, including plastics, concrete, transit, ceramics, and asphalt composites. Consultant shall perform secondary GPR sweeps to confirm results and to mark the location of discovered utilities and structures using the APWA industry recognized painting scheme indicated above. All Indirect scope shall be in accordance with quality Levels A, B, C & D of the guidelines.

In the event that the targeted underground utility systems and substructures have not been located by any methods indicated via EM or GPR and/or due to high potential for conflicts in the field, Consultant may proceed with locating (test borehole) services based on the following:

- For the purposes of this scope of services, "locate" and "locating" mean to establish and obtain by engineering, surveying, drafting and vacuum excavation practices the accurate horizontal and vertical position of subsurface utilities. The test boreholes shall be done using vacuum excavation or comparable nondestructive equipment in a manner as to cause no damage to the utility line. After excavating a test hole, the Consultant shall perform a field survey to determine the exact location and position of the utility line. All potholing shall be in accordance with ASCE 38-02 (Quality Level A).
- Prior to proceeding with test boreholes, Consultant shall propose to the District the number and location of test boreholes/ excavations that will be performed. District approval is required prior to proceeding with this work.
- Consultant shall excavate using non-destructive air/vacuum soil extraction technology, hand digging, and any other non-destructive potholing techniques to enable vertical and horizontal exploration and locating means. An acceptable method includes vacuum excavate proposed test borehole using non-destructive high-pressure air to eliminate any damage to underground utilities and structures. Consultant shall excavate each test borehole until the target is exposed. Neatly cut and remove existing paving or concrete. The size of the cut area shall be kept to the minimum. Once the target has been found, Consultant shall measure both to the top and bottom in such manner that ensures the safety of the excavation and the integrity of the utility. Consultant shall document the location, type, size, depth, and other characteristics of the discovered underground utilities and/ or structures and record data on the master utilities site plan.
- Pursuant to the American Society of Civil Engineers' Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data (CA/ASCE 38-02), there are four quality levels that can be utilized to locate underground utility systems. Perform designating services to locate all existing utilities to quality Levels A, B, C & D pursuant to the guidelines described herein. Each of the following four existing utility data quality levels is established by different methods of data collection and interpretation – the District adds and clarifies expectations for each quality level as follows:
  - **Quality Level A:** Locating Underground Utility Systems: This level is the highest level of accuracy, which includes obtaining precise horizontal and vertical position of the utility line by excavating a test hole. The test holes shall be done using vacuum excavation or comparable nondestructive equipment in a manner as to cause no damage to the utility line. After excavating a test hole, the Consultant shall perform a field survey to determine the exact location and position of the utility line, type, size, conditions, material, and other characteristics of Underground Utility System.
  - **Quality Level B:** Designating Underground Utility Systems: This level includes using surface geophysical prospecting techniques, including electromagnetic, magnetic, sonic, or other energy fields to determine the existence, vertical, and horizontal position of underground utility systems.
  - **Quality Level C:** This level adds field surveys of visible above-ground utility

systems such as maintenance holes, valve boxes, fire hydrants, etc., and reconciles this information to existing utility records (Quality Level D).
  - **Quality Level D:** Records Search: This level of services provides information that has been obtained from existing records, which includes utilizing existing plans, contacting utility companies, verbal recollections, obtaining as-built plans, and researching prior rights (i.e., easements) issues.

- Safety Requirements:
  - Provide all equipment, personnel, survey, safety supervision, traffic control, and supplies required to perform locating services. Consultant shall determine which equipment, personnel and supplies are required to perform such services.
  - Complete documentation required prior to Site Access.
  - Prepare and submit to the District "Emergency Plan and Utility Shutdown Procedure" which identifies critical isolation valves and the main points of connection (POC's) in the area where locating is proposed Injury Illness Prevention Plan.
  - Site Safety Assessment conducted by Safety Manager in conjunction with RSM.
  - Hazard Assessment to be completed by Safety Manager – submitted to RSM for review/acceptance.

5.1.3 Data Management & Deliverables

Deliverables shall include the following:

- Using the latest version of AutoCAD (or equivalent), provide 2-dimensional views in ".dwg" format. These views shall depict plans, elevations, single-line diagrams, details, notes, and schedules for each campus. Each underground utility system type shall be recorded on a separate layer, per A/E/C CAD Standard 5.0 and APWA Uniform Color Code.
  - Two-dimensional Existing Utility Exhibits (hard copy and electronic).
  - Underground utility systems shall be located continuously and recorded in 2-dimensions and at each surface feature, change of direction, and bifurcation.
  - Depth below finish surface shall be annotated at each surface feature and at changes of depth.
  - Raw data collected through surface geophysical locating technologies.
  - Copies of all public and private utility records collected for the project.
  - Copies of all photographs taken as a part of the Quality Level B field investigation.
  - All field notes referencing, size, type, material, or location of utility infrastructure.
  - Where bands of cables or ducts are identified, the upper and lower outer cables or ducts shall be traced in order to be able to provide a cross-section of the cable or duct band. Each utility shall be annotated with the type of utility, the diameter of pipe or voltage and number of lines.
  - Services including abandoned lines, which are located during the survey shall be recorded with any available information regarding the identity or type of materials or services.
  - The consultant shall identify utilities entering the campus at the point of connection. Consultant shall provide campus POC's on separate AutoCAD layer.
- Scaled PDF Package: Using the latest version of Adobe Acrobat PDF, prepare scalable, size BIND-E, plot ready sheets of Existing Utility Exhibits.
- Digital Photographs: Include categorized and indexed digital photographs (with notations) of maintenance holes, pull boxes, and telecommunications vaults.
- Borehole Investigation Report: Pursuant to the requirement indicated herein, Consultant shall prepare and submit borehole reports electronically and in printed format. Borehole shall be numbered and indicated on the master site plan.
- Vault & Maintenance Hole Investigation Report: Pursuant to the requirement indicated herein, Consultant shall prepare and submit reports electronically and in printed format.
- Utility Markings: Underground utilities shall be marked in accordance with APWA Uniform Color Codes for temporary marking of underground utilities as follows: APWA Uniform Color Code (uses ANSI standard

Z535.1 Safety Color Code)

- WHITE: Pre-marking of the outer limits of the proposed excavation or marking the centerline and the width of proposed linear installations of buried facilities.
- PINK: Temporary Survey Markings.
- RED: Electric Power Lines, Cables, Conduit and Lighting Cables.
- 6YELLOW: Gas, Oil, Steam, Petroleum or hazardous liquid or gaseous materials.
- ORANGE: Communication, Alarm or Signal Lines, Cables or Conduit.
- BLUE: Potable Water.
- PURPLE: Reclaimed Water, Irrigation and Slurry Lines.
- GREEN: Sewers, drainage facilities or other drain lines.

5.2 Existing Utility Protection

The Contractor shall do all due diligence and be responsible for identifying existing utilities that are to remain and ensuring their protection during excavation activities as stated in Part 3.4 of Section 31 10 00 Site Clearing and Part 1.06.B of Section 31 20 00 Earth Moving: Existing underground utilities shall be located using ground penetrating radar, potholing, and other means as required to verify existing utilities. Utilities will be potholed to establish critical elevations.

Existing utilities in conflict with the proposed improvements shall be rerouted to accommodate the new facilities. All temporary shutoffs, disconnection or rerouting of utilities shall be coordinated with the District, the campus, and the applicable utility company. The Contractors will assume responsibility for all damaged existing utilities during construction.

The Design Team shall provide site utility plans, specifications, notes and calculations to adequately identify utility works within the Project limit. The required utilities include storm drain, domestic water, fire water, and irrigation water (backbone only) and sanitary sewer.

The Design Team shall adhere to the SSPWC and the Geotechnical Report requirements and recommendations for utility trench bedding and backfill. Refer to Section 31 23 23 Excavation and Fill for Utilities.

5.3 Storm Drain Design Criteria

Specifications for the underground storm drain system can be found in Section 33 41 00 Storm Utility Drainage Piping. Additional design criteria for the proposed underground storm drain system:

- Provide storm drain manholes at 300-foot maximum spacing on storm drain mains.
- Provide storm drain clean-outs at all angle points and 150-foot maximum spacing on straight runs. A catch basin may substitute. Install all cleanouts on grade or paved areas in yard boxes.
- Storm water surface flow shall not create nuisance on pedestrian pathways. Tributary drainage from campus improvements outside the Project limits shall be accommodated by the proposed improvements. Existing drainage patterns shall be maintained.
- The Design Team shall be responsible for determining if hydrodynamic and hydraulic modifications will be required to ensure that the Campus storm drain capacity is not exceeded. The Design Team is to design to a 100-year storm return period.
- Upon installation and at the conclusion of the Project all storm drain lines shall be videoed to ensure that there are no bellies or sags in lines and/or free of construction debris. Video to be transmitted to the Campus.

5.4 Domestic & Fire Water Distribution

5.4.1 General Requirements

The water systems shall be designed and constructed to connect to the existing campus water systems, unless noted otherwise in the contract documents. The Design Team shall verify that the existing systems have adequate capacity to serve the Project. The Design Team shall comply with District and campus specific Standards for water submeter requirements.

The Design Team shall create a water loop condition, where feasible. The Design Team shall validate the suitability of this point of connection. All existing connections to the project site structures that are to be protected in place shall be maintained and protected.

The Design Team shall work with LACCD to obtain a flow test to determine the available flow rate at the pressure required to serve the building systems.

5.4.2 System Criteria

The following shall serve as additional design and implementation criteria for the proposed underground domestic and fire water system:

- The Contractor is to ensure that there are only short-duration interruptions to the water supply lines or disturbance to the existing water lines of the building that are not included in the scope of work.
- The Design Team is responsible for reviewing all existing conditions, designing/indicating lines that need to be protected in place to maintain operation of existing campus facilities.
- The Contractor is responsible for maintaining service to existing occupied buildings and food service so as not to disrupt operation or service during construction.
- The Design Team shall coordinate with the District to obtain a fire flow test to determine the available flow rates at the pressures required to serve the hydrants and sprinkler system.
- The domestic and fire water systems shall be designed based on hydraulic calculations to provide for adequate pressures at a maximum velocity not exceeding the limits provided in the California Plumbing Code.
- Underground pipe for domestic and fire water lines are to be designed and installed per Part 2.2 Pipe and Fittings and 3.4 Pipe Installation of Section 33 11 00 Water Utility Distribution Piping.
- All fittings 4-inches and larger shall be ductile iron fittings.
- In lieu of thrust blocks, joint restraints at pipe joints and fittings may be used. All joint restraints shall be rated for 305 psi working pressure or better.
- All valve design and installation shall be in compliance with Part 2.3-2.5 and 3.7 of Section 33 11 00 Water utility Distribution Piping.
- All 4-inch and larger gate valves shall be iron body, resilient-seated, counter- clockwise opening non- rising bronze stem, shall fully comply with the provisions of American Water Works Association (AWWA) C509, except as amended hereinafter.
- All gate valves shall be the product of one manufacturer.
- For valve and gasket sizing, refer to section 33 11 00 as stated above.
- For tracer wire and warning tape requirements, see Section 22 00 00 Plumbing System Design Criteria part(s) 1.1.K Pipe Markers and 1.1.L Tracer Wire.
- Hot tapping of Transite pipe is not allowed.

5.5 Sanitary Sewer

5.5.1 General Requirements

A gravity sanitary sewer system shall be designed and constructed per Section 33 31 00 Sanitary Utility Sewerage Piping. It shall be able to collect domestic effluent from the new building and discharge to the existing sanitary sewer system. The Design Team shall provide a sanitary sewer connection to an existing on-campus sanitary sewer, when available. When required, the Design Team shall provide a sanitary sewer connection to the public sanitary sewer system and comply with all Authority Having Jurisdiction (AHJ) requirements. All existing service connections to project structures that are to be protected in place shall be maintained and protected. The Design Team shall verify that the existing system has adequate capacity to serve the Project.

The Design Team shall verify any existing physical obstacles between the point of connections or conflicts with other projects on campus by coordinating with the District.

5.5.2 System Criteria

The following shall serve as design criteria for the proposed underground sanitary sewer system:

- Underground sanitary sewer pipes and fittings shall comply with applicable codes and standards as defined in Section 33 31 00 Sanitary Utility Sewerage Piping Part 2.2. Installation of the pipes shall follow Part 3.2 of the same Section.
- Gaskets and joints shall be designed and installed to be in compliance with Part 2.2 and 3.3 of Section 33 31 00 Sanitary Utility Sewerage Piping.
- Sanitary sewer structures and piping systems shall be designed meeting the requirements of the California Plumbing Code, including pipe sizes and minimum slopes. If feasible, all new sewer lines shall be constructed with a 2% slope preferred and a minimum slope.
- All pipe and fittings shall be legibly and permanently marked with type and class.
- For tracer wire and warning tape requirements, see Section 22 00 00 Plumbing System Design Criteria part(s) 1.1.K Pipe Markers and 1.1.L Tracer Wire.

- Sanitary sewer structures (manholes and cleanouts) shall conform to SSPWC and applicable codes and standards. It shall also meet the correct sizing and installation as outlined in Sections 33 31 00 Sanitary Utility Sewerage Piping Part 2.4 and 3.4. For cast-in-place concrete sewer structures, refer to part 2.6 of the same section.
- Provide sanitary sewer manholes at 300-foot maximum spacing on sewer mains.
- Provide sanitary sewer clean- outs at all angle points and 150-foot maximum spacing on straight runs. Install all cleanouts on grade or paved areas in yard boxes.
- Upon installation and at the conclusion of the Project all sewer lines shall be videoed to ensure that there are no bellies or sags in lines and/or free of construction debris.

5.6 Natural Gas

- For Natural Gas, see **Chapter 13 Plumbing Design**, Section 12 Natural Gas System and Specification 22 00 00 Plumbing System Design Criteria.

5.7 Hydronic Piping

For Hydronic Piping, see **Chapter 11 Mechanical Design**.

CHAPTER 6

Landscape Design

Los Angeles Valley College

CHAPTER 6 - LANDSCAPE DESIGN

6 Landscape Design

6.1 Purpose

The purpose of these landscape design criteria is to provide guidance to the landscape design professionals working on the nine LACCD campuses. In general, landscape designs shall be sustainable, maintainable, and complement the architecture and existing campus landscape design to ensure they are designed holistically and consistently.

6.2 Sustainability

LACCD campuses represent the diverse cultural and natural landscapes of the Los Angeles region. They are in a unique position to showcase sustainable development practices and therefore landscape designs shall strive to be as sustainable as possible within current LACCD resources. The success of these efforts may be measured tangibly via adherence to a rating system (i.e., the Sustainable SITES Initiative) or practically (i.e., via a reduction in ambient air temperatures). Projects are to meet the Guidelines and Standards in **Chapter 3 Sustainable Design**. Additionally, LACCD is currently working on a 2040 Sustainability Plan which will provide additional guidance.

The list below includes mandatory sustainability features related to landscape design:

- 3.5.5 Heat Island Reduction
- 3.5.7 Water Efficient Landscaping
- 3.6 Stormwater Design and Management

6.3 Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code and regulations related to landscape design.

- 1.5 Landscape Design Statewide Standards and Codes

6.4 Landscape Design Considerations

The following are a series of landscape design priorities that project landscape architects shall address early in the project (i.e., the Schematic Design Phase). It is at this point that campus representatives (i.e., campus maintenance staff) must approve the landscape design and budget. Specific landscape design priorities are described below.

6.4.1 Spatial Planning

Campus landscapes are settings for academic and student life. They shall be designed in concert with the architectural design and educational programs of the individual campuses and address the following:

- Reinforce campus identity with a unified design at edges, corridors, courtyards, and plazas.
- Project a unified design throughout each campus and the spaces between buildings shall be beautiful, healthy, sustainable, and maintainable.
- Enhance the established appearance of the campus and reinforce campus identity.
- Conserve natural and human resources through ease of maintenance and thoughtful, sustainable design.
- Capitalize on the indoor/outdoor living of much of the year in Southern California.
- Focus on key campus entry locations and main site features to provide a sense of arrival and place.
- Provide shade at outdoor seating areas and walkways.
- Screen all service yards, storage, and work areas from public view with vegetation.
- Orient outdoor spaces to consider views so that they are not facing back-of-house, parking lots, or service/utility yards.
- Strive to reduce impervious surfaces and conserve existing planting areas.
- Design fire vehicle access lanes to appear as pedestrian promenades, plazas, and walkways and be integrated into the overall site design.

6.4.2 Plant Selections

Campus landscapes shall use a diverse palette of plants that are drought-tolerant, low maintenance, and appropriate for the ecoregion of the specific campus. This results in lower irrigation water use and contributes to an authentic sense of place by creating landscapes that reflect the true nature of the region. These plant selections shall be reviewed and approved by campus leadership early in the design phase (i.e., during Schematic Design). See **Volume 2 Campus Specifications Matrix** and **Volume 3 Appendices | Section 6 Landscape Design** for plant recommendations for the campuses and corresponding Ecoregion Zone Maps. Plants that are appropriate per the specific campuses are noted in the matrix.

- Select plants that thrive in the Southern California landscape.
- No invasive plants are to be used. See California Invasive Species Plant Council (https://www.cal-ipc.org/) for list of current invasive species.
- Include a minimum of 30% native plants.
- To encourage a healthy mixture of plants, specify no more than 10 percent of any plant species on a given project, 20 percent of any genus on a given project, and no more than 30 percent of any plant family on a given project.
- Specify trees that are resistant to, and do not host, Invasive Shot Hole Borer (See University of California Integrated Pest Management website for latest tree list: https://ipm.ucanr.edu/PMG/PESTNOTES/pn74179.html)
- Landscape Architect is encouraged to have the plant selections independently reviewed to ensure long term viability and maintenance appropriateness.
- Designate the protection in place of at least 50% of the site's existing healthy soils and plants that are appropriate for the project site (i.e., climate, site conditions).
- Specify any new soils, compost and mulch from within 50 miles of the project site.
- Existing landscape to remain shall be protected and maintained if impacted by construction.
- Existing plant material slated for removal from the project site shall be re-purposed as compost, mulch or other site amenity.
- Recommend specification of 80% of new plants from nurseries that use sustainable growing practices: reduced use of potable water; reduce runoff from irrigation; choose sustainable soil amendments; recycle organic matter; reduce waste; use Integrated Pest Management (IPM); and prevent use and distribution of invasive species.
- Specify new plants that are grown within 250 miles of the project site.
- Confirm plant availability with local suppliers during the schematic design phase and propose contract growing to the District if warranted by the design.
- 3" deep layer of mulch shall be applied in all planting areas.
- All plant substitutions must be approved by the Landscape Architect, College Project Team (CPT) and/or the District Project Manager (CPM).
- Landscape designs shall use durable materials that are regionally sourced.
- Landscape designs shall strive to salvage and reuse existing materials on site.
- The use of materials with recycled content is encouraged.

6.4.3 Trees

Trees are a primary contributor to the landscape character of each campus providing visual interest, outdoor thermal comfort, carbon storage and drawdown, and habitat. Landscape designs shall strive to preserve existing, healthy trees and propose new trees to reduce heat island impacts and provide natural cooling to buildings.

Maintaining protected species trees is a priority. Currently protected trees in Los Angeles County are:

- Quercus lobata/Valley Oak
- Quercus agrifolia/Coast Live Oak
- Any other indigenous oaks to California
- Juglans californica var. Californica/California Black Walnut
- Platanus racemosa/Western Sycamore
- Umbellularia californica/California Bay

Additionally:

- Existing healthy, mature trees impacted by building construction shall be preserved and measures taken to protect them during construction.
- Existing trees shall be evaluated by a registered arborist prior to development of the Program and Project Criteria (PPC) and an arboricultural evaluation provided to the Design Team. This evaluation shall include a unique tree identification number, botanical and common names, trunk diameter, height and canopy spread, health and structural condition, suitability for preservation/ relocation, photographs, and provide recommendations for maintaining and improving the tree's health before, during, and after construction.
- Shade trees that are slow-growing, deep rooted, low maintenance (including minimal litter), and evergreen shall be prioritized.
- All landscape designs shall provide for 25%

coverage of landscape area with tree canopy within 5 years, and shade over all paved areas within 10 years of installation.

- Proposed trees in stormwater management zones shall thrive in wet conditions during heavy rain events as well as in drought conditions.
- Proposed trees shall be a minimum of 36" box size.

6.4.4 Lawn (i.e., Natural Grass) & Turf (i.e., Synthetic Grass)

Landscape designs shall carefully consider the size and location of lawn areas, balancing their use for student gatherings and athletics with water usage.

Lawn:

- Existing lawn areas in excess of what is necessary to fulfill campus academic and sport programming shall be transitioned to drought tolerant plant material.
- Lawn species selection shall be the campus standard. Lawn substitutes (i.e., Kurapia) may be proposed on a case by case basis in consultation with Campus.

Turf:

- Athletic complexes shall be designed to use turf to reduce water usage.
- Synthetic turf fields are to be outfitted with an irrigation cooling system to lower ambient temperatures prior to usage.
- High traffic areas on campuses may incorporate turf.

6.4.5 Water Conservation

Campus landscapes shall be designed to minimize water usage, and use gray or recycled water where it is available. The following provisions apply:

- Reduce potable water consumption for irrigation by 50% over conventional means.
- Design irrigation systems to meet Model Water Efficient Landscape Ordinance (MWELO) requirements.
- Refer to Water Use Classifications of Landscape Species (WUCOLS) for estimation of irrigation water needs based on local evapotranspiration rates.
- Use irrigation systems to incorporate smart technologies including advanced controllers, rain and moisture sensors, and weather stations.
- Protect and maintain existing irrigation systems affected by construction that are not being removed due to project construction.
- Coordinate with Civil Engineer to thoughtfully manage precipitation on site.
- Design irrigation systems to accommodate existing or future reused water systems.
- If a reclaimed water system, a greywater system, or a cistern with reused rainwater is available, the available water volume for the month of July will be directly deducted from the design irrigation amount.
- Incorporate stormwater management features as a visually appealing and physically accessible feature of the site design to educate the public and promote their use.

6.4.6 Human Health & Well Being

Comfortable and safe campus landscapes enhance the social fabric of the campuses and promote student and academic life. As such, they shall promote human physical health and mental well-being; protect and maintain cultural and historic places; protect air, water, and noise quality during construction and maintenance; encourage healthy activities and minimize pesticide and fertilizer use by maintenance staff.

- Where outdoor seating is included, landscape designs shall include seating for a variety of group sizes and elements that address microclimate and other site conditions like sun and wind.
- Provide safe spaces that have adequate lighting levels for surveillance, visibility into and across the spaces, and more than one access into and out of the space.
- Landscape designs shall be designed in concert with building architecture to ensure vegetation is visible from at least 50% of common building spaces.
- Campus circulation shall be connected to on-site and off-site trail and pedestrian networks where feasible.
- Interpretive educational signage illustrating sustainable practices used on the project site are encouraged.
- Athletic facilities and recreational spaces shall be augmented with outdoor fitness equipment.

6.4.7 Maintenance

Campus landscapes shall be designed in concert with campus maintenance staff to ensure ease of maintenance of the completed project.

- Landscape designs shall solicit review and input by Campus Maintenance and Operations, CPT, and/or DPM beginning in Schematic Design phase and at every submittal through 100% Construction Documents. A draft Maintenance Plan shall be provided at the end of Schematic Design for review.
- The Landscape Architect must provide a Landscape Maintenance Plan at project closeout. This maintenance plan shall include at minimum the following: Soil (drainage, pH, and nutrient content); Irrigation (timing and quantities, warning signs of possible problems); Seasonal Maintenance (typical seasonal checklist); Pruning and Trimming of Plants (guidelines for cutting); and Weed Identification and Removal (prevention and physical control).
- Campus buildings shall have a maintenance access pathway of stabilized decomposed granite around their perimeters.

6.4.8 Site Amenities

- All major entries, plazas, and walkways shall have trash and recycling containers.
- Receptacles and site furnishings shall be secured to paving. Receptacles shall have lids.
- Bicycle racks for short-term parking shall be provided as required by LEED.
- Bicycle racks and bicycle lockers shall be located along accessible paths of travel and not reduce accessible route clearances or become obstacles in circulation routes.
- A minimum of 5% of a variety of seating types in each area shall be accessible and on an accessible route of travel.
- Bench seating that is cast in place concrete shall have cast-in skateboard deterrents designed into the seating.
- Site walls shall be complementary to the architectural design with cast-in-place concrete walls preferred.
- Walls and stairs shall be natural gray concrete with a finish that complements the surrounding flatwork and buildings.

6.4.9 Paving Design

Paving within the project site shall enhance, match and connect with the site context.

- Hardscape design shall use natural gray concrete or high albedo pavements to help reduce urban heat island impact. Expansion and sawcut joints shall be as recommended by site geotechnical report.
- Natural gray site concrete shall have a variety of finishes, and be accented with sawcut score lines. Retarded finishes (i.e., Top-Cast) are encouraged to add visual interest to hardscape areas.
- Integral color concrete or pavers may be used to accent axis or important paths, plazas, or courtyards.
- Where geotechnical condition and infiltration rates allow its use, the use of porous pavement is encouraged to help manage stormwater.
- Recessed truncated dome pavers shall be used.
- Decomposed granite is not allowed in primary circulation areas. Stabilized decomposed granite may be acceptable in non-primary, non-high traffic circulation areas provided its use is approved by the Director of College Facilities (DOCF).

6.4.10 Green Roofs

The use of vegetated green roof systems to manage stormwater and reduce building energy use must be approved by the CPT and/or DPM in the Schematic Design phase.

CHAPTER 7

Architectural Design

Los Angeles Harbor College

CHAPTER 7 - ARCHITECTURAL DESIGN

CHAPTER 7 - ARCHITECTURAL DESIGN

7 Architectural Design

This Chapter covers Architectural Design with a focus on overall building planning and exterior design. Specific site-related design guidelines are covered in **Chapter 4 Site Design** and **Chapter 6 Landscape Design**. Interior Architecture, including space planning standards, is covered in **Chapter 8 Interior Design**. See other chapters for specific provisions related to Wayfinding, Accessibility, Sustainability, and more.

7.1 Overall Design Intent

The purpose of Architectural Design guidelines and standards is to set clear criteria without encumbering the creative design response to project-specific goals and opportunities. The provisions in this chapter address and inform the following:

- Overall building approach and concept.
- Site planning, building massing and orientation.
- Accommodation and organization of program functions and facilities, e.g., blocking and stacking.
- Relationship of building and campus context.
- Climate response relative to overall energy performance approach.
- Exterior design and building envelope.
- Total cost of ownership.

Project Program and Criteria (PPC) Development & Design Phases

These provisions generally apply to every phase of project development, with greater detail as the project proceeds through design and construction. Project definition at the PPC stage shall conform to these Guidelines and Standards and address key design and planning criteria as well as specific program needs. The Design Team (Design-Build Entity and/or Architect/Engineer of Record) responsible for each project shall demonstrate design response to, and where mandated, compliance with these Guidelines and Standards and the provisions of the PPC itself, as well as all applicable codes and regulations.

Overarching Design & Planning Objectives

Architectural Design shall be guided by key principles and aims of the District, including:

- Safe and secure public facilities for education and all other uses.
- Support quality student education, student experience and student success.
- Design for sustainability, resilience, and long-term operations.
- Create welcoming, inclusive environments where people "want to be."
- Support health and wellness.
- Appropriately express the function and meaning of each building though authentic contemporary design.
- Demonstrate responsible institutional investment by providing long-term value for the costs of construction and operations.

In fulfilling these higher aims, the following guidelines represent important criteria that inform the design of virtually any project, at any phase of design, and shall be taken as a "To-Do" list of implicit goals and objectives, whether expressed in qualitative or quantitative terms.

7.2 Sustainability

Sustainable design strategies are an essential aspect of architectural design for every project, to support the District's established goals for a carbon-free future. Key areas of architectural design that bear on sustainability shall be given deep consideration and high priority throughout the design process, including:

- Site planning and landscape to conserve resources and streamline maintenance.
- Building orientation and massing to facilitate sun control and harvest daylight.
- Exterior envelope design to reduce mechanical heating and cooling requirements.
- Efficient fixtures and systems to reduce power and water demands.
- Reliable long-term performance and efficient maintenance to reduce operation costs.

The list below includes mandatory sustainability features related to architectural design:

- 3.5.11 Energy Performance
- 3.15.12 Material and Resources
- 3.5.14 Low Emitting Materials
- 3.5.17 Daylight
- 3.5.18 Views

Please refer to **Chapter 3 Sustainable Design** for specific provisions, in addition to those noted throughout this chapter. Baseline LEED rating required for all projects is LEED Certification, but all Design Teams are encouraged to target higher ratings.

7.3 Accessibility

All LACCD projects must meet Federal and California State requirements for Accessibility as well as key principles of Universal Design. See **Chapter 2 Accessibility & Universal Design** for more detailed provisions.

7.4 Site & Campus Planning Context

Campus buildings have unique roles as parts of a larger context. Each of the District's nine campuses and two satellite locations present a distinct framework of existing conditions and planned future development, which together with urban planning codes and regional characteristics forms the planning context of each building project.

7.4.1 Key Planning Issues to be Addressed by Architectural Design

All campuses have applicable campus plans that guide development and the integration of new facilities. The current or most recent campus plan provides a framework of context and infrastructure that is one of several critical conditions for coherent campus development. For both PPC development and building design, Design Teams shall consider and demonstrate solutions to the following:

Access & Accessibility for Users, Services & Emergency Response

- Provide seamless connectivity to the campus framework of vehicular and pedestrian circulation.
- Provide required accessible path of travel to building entrances.
- Locate building service access and loading to promote pedestrian safety and minimize visual impact.
- Locate building entrance(s) to address arrival of users to the project site from other campus locations.

Optimize Use of Open Space

- Integrate site planning that supports, extends, and/or improves on the existing sequences and continuity of open spaces.
- Consider opportunities for adjacent outdoor spaces that build on program uses and/or support learning and social engagement.

Basic Provisions & Planning For Security

- Minimize entry points into buildings.
- Integrate design of "defensible" space with inside-outside visibility and night lighting.
- Integrate technical security systems and requirements—see **Chapter 17 Security Design.**

Role of the Project Within the Campus Plan or Phased Campus Development

- Demonstrate design responses to the overall intent and specific goals of campus planning.
- Design for potential relationships with future phases and programs, if any.

7.4.2 Site Planning & Infrastructure

Building planning and siting shall integrate building services and utilities with available campus infrastructure. Internal locations of mechanical rooms and similar service points shall provide efficient proximity to their respective points of connection. For further planning considerations see **Chapter 4 Site Planning** and **Chapter 5 Site Utilities**.

7.5 Building Planning & Organization

The PPC document defines program elements and minimum project requirements. This is the foundation of every project and together with the Owner's Project Requirements (OPR's) forms the basis for design and construction in all delivery methods. Design Teams charged with the development of the PPC shall provide test fits and diagrams that demonstrate a workable initial concept for overall building organization. The initial 3-dimensional planning of program functions shall be based on clear consideration and resolution of the following:

7.5.1 Program Development

Space programs are the foundational level of project definition in the PPC. Detailed listing and sizing of specific spaces and elements of the program are developed with the participation of each campus, including campus leadership, the College Project Team (CPT), District Project Manager (DPM) and the Building User Group (BUG) for the project. Programming itself is guided by:

- Detailed requirements and relationships of people and functions within the project.
- Space allocation for all functions based on District Standards, as well as California Community Colleges room types and standards if State funding is required.
- Coordination with the campus's Capacity Load, an allowable inventory of space types based on student population.
- Overall scope and scale of the project, and

its established budget, if any.

- Previous project definition as provided by an approved FPP or "white paper".

7.5.2 Blocking & Stacking

The 3-dimensional organization of spaces and functions provides critical guidance for design. Placement of all rooms with their required adjacencies (including service access and loading) must be clearly defined in the PPC.

Both the PPC and later design shall demonstrate responsiveness to the following principles:

- Program components shall be efficiently organized into coordinated groups based on functionality, e.g., general classrooms, class labs, study areas, administrative suites, etc.
- Building planning shall address all relationships in the detailed program adjacency matrices in the PPC.
- Instructional spaces shall be organized for efficient movement connecting student activities.
- Public- or student-facing work areas shall be easy to locate and access.
- Circulation spaces shall provide for security with controlled access to "back of house" areas.

7.5.3 Code Requirements for Fire & Life Safety

The PPC shall include a preliminary code analysis. The Design Team in all delivery methods is responsible for ensuring code compliance, demonstrated by regular updates throughout the design process.

7.5.4 Shared Support & Circulation Spaces

Provision of circulation spaces and building core elements—i.e. elevators, stairways, restroom facilities, vertical shafts for building systems, and all LACCD required service and utility spaces—form the initial 3-dimensional armature of the building. Design horizontal and vertical circulation to provide ease of servicing and/or replacement of equipment.

7.5.5 Intuitive Wayfinding

Movement of people—students, visitors and staff—through the building shall be guided by a clearly organized, hierarchical network of circulation. The choreography of circulation relies first on visual cues within the physical space sequences and secondarily on signage.

7.5.6 Accessibility & Universal Design

Solutions for accessibility shall integrate associated exterior paths of travel, and continue inside with straightforward arrival at lobbies, elevators and rest room facilities, assisted by signage that meets Universal Design standards.

7.5.7 Respecting Room Types & Requirements

Building layouts in the PPC and project design shall respect the specific program needs of space types by addressing access priorities, adjacency preferences and service/ infrastructure needs—e.g., lab and industrial type functions needing ground floor location or high-bay space. High-traffic areas such as classrooms and public-facing functions are best set on ground or lower floors, while more private workplaces may benefit from quieter, less frequented upper floor locations.

7.5.8 Opportunities for Interaction

Design and arrangement of interior spaces shall accommodate positive interaction of students, faculty, and guests. A number of planning and design features can support this important educational and social goal:

- Design Circulation areas that allow for informal interaction zones
- Provide stairways with daylight and view, providing visibility at landings
- Allow for informal seating at balcony edges or overlooking multi-story atria
- Design entry lobbies and atria with flexible layouts that allow multi-use options for gathering while meeting code-required spacing for circulation

7.6 Height & Massing

Building height, massing and floor areas shall be optimized in response to multiple factors, such as specific provisions of a campus master plan, program requirements and site area. The number and size of floors shall be fully studied and vetted in the PPC with the following considerations:

7.6.1 Balancing Building Height & Efficient Floor Area

Within reasonable limits, building height can be a virtue. Taller buildings can make judicious use of limited campus real estate, and bring college functions closer together for the virtues of a more "compact" campus. Program identity can be boosted by the building's presence on the campus "skyline". Conversely, for all but very small or special-use programs, low-scale building development—

especially at one-story—is an inefficient use of valuable campus lands.

Building Efficiency & Floor Area

There are important reasons to opt for larger floor plates and fewer floors:

- Interaction and collaboration—critical to successful facilities of all kinds, but especially in higher education—has been shown to happen best within each floor level vs vertically.
- Fewer floors enhance accessibility.
- Larger contiguous floor areas are more flexible and adaptable to future change.
- Designing with fewer floors generally reduces cost, saving on stairways, elevator stops, bathrooms, and mechanical shafts, all of which can be translated into lower cost or more functional space within the same budget.
- The PPC Shall establish the target for building efficiency based on project specific requirements.

Development of blocking and stacking alternatives provides the opportunity to optimize these values. At the PPC stage, Design Teams shall develop and demonstrate a clear rationale for building location, scale, height, number of stories, and ideal stacking of program uses. Design Build Entities or Architects of Record must demonstrate clear value when varying from the PPC in terms of building format.

7.6.2 Future Adaptability & Resilience

All LACCD buildings and their systems are intended to accommodate change. As pedagogy and patterns of hybrid and remote learning evolve, facilities increasingly will be re-programmed for new uses, and the adaptability of building space and systems is critical to long-term viability. As Design Teams provide for the needs of current programs, design shall also consider incorporating flexibility for the practical transition and transformation spaces for a variety of user needs in pedagogy, learning, collaborating, and gathering. Simple, modular planning of building format and structure is encouraged, with robust capacity of infrastructure, systems, and technology to allow for long-term evolution.

7.7 Architectural Character & Expression

Exterior design encompasses the making of buildings in all their detail and materiality. The overall building exterior shall present a self-evident, legible composition of forms, systems, and materials in harmony with the larger campus context. Colors and materials may be used to help provide continuity, connection, and dialogue with the existing context, while also allow providing a clear identity for each project.

The District's campuses have developed over time and typically display a range of architectural expression that may require interpretation to be understood as a context for design. The following considerations shall be integrated at both the PPC stage and later design phases.

7.7.1 Balancing Project Identity & a Coherent Campus Environment

While addressing contemporary design goals and principles, as well as the specific program requirements, each project shall also make its own contribution toward a more coherent campus environment, through the application of clear aesthetic principles and processes. Design Teams charged with creating the PPC shall provide guidance including:

- Provide analysis and depiction of key campus-defining themes and elements using on-site photography and/or graphics.
- Establish the environmental and energy performance of exterior design in response to climate.
- Prioritize the use of proven contemporary systems and materials for longevity and ease of maintenance.

More specifically, Design Teams shall demonstrate creative responses to the following:

Clarify the Relationship to Existing Campus Buildings

Both older and more recent buildings can provide a strong precedent for expression in terms of their character, gestures, or scale. Develop a clearly stated design approach to materiality, scale, and other existing traits, and how they may be adapted and/or reinterpreted to advance the new project's design opportunities.

Leverage Project Location & Role on Campus

The PPC should establish a clear concept of the role and significance of the project within its campus context. Design Teams at every stage shall develop intentional design responses to campus location and context in developing building organization, scale and massing, entrances, rooflines, and overall gesture.

Survey Campus Exterior Materials & Features

Key existing buildings reinforce campus identity

with a distinct array of materials. The PPC shall include an analysis of significant character elements using curated photo surveys. While making exterior expression relevant to interior function, Design Teams shall demonstrate a responsive approach to design in relation to existing campus materiality, including lessons learned in terms of maintenance and durability.

Inside-Outside Connectivity
For security purposes, campus buildings should have limited points of entry. However with care for access, buildings should have a strong visual or physical connection to the immediate landscape at the ground floor, making it a participant in the campus network of activated open space. Design Teams for the PPC and after shall determine what ground-floor uses or activities are most relevant for engagement with student and campus life, and leverage opportunities to heighten connectivity with active outdoor spaces.

Integrated Landscape Programming
Each project's included exterior space shall provide continuity with existing campus landscape, and may also complement adjacent spaces with newly programmed outdoor use. The PPC shall establish a clear concept for exterior space programming and design, setting limits of work that allow the project to resolve key issues of its open space context. Design Teams shall address building entry in relation to the broader pedestrian experience of the campus, for example:

- How existing or potential visual axes and/or vistas are enhanced by locating entrances.
- How the sequence of approach, arrival and welcoming at major entry points considers security, as well as advances the goals of diversity and equity.

7.7.2 Building Scale & Articulation

The shape and articulation of building massing has great impact on the apparent scale from a pedestrian viewpoint. Design Teams shall address the following key considerations in order to achieve an appropriate scale in relation to context and project identity:

- Leverage vertical articulation—for example, differentiation at the ground and/or top floor.
- Develop roof line expression with due consideration for any rooftop equipment as well as potential to maximize photovoltaic installation.
- Use distinct program elements for secondary massing and articulation.
- Compose the "graphics" of fenestration and wall materials.

7.8 Building Orientation & Energy Performance

Design Teams shall study building massing and orientation to enhance energy performance and minimize mechanical loads. As building sites may not afford an ideal orientation, exterior elevations shall be specifically designed for solar performance based on directions they face. Develop exterior design of facades, fenestration and appropriate sun controls based on a study of solar gain and fenestration using 3-D energy modeling to meet overall building performance goals as called for in District Guidelines and Standards **Chapter 3 Sustainable Design**.

7.9 Exterior Envelope Design

The selection and design or exterior envelope systems is critical to ongoing programs, building operations and maintenance and energy usage. The goal of these provisions is to implement proven successful systems by outlining acceptable basis of design and performance requirements of building envelope systems.

System priorities are durability, ease of serviceability and low maintenance. Design and construction teams should comply with the following minimum requirements for design, remediation, and replacement of exterior envelope systems.

Design and construction teams shall comply with the following minimum requirements for design, remediation, and replacement of exterior envelope systems. Except as formally approved, materials and systems used for building exteriors shall comply with selections in **Volume 2 District Specifications** and as indicated for each college in **Volume 2 Campus Specifications Matrix**.

7.9.1 Lessons Learned: Notable Failures & Issues from the Past

Corrosion & Rust

The LA area has many different microclimates, including campuses that are close to the corrosion inducing ocean. Campuses have all reported, to different extents, struggling with rooftop units, rooftop ductwork, rooftop piping, and wall cladding components (fasteners, flashing, and accessories) that were rusting. Specify and provide products and components with sufficient corrosion resistance so that corrosion does not occur.

Water Intrusion Due to Poor Drainage

Buildings with subterranean floors are most susceptible to water intrusion due to surface runoff. Campuses have reported issues with these spaces and intrusion are linked to poor waterproofing design and inadequate drainage. Design positive slope away from buildings, in addition to using robust below grade waterproofing strategies with subsurface drainage.

Water Intrusion Due to Failed Sealants

In buildings where sealant joints are the primary and only barrier to water and air infiltration, this non-redundant and high maintenance approach has led to water intrusion. These types of barrier assemblies led to failure due to low quality sealant use, building movement exceeding the capacity of the sealant, and lack of maintenance. Design exterior envelopes using rainscreens, where applicable, so that building construction isn't solely reliant on sealant performance. Sealants themselves shall be selected based on long-term performance. Design team shall indicate ongoing maintenance requirements for sealants.

7.9.2 General Considerations

Maintenance

Campuses will not always have the resources to proactively clean, service, and maintain the exterior envelope systems. It is critical to prioritize systems and assemblies that are durable, easily serviced and require low maintenance. Ledges, copings, overhangs, and articulations where birds or wildlife can nest or gather are to be avoided or provided with deterrents.

Products

Specify waterproofing products, all manufactured in the United States, supplied by a single manufacturer which has been successfully producing the specified types of primary products with the same materials without making adjustments, modifications or alterations to the chemical or physical composition of the products for not less than the warranty period.

See **Volume 2 Appendices District Specifications and Campus Specifications Matrix** for preferred products. Any variations to these standards require a "Deviation Letter" signed and approved by the District PMO prior to project use.

7.9.3 Wall Systems

Wall systems include the cladding, cladding attachment, thermal insulation (where required), weather/water resistant barrier, and sheathing.

General Considerations

- **Movement:** Building movement shall be accommodated in the wall design. Expansion joints, seismic joints, control joints, floor line flashings, and other means of separating and controlling movement in wall assemblies shall be provided where needed.
- **Flashings:** Provide flashings where different materials and assemblies adjoin, where horizontal projections (windows, doors, etc.) occur, and where the weather resistant barrier is intended to drain incidental moisture. Flashings shall be integrated into the weather resistance barrier. Where air barriers are required, flashings shall also be integrated to avoid air leakage.

Cladding

The first requirement of exterior envelopes is to keep the weather out. This applies to all components of the exterior. As cladding systems comprise a high percentage of exterior enclosure, performance is critical. Wall materials used in the construction of the facility shall support heavy building use and shall be selected according to durability (20+ years of low or no maintenance), aesthetic consistency with the overall design intent, longevity, sustainability, color retention, structural integrity, fire resistance, and ease of upkeep and replacement. Materials shall be selected for recycled content, regional availability, and low embodied energy to meet or exceed LEED requirements. Material options that have proved successful in higher educational settings include:

- Rainscreen systems with cementitious, stone or ceramic panels.
- Airtight insulated metal paneling with factory finish
- Exposed painted or natural finish precast or cast-in-place concrete
- Fiberglass-reinforced concrete panels (GFRC)
- Exposed concrete masonry units
- Ultra-high-performance concrete panels (UHPC)
- Corrugated sheet metal cladding with factory finish
- Exterior masonry veneer
- Cement plaster with appropriate specification and detailing

Exterior cladding materials within ten feet above grade shall be given careful consideration for potential graffiti, vandalism, and general wear and

tear. These materials shall be selected for greater durability and impact resistance.

Examples of specifications for exterior systems are included in **Volume 2 District Specifications.**

Note: Exterior Insulation and Finishing Systems (EIFS) and any variations of EFIS are prohibited on LACCD projects.

Where cladding is attached to furring, girts, hat channels or sub-framing that is not considered part of the buildings framing, this attachment method shall be detailed by the Design Team. The attachment method shall accommodate the project's energy code requirements for exterior continuous insulation via an effective R-value or effective U-value basis. The corrosion resistance of the attachment must be capable of handling high salt spray exposure.

Continuous Exterior Insulation

Energy code requirements for certain types of wall assemblies require the use of continuous insulation. Criteria to be addressed include:

- **R-value:** When determining the type and thickness of insulation the design team shall consider that the effective R-value are impacted by the type of material and type of cladding attachment. These shall be coordinated such that the effective R-value meets the sustainability and code requirements for the project.
- **Attachment and compressibility:** The attachment, through fastening or through friction fit, shall be considered and be in accordance with both the insulation and the WRBs manufacturers. Where the insulation is placed in compression, cladding manufacturer shall approve and outline attachment requirements.
- **Location of Water Resistant Barrier (WRB):** The location of the WRB is preferred to occur behind the insulation. If the weather resistant barrier is in front of the insulation, the design team shall consider the impact to fenestration transition detailing and appropriateness of insulation as the substrate for the WRB. Drainage behind continuous insulation is required.
- **Fire resistance:** Insulation materials shall meet code requirements for fire resistance.

Weather/ Water Resistance Membrane/Barrier

The water/weather management layer is the WRB. The project design shall consider and accommodate the following:

- Maintain water tightness through shingling, sealants, gaskets, and flashing membranes.
- Compatibility of materials is required.
- Permeability (air and vapor) of materials shall be considered by the team.
- Where continuous insulation is required, drainage between the WRB and insulation shall be provided.

Note: Insulated Concrete Formwork and ccSPF as Continuous Exterior Insulation are prohibited in LACCD projects.

7.9.4 Doors & Windows

Design of fenestration and exterior doorways shall integrate both exterior design direction and interior requirements. Fenestration must meet daylighting and energy code requirements, as well as addressing the following criteria:

Serviceability & Cleaning

Avoid locations of glazing that are not easily accessed (exterior and interior) for cleaning, serviceability, and repair.

Exterior Doors & Windows to Meet Contemporary Environmental Challenges

Exterior door and window systems shall be watertight. The integrity of window and window-wall systems shall be designed to withstand the increased impact of weather patterns and intensity resulting from climate change, with mock-ups tested by approved methodologies during construction. Use of custom factory finish aluminum door and window frames is common, but actual systems are to be determined based on design intent. Weather and water resistance shall also consider the following:

Condensation Resistance

Fenestration assemblies shall be designed to prevent condensation. Design Teams shall verify that the condensation resistance factor for the assembly being designed or installed is sufficient to prevent condensation under the project specific conditions.

Corrosion Resistance

Fenestration frames, hardware, flashings, and fasteners shall be of sufficient corrosion resistance given the project's location.

Thermal Performance

Fenestration forms part of the building envelope's continuous exterior insulation. Window frames shall be designed with thermal breaks.

Air Leakage
Detailing of conditions where door and window framing meets wall assembly shall limit air leakage. CPT and/or DPM shall determine if whole building air tightness testing is required. An air leakage rate of 0.4 CFM/SF at 70 pascals shall be the maximum allowable air leakage rate. The envelope shall be commissioned for air and water tightness, refer to commissioning specifications for requirements.

Operability
Natural ventilation can be provided through operability of windows, but may also reduce the water penetration resistance, air infiltration resistance, and acoustical performance of the window. Operable windows shall maintain water penetration resistance of the overall assembly. Integrate magnetic switches tied to HVAC control to toggle natural and mechanical ventilation.

Glazing
Exterior glass is generally to be double-glazed, with multi-surface coating systems or tinting to balance visibility with solar gain mitigation. Tinted, "low-e" glass is preferred and likely required to meet energy code requirements.

Skylights, Clerestory Windows and Solar Tubes
Fenestration from above can help provide for daylight requirements at interior spaces, but also may increase solar gain and energy loads. Design Teams shall confirm that energy savings due to increased daylighting exceed the energy losses from increased solar loading, or that increased functionality benefits otherwise justify the increased load.

Acoustics
Exterior doors and windows shall be designed to meet minimum acoustical requirements, keeping in consideration that some project sites may be located near noisier streets or utilities. See **Chapter 9 Acoustics Design** for additional guidelines and criteria.

Sun Control Systems
Horizontal and vertical sun-shading devices can be essential features of a high-performance building envelope. All such systems shall be developed through parametric design methodologies to assure performance. Sun control projections and/or screens must allow for window cleaning by approved devices. Materiality and finish shall be consistent with adjacent window and door systems. Use of fritted clear or translucent glass at horizontal canopies and shade projections is discouraged in consideration of unreliable cleaning and maintenance at most campuses. Depending on design, sun-shading systems may require devices to prevent bird nests.

7.9.5 Roofing

General Considerations
Roof system designs shall incorporate all aspects of roof waterproofing, including parapet walls, skylights, flashings, drains, scuppers, gutters, downspouts, etc., and comply with current National Roofing Contractors Association (NRCA) and Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards. Roof design shall integrate criteria and requirements including:

Drainage
Primary drains shall not discharge onto hardscaped surfaces. They shall either be hard-piped or directly discharge into landscaped areas.

Roof Hatches, Stairs & Elevators
Campus maintenance will require a means to replace or repair rooftop equipment, except as formally approved, provide elevators for roof access in multi-story buildings. Size rooftop access elevators, staircases and hatches in an integrated solution that allows larger equipment or materials to be brought to the roof. The minimum roof hatch size is 30"x96" for a service stair type hatch, 30"x54" for a ladder or ship-stair type hatch shall be provided so that small and light equipment can be brought to the roof for replacement.

Roof Numbering
On a campus by campus basis, Design Teams shall request if painting building identification on rooftop is needed.

Safety
Roofs are frequently accessed by campus staff and vendors for the purposes of inspection, equipment servicing, and maintenance. Therefore, roofs shall be designed to have safe access and fall protection where needed. The path of travel from the elevator/hatch to any serviceable equipment, including PV systems, on a roof shall have protective membrane.

Photovoltaic Arrays & Solar Canopies
The use of solar canopies with photovoltaic panels is encouraged to protect rooftop equipment such as air handling units (AHU's), to reduce heat loads, extend the life of equipment, while also generating renewable power. Attachment of photovoltaics and similar systems must maintain the integrity of the

roof itself, and meet DSA requirements for structural design. Layouts of photovoltaic arrays must allow adequate access for maintenance and replacement.

Low-Slope Roofing

General Considerations

- **Thermal Performance:** New low-slope roofs, roof alterations, and roof replacements shall meet or exceed Title 24 Part 6 Non-residential Energy Efficiency Standards. Compliance can be achieved using a performance approach or the prescriptive approach. For roof alterations and roof replacements, confirm that sufficient insulation exists to eliminate the need for a vapor barrier. Refer to Cool Roof Rating Council's (CRRC) rated product directory on the CRRC website (www.coolroofs.org)
- **Drainage:** No ponding area larger than 4' square. Down spout from the roof drain shall not drain onto any walking surface and hardscape area.
- **Green Roofs:** Green Roofs are generally not accepted due to high maintenance. Solar roofs are preferred. If provided as an exception with formal college and District approval, design shall demonstrate robust and adequate solutions to longevity and performance.
- **Walk Pads:** Install walking pads with shims on low slope roof surfaces along a path from the roof hatch or access door to mechanical equipment requiring maintenance, installed with a sufficient area to limit damage to finished roof system from foot traffic and service tools/equipment.
- **Hose Bibs:** Provide 1 hose bib every 75 feet each way for the entire roof for maintenance where applicable.

Note: Foam roofing in new or re-roofing applications is prohibited in LACCD projects.

Performance Testing

Building envelope leakage testing shall be conducted per ASHRAE Guideline 3, AAMA 502-02 & ASTM E 1105 and performed by an accredited agency that has been approved by the District. Provide flood test or electronic leak detection or approved non-destructive moisture testing on all flat roof area prior to final acceptance.

Materials

Design Teams shall consult with College Project Teams (CPT) and the Director of College Facilities (DOCF) for direction to proceed with one of the following low slope roofing system options:

Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofs

Where used, specify a 2-ply system where roofing products, including each type of sheet, are all manufactured in the United States, supplied by a single manufacturer which has been successfully producing the specified types of primary products with the same materials without making adjustments, modifications, or alterations to the chemical or physical composition of the products for not less than the specified warranty period.

- Roofing systems shall be designed for a minimum 30-year non-prorated, no-dollar-limit, labor-and-materials warranty. The roofing membrane, base flashings, liquid applied flashing, roofing membrane accessories, roof insulation, fasteners, cover board, walkway products, and other single-source components of the roofing system must be covered under the warranty. Manufacturers of products only. Private Label products are not permitted.
- *Atactic Polypropylene (APP) systems are not permitted.*
- Specify SBS roof systems where high puncture resistance, exposure to abuse or frequent access is needed on the roof to maintain mechanical equipment.
- Specify cold-applied adhesive systems with minimum MD 310 lbf/in. tensile and 510 lbf/in. tear for the cap sheet.
- Specify a dense, fire and water resistance cover board made from gypsum or other man made materials to be placed over the deck or insulation board. Use adhesive to attach cover board to insulation.
- Specify cant strips and curbs to be pressure treated wood, unless metal curbs are used. Fiber products are not permitted.
- Specify a pre-manufactured 2-piece counterflashing, coping system, roof edge/fascia system, and mechanical equipment curbs per ANSI SPRI ES-1.
- Minimum roof pitch of 1/2 inch/feet and 1/4 inch/feet along valleys.
- Manufacturer to perform site visits a minimum of 3 days per week during construction of roof.

Single-Ply Membrane Roofs

Design Teams shall receive written and signed permission from the CPT and/or DPM prior specifying a single ply roofing system. Design and products shall conform to the following:

- Specify roofing products, all manufactured in the United States, supplied by a single manufacturer which has been successfully producing the specified types of primary products with the same materials without making adjustments, modifications, or alterations to the chemical or physical composition of the products for not less than the warranty period.
- Specify a 30-year system and require a 30-year System Roofing Manufacturer's Warranty for labor and material, without monetary limitation, to correct defects in materials or workmanship. Warranty shall contain no exclusions for random occurrences of ponding water.
- Specify PVC with 60 mil minimum thickness and EIP (Ethylene-Interpolymer) with 60 mil minimum thickness, systems to be mechanically attached. Roof membrane is visible from ground and shall be fully adhered.
- EPDM (Ethylene Propylene Diene Monomers) system shall be fully adhered 60 mil thickness, using 7" wide tape seams, and be warranted for 20 years.
- Specify single-ply roof system when foot traffic is minimal, roof shape is complex, or when numerous roof penetrations are present.
- Specify a dense, fire and water resistance cover board made from gypsum or other man-made materials to be placed over the deck or insulation board. Use adhesive to attach cover board to insulation.
- Specify a pre-manufactured 2-piece counterflashing, coping system, roof edge/ fascia system, and mechanical equipment curbs.
- Minimum roof pitch of ½ inch/feet and ¼ inch/feet along valleys.
- Manufacturer to perform site visits minimum 3 days per week during construction of roof.
- Prohibited Systems:
    - APP (Atactic Polypropylene)
    - TPO (Thermoplastic Polyolefin)
    - Foam Roofing

Steep Slope Roofing

General Considerations

Steep sloped roofing may offer aesthetic and functional opportunities, particularly for buildings that are four stories or less, and also less likely to have leaks. Material choices shall be appropriate to the actual slope, with system choices narrowed below 3:12 pitch.

Drainage

Valleys shall be designed so that they reduce the potential for being blocked by debris.

Performance & Upkeep

Design Teams shall consider that brittle materials like concrete tile and clay tile are more difficult to access and service.

Asphalt Shingle Roofs

- Specify a 2-ply laminated shingle, conforming to ASTM D3462, with a minimum 50-year material warranty, and a minimum 15-year non-prorated labor and material watertightness warranty, comparable to Certainteed-Sure Start Plus 5 Star, GAF-Golden Pledge, Malarkey-steep slope system.
- Specify algae resistant shingles.
- In high wind areas (greater than 90 mph), specify wind resistant shingles rating to wind speed determined by ASCE 7, and requires a 10-year wind warranty. Wind speed requirements shall be determined on a project by project basis and be coordinated with roof mounted photovoltaic arrays, as needed.
- Fasten shingles with minimum 12 gauge corrosion resistant nails only. Minimum nail head diameter shall be 3/8". Shank shall penetrate minimum of 3/4" in wood decking or completely through plywood decking.
- Asphalt-saturated felt underlayment shall meet ASTM D 226 and/or D 4869. Use double layers on roof slopes less than 4:12.
- Specify roof perimeter edge metal and step flashing at walls and chimneys.
- Minimum slope 3:12.
- Specify open, closed, or woven valleys. Minimize the use of metal valleys.

Clay & Concrete Tile Roofs

- Specify clay tile manufacturers who offer a 20-year labor and material warranty, for the installed cost of roof.

- Clay Tile shall meet or exceed ASTM C1167 Grade 1 requirements for durability and ASTM C1167 Type I, for appearance.
- Concrete tile shall meet or exceed ASTM C1492 requirements and shall be cool tiles for LEED credit.
- Specify two layers of modified self-adhering underlayment.
- Contractor shall provide additional 5% replacement tiles to Facilities Maintenance and Operations (FMO) at close out of the project.

Metal Roofs

- Specify metal roof manufacturers who offer Full System Manufacturer's Roofing Warranty for 30- year labor and material warranty, for the installed cost of roof, to repair leaks in the roof panels, flashing and trim resulting from defects in materials or workmanship. Roof manufacturers shall be required to inspect the work during construction.
- Specify one layer of SBS modified self-adhering base sheet complying with the manufacturer warranted system. Underlayment to carry a 20 year warranty.
- Steep roof (hydrokinetic) roofs shall pass air and water infiltration tests per ASTM E1646 and E1680. Low slope (hydrostatic) roofs shall pass water infiltration tests per ASTM E2140. Submit test report.
- Specify Kynar 500 or Hylar 5000 paint finish on metal panels which require paint.
- Specify 22 gauge, galvanized.
- For architectural panel roofs, specify snap type standing or batten seam with continuous length panels. Panel shall be kept off substrate by manufacturer's clips.
- For structural or structural/architectural panel roofs, specify concealed fasteners and clips for panel attachment. No fasteners shall be located in the pan of the panel except at the ridge.
- Panels and trim shall be rolled formed at the manufacturer's prime manufacturing plant or on-site with manufacturing equipment.
- Specify manufacturer-prepared shop drawing.
- Metal shingles and shingle panels to be used on steep slope (3:12 or greater). Investigate the bottom, top, and side of each shingle to determine the interlocking mechanism and water tightness of the lap, joint, and seam. Examine ridge, valley, hip, and perimeter flashings profiles for water tightness.
- Specify self-adhered high temperature underlayment.

7.9.6 Other Systems

Below Grade Waterproofing

- Direct surface runoff away from buildings.
- Where surface run off can collect against building exterior walls, collect and drain runoff away from the wall. Irrigation shall be limited at building perimeters where it can potentially create surface run off issues for the building.
- Rain run off at roofs, decks, breezeways, and walls shall be collected and diverted away from building walls or door thresholds.
- Specify a minimum 15-year Manufacturer's Warranty for labor and material, without monetary limitation, to correct defects in materials or workmanship. Warranty shall contain no exclusions for random occurrences of ponding water.
- Specify the use of certified contractors to apply the waterproofing system and that the work must be inspected by the manufacturer at a minimum of once a week during installation.
- Waterproofing below the water table may limit the selection of the waterproofing membrane.
- Select waterproofing systems that are typically used on substrates as stated in the manufacturer's literature.

Below Slab Waterproofing/Vapor Barrier/ Gas Barrier

- Occupied rooms that occur at slab-on-grade locations are required to have a vapor barrier to prevent issues with new or future flooring.
- Roof, decks, breezeways, and wall rain run off shall be collected and drained so that it cannot build up pressure against building walls or door thresholds.

Split Slab/Horizontal Waterproofing

The use of split slab or covered waterproofing shall be carefully considered by each Campus as these areas are expensive to repair or replace due to being covered by concrete, pavers, or other overburden. Where a Campus approves the use of

a roof area as concrete, pavers or overburden, the following shall be required:

- Specify 15 year Manufacturer's Warranty for labor and material at a minimum. Where available and feasible, warranty shall be a no dollar limit warranty that includes corrections to defects in labor and materials. Warranty shall not exclude ponding water.
- Specify the use of certified contractors to apply the waterproofing system and that the work must be inspected by the manufacturer at a minimum of once a week during installation.
- Design sloped concrete substrates only.
- Hot Fluid Applied Rubberized Asphalt waterproofing shall be designed and specified.
- Waterproofing membrane shall be fully adhered and monolithic across the entire surface of the sloped concrete substrate. Planter walls, stairs, or other permanent structures shall be placed over the waterproofing membrane with drainage provisions incorporated.
- Waterproofing membrane shall be protected with a protection membrane.
- Where insulation is required, it shall be designed over the waterproofing membrane.
- Provide duel stage drains with clamping ring receivers at primary waterproofing surface.
- Pedestal-mounted pavers are preferred where pedestrian traffic is expected. Concrete topping slabs are discouraged as they are costly to remove in the event of failure or replacement.
- Areas with planting require root barriers.
- Transitions of the waterproofing at walls shall extend eight (8) inches minimum above the height of the substrate and terminate into a termination bar with a gumlip for a sealant joint.
- PMMA (Polymethyl-Metharcylate) waterproofing transitions are recommended at penetrations, transitions into doors and base of walls.

Exterior Decks & Breezeway Coatings

- Finished surfaces shall be slip resistant.
- Provide sufficient slope to drain to perimeter edges or internal drains.
- Drains shall have a 4 inch minimum flange to integrate waterproofing coating. Drains and flanges shall be recessed into substrates to eliminate ponding.
- High traffic drains and strainers are required.
- High traffic nosing and support is required at staircases.
- Non-metallic reinforcement and flashings are preferred. Where required by Manufacturer, embedded metal flashings shall be corrosion resistant.
- Transitions at edges shall incorporate manufacturer required reinforcement or flashing.
- Substrate deflection shall be less than L/360 or as required by manufacturer.
- Membrane reinforcement is required.
- Railing posts are not permitted to be attached through membrane coatings.

Rooftop Equipment Screening

Rooftop equipment must be screened from view from ground level viewpoints and up to third story positions that look onto adjacent roofs. Screening systems or materials must be compatible with major materials and colors of the building. If screening is co-planar with exterior facades, the material/system continuity is critical.

7.10 Long Term Performance & Operations

Campuses need durable facilities that are both resilient and easy to maintain. To the extent feasible with program requirements, design shall be simply detailed and utilize materials and finishes that resist intensive use and environmental exposure and are easy to maintain and clean. Building systems shall be easily accessible throughout the building for periodic upgrades, regular maintenance and replacement as needed.

CHAPTER 8

Interiors & FFE

Los Angeles Mission College

CHAPTER 8 - INTERIORS & FFE

8 Interiors & FFE

This Chapter covers Interior Design including overall objectives and design intent, space planning, common room types, interior systems and materials, color, and Furniture, Fixtures, and Equipment (FFE). See also related **Chapters 2 Accessibility & Universal Design, 3 Sustainable Design, 7 Architectural Design, 9 Acoustics Design, 11, 12, and 13 for MEP systems** related to interior fit-out (e.g. lighting) and **Chapters 16, 17, and 18** for related technology systems.

8.1 Overall Design Intent

Interior fit-out encompasses and engages the broadest range of overall building systems. Design of interior spaces requires a high level of coordination and integration of disciplines, and shall only be provided by experienced, credentialed architects and/or interior designers.

New and/or renovated interior spaces for the LACCD campuses shall be built to meet or exceed the minimum requirements as provided in these Guidelines and Standards. In addition to code compliance and technical/performance requirements, the interior planning and design of systems, finishes, furnishings, fixtures, and equipment are expected to achieve overall Design Intent as described herein. Key objectives include:

- Interiors are fit to program and purpose of each space and use.
- Space planning features clear organization and sequencing of interior functions (see also **Chapter 7 Architectural Design** for Building Organization).
- Facility design, materials, and systems selections enhance health and wellness by integrating natural light, assuring indoor air quality that integrates post-Covid bio-filtration, and promoting physical activity.
- Layouts and room proportions are designed to be flexible, interior systems to be adaptable.
- Programmed spaces and circulation areas are designed to support and foster interaction.
- Acoustics are specifically calculated per **Chapter 9 Acoustics Design** to support the function of each space.
- Finishes and materials are durable, maintainable, and appropriate for the maintenance resources of each college.
- "Red listed" materials according to LEED or the International Living Building Institute are excluded.

8.2 Sustainability

LACCD's policies regarding Sustainability apply to Interiors as well as Furniture, Fixtures, and Equipment (FFE). Sustainable design strategies are an essential aspect of Interior Design for every project, to support the District's established goals for a carbon-free future. Elements of onterior design that bear on Sustainability shall be given full consideration and high priority throughout the design process, including:

- Embodied energy of interior systems and materials.
- Circadian lighting- Daylight harvesting as appropriate to spaces and their use.
- Energy efficiency of lighting and HVAC equipment
- Implement water-efficient fixtures and energy smart appliances.
- Specify low-VOC (volatile organic compound) materials, formaldehyde-free products, and ergonomic furniture to create a healthy indoor environment.
- Sustainable material for all interior finishes like carpet, flooring, fabrics, wall covering, etc.

Interior systems and materials, and all FFE, must be accounted for within LEED credits. See **Chapter 3 Sustainable Design** for specific provisions, in addition to those noted throughout this chapter. The baseline LEED rating required for all projects is LEED Certification. However, all Design Teams are encouraged to target higher ratings, including selection of materials and systems that meet or exceed GreenGuard standards to ensure they contribute to a healthy and environmentally responsible project.

8.3 Accessibility

LACCD is committed to ensuring accessibility by creating a barrier-free environment for both staff and students. Each project is to comply with all relevant local, state, and federal regulations to guarantee that everyone can fully participate in and benefit from the college's offerings, facilities, and services.

Each section of the building shall be designed and constructed, furnished, and equipped with accessibility in mind. This includes ensuring that all spaces within the building, from the main entrances

to every room, are easily reachable and usable by individuals with disabilities. Accessible workstations, bathrooms, and other facilities shall be provided according to code requirements. For further detailed provisions see **Chapter 2 Accessibility & Universal Design**.

8.3.1 Inclusive Facilities

LACCD's commitment to accessibility reflects the District's dedication to inclusivity, providing equal and integrated opportunities to all members of its diverse community. An inclusive college facility is designed to meet the diverse needs of all students, faculty, and staff. It promotes physical accessibility, accommodates various learning styles, offers support services, and fosters a culture of diversity and equity. The facility ensures that all individuals, regardless of background or ability, have equal access to education and a sense of belonging. The following key principles and elements of an inclusive facility shall be carefully considered and demonstrated through interior design:

- Design facilities that comply with Universal Design principles. This includes appropriately designed elevators, restrooms, corridors, and programmed areas.
- Promote inclusivity by design, creating environments that are welcoming and accessible to all people, irrespective of their physical abilities or diverse needs.
- Provide gender-inclusive, single occupancy restrooms at each level, in addition to code-required accessible accommodation.
- Provide one lactation room per building, with ADA compliant sink, and mirror.
- Incorporate flexible furniture and classroom layouts that can be easily adjusted to accommodate different learning styles and physical needs.

To support **mental health**, virtual and physical spaces shall be designed to promote well-being and create environments where people feel safe and relaxed. Focus on elements like color, sound, and visual distraction or animation, as these can affect users with mental health conditions. Soft colors, calming sounds, and minimal animation can contribute to a soothing atmosphere that helps reduce stress and anxiety.

8.4 Interior Space Planning

Space planning is foundational to a successful design for all LACCD projects, and shall fulfill the overall functional needs of each building's space program. Initial space planning is provided by the Programming and Project Criteria (PPC) Design Team in diagrammatic form and relates to Blocking and Stacking as described in **Chapter 7 Architectural Design**. PPC Design Teams shall provide detailed adjacency matrices that identify internal and group adjacencies as well as overall building and departmental organization. Both the PPC and later design shall demonstrate responsiveness to the following principles:

- Program components shall be efficiently organized into coordinated groups based on functionality, e.g., general classrooms, class labs, study areas, administrative suites, etc.
- Space planning shall address all relationships in the detailed program adjacency matrices in the PPC.
- Layouts shall provide efficient movement connecting student activities.
- Public- or student-facing work areas shall be easy to access.
- Circulation spaces shall provide for security with controlled access to "back of house" areas.

8.4.1 Opportunities for Interaction

For interior design, a key experiential quality that supports interaction is visual connectivity. Classrooms, offices, study rooms, class-labs, and meeting spaces may incorporate interior glazing along their circulation paths, with a preference for locations facing direct natural light. Sidelights, clerestory windows and/or glass doors can ensure visual connectivity within spaces and facilitate the flow of natural light.

Given contemporary security and public safety concerns, Design Teams for the PPC and later phases shall confirm the approach to interior windows with each campus. See also **Chapter 7 Architectural Design** for related design approach and features to promote interaction.

8.5 Interior Space Guidelines and Standards by Room Type

Interior rooms for California Community College facilities are identified by Room Codes based on function and type, with standardized formulae for sizes and quantities based on utilization. Refer to the current "Board of Governors of the California Community Colleges Policy on Utilization and Space Standards" for requirements. PPC Design Teams are responsible for validating proposed program areas with these requirements and documenting in tabular form.

For core functional aspects of acoustics, lighting, and technology, refer to **Chapter 9 Acoustics Design, Chapter 12 Electrical Design,** and **Chapter 16 Technology & Audiovisual Design**. See also **Volume 3 Appendices | Section 8 Interiors & FFE** for selected examples of Room Data Sheets for some common room types. Design Teams preparing the PPC shall review these examples as a guideline scope of graphic and written information to be provided for all room types in the project's space inventory. The following Guidelines provide an overview of LACCD's goals and priorities with respect to interior environments.

8.5.1 Lobbies

Major entrances and building lobbies shall be easily identified on approach and make a clearly welcoming first impression with cohesive design that reflects the overall dignity and purpose of LACCD's colleges. This includes providing natural light and visibility from inside out and outside in, as well as meeting guidelines and standards for Accessibility and Inclusivity under 8.3 above. Space planning for these spaces shall address way-finding with visible connections to stairs and elevators. As high-traffic spaces, lobbies shall be finished with durable and easy-to-maintain materials for flooring, walls, and other surfaces. Interior and exterior night lighting shall be designed for safety and security. Acoustics may be livelier than other interior spaces, but shall allow speech intelligibility. Provide walk-off mats at entry doorways and vestibules.

8.5.2 Transition Spaces/Corridors

A well-connected network of accessible circulation spaces forms the vital armature of building organization. These spaces can also play a crucial role in enhancing the educational experience when designed to foster social and educational gatherings, facilitate conversation through acoustical design, and offer informational signage and display zones.

Minimum Clear Corridor widths shall be as follows:

- Single-loaded at offices: 5 feet
- Double-loaded at offices: 6 feet
- Single loaded at Instructional rooms: 8 feet
- Double-loaded at Instructional rooms: 10 feet
- Minimum corridor clear ceiling height: 8 feet
- Preferred clear corridor ceiling height: 10 feet

In any case, transition spaces and corridors shall be sized as needed for the simultaneous movement of many students during class turnovers, and to comply with code-required exiting. Natural light and view for at least portions of hallways is strongly preferred. Open stairways shall strengthen the visual as well as functional ties between floors and provide views and natural light where possible. For security, design to avoid niches and blind corners that allow someone to hide. Signage and graphics following Universal Design principles shall be fully integrated to assist student and staff wayfinding.

8.5.3 Elevators

All elevator finishes and materials shall support heavy-duty use and be selected to provide durability, longevity, sustainability, color retention, structural integrity, ease of upkeep, and replacement, allowing for 20 years of low maintenance. Material and color selections shall be compatible with adjacent interior space design. See **Volume 2 District Specifications** and **Campus Specifications Matrix**.

Note: Machine-room-less (MRL) elevator systems are specifically prohibited in LACCD buildings.

8.5.4 Classrooms

This category includes general-purpose classrooms, lecture halls, and other rooms used primarily for scheduled instruction not requiring special furnishings or equipment for student use. Classroom facilities may include any support rooms that serve the classroom activity. A general use classroom typically contains instructional aids and equipment that support multiple types of instruction. Key principles that shall guide the design of classrooms include:

Design for Functionality

Classrooms shall be sized and proportioned to accommodate the programmed number of occupants utilizing efficient, accessible furniture layouts. Classroom design must take into consideration both the set up and use of audio-visual equipment, layout of the instructor's materials, circulation space, and empty floor space needed to seat students with proper distance to view whiteboards, projection screens, or video monitors.

Integrate Building Systems

Design for teaching/learning environments shall result from careful coordination and integration of disciplines, including the interior designer, architect, mechanical engineer, electrical engineer, lighting designer, audiovisual specialist, acoustician, and instructor.

Incorporate Instructional Technology

All classrooms shall be designed with current

technology to meet instructional needs. Instructional technology shall be easily accessed and employed. The PPC shall provide complete listings of required FFE for each space. In addition to providing the programmed fixtures and equipment, Design Teams shall seek to standardize selections of classroom technology for consistent user interface and ease of maintenance. Refer to **Chapter 16 Technology & Audiovisual Design** for further details and requirements.

Allow for Adaptation

Provide for appropriate and changing technology. Renovations and new construction shall provide an infrastructure that is adaptable, flexible, and able to support future technologies. There must be balance between standardization for easier use and maintenance, and the need to upgrade, update, and add new capacities as technologies evolve.

8.5.5 Laboratories

A Laboratory is a room used primarily for formally or regularly scheduled classes that require special purpose equipment or a specific room configuration for student participation, experimentation, observation, or practice in an academic discipline. Virtually all types of laboratory space on LACCD campuses are teaching laboratories or Class-labs.

Design Teams developing the project's PPC shall provide specific Room Data Sheets on these very specialized spaces, showing test-fit layouts of furniture and equipment, as well as environmental and technical criteria. Common considerations include:

Capacity Load and Allowable Area

Labs have their own space standards in terms of area per student for the wide range of types. For a listing of Laboratory types and space allocations per student occupant see the current version of the "Board of Governors of the California Community Colleges Policy on Utilization and Space Standards".

Flexibility/ Adaptability

Design Teams shall configure laboratory space in as flexible and modular a way as possible to meet specific program needs and also allow for advances in pedagogy and change of use. Depending on the discipline being accommodated, modularity can be important in coordinating mechanical, electrical, and plumbing (MEP) systems, casework, laboratory support spaces, and specialized equipment and functions.

Zoning

For projects with programs largely devoted to laboratory spaces, creating "zones" based on lab types and service needs enable flexibility and ease of operations. Environmental Health and Safety (EHS) and Accessibility (ADA) codes are critical here. Zones may be differentiated relative to wet or dry lab fit-out, vibration requirements, interior ceiling heights, use of chemicals, or other significant technical needs.

Volume

Provide adequate ceiling height to allow ready access to systems for maintenance and/or modifications. For more industrial lab programs, planning shall provide greater floor to floor height to accommodate functions and equipment clear of mechanical, plumbing, and electrical distribution. These requirements shall be clearly established in the PPC.

Health & Safety

Science and engineering labs such as chemistry that use potentially hazardous materials require readily accessible safety features such as emergency eye-wash stations. Chemicals shall be stored so as to be controlled by staff and faculty.

Environmental Controls

Air supply for labs is to be coordinated with special exhaust equipment such as fume hoods to meet minimum requirements for air changes.

8.5.6 Office Space

This category includes enclosed rooms that are individual or shared, and open workstation space, used by faculty, staff, or students when working at one or more desks, tables, or workstations. Design Teams for the PPC develop the range of offices and workstations during programming and illustrate with Room Data Sheets for each type, including all furnishings, locations for power and data, and other requirements. Illustrative examples are provided in **Volume 3 Appendices | Section 8 Interiors & FFE**. Refer to the current "Board of Governors of the California Community Colleges Policy on Utilization and Space Standards" for requirements.

In planning office areas to serve specific departments, efficiency and flexibility are important considerations, and can be enhanced by:

- Shared reception and convenient conferencing/collaboration spaces accessible from public circulation.
- Program adjacency enables staff to work efficiently and in collaboration with colleagues.
- Open environments with well-defined

workstations allow for concentrated work as well as collaboration, and flexibility, and efficiency.

8.5.7 Meeting and Conference Rooms

Meeting Rooms are shared spaces accessible directly from building circulation, i.e., not included in an office suite. They may qualify as shared amenities that are typically not calculated in the campus Capacity Load and can provide important resources for students and staff. Conference Rooms accommodate fewer people and can often be sized to be repurposed as an enclosed Office. When enclosed within an office suite, Conference Rooms can add to the campus capacity load, which may place limits on allowable space. Meeting and Conference Room layouts shall be sized to allow proper viewing distances and access for AV equipment, as well as an accessible route into and around the space.

8.5.8 Building Support Areas

Volume 3 Appendices | Section 8 Interiors & FFE contains sample Room Data Sheets with additional provisions and guidelines for building support room types:

- Break Rooms
- Custodial Closets
- All-gender Rest Rooms
- Lactation Rooms

For other specific types of support spaces—e.g., Mechanical Rooms, Telecom, and Data Closets—see related Chapters for overall building systems.

8.5.9 Room Numbering

Room Numbering on Contract Documents must conform to the Campus Facilities conventions and must be coordinated with the Facilities Director. See also Design Bulletin 2022-006 Room Numbering Guidelines in **Volume 3 Appendices | Section 23 Bulletins**.

8.6 Architectural Systems, Materials & Color

Architectural systems, materials, and color are crucial design elements that impact function, aesthetics, and long-term serviceability of any space. Design Teams for the PPC shall include thorough guidelines for interior fit-out with clear criteria based on these Guidelines and Standards. It is essential for the Design Build Entity (DBE) and/or Architect/Engineer of Record to thoroughly review each of these elements, assessing architectural systems for functionality and efficiency, selecting appropriate materials based on durability and aesthetics, and choosing colors that reinforce building user experience and the overall design concept.

In general, materials, products, and finishes shall be selected for their durability and maintainability. Palettes of materials and colors within each building shall allow efficient repair and replacement by limiting varieties of attic stock and creating a harmonious use of a limited number and range of colors.

Note: All systems and materials shall align with **Volume 2 District Specifications** and **Campus Specifications Matrix** for preferred product selections for each college. See also any updated provisions in **Volume 3 Appendices | Section 23 Design Bulletins**.

8.6.1 Interior Architectural Systems

Architectural interior systems encompass the various integrated components and subsystems within a building, crucial for its function, performance, and aesthetic appeal. These systems provide structural support, control environmental conditions, ensure safety, and enhance user comfort. Examples of common interior architectural systems include:

- Interior Partitions and light gauge metal framing
- Gypsum board and interior lath and plaster
- Suspended ceiling grids and acoustic panels
- Fire suppression sprinkler heads and piping
- Registers, grilles, and any exposed ductwork for air supply and return
- General and special Interior Lighting and controls
- Acoustic wall panels
- Interior glazing with metal framing
- Raised floor systems

These architectural systems shall work together seamlessly to create interiors that meet functional needs, ensure occupant well-being, and contribute to overall sustainability. Critical factors for performance and serviceability include:

- Selecting/designing ceiling systems with ready access to systems above.
- Incorporating HVAC vents and other Mechanical System elements into ceiling design.
- Selecting and integrating lighting fixtures for specific room functionality and consistent interior character.

- Selecting wall and ceiling systems that meet acoustic requirements.
- Minimizing the number of different systems and elements to facilitate repair and replacement.
- Use of impact-resistant wall finish systems in service/support spaces as well as high-traffic circulation areas.
- Fixtures and equipment critical to building systems—including but not limited to lighting and temperature controls—that are within reach of users shall be vandal-resistant.

8.6.2 Materials & Colors

The selection of interior colors and materials directly affects the performance of any facility, as well as health and effectiveness of students, faculty, and administrators. Finish materials shall be selected to support and enhance the respective activities of each space. PPC provisions and Design team solutions shall address the following key considerations:

Durability and Resilience

All materials shall be durable and low in maintenance. While responding to function, aesthetics, and long-term performance, balance consideration of the varieties and types of finish materials throughout the project with the needs of repair and replacement. More precious or less durable materials should be used sparingly, away from high-traffic exposure or placed out of reach. Floors shall be easily maintained with no special knowledge, such as polished concrete or carpet tile.

Sustainability, Health & Wellness

Advance sustainability by choosing interior materials with minimal environmental impact, such as those made from renewable resources or that include significant recycled content. Durable materials that reduce maintenance and replacement costs also reduce the building's environmental footprint. Interior finishes and furnishings shall be of natural, zero/low toxicity, zero/low VOC, and allergy-free materials to maintain a healthy interior environment.

Color Selection

Color selection is a major design element that can enhance a project's overall interior design objectives by providing a balanced and harmonious atmosphere. This is achieved by understanding the relationship of neutral and accent colors and their use within the project's range of spaces and activities.

Selection of neutral colors is essential for promoting an environment conducive to learning and reducing stress levels. By avoiding overly stimulating or distracting colors, neutral tones help create a calming atmosphere that supports cognitive function and encourages a sense of well-being. Neutral colors, such as soft shades of white, ivory, or light gray create a sense of openness and tranquility, allowing occupants to focus without distractions. These colors reflect light effectively, maximizing natural and artificial illumination, which is crucial for maintaining alertness and concentration.

Accent Colors

Limit the use of accent colors, especially in areas programmed for learning. Overuse of accents can result in an overwhelming and distracting interior experience. Instead, focus on using accent colors sparingly and strategically to highlight specific features or elements. Accent colors can add visual interest and support wayfinding when used in more active circulation and arrival spaces. Use accent colors in artwork, furniture, or materials that can easily be replaced, such as paint, carpet and fabric. Bold or accent colors shall be avoided in most long-term, factory-finish materials, such as metal frames and panels, glass partitions or operable partitions, and lighting equipment.

Opportunities for Pattern, Texture & Environmental Graphics

Incorporating texture, graphics, and interesting patterns into appropriate spaces can enhance their visual appeal, creating engaging environments that enrich student and staff experience and support college identity through interior place-making. Texture adds depth and tactile interest to surfaces, while graphics and patterns can convey messaging, branding, and personality. The use of sculptural forms such as acoustical baffles and textured wall treatment, ceiling "clouds", and distinctive lighting forms augment the language of interior architecture. By integrating these elements thoughtfully, the design team can create dynamic and visually stimulating spaces that capture attention and leave a lasting impression. Integrate these elements in the design of focal point areas like main lobby, cafeterias, or other dynamic activity spaces.

8.7 Furniture, Fixtures & Equipment (FFE)

The selection of equipment, fixtures, and furnishings must be functionally appropriate and must meet or exceed performance criteria for District and/or college preferred products. Refer to **Volume 2 Campus Specifications Matrix** for furniture, fixtures, and equipment. Design Teams and

suppliers must demonstrate compliance with requirements for quantity, quality, and performance using manufacturer data and certification. All furniture and equipment must adhere to the District Master Agreement. The current list of FFE Master Agreement vendors can be obtained from the Relocation Project Manager. See related Divisions in **Volume 2 District and Campus Specifications**.

Note: For all structure-attached fixtures and equipment, provide structural design and calculations per DSA requirements.

Furniture Selection & Placement

Choose furniture that meets Universal Design principles to ensure accessibility for all users. This includes considerations such as adjustable height desks and tables to accommodate individuals with mobility impairments, ergonomic seating options to promote comfort and support for users of varying needs. All furniture shall be chosen with careful consideration of the room's layout and capacity, including dimensions that accommodate accessibility. Furniture selections shall balance comfort, appearance, durability, and maintenance. Prioritize functionality and sturdy construction to ensure durability and usability for users of all ages and abilities.

All finish surfaces must be easy to clean and antimicrobial. Additionally, fabrics shall be durable, without excessive texture, and easy to maintain and clean. These requirements ensure a hygienic environment and simplify maintenance, promoting cleanliness and longevity of the furnishings.

The interchangeability of colors in furniture is essential for design flexibility, enabling seamless adaptation to evolving preferences and decor schemes. This feature enhances versatility and ensures the longevity of furniture's aesthetic appeal, accommodating a variety of needs across different settings and functions within the college. Accent colors in furniture can be employed in smaller proportions to add flair and draw attention to specific seating areas, thereby enhancing the overall ambiance and functionality of the space.

Millwork & Casework

Millwork refers to custom made, built-in interior fixtures. Casework refers to modular or preassembled cabinets, shelving, and other fixtures that may be relocatable. Meet or exceed ANSI/AWI 0641-2019-Architectural Wood Casework standards for Custom Grade.

Interior Doors & Door Hardware

Interior doors must meet or exceed California Code minimum for size of openings, as well as numbers and capacities of exit doors per space and occupancy. Door construction and finish materials shall meet code requirements and fire ratings for space locations and exiting.

Provide metal or solid core wood doors that meet or exceed ANSI/AWI standard for Custom Grade or better.

Accessibility for FFE

Ensure that cabinets are installed at heights reachable by individuals with disabilities, provide adequate clear floor space in front of them for wheelchair users, use hardware that is operable with a closed fist or limited range of motion, locate operable parts within accessible reach range, and provide sufficient clearance underneath for wheelchair access. Create environments that accommodate individuals of all abilities, foster inclusivity and allow everyone to navigate and utilize the space effectively.

Lighting

Light fixture selection and placement shall provide adequate lighting levels for all functional areas of rooms and interior spaces. Fixture installation shall meet seismic design criteria with details and systems required for DSA approval. Select LED light fixtures with a correlated color temperature (CCT) of 3500°Kelvin or as determined by the specific needs or use of the space as stated in the PPC or OPR, with minimum of 90 color rendering index (CRI) ratings to accurately render colors and enhance visibility. Additionally, consider fixtures with dimming capabilities to adjust light levels according to specific needs throughout the day.

Refer to **Chapter 12 Electrical Design | Section 12.17 General Lighting** section for light fixture selection.

CHAPTER 9

Acoustics Design

Los Angeles Harbor College

CHAPTER 9 - ACOUSTICS DESIGN

CHAPTER 9 - ACOUSTICS DESIGN

9 Acoustics Design

To provide the appropriate acoustical design for teaching, learning, and working spaces, LACCD projects shall typically focus on 4 primary areas of acoustical performance:

- Sound Isolation
- Background Noise
- Room Acoustics
- Vibration Control

These aspects of acoustical design impact speech intelligibility and ease of speech communication in classroom and meeting room settings, reduction of distracting intrusive noise, speech privacy in spaces housing sensitive conversations, and more.

9.1 Acoustical Design Process

9.1.1 Programming

The programming phase shall include efforts to identify space types with acoustical requirements and to define those acoustical requirements. For the most common space types, acoustical performance criteria are provided in the Design Guidelines and Standards. For space types for which acoustical performance criteria are not defined, criteria shall be developed in coordination between the Design Team (DT) (or Design-Build team) and the District.

It is assumed that some LACCD projects will include space types not covered within these criteria narratives, but such rooms may still require the implementation of acoustical measures for proper functionality. For room types not covered in these criteria, acoustical requirements shall be coordinated between the Acoustical Consultant and the College Project Team (CPT) and/or District Project Manager (DPM) during the Program and Project Criteria (PPC) process. Examples of such spaces include, but are not limited to, Fine Arts or Music Performance and Rehearsal, Video or Audio Broadcast or Recording, Cinematic Viewing, etc.

9.1.2 Design Team

On all projects with acoustical criteria, the Design Team shall include a qualified acoustical consultant. Planning and design efforts shall include coordination with the project acoustical consultant early in the design process. Cost impact can typically be reduced by incorporating acoustical performance requirements early in a project and by implementing some of the general planning considerations discussed below.

For projects utilizing a Design-Build delivery method, the completion of acoustical design to achieve the acoustical performance criteria listed in the Design Guidelines and Standards shall be the sole responsibility of the Design-Builder. The Design-Build team shall clarify with the CPT and/or DPM any performance requirements for specialty spaces not covered in the Design Guidelines and Standards.

9.1.3 Space Planning

In general, space planning efforts shall aim to avoid direct horizontal or vertical adjacencies between noisy spaces (e.g., restrooms, equipment rooms, etc.) and acoustically sensitive spaces (e.g., classrooms, offices, etc.). Acoustically sensitive spaces would generally include spaces with background noise criteria of NC-35 or lower as specified in Table 4 Maximum HVAC Background Noise Levels and particularly noisy areas, such as event/presentation spaces, MEP equipment rooms, elevator shafts and equipment rooms, noisy outdoor areas (e.g., busy roadways, rooftop equipment areas, central plants), etc. Where possible, buffer spaces with less stringent background noise criteria shall be located between acoustically sensitive space types and potentially noisy areas.

Where this cannot be achieved, allow for relatively thick and massive demising assemblies, with final detailed assemblies to be closely coordinated by the Acoustical Consultant to achieve acoustical performance criteria in these Design Guidelines and Standards.

9.1.4 Site Conditions

The Design Team shall consider specific aspects of the project site to identify potential challenges with achieving any of the acoustical criteria listed in these Design Guidelines and Standards.

For renovations, the Acoustical Consultant shall visit the existing site and building to evaluate existing conditions and identify potential limitations in achievable acoustical performance, needs for adjusting acoustical design approaches, and/or needs for providing acoustical mitigation outside of the base project scope of work based on items outside the project scope of work impacting the acoustical environment within the project scope of work.

9.2 Sustainability

Some materials and assemblies provide crucial acoustical performance, and acoustically functional buildings will generally require the use of materials and products based solely or partly on their acoustical performance. It is important that such

Projects shall achieve any pre-requisite acoustical criteria required for achieving LEED Certification (according to the version of LEED being used for the subject project), and pursuit of optional acoustical credits shall be considered.

Refer to **Chapter 3 Sustainable Design** and to **Volume 2 District Specifications** and **Campus Specifications Matrix** for more information.

The general intent of these Design Guidelines and Standards is to provide acoustical criteria similar to LEED v4.1. If acoustical LEED credits will be pursued (including for LEED versions subsequent to v4.1), for all aspects of acoustical design, the more stringent requirement (between the Design Guidelines and Standards and LEED performance requirements) shall apply.

9.3 Interior Sound Isolation

Sound isolation is a measure of the decrease in sound level when sound passes through construction assemblies. It is important to quantify the degree to which acoustically sensitive spaces are protected from distracting noise and/or speech privacy is maintained. The total noise reduction between two adjacent spaces depends on the composite transmission loss of the various components (partitions, doors, windows) making up the demising assembly between the two spaces.

9.3.1 Airborne Sound Isolation

Interior partition and floor/ceiling assemblies shall be specified and constructed to achieve the composite sound isolation criteria provided in Tables 1 and 2. Criteria for composite airborne sound isolation are provided in terms of the Noise Isolation Class (NIC), as tested according to ASTM E336 and classified according to ASTM E413.

Detailing of acoustically-rated partition, door, and interior glazing assemblies is critical in maintaining the specified sound isolation performance. Typically, such detailing would include consideration of stud framing stiffness and spacing, acoustically sealing perimeter, intersection, and penetration conditions. Additionally, design of building services systems, particularly duct layouts, shall not reduce the composite sound isolation performance of demising assemblies.

Table 1: Matrix of Composite Sound Isolation Performance Requirements (Noise Isolation Class) for Partitions and Floor/Ceiling Assemblies (also ref. Table 2)

	Classrooms, Laboratories	Group Study, Class/ Lab Support	Lecture Hall, Auditorium[1]	Open Office	Private Office	Confidential Private Office	Conference Room	Office Support (Copy/ Print)	Café, Pantry, Kitchen[2,3]	Lobby, Corridor	Restrooms[2]	Storage Room[3]	Elec, IDF	MEP Equipment Room[4]
Classrooms, Laboratories	40	40	50	40	40	45	45	40	45	40	50	35	45	AR
Group Study, Class/Lab Support		40	50	35	35	45	45	35	45	35	50	35	45	AR
Lecture Hall, Auditorium[1]			50	50	50	45	50	50	50	45	DNU	35	45	DNU
Open Office				N/A	35	45	40	N/A	N/A	N/A	45	N/A	40	AR
Private Office					35	45	40	35	40	35	50	35	40	AR
Confidential Private Office						45	45	45	45	35	50	45	40	AR
Conference Room							45	45	50	40	50	35	45	AR
Office Support (Copy/Print)								N/A	N/A	N/A	N/A	N/A	35	AR
Café, Pantry, Kitchen[2,3]									N/A	N/A	N/A	N/A	35	AR
Lobby, Corridor										N/A	N/A	N/A	35	AR
Restrooms[2]											N/A	N/A	N/A	AR
Storage Room[3]												N/A	N/A	N/A
Elec, IDF													N/A	N/A
MEP Equipment Room[4]														N/A

Table 1 Legend:

- "N/A": No acoustical requirements apply at this adjacency.
- "DNU": Adjacency shall be avoided.
- "AR": As required to achieve other criteria.

Table 1 General Notes:

- Partitions at doors:
  - Avoid interconnecting doors between enclosed rooms unless required for life safety purposes or unless the programming of the connected rooms will be shared such that sound transfer through the door is not a concern. Otherwise, all room entry doors shall open into circulation areas or open work areas.
  - Where doors occur between spaces, the door will be the weakest point in the partition, acoustically. The partition assembly surrounding the door shall be specified such that the composite sound isolation requirements listed in Table 2 Keynotes, below, are achieved.
  - Proprietary acoustically-rated doors shall be used only when other options (modifying adjacencies, providing buffer spaces or vestibules) are not available.
- Interior glazing:
  - Avoid interior glazing at adjacencies where doors are not provided (i.e., interior glazing is typically only acceptable between enclosed spaces and circulation areas or open work areas) unless required for life safety purposes or unless the programming of the adjacent spaces will be shared such that sound transfer through the glazing is not a concern.
  - Where interior glazing is provided at adjacencies with doors, the interior glazing shall meet STC-35. Interior glazing is generally not acceptable at adjacencies requiring acoustical performance greater than STC-35.
- Demountable partitions:
  - If used, demountable partition, glazing, and door systems shall be specified for the sound isolation requirements given in Table 1 and Table 2 Keynotes. Assemblies must include laboratory acoustical test data for entire composite assemblies (i.e., laboratory tests of individual panels are not acceptable) or equivalent field test performance higher than 5 NIC points lower than the required STC rating (e.g., ≥NIC-40 acceptable for STC-45 requirement).
- Operable partitions:
  - Where operable partitions will subdivide rooms, assemblies shall be specified according to the NIC requirements from Table 1 between like-kind spaces. Architectural details for head and perimeter intersection details shall be coordinated to maintain the acoustical performance of the partition. Avoid ductwork passing above operable partition heads or provide acoustical control within duct systems such that the sound isolation performance of the operable partition is not compromised. Likewise, inclusion of acoustically absorptive finish materials on operable partitions, if required to achieve reverberation time requirements, shall not reduce the STC performance of the assembly such that sound isolation requirements are not achieved.

Table 1 Keynotes:

1. Noted requirements for Auditoria shall be considered minimum requirements, but specific programming of individual rooms may require more stringent acoustical criteria. This shall be coordinated with the project acoustical consultant and the CPT and/or DPM.
2. In addition to STC requirements, partitions containing plumbing fixtures shall be specified with a resilient air gap between the service-side row of studs and the studs (e.g., double-stud or independent furred stud row). There shall be no bridging across the resilient air gap. Avoid direct adjacencies between plumbing walls and acoustically-sensitive spaces (per Section 9.1.3).
3. Where impact noise (e.g., cabinetry on the wall of a break room) is a concern, double stud partitions shall be provided, superseding this table.
4. Partition types at mechanical rooms shall ultimately be determined by equipment noise analysis.

Table 2: Sound Isolation Requirements for Partitions Containing Entry Doors From Enclosed Spaces to Lobbies/Corridors

Source Space	Demising Assembly Composite Sound Isolation
Classroom, Laboratory, Group Study, Class/Lab Support, Private Office	NIC-25[1]
Conference Room, Elec/IDF	NIC-30
Confidential Private Office	NIC-35
Lecture Hall, Auditorium	NIC-45[2]
MEP Equipment Room	"AR" per Table 1
Media Production Classroom or Laboratory	TBD by CPT and/or DPM

Table 2 Keynotes:

1. Acoustical requirements for doors between classrooms and corridors are not particularly acoustically stringent with the assumption that noise generated by corridor traffic can be controlled administratively.
2. It is acceptable to achieve equivalent sound isolation performance across two separate doors as part of a sound lock vestibule.

9.3.2 Impact Sound Isolation

Floor/ceiling assemblies of normally occupied rooms located above acoustically sensitive spaces shall be designed for impact sound isolation rating criteria provided in Table 3. Criteria for impact sound isolation are provided in terms of the Impact Isolation Class (IIC), as tested according to ASTM E492 and classified according to ASTM E989.

9.4 Background Noise

Background noise levels are an important aspect of speech intelligibility, so background noise levels due to environmental noise intrusion and building services shall be limited according to Sections 9.4.1 and 9.4.2, below.

Massing and siting exercises shall consider impacts of nearby environmental noise sources, such as freeways, roadways, airports, etc.

9.4.1 Environmental Noise Intrusion

The Acoustical Consultant shall complete an exterior noise intrusion study to assess environmental noise level exposure for the project. The building envelope shall be designed in order to limit environmental noise intrusion per below (with windows closed.)

Classrooms, Laboratories, and Group Study/ Classroom Support: 40 dBA max hourly average sound pressure level (L_{eq}-1hr).

All other interior occupied areas: Comply with CALGreen, Title 24, Section 5.507.4.

Furthermore, as discussed in Section 9.1.2, it is conceivable that future projects will include programming for which even more stringent exterior noise intrusion attenuation shall be required. Such additional criteria shall be established as appropriate at the discretion of the CPT and/or DPM.

9.4.2 Building Services - HVAC

Mechanical equipment shall be selected for low noise levels and located remote from acoustically sensitive spaces to the extent feasible. The noise data for all mechanical equipment shall be incorporated into the project specifications and project drawings.

For any air handling units, dedicated outside air units, and exhaust fans, down discharge units are unacceptable. A sufficient length of ductwork shall occur between the unit and the roof penetration, or where the ductwork penetrates the mechanical room envelope, such that sound attenuators may be incorporated into the duct runs prior to entering occupied space.

Design criteria for background noise due to HVAC equipment are provided in Table 4. Criteria for background noise levels are provided in terms of the Noise Criterion (NC), as defined in ANSI/ASA S12.2-2019 and measured per ANSI S1.13-2005. Additionally, no "prominent" tones shall be present in background noise spectra, as defined by ANSI S1.13-2005, Annex A, Section A.7.5.

The Acoustical Consultant shall conduct acoustical analyses and provide noise mitigation strategies to confirm that neither airborne noise from equipment openings or radiated from equipment casing (when transmitted through building structures including wall and floor/ceiling assemblies) nor ductborne noise will increase background noise levels in occupied spaces above the background noise criteria.

Table 3: Floor/Ceiling Impact Sound Isolation Requirements

Space Below Floor/Ceiling Assembly	Floor/Ceiling Impact Sound Isolation
Classroom, Laboratory, Group Study, Class/Lab Support, Private Office, Confidential Private Office, Conference Room	IIC-45
Lecture Hall, Auditorium	IIC-55

Acoustical design shall include measures to limit airflow-generated noise through ductwork, terminal devices, dampers, and air inlets/outlets.

All new HVAC equipment (including food service ventilation or cooling equipment) shall include acoustical mitigation as required to comply with any and all requirements (e.g., local noise ordinances, noise elements, etc.) at neighboring property lines. Additionally, all new HVAC equipment shall include acoustical mitigation as required such that equipment noise levels at outdoor gathering, teaching, or dining areas do not exceed 55 dBA.

9.4.3 Building Services - Plumbing

Plumbing piping, including waste/drainage piping, shall not pass over or through acoustically sensitive spaces wherever possible. Where this adjacency cannot be avoided, piping shall be enclosed in drywall or mass-loaded vinyl lagging to reduce fluid noise transfer to the sensitive space. The pressure at the inlet(s) to the building be limited to 70 PSI.

Waste and vent lines shall utilize cast iron piping, and cold and hot water lines shall be copper. Plastic piping shall be avoided at acoustically sensitive spaces. Fluid velocities for cold and hot water lines shall be limited to 6fps and 4fps, if feasible.

All new plumbing equipment shall include acoustical mitigation as required to comply with any and all requirements (e.g., local noise ordinances, noise elements, etc.) at neighboring property lines. Additionally, all new plumbing equipment shall include acoustical mitigation as required such that equipment noise levels at outdoor gathering, teaching, or dining areas do not exceed 55 dBA.

9.4.4 Building Services – Electrical

All new electrical equipment shall include acoustical mitigation as required to comply with any and all requirements (e.g., local noise ordinances, noise elements, etc.) at neighboring property lines. Additionally, all new electrical equipment shall include acoustical mitigation as required such that equipment noise levels at outdoor gathering, teaching, or dining areas do not exceed 55 dBA.

9.5 Structural Vibration

All HVAC, electrical, plumbing, food service, fire protection, and elevator equipment and/or piping (new equipment only in the case of renovations) shall include appropriate vibration isolation measures, compliant with any and all seismic restraint requirements, to limit structural vibration levels in floor assemblies of regularly-occupied spaces due to such equipment to below the "Office/16000 μin/s" curve in ASHRAE 2023, Chapter 49, Fig. 42 (or equivalent in subsequent versions). Refer to ASHRAE 2023, Chapter 49, Table 47 for guidance for such vibration isolation measures.

Additionally, the building structural design shall provide sufficient stiffness and damping in floor assemblies to limit structural vibration levels within occupied areas due to footfall traffic to below the "Office/16000 μin/s" curve in ASHRAE 2019, Chapter 49, Fig. 42 (or equivalent in subsequent versions.)

9.6 Room Acoustics

Acoustically absorptive finish treatments shall be specified within rooms to limit maximum reverberation times (RT) as listed in Table 5. RT criteria are provided in terms of the mid-frequency reverberation time, which represents the average reverberation time in the 500 Hz, 1000 Hz, and 2000 Hz octave bands.

Acoustical treatments shall be placed within rooms as required to minimize perceptible flutter, echo, or other reflections. Material selections and placement shall be coordinated with the Design Team to account for non-acoustical considerations (e.g., durability).

For spaces where reasonable to high quality audio system usage is required (typically including Classrooms, Lecture Theaters, Auditoria, Large Conference Rooms, some Classrooms and Gymnasia) the placement of acoustical treatment shall be coordinated with the audio design in order to support that goal.

Table 4 Maximum HVAC Background Noise Levels

Space Type	Background Noise Criterion
Lecture Hall, Auditorium	NC-25
Conference Room	NC-30
Classroom, Teaching Laboratory, Group Study, Class/Lab Support	NC-35
Private Office, Confidential Private Office	NC-35
Wet/Science Laboratories (no fume hoods running)	NC-40
Open Office	NC-40
Corridor, Lobby	NC-40
Café, Pantry	NC-40
Restrooms	NC-45
Wet/Science Laboratories (with fume hoods running)	NC-55

9.7 Construction Verification

The need for the testing discussed in this section shall be determined on a project-by-project basis at the discretion of the CPT and/or DPM. At Owner's discretion, they may conduct acoustical testing of completed construction, or commission such services from a third-party. Should testing be undertaken, and deficiencies identified, the burden for correctional work shall be determined on a project-by-project basis. Sections below provide guidance for how testing shall be conducted, unless the District decides to provide more specific requirements.

After substantial completion of construction and completion of HVAC testing and balancing of each project, field testing to verify acoustical performance shall be performed by the design team, and results shall be provided in a Post-Construction Acoustical Compliance Report. This report shall include documentation of the following testing. General requirements for sampling of locations requiring testing are provided below, but final testing locations shall be coordinated and confirmed with the District prior to commencing testing.

For Design-Build projects, the Design-Builder shall have the burden of modifying the space until the specifications are met. After remedial work, the areas not in compliance shall be retested. This shall continue until all tests performed comply with the project criteria.

9.7.1 Horizontal Airborne Sound Isolation

Horizontal airborne sound isolation measurements shall be in accordance with ASTM E336 and classified in accordance with ASTM E413. Testing shall capture nominally 15% of partition and door assemblies on the project over a range of adjacency combinations on multiple floors.

9.7.2 Vertical Airborne Sound Isolation

Vertical airborne sound isolation measurements shall be in accordance with ASTM E336 and classified in accordance with ASTM E413. The measurements shall be considered in compliance if the measured NIC level is less than 5 points below the required STC rating of the assembly. Testing shall be provided for at least 1 location on each story (no testing required to exterior roof level or penthouse service areas). Up to 2 additional tests may be requested by the District for particularly acoustically sensitive spaces and/or for different structural floor/ceiling arrangements.

9.7.3 Impact Sound Isolation

Impact sound isolation measurements shall be in accordance with ASTM E1007 and classified in accordance with ASTM E989. The measurements shall be considered in compliance if the measured Impact Sound Rating (ISR) is less than 5 points below the required IIC rating of the assembly. Testing shall be provided for at least 1 location on each story (no testing required to exterior roof level or penthouse service areas). Up to 2 additional tests may be requested by the District for particularly acoustically sensitive spaces and/or for different structural floor/ceiling arrangements.

9.7.4 HVAC Background Noise Levels

HVAC background noise measurements shall be in accordance with the latest version of ANSI S1.13 using the slow time constant of a Class 1 sound level meter and octave filter set meeting the requirements of the latest edition of ANSI Standard S1.4 and S1.11. Measurements shall be made with the microphone located 3 feet above the floor in areas where individuals are normally seated and 5 feet above the floor where individuals are

Table 5 Maximum Reverberation Time Criteria

Space Type	Max. Mid-Frequency RT
Lecture Hall, Auditorium	0.7 seconds
Classroom or Teaching Laboratory (< 10,000 cubic ft)	0.6 seconds
Classroom or Teaching Laboratory (≥ 10,000 cubic ft)	0.7 seconds
Conference Room, Group Study, Class/Lab Support, Private Office, Confidential Private Office	0.6 seconds
Open Office	0.8 seconds
Lobby with A/V Program (Gathering, Events)	1.0 seconds
Lobby with no A/V program	1.5 seconds
Wet/Science Laboratories	1.0 seconds
Café, Pantry	1.0 seconds

normally standing. Sound levels shall be classified in accordance with the latest version of ANSI/ ASA S12.2. Testing shall capture nominally 20% of occupied rooms on the project over a range of adjacency combinations on multiple floors.

9.7.5 MEP Equipment Noise at Property Lines

Measure noise levels at property lines in locations as dictated by the District. Measurement durations and methodology shall be determined by the applicable project criteria.

9.7.6 Exterior Noise Intrusion

Measure exterior noise intrusion at representative rooms on each façade of the building to demonstrate compliance with the exterior noise intrusion criteria required for this project. Measurement durations and methodology shall be determined by the applicable project criteria.

9.7.7 Structural Vibration

Vibration measurements shall be made in accordance with ANSI S2.71 "Guide to the Evaluation of Human Exposure to Vibration in Buildings" utilizing equipment and calibration procedures contained in ANSI Standards S1.6. S1.11, S2.2, and S2.4. Vibration Measurements shall be made on hard-surfaced flooring, not carpet. Where carpet is installed the carpet shall be rolled back or removed so that the vibration measurement can be performed. Testing shall be provided for at least 1 location on each occupied above-grade story.

9.7.8 Reverberation Time

Reverberation time measurements shall be in accordance with ASTM E2235. Testing shall capture nominally 20% of occupied rooms for which reverberation time criteria are provided.

CHAPTER 10

Structural Design

Los Angeles Valley College

CHAPTER 10 - STRUCTURAL DESIGN

CHAPTER 10 - STRUCTURAL DESIGN

10 Structural Design

10.1 Introduction

This chapter establishes the minimum basic requirements and parameters for the Structural systems design for LACCD projects. These requirements are to be interpreted only as a minimum requirement; the Structural Engineer of Record (SEOR) may exceed these minimum requirements where deemed necessary in their judgment and/or to meet unique project requirements

10.2 Sustainability

The structural design shall incorporate sustainability strategies as necessary to accomplish the overall sustainability goals of the project as established in **Chapter 3 Sustainable Design.** Such measures at a minimum shall include:

- Documentation of Recycled Content – primarily for structural steel and concrete reinforcement
- Minimization of cementitious material in concrete mix designs
- Other well-established proven strategies/ technologies that do not expose LACCD to undue risk, unless otherwise permitted by LACCD minimizing embodied energy.

The list below includes mandatory sustainability features related to structural design.

- 3.5.12 Material and Resources

Please refer to **Chapter 3 Sustainable Design** for details on sustainable design features related to structural materials.

10.3 Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code and regulations related to structural design.

- 1.6 Structural Regulatory Requirements

10.4 Design Loads

10.4.1 Live Loads

- Live loads shall be developed in conformance with Section 1607A of the California Building Code (CBC).
- Partition loading per Section 1607A.5 shall be over and above the live loads listed in Table 1607A.1.
- General storage rooms/closets shall be classified as either Light or Heavy Storage areas in accordance with Item 33 in Table 1607A.1.

10.4.2 Dead Loads

Dead loading for structures shall at a minimum include the following as applicable:

- Self-weight of the primary structure, including the following:
  - Overpour of concrete to achieve level decks
  - Connections and miscellaneous bracing, etc.
- Roofing assembly above the roof primary structure, including an allowance for (1) re-roof
- Floor finish assemblies, including mortar beds, topping slabs, etc.
- M/E/P components, pads/curbs, and distribution systems
- Fire Sprinkler components and distribution systems
- Ceiling assemblies
- Light fixtures
- Partitions when considering seismic dead load only (5 psf roof, 10 psf floors)
- Any other permanent components of the building structure

10.4.3 Wind Loads

Wind loads shall be developed in accordance with the following at a minimum:

- **Exposure Category:** C, unless D is required due to proximity to large bodies of water
- **Risk Category/Importance Factor:** As required based on occupancy load and type
- **Basic Wind Speed:** Per Figure CBC Figure 1609A.3(1) through 1609A.3(4) based on the established Risk Category

10.4.4 Seismic Loads

Seismic loads shall be developed in accordance with the following at a minimum unless alternative criteria is provided by a project-specific geotechnical report:

- **Risk Category/Importance Factor:** As required based on occupancy load and type.
- **Acceleration Parameters:** As specified in ASCE 7 Section 11.4.2. Utilize precise latitude and longitude coordinates based

on the project site location on the campus where possible.

- **Site Class:** As specified in ASCE 7 Section 11.4.3.
- **Risk-Targeted Maximum Considered Earthquake (MCER) Spectral Acceleration Parameters:** As specified in ASCE 7 Section 11.4.4.
- **Design Spectral Acceleration Parameters:** As specified in ASCE 7 Section 11.4.5.

10.5 Structural Systems

10.5.1 General

Structural systems shall be selected based on the following criteria:

- Structural systems selected for use shall be well documented in the Structural Codes and References section in **Chapter 1 Codes & Regulations**. Systems that require an Alternate Means of Compliance (i.e. DSA SS/CC) are to be avoided unless otherwise permitted by LACCD in writing.
- Compatibility with architectural massing and exterior wall concepts
- Construction cost
- Schedule
- In general, most buildings will consist of one of the following types (or a combination thereof): structural steel, concrete, or CMU. Wood framed/CLT structures are to be avoided unless specifically permitted by LACCD.

10.5.2 Structural Steel Systems

Composite floor deck systems shall generally consist of W3+3-1/4" lightweight concrete decks. Shallower flutes may be considered locally to address small floor depressions or where structural steel framing spacing permits. Thinner deck toppings than 3-1/4" shall generally be avoided as they may present challenges for rebar placement and post-installed anchor design. Conduit/pipe runs shall not be embedded in composite decks unless they are thickened as required to accommodate the worst case conditions, including crossing conditions.

Framing at exterior deck edges or at other locations where deflections may impact the exterior wall system shall be designed for a maximum live load deflection (up or down) of 3/8".

Steel Seismic Lateral Force Resisting Systems shall consist of braced frames or moment frames as currently recognized by ASCE 7 in Table 12.2-1. Division of the State Architect (DSA) and LACCD familiarity with the proposed system shall also be taken into consideration, which may preclude some code-recognized systems.

10.5.3 Concrete Systems

LACCD permission is required for the use of Post-Tensioned floor systems (parking structures exempt.) The potential of damaging a tendon during future alterations/renovations may preclude the use of this type of floor system.

Framing at exterior deck edges or at other locations where deflections may impact the exterior wall system shall be designed for a maximum live load deflection (up or down) of 3/8".

Concrete Seismic Lateral Force Resisting Systems shall consist of shear walls or moment frames as currently recognized by ASCE 7 in Table 12.2-1. Moment frame columns shall be square or rectangular in cross-section shape.

10.5.4 Moment Frame Systems

If moment frame systems are utilized to resist seismic loads, the SEOR shall coordinate with LACCD and the Geotechnical Engineer of Record (GEOR) to determine if a site-specific ground motion study is warranted to avoid the penalties on the response spectrum curve associated with Exception 2 of ASCE 7 Section 11.4.8. Please note that the results of a site-specific ground motion analysis can vary; there is no guarantee of lower ground motions at the natural building periods.

10.6 Foundation Systems

Foundation systems shall consist of reinforced concrete conventional spread footings, a reinforced concrete mat foundation, or reinforced concrete pile foundations. The system type selection shall be based on coordination between the Design Team (DT) and the Geotechnical Engineer.

The foundation design shall conform to ASCE Section 12.13, including Section 12.13.9 - Requirements for Foundations on Liquefiable Sites.

Where ground improvement is proposed for a project, the following requirements apply:

- Potential disturbance to the campus and adjacent neighborhoods shall be considered in the selection of a ground improvement system.
- Appropriate consultants shall be retained to fully design and detail the ground improvement system.

- The geotechnical report shall include full recommendations and performance criteria objectives for the proposed ground improvement system.
- Drawings and specifications for the ground improvement system shall be provided by a knowledgeable consultant that includes a complete testing program as required by the California Geological Survey (CGS). The ground improvement plan shall be overlayed by the SEOR on the foundation plan.

10.7 Exterior Wall Systems

Exterior wall system design and detailing shall account for building drift and building vertical deflections.

Crush zones or expansion joints shall be provided where differing wall systems intersect (i.e. wall framing and curtainwall) with dissimilar drift joints or racking design approaches.

10.8 Interior Wall Partitions

Interior wall systems shall account for building drift and building vertical deflections.

Interior wall systems shall be designed to resist seismic and/or dead loads from all attached shelving, equipment, or other elements. Coordinate with the architect for attachment detailing of said shelving/equipment.

10.9 Interdisciplinary Coordination

10.9.1 Mechanical/Electrical/Plumbing (MEP)

SEOR and MEP subconsultants shall coordinate to ensure the following requirements have been addressed in the DSA Submittal:

- Seismic Anchorage Calculations:
  - Floor/Roof mounted equipment over 400 pounds or with a center of gravity above 4 feet from the floor/roof
  - Wall/ceiling mounted equipment over 20 pounds
- Seismic Anchorage Specification:
  - Required for all equipment regardless of weight
- Specification and engineering justification of distribution system hangers, seismic bracing, and attachment to structure
- Primary structure has been designed to accommodate the anticipated loading from all equipment and distribution systems
- Distribution systems crossing seismic joints are detailed to accommodate the anticipated relative seismic movement.
- Where distribution systems are not seismically braced and are close enough in proximity to collide in a seismic event due to a hanger sway of up to 45 degrees, movement restraints shall be provided. Such restraints may consist of a splay wire type of assembly and need not be designed as full seismic bracing elements.

10.9.2 Photovoltaic Systems

SEOR and Electrical and/or Photovoltaic System consultant shall coordinate to ensure the following requirements have been addressed in the DSA Submittal:

- The PV panels, racking system, and attachment to structure are all in conformance with DSA IR 16-8.
  - The rated capacity of the PV panels and the corresponding wind design loads shall be clearly represented on the drawings.
  - The racking system shall be fully designed and detailed.
  - The racking attachment to the structure shall be coordinated with the specific primary structure conditions present.

10.9.3 Fire Protection

SEOR and Fire Protection subconsultants shall coordinate to ensure the following requirements have been addressed in the DSA Submittal:

- Seismic Bracing Calculations: DSA will require the seismic bracing calculations to be stamped and signed by a licensed Structural Engineer. The Design Team must coordinate during contractual negotiations to ensure that either the SEOR will be responsible for providing these calculations or the Fire Protection Engineer will retain the services of a State of California licensed Structural Engineer to provide these calculations.
- Seismic Bracing Details: SEOR to coordinate with Fire Protection Engineer on acceptable locations and methods of attachment of seismic bracing to the primary structure. Braces perpendicular to the longitudinal axis of a structural steel wide flange beam generally shall not be attached to the bottom flange of the beam unless torsional loading has been accounted for in the design of the beam.
- Primary structure has been designed to

accommodate the anticipated loading from fire protection systems, especially mains.

- Fire sprinkler piping systems crossing seismic joints are detailed to accommodate the anticipated relative seismic movement.

10.10 Special Design Considerations

- **Acoustical Criteria:** Review the Acoustical Design Criteria for any floor/roof/equipment vibration criteria or specified STC ratings for interior wall systems. Refer to **Chapter 9 Acoustics Design** for more information.
- **Special Deflection Criteria:** Coordinate with other building system components that may require an elevated level of deflection performance (movable partitions, glass sliding doors, sensitive equipment, etc.)

10.11 DSA Approval Process

10.11.1 Pre-Application Meeting

- SEOR shall identify any critical system design issues that may benefit from early discussion with DSA and prepare questions for inclusion in the meeting agenda along with any required exhibits to facilitate the conversation with DSA.
- SEOR shall assist the Architect with finalization of meeting minutes for submission to DSA to document the discussion.

10.11.2 Plan Check Comment Response

- SEOR shall fully respond to each DSA-SS comment applicable to their scope. If drawing updates relevant to the response are made elsewhere in the drawings, the written response shall reference the specific location in the drawings where the revision may be found.
- Responses shall reference specific calculations page numbers where calculations are provided in support of a comment response.
- SEOR shall satisfy the requirements found in DSA PR 18-04.

10.12 Construction Phase

- Where it is determined that a Construction Change Document (CCD) is required during the course of construction, such CCD's shall be CCD Category A. LACCD does not permit Category B CCDs.
- Where DSA Field Trip Notes (FTN) indicate items requiring SEOR action, the SEOR shall promptly coordinate with the project team to take the necessary steps to resolve the FTN item as soon as possible. Unresolved FTN items will prevent DSA certification of the project.

CHAPTER 11

Mechanical Design

East Los Angeles College

CHAPTER 11 - MECHANICAL DESIGN

11 Mechanical Design

11.1 Introduction

The section establishes the minimum basic requirements and parameters for the Mechanical systems design. The Design Team (DT) may incorporate other necessary features into the design, without compromising the intent set forth herein.

11.2 Sustainability

LACCD requires new buildings and major renovation projects to be fully electrified and to perform 15% more efficiently than Title 24 requirements. In addition, the project shall meet the LEED goals set forth by the project with a minimum of LEED Certified. The mechanical systems shall be designed at a minimum to achieve these standards including but not limited to ventilation, equipment efficiency, and system types. The DT shall coordinate the mechanical system design with the envelope, lighting design, and plumbing design to achieve the 15% better than Title 24 requirement.

The list below includes mandatory sustainability features related to mechanical design.

- 3.5.10 Commissioning – Fundamental & Enhanced
- 3.5.11 Energy Performance

Please refer to **Chapter 3 Sustainable Design** for details on required energy efficiency and sustainable design features.

11.3 Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code, and regulations related to mechanical design.

- 1.7 Mechanical Regulatory Requirements
- 1.7.1 Mechanical Code
- 1.7.2 Mechanical Standards and Regulations Compliance

11.4 Related Work in Other Chapters

See the following Chapters for additional information:

- Chapter 3 – Sustainable Design
- Chapter 9 – Acoustics Design
- Chapter 19 – Whole Building Commissioning

11.5 Mechanical Systems

11.5.1 Mechanical Load Calculation

The mechanical engineer shall use a recognized energy modeling software to provide building load calculations. The mechanical systems shall be sized to meet the block load. The DT shall size all new HVAC equipment at minimum per the California Building Energy Efficiency Standard (Title 24) climate data for the appropriate city. At a minimum, the 0.1% value shall be used for the summer design dry-bulb and wet-bulb temperatures. It is recommended to add 4-degrees F to the code design dry-bulb temperature to accommodate future climatic temperatures. The 0.2% value shall be used for the winter design temperature.

11.5.2 Acceptable Mechanical Systems

It is a preference for LACCD to provide custom air handling units (AHUs) with terminal reheat boxes at each thermal zone. If the project is located on a campus that does not have a central utility plant or the central utility plant does not have spare capacity, a packaged air handling unit may be proposed to LACCD. Active chilled beams, radiant slabs, water-source heat pumps, 4-pipe fan coil units, and VRF may be considered with authorization from the campus. The selected system must follow LACCD's sustainability goals and standards.

11.5.3 Heating Hot Water Generation

The project shall connect into the main campus heating hot water loop if the loop is available and has sufficient capacity. If the project is located on a Campus without a central heating hot water loop or if the loop does not have sufficient capacity for the new scope of work, an electrified hot water system will be required in alignment with LACCD's electrification goals. The project is to utilize an air-to-water heat pump.

If the campus has a chilled water loop available for the project site, a water-to-water heat pump may be considered as an electrified heating source. The DT must receive authorization from the campus that the central utility plant has a chilled water demand throughout the winter period and approval from the campus prior to proceeding with the design.

An electric water boiler may be used so long as the project meets LACCD's sustainability goal of 15% better than Title 24.

11.5.4 Campus Integration

When a project is connecting into a Campus's central utility plant, the design team shall coordinate the points of connection on the plans. The DT

shall show new shutoff valves to the building and flow monitoring devices connected to the Building Management System (BMS). Coordinate chilled water taps for a portable chiller if needed by the campus. Hot taps are generally not allowed. Coordinate with the campus for chilled water loop shutoffs during construction to minimize loop down time.

11.5.5 Electrical Rooms & Data Rooms

Provide dedicated split systems where possible for electrical rooms and data rooms requiring 24/7 cooling. Combining electrical rooms and data rooms on a common Variable Refrigerant Flow (VRF) system may be provided with authorization from the campus.

11.6 Ventilation, UVC & Filtration

LACCD requires all new projects to meet Title 24 ventilation requirements.

Increased filtration shall be provided to decrease the exposure of airborne diseases. Provide MERV-8 pre-filters and MERV-15 final filters for air handling units. Provide MERV-15 filters for fan coil units and water-source heat pumps.

At the air handling unit, provide Ultraviolet-C (UVC) lights for coil cleaning and virus mitigation. UVC lights shall be designed to protect the coils as well as the condensate drain pans.

11.7 Maintenance & Operation

The Architect of Record (AOR) shall verify that drawings are coordinated for all equipment access. Elevators shall run to each level that mechanical equipment are located, including the roof level. Plans shall demonstrate that rooftop walk paths are maintained and not interrupted by pipes, ducts, or conduits.

Equipment located within the building shall be accessible for maintenance and replacement including, but not limited to filters, coils, fans, louvers, and control panels. Equipment located above ceilings shall have access panel sized sufficiently to provide full access. Provide bottom mounted access panels for equipment located above a ceiling.

11.8 Building Management System (BMS) & Building Automation System (BAS)

New projects shall be a Tridium N4 open-source system with non-proprietary controllers. The project shall seamlessly connect into the existing main campus system. The project shall utilize BACnet IP framework wherever possible.

Drawings shall include sequence of operations, control points, and complete control diagrams showing all sensors and controllers for all Direct Digital Control (DDC) equipment specified as part of the project.

Refer to **Volume 2 District Specifications** for more details on BMS/BAS requirements.

11.9 Redundancy of HVAC Equipment

Ensuring the reliability and resilience of the campus HVAC systems is a critical requirement of the mechanical design. Redundancy of HVAC equipment is mandated to mitigate the impact of potential failures and uphold uninterrupted service to the various campus facilities. All major HVAC components, including chillers, boilers, air handling units, and pumps must be designed with N+1 redundancy. The goal is to uphold continuous and reliable operation, particularly during critical academic periods, minimizing downtime and optimizing the overall efficiency of the HVAC infrastructure. Regular testing and maintenance protocols for backup systems are integral to this criterion, guaranteeing their functionality in emergency scenarios. Refer to **Chapter 19 Whole Building Commissioning** for additional information.

11.10 Anchoring & Seismic Restraints

All new HVAC equipment, including rooftop units, air handlers, and ductwork, shall be securely anchored and equipped with seismic restraints to withstand potential earthquakes. These restraints shall comply with California Building Code (CBC) and Division of State Architect (DSA) requirements, ensuring the safety of both the equipment and building occupants. Proper installation and regular inspections are mandatory to verify that all restraints remain in good condition.

11.11 Hydronic Piping & Installation in Corrosive Environments

In areas where corrosive environments pose a threat to the longevity and efficiency of hydronic piping systems, materials resistant to corrosion, such as corrosion-resistant alloys or coated piping, shall be provided. All hydronic piping must be installed with careful consideration of the surrounding environment to prevent degradation over time. Manufacturer engineered pre-insulated piping systems are the preferred design for underground piping applications.

Refer to **Volume 2 District Specifications** and **Campus Specifications Matrix** for additional information including options for piping materials. Project specific requirements, including, but

not limited to, soil conditions, system operating pressures, and system operating temperatures, will be key determinants of the pipe material used.

11.12 Fan & Pump Energy Requirements

Low pressure ductwork shall be sized for pressure drops no greater than 0.08 in.wg. per 100 feet.

Pipework shall be sized for pressure drops no greater than 4 ft.wg. per 100 feet.

Coils and filters shall be sized for face velocities no greater than 400 fpm.

Single-duct terminal units, including the reheat coil, shall be sized for pressure drops no greater than 0.5 in.wg.

Exception: laboratories or other similar spaces that are served by Venturi-type air valves for precise air flow control.

11.13 Outside Air Intake Locations Requirements

Locate outside air intakes on the north side of the building or in another shaded location. Outside air intakes shall be located 20 feet from exhausts and other air polluting factors. Wind direction shall be considered when designing these.

11.14 Low Pressure Filter Requirements

Provide deep-pleated filters with initial pressure drops for a 24”x24” module at 500 fpm, Minimum Efficiency Reporting Value (MERV) no greater than:

- MERV 10: 0.25 in. wg.
- MERV 11: 0.31 in. wg.
- MERV 13: 0.34 in. wg.
- MERV 14: 0.37 in. wg.
- MERV 15: 0.40 in. wg.
- MERV 16: 0.61 in. wg.

Provide electrically-charged filters connected to a permanent electrical power source. Electronic filters shall not produce ozone and shall not ionize particles.

CHAPTER 12

Electrical Design

Los Angeles Harbor College

CHAPTER 12 - ELECTRICAL DESIGN

CHAPTER 12 - ELECTRICAL DESIGN

12 Electrical Design

12.1 Introduction

This chapter establishes the minimum basic requirements and parameters for the Electrical systems design. Design Team (DT) may incorporate other necessary features into the design, without compromising the intent set forth herein. DT is provided latitude in the design for new concepts, alternate equipment, etc., provided an equal and adequate quality level installation would result.

DT is responsible for coordination of the electrical systems with other related aspects of the project.

12.2 Sustainability

The list below includes mandatory sustainability features related to electrical design.

- 3.5.3 Electric Vehicle Supply Equipment
- 3.5.11 Energy Performance

Please refer to **Chapter 3 Sustainable Design** for details on required energy efficiency and sustainable design features.

12.3 Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code, and regulations related to electrical design.

- 1.8 Electrical Regulatory Legal Requirements
- 1.8.1 Electrical Codes and Standards
- 1.8.2 Electrical Standards and Regulations Compliance

12.4 Reporting

Provide a report detailing all adopted criteria and description of proposed systems which shall serve as the Basis of Design (BOD). This BOD document is also used to satisfy the requirements of Commissioning for LEED certification.

12.5 Coordination of Requirements

Refer to other pertinent sections of the architectural scope of work of which these documents are considered a part, Program and Project Criteria (PPC), and Owner's Project Requirements (OPR). Specific requirements for various user groups within the building, operating hours, and functional requirements of spaces may be further defined within those sections.

12.6 Engineer of Record

This document conveys the general design approach for the detailed installation drawings. The DT shall assume the role of "Engineer of Record" and assume all the responsibilities therewith, including responsibility for fit and necessary clearances of all equipment.

12.7 Structural Integrity

All systems shall be designed to requirements for the local seismic zone, unless more stringent criteria are established by the project Structural Engineer.

12.8 Integrated Requirements

Integrate all requirements and criteria for life safety, preservation of property, security, reliability, energy conservation, and maintainability in the design; and engineer complete electrical systems, including materials, methods, necessary equipment, and start-up as herein specified and as required to deliver a complete, functional installation. Life safety and preservation of property are two critical factors in the design of the system. Safety of personnel cannot be compromised and only the safest systems shall be considered.

12.9 Maintenance

Ease of maintenance, simplicity of systems, and low operational costs of the electrical system and its components shall be a priority of the DT. The operation and maintenance of electrical systems shall be within the capacity of the District's maintenance staff's realm of abilities and equipment.

Provisions shall be made for maintenance and repair of the electrical equipment so that these events can take place without special equipment and rigging of parts and materials into place.

The DT shall coordinate with the College Project Team (CPT) and/or District Project Manager (DPM) for exact operating parameters of the electrical system.

12.10 Utilities

See civil and technology provisions in related chapters for other utilities including Telephone/ data and Cable TV system. Related Chapters are as follows:

- Chapter 4 Site Design
- Chapter 5 Utility Infrastructure Design
- Chapter 16 Technology & Audio-Visual Design

12.11 Electrical System Planning Criteria

The Engineer shall identify electrical loads in KVA during the design phase, including but not limited to general receptacle load, lighting, equipment for HVAC and plumbing, elevators and pumps, kitchen and food facilities, shops and telecommunication equipment, fire alarm system.

Electrical System Planning shall include the following:

- Space separation between underground electrical conduits and underground plumbing/HVAC pipes shall be 3 feet minimum or as required to allow using machine digging for future under work in lieu of manual hand digging. Coordinate with the CPT and/or DPM.
- All circuits conductors shall be sized to maintain a maximum voltage drop of 3% from service to final panelboard/distribution board and 5% from the service to the final branch circuiting load.
- A maximum of three (3) circuits may be combined in a conduit.
- A maximum of six (6) convenience receptacles may be served by a 20A, 120v circuit.
- A dedicated circuit shall be provided for kitchen equipment, copy machines, restrooms, elevator pits, and elevator machine rooms.
- Mechanical control equipment and fire smoke dampers shall be on separate circuits from other equipment.
- Lighting circuits shall be loaded to a maximum of 10 amps.
- Battery operated plumbing fixtures shall not be used due to frequency of battery replacements and plumbing fixtures not in operation when batteries are depleted.
- Coordinate with the project's Sustainability Consultant on electrical load and operational load per year for net zero calculations.

12.12 Voltages

Utilization Voltages shall be as follows:

- LED Lighting: 277V, 1phase
- Exterior Site Lighting: 277V, 1phase
- Motors Less than 1/2HP, 120V, 1phase
- Motors 1/2HP or greater: 480V, 3phase
- General Use receptacles: 120V, 1phase

12.13 Wiring Standards

Copper wiring and bussing shall be used throughout. Aluminum wiring and bussing is not acceptable.

The raceway size to be minimum ¾"C and EMT shall have compression fitting. Set screw fittings are not acceptable. Provide conduit homeruns from panels to junction box in accessible ceilings and not in the floor or walls. Armored cables are not acceptable.

Mineral insulated cables are acceptable for use at locations that meet code requirements.

Limit the use of floor outlets and monument type outlets as much as possible by providing wall outlets where possible. Provide metal floor boxes flushed with floor finishes. Avoid locating floor outlets along walking aisles. Pedestal type floor receptacle is not acceptable.

For classroom power, coordinate with the CPT and/or DPM for utilizing an electrified furniture system in lieu of floor mounted receptacles.

12.14 Electrical Rooms

The DT shall locate a main electrical room on the main floor for each building. The main electrical room size shall be 7'x11' or larger if needed to locate electrical panels/equipment as needed to maintain code required clearances. Coordinate with mechanical engineer for ventilation requirements.

There shall be one electrical room per floor at a minimum. Electrical room size shall be 6'x9' or larger as needed to maintain code required clearances. Larger buildings or buildings with long wings shall be provided with addition electrical rooms to avoid running long feeders with circuit voltage drop greater than allowed under 12.11 above.

All electrical equipment/devices of a floor shall be routed to the electrical room on that same floor. No panel shall be on a floor it does not serve except for remodel with approval by the CPT and/or DPM.

12.15 Site Power

Provide site convenience receptacles for the following:

- Two duplex receptacles minimum at each outdoor gathering area.
- One duplex receptacle for every other bench.
- One duplex receptacle for every two benches at lunch areas.

Coordinate with the CPT and/or DPM for additional requirements.

Outdoor receptacles shall Ground Fault Circuit Interrupter (GFCI) type with "In-Used" weatherproof

cover. They shall be controlled by timeclocks.

12.16 Site Lighting

Lighting at the building exterior, site walkways, and landscape areas shall be designed to complement the architectural concept. Campus standard shall apply for walkway areas. The fixtures shall be LED type. The fixtures shall be selected with lower cut offs to reduce light pollution and light spillage at the project boundary. Provide site lighting underneath solar canopies.

Provide safety and security lighting on exterior walls of buildings, building entrances, parking lots, covered walkways, and where needed to meet specific project requirements. Emergency power for site lighting shall be provided as required to meet code. Pole lighting is preferred over bollard lights.

Lighting fixtures for exterior shall be weatherproof and vandal resistant type. They shall be placed as high and out of reach as practical.

Parking lot lighting shall use full cut-off and dark sky compliant lighting fixtures.

Avoid using solar/battery outdoor lighting fixtures which require battery replacement.

12.17 General Lighting

Illumination levels shall comply to the illuminance category recommendations of current edition of the IES lighting handbook as a guide.

See **Volume 3 Appendices | Section 12 Electrical Design**.

General illumination for building interior shall comply to the energy limitation and control requirements of the Title 24, Part 6 Building Energy Efficiency Standards, and the recommendations of the current edition of IES Lighting Handbook.

LED lighting shall be used throughout.

Uniform light distribution shall be provided within each area. Task area lighting shall be designed with higher light level than surrounding general area lighting. Lighting level shall be in compliance with IESNA recommendations. Avoid lighting system discomfort caused by glare, harsh extreme brightness and high color temperature. Coordinate with the CPT and/or DPM for providing tunable-white (adjusting color temperature) lighting system with dimming light level capability.

Minimize reflections in task areas. Coordinate with the DT on reflectance of walls, ceiling and floor surfaces.

Provide high color rendering light source of 90% or higher. Color temperature shall be 3500 degrees Kelvin with exception as required for specific uses. Verify with the CPT and/or DPM.

Select lighting fixtures that are easy to clean and maintain.

Refer to **Chapter 16 Technology & Audiovisual Design** and **Volume 3 Appendices | Section 12 Electrical Design | Lighting Levels per Space** for additional specific provisions, in addition to those noted in this chapter.

12.18 Lighting Controls

The lighting control package shall include such provisions as dual technology occupancy sensors, photocells, timers, dimmers, override switches and central control systems. Dimming controls and daylight harvesting shall be utilized within common areas.

Interior lighting shall be controlled by time clock controls or occupancy sensor. Common areas shall have continuous dimming or step dimming with occupancy sensors and local wall dimmers as required by Title 24. Occupancy sensors shall utilize a twenty-minute timer with adjustment to lesser time capability. Areas with natural daylight must have sufficient capabilities to implement daylight harvesting. Lighting central control system shall be programmed for after-hours sweeps to turn off lights in areas not already connected to occupancy sensors.

Lighting central control systems shall be integrated with BMS for the following:

- Coordinated scheduling of lighting.
- The BMS shall monitor the energy consumption for lighting circuits and use this information to determine energy savings.
- The BMS shall incorporate occupancy sensors to determine how often certain rooms and areas are occupied.
- The BMS shall be programmed to track the number of operating hours for each lighting fixture as well as the number of on/off cycles per fixture. This data shall be used by maintenance personnel to perform relamping or fixture replacement as it correlates to the lumen depreciation and mean life for the lamps in each lighting fixture.
- Lighting control switch packs to be mounted on separate junction boxes.
- All controls intended for occupants' use must be accessible, on accessible routes, and within accessible reach range.
- Exterior lighting shall be controlled

by dimming panel, photocell and fully programmable lighting central control system with astronomical timeclock. Daylight harvesting controls shall be used which shall include photosensor and dimming ballasts/ drivers.

- This integration of lighting control system and BMS shall simplify training, maintenance, and operations through the use of one interface.
- The lighting control system shall be integrated with BMS to meet M&DR2.0 (Measure and Demand Response) requirements.

Refer to **Chapter 11 Mechanical Design** - 11.8 Building Management System (BMS) and Building Automation Systems (BAS) for more information.

12.19 Grounding

A grounding system shall be provided in each building using building steel, the cold-water main, and a Ufer ground and tie to copper ground bus bar in the main electrical room. Each electrical room shall be provided with a ground bus bar for grounding transformers, switchboards, metallic conduits, and raceways. Ground continuity shall be provided for all ground bus bars, electrical equipment and devices as required by current applicable codes.

A ground bus shall be provided in each telecom and data room. It shall be connected to the grounding system outlined in other sections.

The ground system resistance shall be 5 ohm or less.

All electrical equipment shall be grounded.

12.20 Metering

There shall be a main building meter board located in the main electrical room inside each building. The meter board shall include digital meter for the building electricity with reading for demand, kWh, kW, PF, Hz, VAR and VARs, meter provision for the PV system per CalGreen requirement and meters at the feeders to measure Lighting, Receptacles, equipment and HVAC loads. The existing campus standard metering system and new system shall match. The metering system shall have data system connection to report the data remotely on campus and communicate with BMS. Coordinate for reporting to location and provide connection as required to the CPT and/or DPM.

Provide utility grade electric meter for temporary construction power at the point of connection. Coordinate construction power source with the CPT and/or DPM.

The DT may include a Photo Voltaic (PV) system and Battery Energy Storage System (BESS) system to achieve sustainability required as outlined in other sections.

12.21 Emergency Power

The DT shall provide de-carbonized solutions for the emergency power in lieu of diesel emergency generator. In the event of a power outage, building shall be powered by battery back-up emergency system designed to provide uninterrupted power for all code required building systems including but not limited to emergency egress lighting, elevators, fire alarm, fire pump, etc. for the code specified duration(s). In addition:

- The emergency power system shall be designed to support the code required emergency egress lighting for a minimum duration of 90 minutes.
- The DT shall include emergency systems required as outlined in other sections.
- The building shall have Emergency branch and standby branch 480/277 volt and 208/120volt distribution.
- Power shall be distributed throughout the building cable feeders.
- Each emergency panelboard and switchboard shall have integral surge protective devices as required by code.
- 480Y/277V and 208Y/120V panelboards shall be located throughout as required.

The DT shall coordinate other auxiliary requirement because of the de-carbonized solutions such as space requirements, fire life safety systems, etc.

The DT shall provide portable generator connection panel with quick connectors and manual transfer switch for the emergency power system at a truck accessible location for connecting to a mobile emergency generator.

12.22 Acoustic for Electrical System

See **Chapter 9 Acoustics Design**.

12.23 Electric Vehicle Charging Stations

The number of Electric Vehicle Charging Stations (EVCS's) shall be reviewed with the CPT and/or DPM and provided according to their requirements/input.

EVCS shall be commercial type and shall include the following features:

- Software that shall allow District staff to program hours of operation, rates, usage rules, and ability for staff to adjust each as needed, from web-based interface and without having to contact a third party.
- Charger or software shall notify customers/ users when their cars are charges and/or when charging time for which they pay has expired.
- Chargers shall accept payment from common credit cards and mobile devices such as smartphones. Chargers may also use third party pre-paid accounts through vendor's proprietary smart phone application or other vendor-approved payment system.
- Metering capability at each charger to allow operators to track times when charges are in use, revenue produced by each charger and other metrics.

Site planning for EVCS shall include:

- Site location shall have good cellular reception and/or wireless connectivity.
- Adequate lighting should be minimum 0.2 footcandle or higher as recommended by lighting designer.
- Space shall be shaded, when possible, to avoid sunlight shining on station display screens or provide sunlight readable display.
- Do not place stations in direct line of lawn/ plant irrigation streams. Avoid pooled water and irrigation overspray.
- Coordinate with the District on vandalism preventative strategies.

EVCS shall meet the requirements stated in **Chapter 3 Sustainable Design** Section 3.23 and Bulletin 2022-007R1 Electric Vehicle Charging Stations (EVCS) in Volume 3 Appendices.

12.24 Microgrid System

The DT shall coordinate with LACCD's Whole Building Commissioning (WBCx) Consultant and Owner Project Requirements (OPR's) for campus microgrid requirements and provide an electrical design that can integrate into a campus microgrid (i.e., solar, energy storage, operated circuit breaker, etc.)

New buildings shall be provided with solar and battery energy storage system as required by Title 24 and the system shall be able to transition to a future campus microgrid energy management and control system.

12.25 Seismic Controls for Electrical Systems

Electrical Design Team shall engage a qualified professional structural engineer to design seismic and wind-load control system in accordance with criteria specified in **Chapter 10 Structural Design**.

Seismic and Wind-Load-Restraint Devices shall be tested and rated in accordance with applicable code requirements and authorities having jurisdiction. Devices shall be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public.

Provide additional seismic and wind-load restraints for suspended components or anchorage of floor, roof, or wall mounted components so that failure of a non-essential or essential component does not cause failure of any other essential building components.

Load ratings, features, and applications of all reinforcement components shall be based on testing standards of a qualified testing laboratory.

12.26 Arc Flash Hazard Analysis Study & PPE Label

Providing an Arc Flash Hazard Analysis Study and Arc Flash Hazard Equipment Labels are required per BuildLACCD Bulletin No. 2011-002 and per Section 26 05 73 Electrical Distribution System Studies in **Volume 2 District Specifications.**

CHAPTER 13

Plumbing Design

Los Angeles City College

CHAPTER 13 - PLUMBING DESIGN

13 Plumbing Design

13.1 Introduction

This chapter establishes the minimum basic requirements and parameters for the Plumbing systems design. The Design Team (DT) may incorporate other necessary features into the design, without compromising the intent set forth herein. DT is provided latitude in the design for new concepts, alternate equipment, etc., provided an equal and adequate quality level installation would result.

The DT is responsible for coordination of the plumbing systems with other related aspects of the project, including all other trades.

Provide a report detailing all adopted criteria and description of proposed systems which will serve as the Basis of Design (BOD). This BOD document is also used to satisfy the requirements of Commissioning for LEED certification.

Refer to the Program and Project Criteria (PPC) document for other pertinent sections of the architectural scope of work of which these documents are considered a part. Specific requirements for various user groups within the building, operating hours, and functional requirements of spaces may be further defined within those sections.

Ease of maintenance, simplicity of systems, and low operational costs of the plumbing system and its components shall be a priority of the DT. The operation and maintenance of plumbing systems shall be within the capacity of LACCD's maintenance staff's realm of abilities and equipment.

Provisions shall be made for maintenance and repair of the plumbing equipment so that these events can take place without special equipment and rigging of parts and materials into place.

The DT shall coordinate with the College Project Team (CPT) and/or District Project Manager (DPM) and the Director of College Facilities (DOCF) for exact operating parameters of the plumbing system.

All premises intended for human habitation, occupancy, or use shall be provided with a supply of potable water. Such a water supply shall not be connected with unsafe water sources, nor shall it be subject to the hazards of backflow.

13.2 Sustainability

The following list includes mandatory sustainability features related to plumbing design.

- 3.5.8 Building Water Use Reduction – Plumbing Fixtures
- 3.5.9 Building Water Use Reduction – Appliances for Process Loads

Please refer to **Chapter 3 Sustainable Design** for details on required water efficiency and sustainable design features related to plumbing design.

13.3 Codes & Regulations

Comply with adopted applicable sections of national, state, and local codes, laws, ordinances, rules, and regulations enforced by the authorities having jurisdictions.

Refer to **Chapter 1 Codes & Regulations**, **Volume 2 District Specifications and Campus Specifications Matrix** for applicable listings.

13.4 Related Work in Other Chapters

See the following Chapters for additional information:

- Chapter 3 – Sustainable Design
- Chapter 4 - Site Design
- Chapter 9 – Acoustics Design
- Chapter 19 – Whole Building Commissioning

13.5 Site Utilities

See Civil Engineering documents for all site utilities including Sanitary Sewer, Greywater Sewer, Storm Drain, Fire Water, Reclaim Water, and Domestic Water. Refer to **Chapter 4 Site Design**.

The Plumbing Engineer of Record shall be responsible for plumbing utilities up to 5 feet from the building. For utilities that are 5 feet and farther away from the building, the Civil Engineer shall be responsible.

13.6 Domestic/Reclaim Water System

Reclaim Water

Building water systems shall be configured such that the piping serving any fixtures that can accept reclaim water (water closets, urinals, etc.) are isolated from the piping serving fixtures that can only accept potable water.

If reclaim water is not available at the start of occupancy for a new building, provisions shall be made to serve the reclaim water fixtures with potable water until the reclaim water is available.

The following requirements shall be accommodated for the domestic water system and the reclaim water system (where applicable).

Water Requirements

- Maximum Pressure at Fixture = 80 PSI
- Minimum Pressure at Fixture = 40 PSI
- Minimum available water pressure (static) available from municipal water service shall be identified by the DT.
- Maximum 8 feet per second (FPS) in cold water distribution piping.
- Maximum 5 feet per second (FPS) in hot water distribution piping.
- Maximum 5 feet per second (FPS) in hot water recirculation piping.

Water Piping

- The aboveground piping system shall be Type 'L' copper tube with wrought copper or brass fittings and lead-free solder joints.
- The belowground piping system shall be Type 'K' copper tube with wrought copper or brass fittings and lead-free brazed joints. Protect underground piping with PVC tape.
- System shall be designed to prevent water hammer conditions by providing air chambers for fixtures and shock arrestors for quick closing valves.

Water Miscellaneous

- Show all balancing stations and isolation/ shut-off valves on the drawings.
- Typical details may be used for pumps, coils, and fin tube. Sub-mains, branch line balancing stations, and isolation shut-off valves must be shown on either the floor plans or a riser diagram.
- Details and plans must clearly show locations of balancing stations so that accurate flow measurements can be made at all mains, sub-mains, and branches. Show dimensions of straight runs to assure acceptable measurement accuracy.
- GPM gauges are required for all pumps larger than 200 gpm.
- Shutoff valves shall be provided at strategic locations in order to isolate distribution and for maintenance as required.
- Shutoff valves shall be provided at a minimum at the following locations: floors, restrooms, and exterior hose bibs.
- Make-up water for all HVAC equipment shall be provided from the domestic water distribution system, each cross connection between systems shall be provided with a backflow prevention device.
- Hose bibs shall be provided in all mechanical equipment rooms, bank fixture restrooms, on flat roofs, where PV panels occur, and every 100 FT around building perimeter.
- Trap primers shall be provided for all floor drains throughout the facility.
- Building water meter shall be provided for each building. Each meter shall be capable of connecting to the building management system.

13.7 Domestic Hot Water System

The water heating system shall store and supply domestic hot water at an appropriate temperature to minimize biological growth and use thermostatic mixing valves upstream of remote fixtures to supply reduced hot water temperatures as required by local code requirements and OSHA.

Domestic Hot Water System Equipment

The domestic hot water system shall utilize electricity as the only source of energy for heating. Acceptable water heating equipment is as follows:

- Heat Pump Domestic Water Heater
  - High Coefficient of Performance (COP)
  - Low Global Warming Potential (GWP) refrigerant.
  - Sufficient energy storage to accommodate peak building demands with a hot water storage tank or phase change material (PCM) storage system.
  - Capable of minimum 140°F water temperature generation.
- As an alternative when heat pump water heating systems are not possible due to the program requirements or the physical construction of the building and lack of space, the building may utilize electric resistance water heaters.
  - Centralized electric resistance water heater tank system.
  - Localized instantaneous electric resistance water heaters for remote fixtures to reduce recirculation piping.
  - Capable of minimum 140°F water temperature generation.
- Domestic water heating systems utilizing natural gas, propane, or any other fossil

fuel as the primary source of fuel are not acceptable.

Centralized water heating systems shall be provided with a recirculation system to reduce wasted water while waiting for it to heat up at the fixture outlets. The recirculation pump shall be sized and controlled to conserve energy when possible.

Domestic Hot Water System Temperatures

- Domestic hot water heater setpoint temperature: 140°F.
- Domestic hot water supply temperature: 110°F (public areas).
- Domestic hot water supply temperature: 140°F (kitchen and non-public areas).
- Domestic hot water recirculation temperature: 95°F to 105°F as allowed by local energy code. Above this temperature, the recirculating pump will be off.
- Domestic incoming cold-water temperature: 50°F (used for water heater sizing).

Domestic Hot Water Recirculation Criteria

- The maximum allowable piping length for domestic hot water from the nearest source of heated water to the termination of the fixture supply pipe shall not exceed 3 feet for public lavatories and hand washing sinks.
- For other fixtures, such as showers, kitchen sinks, and scrub sinks, the maximum piping length shall not exceed 10 feet.

13.8 Sanitary Waste & Vent System

Reclaim/Grey Water

Where the CPT and/or DPM requires reclaimed greywater to be used, the building sanitary piping with wastewater that can be reclaimed as greywater shall be routed separately from the blackwater sanitary piping to the exterior of the building and separate points of connection provided for Civil.

If greywater site waste piping is not available at the start of occupancy for a new building, the greywater and blackwater sanitary piping may be combined outside of the building until greywater site piping is available.

The following requirements shall be accommodated for the sanitary sewer (black water) system and the reclaim/greywater system (where applicable).

Waste and Vent Piping

- Buried piping shall be service weight cast iron (SW) soil pipe and fittings. Joints shall be made with neoprene push-on gaskets.
- Soil waste and vent piping above grade shall be hub-less cast-iron soil pipe and fittings with heavy duty neoprene gasketed couplings with stainless steel corrugated jackets and a minimum of 4 stainless steel clamps per coupling.
- Piping in finished areas exposed at fixtures shall be chromium plated brass pipe with 125-pound SWP screwed chromium plated brass.

Waste and Vent Miscellaneous

- There shall be open hub type drains provided at the locations of all sprinkler risers and dry valve assemblies for drain down purposes. These drains shall be provided with trap primers to prevent the trap seals from drying out.
- The public toilet rooms, mechanical equipment rooms, refuse rooms, incoming water service room, fire pump room, and the interior area of any loading dock areas are provided with floor drains allowing for a quick drainage of water in case of an unexpected water condition. The floor drains shall be provided with trap primers to maintain the trap seals as required by code.
- Floor sinks for indirect waste from equipment or certain fixtures that require indirect drainage shall be provided and equipped with an electronic trap primer.
- Any sanitary sewer waste piping that serves spaces or fixtures anticipated to produce grease waste shall be routed to a grease waste interceptor before being introduced into the site sanitary sewer piping or the normal building sanitary sewer piping.

13.9 Storm Water System

Storm Water Reuse

Where LACCD requires reclaimed stormwater to be used, the building storm drain piping with rainwater that can be reclaimed shall be routed separately from the rainwater that cannot be reclaimed to the exterior of the building and separate points of connection provided for Civil.

If reclaimed stormwater site piping is not available at the start of occupancy for a new building, the reclaimable and non-reclaimable storm water piping may be combined outside of the building until appropriate piping is available.

The following requirements shall be accommodated

for the storm water and reclaimed storm water (where applicable).

Storm Water Piping

- Buried piping shall be service weight cast iron (SW) soil pipe and fittings. Joints shall be made with neoprene push-on gaskets.
- Storm drainage piping above grade shall be hubless service cast iron pipe and fittings with heavy duty neoprene gasketed couplings with stainless steel corrugated jackets and a minimum of 4 stainless clamps per couplings.
- The cast iron leader boots shall tie into a system of service weight cast iron (SW) soil pipe and connect to the site storm water management system. This system will be coordinated with the Civil Engineer.

Storm Water Design Criteria

- Rainfall intensity 2 inches/hour or per local ordinance.
- Roof drains shall be provided to drain the storm water from the roof of the building; these drains shall have cast iron bodies and cast-iron dome strainers.
- The roofs shall be pitched in order to allow all storm water to be drained through the drains.
- Any loading docks and additional exterior areas will be provided with a combination of area drains and trench drains. These drains shall discharge into the storm system. Area drains shall have coated cast iron bodies and heel-proof flat top nickel-bronze strainer.

13.10 Natural Gas System

Natural gas systems may only be utilized to serve equipment or point of use outlets in educational spaces, science labs, and culinary arts facilities. All other usages including HVAC space heating and domestic water heating are not allowed.

Natural Gas Utility

- Natural gas will be brought into the building by the utility company. The service shall be metered and provided with gas pressure regulating valves with associated relief vents, vented to atmosphere.
- Delivery of low-pressure gas: 14" water column.
- Delivery of medium pressure gas: 5 PSI.
- Maximum demand: Cubic feet per hour as determined by program requirements.

Natural Gas Distribution

- Gas will be provided to the cooking equipment and appliances within kitchen areas and to laboratory/shop spaces with equipment requiring natural gas.
- A master shut-off valve assembly shall be installed and tied into kitchen hood exhaust fire protection systems and shall shut down the gas supply to the kitchen in the event of a fire condition.
- A readily accessible manual shut-off valve is required at building gas supply connections.
- A readily accessible manual shut-off valve is required at any lab which has more than two gas outlets.
- Provide readily accessible manual shut-off valves (e.g., bench top turret valves) within 6 feet of equipment being served. Shut-off valves may NOT be located above ceilings.
- An emergency seismic shut-off valve shall be provided for each natural gas building point of connection at each building.

13.11 Plumbing Fixtures & Trim

Generally, fixtures will be vitreous China, enamel coated cast iron, or stainless steel, and wall hung or countertop type, as applicable, with chrome plated brass trim and individual stop valves.

Americans with Disabilities Act will be applied to all areas where plumbing fixtures are required to be accessible. See also **Chapter 2 Accessibility & Universal Design.**

Plumbing fixtures shall be water conserving high efficiency fixtures with the following minimum requirements:

- Water closets to be 1.28 gallon per flush.
- Urinals to be 0.125 gallon per flush.
- Lavatories to be 0.4 gallons per minute.
- Sinks to be 1.8 gallons per minute maximum.
- Showers to be 1.8 gallons per minute maximum.
- Service sinks/mop sinks to be 2.2 gallons per minute per ANSI standard.

- Drinking fountains to be 0.5 gallons per minute maximum.

Plumbing fixtures in public and back of house areas shall be commercial quality.

Refer to Specification 22 40 00 Plumbing Fixtures for additional criteria and to **Volume 2 District Specifications and Campus Specifications Matrix** of more preferred product information.

13.12 Insulation

Pipe insulation for hot water, cold water, and hot water return piping shall be glass fiber/mineral wool, non-combustible, with vapor barrier jacket.

Valves and fittings shall be provided with pre-formed PVC jackets.

Insulation shall be provided in accordance with the requirements of the code on the following systems:

- Domestic cold-water piping.
- Domestic hot water and return piping.
- Roof drain bodies and the horizontal storm water piping.
- Vapor barrier will be provided on cold water and storm drainage piping.
- Condensate Piping

13.13 Laboratory Plumbing Requirements

Auxiliary valves for gas and vacuum lines shall be located outside the lab in the event the laboratory may be unsafe to enter.

Flexible connections shall be used for connecting gas and other plumbed utilities to any freestanding device, including but not limited to biosafety cabinets, incubators, and liquid nitrogen freezers. Flexible connections shall be appropriate for the pressure requirements and shall be constructed of material compatible with the transport gas. A shutoff valve shall be located within sight of the connection and clearly marked.

Seismic activity may cause gas and other utility connections to break off. A flexible connection will minimize this potential considerably.

Lab Chemical Waste

- Lab wastewater lines shall be separate from domestic sewage, and a sampling point shall be installed in an easily accessible location outside the building.
- The sampling point shall be installed at a location where all building lab wastes are discharged, before the lab waste line connects to the domestic waste line.
- The sampling point shall be designed so that it is perpendicular to the lab waste line, has a minimum 4 inches diameter, and has a cleanout screw on cap and is protected by a Christy box. The sampling point shall not be located in an area where water from irrigation or flow from storm water runoff can accumulate.

Lab Plumbing Fixtures

- Each laboratory must contain an accessible sink for handwashing.
- Exposure to hazardous materials and/or pathogenic organisms can occur by hand-to mouth transmission. It is extremely important that hands are washed prior to leaving the laboratory. For this reason, the sink shall be located close to the egress.
- Laboratory sinks shall have lips that protect sink drains from spills.
- Sink lips or berms shall be >= 0.25 inches and designed to completely separate the lab bench or fume hood work area from the sink drain.
- Sink drains traps shall be transparent (e.g., made of glass) and easy to inspect or have drain plugs to facilitate mercury spill control.
- Provide accessible eyewash and shower equipment for emergency treatment shall be provided for emergency treatment and shall conform to ANSI/ISEA Z358.1-201 American National Standard for Emergency Eyewash and Shower equipment.

13.14 Miscellaneous Plumbing Requirements

All rotating equipment shall be provided with vibration isolation machinery bases and mounted on concrete housekeeping pads. Piping connections to equipment shall be provided with flexible connectors.

Identification

- All valves shall be provided with securely fastened 2 inch diameter brass tags indicating valve number and service. The tag information and valve locations shall be displayed in a permanently mounted chart.
- All piping shall be provided with identification markings at regular intervals for service and direction of flow.
- All equipment shall be clearly labeled as to its function and service.

Plumbing Anchorage

- All penetrations through fire rated assemblies shall be thoroughly sealed with a UL Approved fire stopping method. All slab penetrations shall be fitted with escutcheon plates.
- All piping supports shall be securely anchored and seismically supported to the building structural system. Seismic importance factor shall be 1.5 for all piping supports.
- Provide all supplementary steel and/or anchors required to properly support the plumbing systems.
- All plumbing systems and equipment will be tested in accordance with the applicable codes for integrity and operation.

CHAPTER 14

Wayfinding & Signage

Los Angeles City College

CHAPTER 14 - WAYFINDING & SIGNAGE

CHAPTER 14 - WAYFINDING & SIGNAGE

14 Wayfinding & Signage

14.1 Introduction

The intent of the wayfinding and signage guidelines is to provide a consistent, coherent resource to inform wayfinding and signage expectations across all District college campuses and properties.

The intent of the Guidelines and Standards is to aid college staff by:

- Outlining a strategy for wayfinding
- Identifying necessary sign types for exterior and interior locations
- Providing general information about the function and location of typical signs
- Establishing general criteria and best practices
- Listing regulatory and governance entities
- Providing a glossary of signage and wayfinding terms
- Establishing general performance specifications for materials, fabrication, and installation.

The Guidelines and Standards apply to all permanently installed identification and wayfinding signage on District campuses for exterior and interior environments.
The Guidelines do not include information about:

- Vehicle traffic signage regulated by the Manual on Uniform Traffic Control Devices (MUTCD)
- Non-public areas of LACCD properties
- Signage required by disciplines not related to campus and building identification and wayfinding, such as equipment labels, usage warnings, etc.

Wayfinding is defined as the process by which people determine their way between places. Signage is defined as any object that is designed to identify, provide information, give direction, or raise safety awareness with letters, words, numbers, symbols, images, and graphics.

14.2 Sustainability

Smoking and No Smoking signs are mandated by the State of California. Per California Labor Code Section 6404.5(c)(1),

- For buildings where smoking is prohibited, the posting of a "No Smoking" message sign shall be exhibited at each entrance and exit to the building.
- Where smoking is permitted in designated areas of a building or structure, a sign stating "Smoking is prohibited except in designated areas" shall be posted at each entrance to the building or structure.

14.3 Codes & Regulations

To achieve consistency and meet legal requirements, all new signage shall meet all code and regulatory requirements of the appropriate jurisdiction including, but not limited to, the most current federal and state regulations and statutes. Refer to **Chapter 1 Codes & Regulations**.

It is the responsibility of each College to administer, implement procurement and installation, and oversee all legal and practical aspects of signage.

It is the duty of the Sign Contractor to comply with all current codes and regulations for static and dynamic signage.

For procurement information, refer to Bulletin Number 2023-004 in Volume 3 Appendices | Bulletins, LACCD Wayfinding Signage, Banners and Decorative Signs.

14.4 General Wayfinding Standards Criteria

14.4.1 Design Approach

The goals for wayfinding and signage are to clearly and efficiently guide people to their various destinations and enhance the College's overall usefulness.

14.4.2 Strategic Approach

An effective signage and wayfinding strategy shall:

- Create sign messages that are accessible to all users—regardless of language, gender, or physical limitations.
- Provide key direction information to guide people to principal destinations, such as parking, buildings, departments, rooms, and exits.
- Enable people to identify key facilities within buildings, such as entrances and exits, elevators, escalators, stairs, and restrooms.
- Include all emergency egress information required by building and fire codes.

14.5 Fundamental Wayfinding Directives

Underscoring all aspects of the wayfinding effort is the intent to inform people by answering 2

fundamental questions:

- "Where am I?"
- "What is next?"

14.6 Four Principles of a Successful Wayfinding System

An effective wayfinding system relies on 4 guiding principles. Communication of wayfinding information must be:

- **Coherent:** At every interaction a person encounters on their journey, information must be presented coherently across various forms of communication—verbal, visual, and virtual—to maintain the integrity of the message. For example, consistent name and terminology usage is important for message clarity across various communication media such as websites, mobile apps, maps, directories, and signage. Uniformity is necessary for sign types, sizes, and locations. Standardized message layouts, typography, colors, and symbols contribute to information comprehension and overall wayfinding coherency.
- **Successive:** People depend on a reliable "wayfinding chain" of information throughout their journey. Successive "information links" assist travelers from one decision point to the next, from the start of the journey until arrival at the destination.
- **Pertinent:** Pertinence in the wayfinding system is realized when the information provided is available when and where it is needed. Pertinence is the right message delivered at the right location and right time.
- **Validating:** Validation transpires with "you are here" messages. Various affirmation indicators along the journey inform people of their location and progress and ultimately confirm completion upon reaching the destination.

14.7 Strategic Wayfinding Analysis & Planning Practices

14.7.1 Analysis

A successful wayfinding program is achieved by:

- Applying the 4 Principles of a Successful Wayfinding System.
- Determining key journey points that require navigational decisions.
- Appropriately locating wayfinding elements.

14.7.2 Planning Practices

The wayfinding analysis informs an effective signage system with the following best planning practices:

- Identify origin, primary, and secondary destinations.
- Map out travel routes to primary destinations.
- Locate signs at key decision points and slightly in advance of intersections.
- Compose messages for primary direction signs;. Include secondary destinations only as needed.
- Determine areas along routes that need supplemental directions and information.
- Compose sign messages for supplemental direction and information signs.
- Consistently implement approved sign types, messages, symbols, colors, and materials.

14.7.3 Room Numbering

The District requires numbering for all accessible spaces within buildings. Room name and numbering conventions use a 3-digit format and numbers are assigned by floor level. All printed signage must match the room number entered into the California Community College FUSION system. Refer to the policy in the Space Inventory Handbook.

For complete information refer to Bulletin Number 2022-006, Room Numbering Guidelines in **Volume 3 Appendices | Bulletins**.

14.8 General Signage Standards Criteria

Several criteria have been used to develop signage categories and guidelines for each sign type. These are:

Design

Simplicity and legibility are the primary criteria for effective signage. Simplicity is achieved by the use of common terminology and names, consistent message language, easily recognized symbols, and a limited amount of information per sign. Legibility includes the correct application of fonts, graphics, and colors with adequate contrast for message comprehension appropriate for the viewer's line of sight and speed of travel.

Consistency

Consistent representation of design style, message hierarchy, materials, and placement is key for effective information retention and brand recognition.

Durability
Durability is paramount for long term effectiveness. The materials and fabrication specifications in this document are intended to produce signs that are durable, resilient, easy to maintain, and resistant to normal weathering and minor acts of vandalism. The goal is permanence.

Attainability
The Guidelines and Standards are intended to inform signage constructed of materials and components that are readily available. This enables competitive bidding and fabrication by multiple suppliers.

Quality
The District's goal is to maximize quality and reflect the best aspects of each College. Good quality materials and workmanship are necessary for both effectiveness and longevity. Fabrication shall be informed by industry best practices.

Supplier Selection
Suppliers shall be selected based on proven ability to deliver on time, adherence to safety and regulatory legislation, and professional competence.

14.9 Best Practices for Signage

14.9.1 Sign Locations

Placement
Whenever possible, signs shall be installed with a common height, coordinated with other architectural and operational elements, and meet regulatory height requirements.

Sight Lines
Care must be taken to assure that signs are placed directly within the user's field of vision and not obstructed by any object.

Signage Hierarchy
Signage for wayfinding and identification shall be given priority over other visual elements such as advertising, retail signage, and public art.

Decision Points
Wayfinding signs shall be positioned near key decision points along traffic routes where users need them the most, which is typically a location where information influences a directional decision.

Information Confirmation
Directional information signs at decision points not only lead travelers to their destinations but also confirm their positioning and path of travel.

Clarity
Signs shall be sized and placed to be read from a distance that does not physically interfere with traffic flow in high-volume areas.

Traffic Flow
Care must be taken to ensure that sign structures generally do not impede primary traffic flows. Consideration shall be given to the fact that certain sign types may attract people to gather around them, for example, directories and maps.

14.9.2 Message Consistency, Consolidation & Integrity

Consistency
All messages appearing on signs shall be composed with consistency in terminology and style to present information clearly, prevent confusion, and ease navigation.

Consolidation
Whenever possible, multiple lines of information shall be consolidated and coordinated to reduce visual clutter and over-signing.

Integrity
For information integrity, it is important to maintain a distinct separation between functional signage and advertising. Logos, slogans, or custom colors shall not appear on a signs displaying wayfinding or information messages.

14.9.3 Message Hierarchy

Message Importance
Based on the sign's location, information shall be presented with the most important information acquiring the highest visibility. Primary information is typically placed in the first or top most position, with secondary and tertiary messages in less prominent positions.

Information Hierarchy
Message importance is determined by sign location, travel direction, and destination order. For wayfinding, the sequence of messages leading to a destination begins with general information closest to the route's origin and progresses to more specific information nearer the destination. Message content shall be limited to the most critical information for the decision point or juncture along the path of travel.

14.9.4 Message Composition & Style

Word Style

The following guidelines are best practices for word usage:

- Messages shall be displayed in roman style characters. Italics are not necessary.
- Letter and word spacing shall conform to regulatory standards such as those required by Americans with Disabilities Act Accessibility Guidelines (ADAAG) and MUTCD codes.
- Title capitalization is preferred for direction messages except for articles, conjunctions, and prepositions, for example: Elevator to Mezzanine.
- Tactile messages shall be displayed in upper case characters per the applicable regulatory code.

Grammar

The following guidelines are best practices for grammar usage:

- Messages must be concise.
- Sentences shall be succinct.
- Messages shall be positive. Restrict use of words such as “only,” “no,” “not,” and “do not”.

Punctuation

The following guidelines are best practices for punctuation usage:

- Punctuation shall generally be avoided.
- Hyphens shall be used only in the conventional manners. Do not use hyphens to substitute a comma, as a dash, or in place of “to”.
- The ampersand character (&) shall be used in place of the word “and” only when two conjoining words have equal bearing, for example: Buildings A & B.

Abbreviations

- Abbreviations shall be avoided wherever possible.

Arrows

The following guidelines are best practices for arrow usage:

- Arrows show a path of direction.
- An arrow pointing up indicates the direction is either straight ahead or ascends in elevation.
- An arrow pointing down indicates the direction descends in elevation or a place to stop. Arrows pointing down shall only indicate a straight ahead direction in the case of a downward gradient ahead.
- Arrows shall point toward a destination being directed to, not into the message text.

Bullets

The following guidelines are best practices for bullet usage:

- Bullets shall only be used to separate words in a running list (in place of commas)
- Bullets shall conform to the circular dot glyph of the font in use; no decorative ornaments

Braille

All tactile braille messages must be verified for accuracy by an independent professional braille transcriber.

- A physical fingertip examination and written statement of approval shall be required of the sign supplier prior to installation
- Braille sign messages shall conform to California Grade 2 standards

14.9.5 Signage Maintenance

Regular Inspection:

- All signs, external and internal, shall be inspected and cleaned bi-annually to maintain durability and maximize effectiveness.
- Site-wide inspections shall occur after natural environment occurrences such as earthquake, heavy rainfall, and high wind, and after power outages.
- Colleges are encouraged to keep a data base inventory of signs to aid inspection organized by sign type categories:
  - Identity Signs (external, internal)
  - Direction Signs (external, internal)
  - Information Signs (external, internal)
  - Regulation Signs (external, internal)
  - Miscellaneous Signs (external, internal)
- Signage inspections shall include at least two steps:
  - Physical inspection and photographic documentation.
  - Written documentation of signage conditions.

- Signs shall be examined and remedied for:
  - Cleanliness
  - Damage such as cracks, dents, broken elements
  - Message changes
  - Verification of peak performance for illuminated and dynamic elements
  - Loose fasteners
  - Fading and rust
  - Weather seals, vandalism and graffiti

14.10 Sign Types

Sign types to be included for wayfinding and signage at all Colleges are divided into seven categories: Identity, Direction, Information, Regulation, Amenity, Donor Recognition, and Temporary. Signage may be static or dynamic depending on the intended use.

Identity Signs
Signs that identify the campus, areas, parking, buildings, departments, permanent rooms and spaces, facilities, amenities, elevators, stairs, and anything requiring identification.

Direction Signs
Direction signs always include an arrow. These signs exhibit destination orientation and are designed to enhance traffic flow. Examples include road signs and overhead pedestrian signs.

Information Signs
Information signs notify people of destination routes, building locations, services, rules of conduct, occupation load limits, etc. Examples are campus maps, building and floor directories, and electronic message displays.

Regulation Signs
Regulation signs are mandated by codes and/or laws and may include signs required by building and fire agencies, Title 19, Title 24, LAFD, and ADA. Examples include, but are not limited to:

- Accessibility specific signs requiring tactile and braille messages.
- Accessible parking signs.
- Accessibility symbol signs such as the International Symbol of Accessibility (ISA)
- Assistive Listening System (ALS)
- Accessibility hearing equipment identification (TTY, TDD, TT).
- Other required signage types include egress signs, restroom signs, no smoking signs, emergency evacuation plans, stairwell identity, elevator level identification, warnings, and general restrictions.

Amenity Signs
Amenity signs are typically promotional and on our campuses encourage school spirit and pride of place. Examples include banners and wall murals.

Donor Recognition Signs
Signs that give tribute to donors vary in size and style. Some examples are building names, recognition walls, commemorative displays, and plaques.

Temporary Signs
Temporary signs may include any signs in the other categories but are not intended for permanent installation. Examples of temporary signs are construction boards, detour directions, maintenance caution signs, and events information placards.

See **Volume 3 Appendices | Section 14 Wayfinding & Signage** for diagrams of typical signs for each category.

14.11 Building & Classroom Signage/ Wayfinding

Building signage shall be designed such that the user is directed to classrooms from the major entrances and circulation areas of the building, including elevator lobbies and stairwell landings. All signage shall employ easily changeable paper inserts, if required by the College, and be ADA and California Accessibility code compliant.

Classroom Number Signs
Room number signs must include a display bar to post announcements. They shall not require tape, thumbtacks or special instruments. Instruction on the mounting location and the height of room signs shall be taken from the more stringent of ADA standards, and the latest edition of CBC.

Classroom Data Sheets
Data sheets shall be posted inside the classroom, preferably near the instructor station or near the room entrance. Data sheets include a photo of the room set-up to help assist the custodial crew in setting the room configuration correctly at the start of each day. Other information listed on the sign includes: type and quantity of furniture, room configuration, audio-visual level, audio visual equipment, and phone numbers for reporting problems with the facility or requesting assistance with the audio visual equipment.

Classroom Contact Sign
Contact signs shall be included near the instructor station in the event if an issue arises in classrooms.

14.12 Building Dedication Plaque

The District maintains a standardized Building Dedication Plaque format which includes the names of current members of the Board of Trustees, College and District Administration, and relevant Project Team.

For fabrication specifications, refer to Bulletin Number 2022-005, Building Dedication Plaque in **Volume 3 Appendices | Bulletins.**

14.13 Donor Recognition Signage

14.14.1 Donor Recognition Sign Types

The following types of signs are deemed suitable for donor recognition signage at all Colleges. Each College shall establish and maintain criteria for donor recognition programs.

Recognition Wall

A donor recognition wall displays the names of multiple donors. The display may be crafted in a creative way depending on the campaign and mounting location. The display shall conform with the aesthetic of its immediate physical context and maintain reasonable consistency of size and style within the donor recognition program design parameters.

Exterior Wall Sign
A donor recognition sign affixed to the exterior of a building or structure. Formats may include individual letters and plaques.

- Individual letters are appropriate for building or facility names. An example is:
  Donor Name Building
- Plaques are typically installed near the main entrance at a location easily viewed by individuals of all abilities. Wall plaques shall be limited to one location per donor per building or facility. Plaques signs shall be mounted at a consistent height and shall not impede or obscure regulation signage. A typical message is:
  The Donor Name Building / was generously funded by / Donor Name / Date

Interior Wall Sign
A donor recognition sign affixed to the interior of a building or structure. Formats may include individual letters and plaques.

- Individual letters are appropriate for departments, floors, rooms, and large meeting spaces. Individual letters shall be located near the main entrance to the space, such as on the wall above or adjacent to an entryway. An example is:
  Donor Name Auditorium
- Plaques are typically installed near the entrance to a department or room, at a location easily viewed by individuals of all abilities. Room plaques are limited to one location per donor per room. Plaques signs shall be mounted at a consistent height and shall not impede or obscure regulation signage. A typical message is:
  The Blank Room was generously funded by / Donor Name / Date

Narrative Sign
A narrative sign features the donor and the donor's story. The narrative may be crafted in a creative way and display photographs or illustrations. The display shall conform with the aesthetic of its immediate physical context and maintain reasonable consistency of size and style within the donor recognition program design parameters.

Commemorative Sign
Commemorative signs display a brief message in memoriam or dedication and may be affixed to equipment such as benches. Types may include plaques and metal plates. Commemorative signs shall be blind attached with no visible hardware on the message panel. Care shall be taken to locate the sign in an unobtrusive manner. A typical message is:
Donated in memory of / Name / by / Donor Name / Date

Service Sign
A service recognition sign may be affixed to equipment in recognition of the donor. Types may include plaques and metal plates. Service signs shall be blind attached with no visible hardware on the message panel. Care shall be taken to locate the sign in an unobtrusive manner to avoid interference with equipment operation. A typical message is:
Generously funded by / Donor Name / Date

14.14.2 General Guidelines for Donor Recognition Signage

A donor recognition signage program must be flexible to accommodate mitigating factors. No definitive style shall be so rigid as to deter the donor from making a contribution. The following are best practices for signage:

- Donor recognition signs shall be elegant and modest in keeping with each College's reputation and character.

- Sign types shall be consistent in size and style including, but not limited to materials, size, typography, colors, verbiage, and fabrication.
- Signage shall be appropriate for its immediate building, architecture, and landscape context.
- All sign messages shall be English. Donor names shall include conventional orthography per the donor's preference.
- Signage placement and installation shall be selected with regard to the following factors:
  - Traffic (vehicle, pedestrian)
  - Visibility (line of sight, height)
  - Attachment surface (ground, wall, structure, equipment)
  - Vandalism
  - Maintenance
- All donor recognition signage shall conform to the best practices and specifications of these Guidelines.

14.14 Sign Types & ADA Signage References

See **Volume 3 Appendices | Section 14 Wayfinding & Signage | Sign Types & ADA Signage Reference** for examples of sign types and their uses.

14.15 Dynamic Visual Signage

See **Chapter 16 Technology & Audio Visual Design** for general requirements.

14.16 Glossary of Signage Terms

See **Volume 3 Appendices | Acronyms, Titles & Terms** for a glossary of signage related terms.

CHAPTER 15

Fire Protection Design

Los Angeles City College

CHAPTER 15 - FIRE PROTECTION DESIGN

15 Fire Protection Design

15.1 Introduction

The following sections establish the minimum requirements, parameters, and design criteria associated with fire protection and life safety system design for addition, renovation, retrofit, and new construction projects.

In order to provide a code compliant and cohesive fire and life safety approach, all fire protection and life safety system design work must consider, incorporate, and coordinate with interfaced systems including, but not limited to:

- HVAC System Shutdown
- Interface and Shutdown of AV/IT Equipment
- Campus and District Fire Alarm Monitoring
- Laboratory Fume Hood and Safety Equipment Interface
- Special Suppression Systems
- Egress Hardware and Locking Devices
- Battery and Energy Storage System Requirements
- PV System Requirements
- Building Management System Interface

15.2 Fire Protection & Life Safety Design Report

For each project, the Design Team (DT) must develop a comprehensive fire protection and life narrative design report which clearly outlines the applicable code requirements, referenced standards and proposed design intent for any and all fire-protection and life-safety systems for the project.

System design approaches must incorporate unique conditions based on the LACCD Campus on which they are located, including but not limited to, site fire alarm reporting, network and communication strategy, on-going facility inspection, testing and maintenance considerations, as well as building, project or occupancy specific hazards, and fire and life safety system design challenges.

This report must include, but is not limited to:

- Site Fire Department Access
- Building Construction Type
- Allowable Height and Area
- Fire-Resistance Rated Construction
- Interior Finish Requirements
- Fire Protection and Alarm System Requirements
- Means of Egress Requirements
- Occupancy and Hazard Specific Requirements
- Key Issues and Special Considerations for coordination among disciplines

15.3 Codes & Regulations

15.3.1 Code & Referenced Standards

All systems must be designed in accordance with the applicable requirements of the California Building Code (CBC), California Fire Code and referenced National Fire Protection Association (NFPA) Standards as well as industry best practice for protection of property as well as fire and life safety.

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code, and regulations related to fire protection design.

- 1.9 Fire Protection Codes & Standards

15.3.2 Plan Check & Permitting

No deferred approvals are permitted in accordance with LACCD Design Bulletin 2023-001 Deferred Approval. See Volume 3 Appendices **| Bulletins.**

15.3.3 Inspections

Fire-protection and life-safety systems including but not limited to:

- Fire Alarm Systems
- Fire Protection Systems
- Special Suppression Systems
- Smoke Control Systems

Shall be inspected by the installing contractor and General Contractor prior to requesting inspection from the Division of the State Architect (DSA) Project Inspector.

Pre-inspection is intended to ensure that these systems are ready for inspection, required input/responses are functional and coordinated with project design intent as documented in the approved Construction Documents and Shop Drawings.

15.4 Fire Protection Systems

15.4.1 General Considerations

Fire protection system design and installation must include all required labor, materials, equipment,

permit and inspection fees, and Contractor's services for complete installation and coordination of Fire Protection System including, but not limited to:

- Automatic Fire Sprinkler Systems
- Special Suppression Systems
- Pre-Action Sprinkler System
- Standpipe Systems

In full conformance with the requirements of all Agencies Having Jurisdictions (AHJ's) including DSA, Local Fire Authority requirements.

System Interconnections

Site utility requirements, including underground fire water supply, Backflow Preventer requirements and thrust-blocking are addressed in **Chapter 5 Site Utility Infrastructure Design**.

Fire Suppression system design must include Water Service to a point 5 feet beyond the building exterior wall and the point of connection to the building system. Coordination with the Civil Engineer must be included in the overall system approach and design.

Fire Department connections must be located a minimum of 35 feet from the building served and a maximum of 75 feet from the nearest fire hydrant. Interconnections and locations must be coordinated with the Civil Engineer.

Seismic Bracing of Piping and Equipment

Seismic bracing of piping and equipment must be provided in accordance with applicable NFPA 13 requirements. Design must be in accordance with the requirements found in the CBC, NFPA, and Chapter 10 Structural Design.

Equipment Access

Access doors, fire suppression related access panels, fire sprinkler riser rooms, special suppression system rooms and other spaces dedicated to fire suppression system work must be coordinated and designed in accordance with the applicable portions of these standards and due consideration of on-going testing, inspection and maintenance.

System Documentation and Training

Shop drawings, equipment and product data as well as record drawings Operations & Maintenance (O&M) Manuals and Owner Training must be provided at the completion of work.

15.4.2 Fire Protection Systems Design

Fire protection systems must be hydraulically calculated in accordance with NFPA 13. The following minimum design densities shall be provided based on Hazard Classification of the space in consideration:

- Lecture Halls, Classrooms, Offices, Conference and General Office Storage – Light Hazard
- Trade, Technical and Workshop Spaces – Ordinary Hazard Group 1 or Ordinary Hazard Group 2
- Facilities Maintenance and Operations Space – Ordinary Hazard Group 1
- Laboratories with Chemicals – Ordinary Hazard Group 1

Spaces not specifically referenced here must be designed in accordance with NFPA 13.

15.4.3 Fire Suppression Water Supply

Refer to **Chapter 1 Codes & Regulations** for list of applicable codes.

15.4.4 Standpipe Systems

Standpipe systems must be designed and installed with due consideration of the following:

- Visibility and Architectural Design
- Prevention of Tampering, Damage and Vandalism

15.4.5 Pre-Action & Special Suppression Systems

The following rooms, spaces and areas shall include consideration of and design for double-interlock pre-action and/or special suppression systems:

- Data Centers
- IT MPOE Rooms
- Battery Energy Storage System Rooms

All pre-action systems shall be double-interlock pre-action system requiring smoke detection for water release and sprinkler activation for suppression system actuation.

Special suppression system design must be based on industry best practice and clearly defined within the fire protection and life safety narrative report outlined within this chapter.

15.5 Fire Alarm System

Refer to **Chapter 1 Codes & Regulations** for list of applicable codes.

15.5.1 Fire Alarm Systems Description

The fire alarm must be an addressable point-to-point fire alarm system meeting the requirements of the building use and occupancy. The system shall report to:

- Monitoring stations at campus facilities
- Monitoring stations at Campus PD
- Readily capable of interconnection to future district Security Operations Center (SOC.)

Ready and complete interface, networking, and monitoring by the existing campus Fire Alarm System must be considered and provided for in the Fire Alarm System design.

The fire alarm system design must include all necessary interfaces for:

- Building Fire Alarm and Detection System
- Special Suppression System Monitoring/ Releasing
- Emergency Voice Alarm Communication, Mass Notification
- Interface with tangential MEP/AV/IT/Security systems as directed elsewhere within this design standard.
- Building Management System (BMS) and Building Automation System (BAS) Systems

Fire Alarm System Standby Power must be provided in accordance with applicable codes and referenced standards.

All fire alarm system wiring must be installed in conduit.

Fire Alarm Control Unit (FACU), Terminal Cabinets, and Conduits will be painted red.

15.5.2 Fire Alarm System Notification

Fire alarm systems installed in new buildings, renovations, modifications, and renewals shall be Emergency Voice/Alarm Communication systems with speaker-strobes as required by the CBC, CFC and NFPA 72.

Notification appliances shall be capable of ready future upgrade to support district wide mass notification.

15.5.3 Audio/Visual Systems Interface

Fire alarm system designs must include required interface, control and shut down of amplified noise producing equipment including classroom Audio-Visual Amplification Systems, Assisted Listening Systems, and special systems for performing arts and assembly areas. Specific design must be based on coordination with Audio-Visual equipment provider.

CHAPTER 16

Technology & Audiovisual Design

Los Angeles Harbor College

CHAPTER 16 - TECHNOLOGY & AUDIOVISUAL DESIGN

CHAPTER 16 - TECHNOLOGY & AUDIOVISUAL DESIGN

16 Technology & Audiovisual Design

16.1 Structured Cabling & Telecommunications

16.1.1 Introduction

The Design-Build Team or Design-Bid-Build Contractor is required to provide a complete operational system that meets all the requirements of the District and campus standards. The Design-Build Team is responsible for system selection, design, engineering, calculations, coordination with other trades, installation, testing and as-built documentation. The Design Team (DT) is responsible for selecting appropriate locations for telecommunications rooms and cabling pathways.

Refer to **Volume 3 Appendices | Acronyms, Titles & Terms** for a glossary of technology and audiovisual related terms.

16.2 Codes & Regulations

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code and regulations related to technology and audiovisual design.

- 1.10 Technology & Audiovisual Codes and Standards
- 1.10.1 Technology & Audiovisual Relevant Standards

16.3 Technology & Audiovisual Standards & Requirements

Refer to **Volume 3 Appendices - Chapter 16 Technology & Audiovisual Design** for more information.

16.4 Basis of Design Narrative

16.4.1 Intra-Building Spaces

Dedicated telecommunications equipment spaces shall provide voice, data, and video services in all areas of the building and at adjacent exterior areas. A dedicated Building Distribution Frame (BDF) room and Intermediate Distribution Frame (IDF) rooms will be required. The following sections identify the requirements for these dedicated spaces.

1. MDF, BDF & IDF Rooms

The BDF room is a dedicated room that acts as the main telecommunications room for the distribution of backbone cabling to all building IDF rooms and for connection to campus outside plant backbone cabling. (Note: If the building houses a campus Main Distribution Frame (MDF), the BDF functions may be combined in the MDF located within the new Building or renovated Building. Additional square feet per below shall be provided to the MDF to allow for BDF functions.)

- Do not locate MDFs/BDFs/IDFs in any place that may be subject to water infiltration, steam infiltration, humidity from nearby water or steam; heat (e.g., direct sunlight); or any other corrosive atmospheric or adverse environmental conditions.
- BDF shall not be in the same room with transformers, motors, generators, radio transmitters, radar transmitters, and induction heating devices.
- BDFs and IDFs shall be stacked in multistory buildings.
- Locate the BDF far enough away from sources of EMI to reduce interference with telecommunications cabling, including EMI from electrical power supply, transformers, motors, generators, radio transmitters, radar transmitters, and induction heating devices.
- Minimum ceiling height shall be 10 feet
- BDF doors shall be at least 3.0 feet wide. Doors shall be lockable and include access control keypad card readers and associated door monitoring. Doors shall open outward where feasible.
- Provide AC grade ¾" thick fire-rated plywood 6" AFF painted with white fire-retardant paint on each wall with a stamp visible.
- Building Management Systems (BMS) to integrate HVAC that will maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). Maintain positive pressure with a minimum of one air change per hour in the BDF. Provide:
  - (1) Temperature 70 degrees F +/- 10 degrees
  - (2) Relative humidity 50% +/- 20%. Provide 18" UL Classified Cable
- Ladder Rack with rungs spaced no greater than 11" between each other mounted at 8 feet AFF. Ladder rack to cover entire circumference of room and through the center of room in both directions. Include Triangle Wall Support brackets for Ladder Rack spaced no greater than 40" between each support bracket.

- Provide Cable Runway Radius Drops at each vertical cable manager in both directions of ladder rack. Provide Channel Rack-To-Runway Mounting Plate with Elevation Kit above each data rack.
- Provide vertically mounted ladder rack at floor entrance conduits to allow routing of cables to the overhead ladder rack.
- Provide 6" wide x 7' high Double-Sided Vertical Cable Manager with extended fingers mounted at both ends of data racks.
- Provide 10" wide x 7' high Double-Sided Vertical Cable Manager with extended fingers mounted in between each data rack.
- Provide Double Gang Junction Box with 1 CAT6A F/UTP Outlet wall mounted at 42" AFF for VOIP Phone. Cable to be terminated to rack mounted patch panel.
- Provide a minimum of (2) 4" spare unused conduit sleeves out each side of the data closet to extending to the nearest accessible ceiling space for future cabling needs.
- Provide adequate and uniform LED lighting that provides a minimum equivalent of 50 foot-candles when measured 3 feet above the finished floor level. Coordinate lighting layout with the equipment cabinet layout, especially overhead cable trays, to ensure that light is not obstructed.
- Each four-post data cabinet in an MDF requires 2 L21-30R outlets and each row of cabinets shall have 1 Quadraplex NEMA 5-20R outlet. Each outlet to be on a dedicated circuit. Power outlets shall be mounted at the cable ladder runway.
- Provide separate duplex 120 V, 20A convenience outlets (NEMA 5-20R) for tools, test sets, etc., located at least 18 in. above the finished floor, placed at approximately 6 feet intervals around perimeter walls and identified and marked as such.
- Uninterpretable Power Supplies and Power Distribution Units for IDFs shall be owner-furnished and owner-installed (OFOI) to support some or all of the IT rack-mounted equipment.
- Exception: Building(s) with campus MDF(s) shall have CFCI hardwired UPS and PDU systems to serve MDF/BDF/IDFs.
- 4-post racks shall be constructed of steel, include adjustable depths, and include cage nut mounting rails. Must meet 2000 lb. static load rating, evenly distributed. Aluminum racks are not acceptable. Threaded rails are not acceptable.
- Power outlets located inside BDF/IDF shall terminate to a dedicated 42-space electrical sub-panel located within that BDF/IDF. This sub panel shall be connected with an automatic transfer switch to a backup power source if one is required as part of the project scope in the Division 26 - Electrical section in **Volume 2 District Specifications**.
- BDFs and IDFs shall have a connection to the battery only for backup power. However, BDFs and IDFs shall be powered through sub-panels connected to backup power sources and automatic transfer switches if required as part of the project scope as indicated in Division 26 - Electrical section in **Volume 2 District Specifications**.
- All racks, cable trays, and equipment shall be properly grounded according to manufacturer recommendations. Provide a copper signal ground busbar in each Telecom Rooms. The ground conductor shall be a 1/0 copper cable, cad-welded directly to the Ufer Ground or Main Building Entrance Ground, or building steel.
- Provide static dissipated flooring.
- Rack layouts require sign off from IT Managers in the design phase and secondary sign off prior to installation.
- Laminated floor plan as-built drawings shall be mounted in each BDF/IDF identifying all outlets being served. Drawings shall be full "E" size and shall include major cable pathways (all data cabling/pathway infrastructure conduit, cable tray), outlet locations, outlet type (CAM, WAP, IPS, FACP, etc.), and outlet numbers. The drawing shall include updated rack elevations and all patching schedules showing which patch panels and ports to each workstation outlet.

2. Telecom Layout

- BDF Room - Specific Items:
  - Size requirement of 10' x 16' (04) Four-Post Data Cabinets
  - 4U High-Density Fiber Enclosure with fiber connecting BDF to MDF as well as fiber connecting BDF to each IDF.
  - 25-Pair copper OSP cable terminated to protected terminal block with 110 cross connect to rack mounted RJ-45 patch panel with 1-pair terminated per port.

Place patch panel in same rack as the CAT6A F/UTP tie cables going to each IDF.

  - End Node devices connected via fiber cabling shall connect exclusively to the BDF.

- IDF Room - Specific Items:
  - Size requirement of 10' x 12' (2) (03) Four-Post Data Cabinets
  - 2U High-Density Fiber Enclosure with fiber connection from this IDF room to the main BDF.
  - Provide (24) CAT6A F/UTP tie cables terminated to a patch panel on both sides in the BDF that connect to each IDF.

16.4.2 Communications Cabling

The new construction building or renovated building cabling system shall include high-performance copper Category 6A grounded F/UTP and ABF optical fiber cabling. Cables may be routed through conduit, cable trays, spaces below raised floors, open ceiling areas, non-ventilated spaces above ceiling tile, and through plenum air-handling spaces above ceiling tile. Cables shall not be attached to ceiling grids or lighting fixture wires. Where support for horizontal cable is required, the Contractor shall install appropriate carriers to support the cabling. Cables shall not be attached to or laid down on top of the ceiling grids or lighting fixtures.

Horizontal Cabling

Cabling shall be Category 6A F/UTP. These copper station cables shall be installed from each outlet jack to the building BDF/IDF Rooms and shall follow the College's blue color standard. All voice/data cables shall be terminated on Category 6A jacks at the outlets and mounted to faceplates. In the BDF/IDF rooms, the cables shall be terminated on 48-port patch panels in the equipment racks.

Note: Indoor/Outdoor OSP Category 6A cabling shall be required for the installation to exterior outlets which will be required to support exterior voice/data outlets, exterior access point outlets, and exterior video camera outlet installations. Indoor/Outdoor/plenum-rated cable is required for any floor boxes on the ground level as these conduits may be subject to water infiltration. A plenum is required because these cables will most likely end up above the ceiling at some point. Fiber Cabling to End Node Devices over 295 feet that are placed in outdoor areas and cable distances have necessitated the use of fiber rather than CAT6A. If an IP device is placed away from the structure (light pole, for example) Hybrid Fiber cabling shall be used for communication to that device.

- Hybrid fiber cabling shall have 12-strands of SMF and 6 12-AWG copper conductors for low voltage power. This fiber shall be terminated in the BDF where a rack mounted DC power supply and Fiber Enclosure can be installed to support this infrastructure.

Inter & Intra-Building Backbone Fiber Cabling

Fiber cabling installations shall include the installation of 24 strand single mode fiber cable and 24 strand multimode OM4 cabling extended from the BDF to each IDF. Installations shall also include 48-strands of SMF from the BDF to each MDF. Two separate non-overlapping paths shall be utilized from the BDF all the way to each MDF. If only 1 MDF exists on a site, (2) 48-strand bundles will be routed through completely diverse paths all the way to the same MDF and each bundle terminated to two separate racks in that MDF.

New Sumitomo Electric Lightwave Air Blown Fiber (ABF) tube cell infrastructure shall be designed, furnished, and installed by the Design-Build Team. The tube cell design shall be deployed in the non-overlapping pathways being used. The non-overlapping pathways shall be a fully redundant fiber infrastructure with data being able to flow both clockwise and counterclockwise around the campus thereby ensuring survivability of communication in the event of pathway interruption.

Inter & Intra-Building Backbone Copper Multi-Pair Cabling

Backbone copper cabling shall include the installation of 24 CAT6A F/UTP cables terminated to patch panels on both sides shall be supplied between the BDF and each IDF. These tie cables can be used for both analog or IP-based communication and thus dedicated CAT3 cable between BDF and IDF is not needed.

A 25-pair CAT5e cable shall be provided between the primary MPOE and each BDF and be terminated to wall mounted 110 blocks on both sides. A 25-pair cross connect cable and a rack mounted RJ-45 patch panel (with one pair terminated per RJ45 connector) shall be provided between the wall mounted 110 block and the primary data rack.

16.4.3 Inter-Building Cable Pathways

The new construction buildings shall include dual diverse underground backbone pathways to new or existing campus communications vaults/manholes. Each building shall have 2 sets of (2) 4" conduits from the BDF to new underground communications vaults on opposite sides of the building that

connect to the existing underground conduit communications conduit system. Fiber infrastructure coming from each MDF shall enter the building from opposite sides to ensure pathways never overlap each other.

Buildings with an MDF included in the scope of the project require two sets of (9) 4" conduits entering from opposite sides of the building to support communication cabling from all buildings. Projects that include the construction of a new MDF shall include all necessary infrastructure to bring that MDF online and operational including new fiber infrastructure to each BDF.

16.4.4 Service Provider Dedicated Cabling & Pathway To MPOE

The Design-Build Team or Design-Bid-Build Team shall coordinate with the College's service provider to extend a minimum of (3) 4" conduit from existing service provider vault at property line. The Design-Build Team or Design-Bid-Build Team shall coordinate and provide the support systems required by the service provider in the new Main Point of Entry (MPOE) location. These include power, cooling, grounding and pathway.

16.4.5 Cable Pathways

The cable pathway shall include cable tray, conduit and j-hook pathways. Dedicated pathways shall be designed to support both initial building installations along with future cabling installations.

The cable pathways shall be accessible throughout the entire path from BDF/IDF room to outlet for future cable installations.

1. Cable Conditions

- Horizontal cable length maximum 90 meters or 295 feet.
- Tie wraps that distort the cable jacket or affect cable performance shall not be used.
- Velcro strap shall be utilized to organize cabling.
- 4 pair horizontal cable: 25 lbs. of force maximum pull tension.
- F/UTP Bend Radius = 8 X Cable OD

2. Horizontal Pathways in Conduit

- (2) 90 degree bends maximum between pull points
- 30 meters (100 feet) max
- Maximum of 3 work areas served by a single conduit
- Flexible Conduit 5 meters max / increase 1 trade size

3. Conduit Fill Requirements

- Maximum 40% fill-in conduits
- Conduits less than 1.25" shall not be used for any data cabling
- Trade Size 1.25 = 7 CAT 6A F/UTP Cables
- Trade Size 1.5 = 10 CAT 6A F/UTP Cables
- Trade Size 2 = 18 CAT 6A F/UTP Cables
- Trade Size 4 = (4) 4" conduits are necessary between the BDF and each IDF

Note: trade size conduit shall be increased to accommodate OSP cables at in-slab or beneath slab on grade locations. Floor boxes shall utilize no less than 1.5" conduit size. Underground communication conduits that traverse outside of the building footprint shall be no less than 2". First floor boxes shall have two gangs accessible from data conduit.

4. Fire Stopping

- Design-Build Team shall furnish and install all requirements to effectively seal all utilized conduits with an approved conduit sealing kit after splicing, testing and acceptance. Twist-to-close conduit speed sleeves with smoke gaskets shall be supplied for all inter-building conduits entering a data closet.

16.4.6 Cable Testing

All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-C.2. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% usable conductors in all cables installed.

All fiber stands shall be tested using a Optical Time Domain Reflectometer Testing (OTDR) method as well as a Fiber Optic Power Meter Test. This test shall be performed across the entire fiber channel. No fiber strands shall be left unterminated and untested.

All cable test reports shall be delivered in both PDF and Native File format to LACCD. All cable tests shall pass in order to be acceptable.

Testing equipment shall be inspected and calibrated by a certified laboratory within 6 months of the date

of the test. Proof of this calibration report shall be provided along with test results.

The cable labels used on the test results shall match the final cable labels attached to the cables (complying with LACCD standards.)

16.4.7 Cable Labeling

- All cable labels shall have the ability to rotate on the cable to be able to read the entire label from a single position (Example: Panduit Turn-Tell labels.) Flag-style labels are not acceptable for use. Labels shall be machine-printed and clearly legible. Utilize the largest font possible to accommodate the necessary text.
- Both sides of every cable shall be labeled. For cables that go underground, every cable shall be labeled at every accessible pull point.
- Underground cables are preferred to be labeled with both a waterproof machine printed identification as well as a Radio Frequency Identification tag that can be read from above ground without needing to open the vault/handhole.
- All devices, cables, and cable termination/connection points shall have labels attached with unique identifiers assigned using LACCD's approved format. These labels shall be utilized on all as-built and final turnover documentation.
- A matrix shall be created by the installer for every type of label that requires printing and shall be delivered to LACCD for confirmation on the standard to be utilized for each label prior to printing.
- All copper horizontal cables are to be labeled using a machine printed label at each end of the cable at approximately 4 to 12 inches of the termination point. Handwritten labels shall not be used.
- All patch panel ports and telecommunication outlet ports shall be labeled with the cable identifier. All labeling shall comply with district-published standards.
- Note all labeling information on the as-built drawings.
- Design Build Team or Design-Bid-Build Team shall furnish and install self-laminating type labels to the unitized spur cable's overall jacket, 6 inches from the fiber storage panel strain relief, with the BDF/IDF number and fiber number in numerical sequence.
- All fiber cabling shall be labeled in the front of each fiber termination shelf with the labels furnished with such shelf, using LACCD's approved scheme.
- At pull boxes, manholes and vaults – all conduit and cables shall be labeled with permanent tags which indicated from-to information and cable type/pair quantity information.
- Outlet boxes shall be galvanized steel, double-gang and extra deep (2 1/8") or larger. Boxes installed in any exterior location where exposed to rain or moisture-laden atmosphere shall be cast screw hub type with gaskets and weatherproof covers. Single-gang to double-gang mud rings shall be used on recessed boxes.

16.4.8 Cable Warranty

The Telecommunications Contractor must be an approved certified contractor of cable manufacturer products. The telecommunications contractor is responsible for workmanship and installation practices in accordance with the certified installer program. For copper cabling Category 6A system, the telecommunications contractor shall provide labor, materials and documentation according to requirements necessary to ensure that the owner will be furnished with a Manufacturer's Warranty of 25 years in length. The warranty shall guarantee 25 years for the product and 25 years on installation/labor (no pro-rated labor for entirety of 25 years.) The warranty shall be provided after manufacturer inspection of as-built conditions and installations has been completed.

16.4.9 Telecommunication Drawing Standards

To allow various types of applications to automatically populate equipment onto geographical maps, it is imperative that Information Technology, Audio Visual, and Security drawings utilize geospatially aligned drawings and the necessary equipment symbols are placed on those drawings accurately so that Global Positioning System (GPS) coordinates of each symbol can be captured in final as-built documents.

Native drawing files shall utilize the "CA83-VF" Geographical Information System (GIS) Coordinates System and utilize United States Survey Feet units to ensure symbols can be appropriately and consistently assimilated by various applications. Equipment schedules/load sheets on as-built documents shall include unique identifiers for individual devices and shall include geographic

location data expressed in the form of GPS Coordinates in Latitude and Longitude Degrees with accuracy of no less than seven decimal places (Example: 34.3137952, -118.4191156).

Drawings shall meet all minimum standards listed on the latest published LACCD "Building Information Modeling (BIM) Standards" and "Computer Aided Design & Drafting (CADD) Standards". All projects required to produce drawings as part of as-built documents shall follow LACCD Standard Operating Procedures related to BIM standards and drawing submittals. If the project does not have tradition design/construction phases (as is common with many Technology-specific projects) the most stringent and detailed level of standards shall be utilized for each submittal of drawings. All drawings shall be uploaded through LACCD's BIM360 portal and be coordinated with LACCD's BIM/CAD team to ensure design files meet the required standards. All projects shall utilize the latest available Revit files for each building.

16.4.10 Patch Cable, Patch Panels, Surface Mount Box & Outlet Faceplates

CAT6A F/UTP patch cables shall be the skinny 28AWG type and blue in color.

Fiber optic patch cables shall be a uniboot high-density style construction with polarity reversible design. OS2 SMF cable color shall be yellow and OM4 MMF cable color shall be violet.

Copper Patch Panels, Surface Mount Boxes and Outlet faceplates shall all be made from the same manufacturer as the cable and certified as a complete system.

16.4.11 Cable Schedule Chart

The Design-Build Team or Design-Bid-Build Team shall provide the district with cable schedule charts that are part of the Shop drawing submittal that shows how many data drops are expected to be supplied for various types of devices.

Examples: WAP = 2

Computer Station = 3 Camera = 1

Card Reader = 2

16.4.12 Lightning Protection

The Cable that may be susceptible to being struck by lightning such as those that leave the building envelope (either underground or on the roof) shall be adequately protected from lightning.

16.5 Audiovisual Design

16.5.1 Goal & Intent of Section

The intent of this document is to aid in the application of consistent instructional technologies within the LACCD classroom environment to meet the goals established within the 2018-2023 LACCD District Strategic Plan:

Goal 1: Access to Educational Opportunities

Goal 2: Premier Learning Environments

Goal 3: Student Success and Equity

Goal 4: Organizational Effectiveness

Goal 5: Fiscal Integrity

The purpose of the Audio Visual (AV) Classroom Standards are to provide minimum performance criteria for instructional technologies and audio-visual systems that will meet the needs of institutional learning, support various teaching methods and styles, enhance District/College communications, improve operational systems, meet accessibility (ADA) compliance requirements, and meet fire/life/safety compliance requirements. This standard provides a minimum baseline level of audio/visual capabilities along with guidelines for use in architectural programming, design, construction, renovation, and upgrades of classrooms throughout the entire District.

16.5.2 Flexibility & Evolving Classroom Technologies

LACCD Stakeholders identified that classroom technologies will play a major part in how education in the future differs from education today. It was identified that the standards shall be:

- **Flexible:** to support a variety of instructional pedagogy
- **Expandable:** to support future classroom technologies such as wireless presentation, augmented and virtual reality, and holography
- **Scalable:** to support additional media inputs and outputs for future needs

As such, to supplement the existing Audiovisual system capabilities, the standards include infrastructure that enables the District to easily adopt future classroom technologies as identified above.

16.5.3 Design Requirements & Updates to the Audiovisual Standards

General Information

This document provides directions for the Design Team, Construction Contractor, etc. with the guidelines to adhere to for the consistency of Audiovisual space design and system requirements. It also provides the criteria for testing, commissioning, and warranty for the installed and final completed Audiovisual systems. Refer to **Volume 3 Appendices - Chapter 16 Technology & Audiovisual Design** for the Audiovisual Standards and Design Guidelines.

Updates and new additions to the February 2022 published version of the LACCD Audiovisual Standards will be outlined in the sections below and are to be considered during design and incorporated based on the programmatic requirements of the specific project. This includes more specific information on:

- Architectural/Acoustic Requirements
- Lighting
- Wall Clock and Paging Speakers
- Projection Screens
- Audio Support
- Distance Education Support & Web Collaboration (Updated for Hybrid Instruction Support)
- Local Network Switching Support
- Audiovisual System Control
- Manufacturer Certification

16.5.4 Architectural/Acoustic Requirements

Rooms, particularly those seating 40 or more, shall have a sound system that amplifies the program sound (A/V and computer) for listeners. Larger spaces shall also provide amplification of the instructor's voice. The program sound amplification/speakers shall be distributed throughout the room.

Ensure there is enough soundproofing between classrooms and their adjacent spaces to provide a comfortable learning and teaching experience with minimum sound distractions.

Be aware of the acoustics within the room, especially in larger spaces. Slight changes or enhancements to furniture and finishes can reduce echoes and reverberations. In rooms where sound isolation is critical, walls shall be full-height to the deck to minimize audio bleed-over from or into the room. Reference ANSI/ASA S12.60 for more information.

For hybrid learning within instructional spaces, conference room web-conferencing, broadcast, and recording spaces, appropriate acoustic coverings on opposing walls provide the best support for audio absorption during recording or live streaming of classroom sessions, etc., to help reduce echo and to control the audio capture within the spaces for the remote listeners. Also, cooler colors and larger patterns (preferably none at all) work better with cameras to prevent a moiré effect on video capture. No thin patterns or lines shall be provided.

Refer to **Chapter 9 Acoustics Design** for more acoustical design criteria.

16.5.5 Lighting

The lighting system must provide a comfortable level for reading and writing at the student stations plus the ability to light the writing surface and screen at the instruction area independently of the rest of the classroom. It shall allow everyone in the room to see each other's faces easily to foster class discussion. Refer to required illuminance levels in **Volume 3 Appendices | Section 12 Electrical | LACCD Lighting Levels per Space**.

Interior lighting shall allow for variety of lighting scenes from full illumination to subdued lighting for projection.

Banks of lighting near the digital display (front row) shall be switched separately from the remainder of the lights. This will prevent screen image wash-out on projected surfaces.

Lighting must provide a level of room darkening to view projections on the front screen that also provides sufficient lighting for note taking.

All classrooms shall have no less than two separately controlled lighting areas—seating area and instructional area. The ability to dim both areas shall be provided as standard.

When possible, pendant-style lighting shall not be used in concert with projection screens and projectors to avoid conflict between the lights and the projected image.

When the classroom is dimmed for projection, some lighting will be required at the presentation area. Special lighting on the equipment rack or technology controls may be needed.

As a rule, all classroom spaces will have lighting organized into a number of zones. These zones can be combined and dimmed to create any number of different lighting scenarios. Classroom lighting shall include day lighting, multi-modal lighting, controllability, and optimize energy performance. A room can be zoned based on the amount of day

lighting available, with each fixture responding to the amount of light at any time and location.

Note that hybrid learning in instructional spaces may drive the need (based on the room layout) for better instructor facial illumination at designated primary presentation positions. This is required for optimal camera capture. General lighting within the space for the instructor for camera capture shall be considered to support the auto-tracking camera(s) within the room. This shall be designed to not conflict with the projected image area for screen image wash-out.

Dimmer or toggle switches are preferred. No programmable lighting system shall be installed without prior approval from LACCD.

Where programmable lighting is planned, provide a mock-up for instructor review well before planned installation allowing time for modifications to product selection. Place back-lit switches at every room entrance, to provide at least minimal room illumination so users never need enter a dark room. In windowless rooms, provide a small light at the door.

Locate lighting controls with a clearly labeled switch-plate on the instructor multimedia lectern, and on the wall nearest to the instructional area. Where programmable lighting is used, controls shall be integrated into the multimedia control panel.

Reference **Chapter 12 Electrical Design, General Lighting**.

16.5.6 Wall Clock & Paging Speakers

Network (IP) based wall clock speakers that are connected to the SingleWire InformaCast™ network and software are to be deployed in each classroom. A wall data jack and CAT6A cabling shall connect each digital clock speaker to the campus network. It may be preferred by facilities and program for the use of a PoE analog clock (non-speaker) option.

These clock speakers are to be used for campus (or classroom) specific announcements through the paging system. Visual Messaging may be included in the digital clock solutions and shall be dependent on each specific campus and building project. Refer to the individual Campus Facility Standards for individual campus requirements.

16.5.7 Projection Screens

Size
Screens shall be sized to accommodate good viewing at student seat locations. Minimum screen image height is 60" with a student seat location 25 feet from screen (standard rule is 1 foot of screen image height for every 6' of distance from screen.) Bottom of screen image shall be no less than 4 feet above the finished floor.

Aspect Ratio
Typical aspect ratio shall be 16:10 (widescreen format) for computer content and video content viewing.

Screen Location
Screen shall be located at front wall at a centered position. Screen location shall accommodate a minimum 6 feet width of writing board surface adjacent to screen. This design is intended to allow an instructor to use the writing board while a projected image is being shown. Screen shall not be blocked by the Instructor Desk. The screen shall be positioned 6"-8" from the wall surface to clear obstructions such as whiteboard clips; and shall not block clocks and fire beacons when lowered.

Screen Material
Screen material shall be a matte white with a black 2" border. Screen material shall have a gain of approximately 1.0. Screen material shall have a solid black backing to prevent rear light sources (windows, etc.) to pass through. If extreme conditions persist due to room architecture for side lighting, etc., an Ambient Light Rejecting screen material can be used to help control the screen washout effect due to overhead and side lighting or windows.

Installation
Screens shall be ceiling or wall mounted per the room conditions. Standard screen vertical image size is 1/6 the distance to the furthest viewer.

Where feasible, motorized ceiling recessed projection screens with a manual switch located near the instructor station and a low voltage parallel interface for AV system connection shall be used.

Motor and Control
Screens shall have hard-connected ceiling or wall power located on the left (house-left) side and shall be run to the wall low-voltage control switch with a connection wire for operation. A parallel low-voltage control wire for up/down relay operation shall be run to the AV rack or instructor station position for remote system operation. This relay wire shall be run and coiled with a slack 10' of cable for installation within the rack leaving enough cable for a service loop or tether within the harness. The wall control switch shall be located near the front wall (not behind the lowered screen) at located at +44" AFF on the same side as the teaching position.

The wall control switch is a 1-gang Decora™ device and can be shared in the same junction box with other screen wall switches (e.g. dual screen conditions require a 2-gang junction box).

These switches shall be co-located (where possible) with other services such as lighting and HVAC controls for aesthetics. The screen motor shall be a quiet type.

Motorized wall mounted type and shall be non-tab-tensioned. Wall mount spacer brackets to be used as required. For larger lecture or auditoria spaces, tab-tensioned screens shall be used for any screen sizes over 200" diagonal.

Motorized in-ceiling type and shall be non-tab-tensioned. Wall mount spacer brackets to be used as required. For larger lecture or auditoria spaces, tab-tensioned screens shall be used for any screen sizes over 200" diagonal.

Note: For Retrofits – When there is a choice between an image being too small and line-of-sight, retrofits shall prioritize an absolute maximum of 8X distance vs. screen height. If necessary, the image may to go lower than optimum so students in the rear can read the text clearly without strain. Per LACCD, the bottom of the screen does not have a large impact on the presentation that outweighs the need for visibility of all students.

16.5.8 Audio Support

Audio Support

Rooms shall have a sound system that amplifies the program sound (AV and computer) and larger spaces will require amplification of the instructor's voice (voice amplification or reinforcement) via a fixed or wireless microphone system (in rooms that require the use of a wireless lapel microphone system). The program sound amplification and instructor voice speakers shall be distributed throughout the room for even audience coverage and monaural playback. These shall be the 2' x 2' square low-profile 70-volt tile replacement solution but based on design solution, room aesthetics, and ceiling type, can be circular 70-volt units with included plenum back cans or plenum-rated assembly.

In certain spaces, the program may dictate for stereo audio playback for program content sources. When this is required, dual stereo speakers shall be located at the front (+96" AFF) on either side of the projection screen(s).

Other specialty spaces may also require Surround Sound, 5.1, 7.1 Dolby Atmos, etc., for film production or editing classrooms and/or the addition of subwoofers for low frequency audio response in athletic or music classrooms. These are not covered in these standards but the guidelines within this document for installation and ADA clearances shall still be applicable.

Instructional classrooms now all require support for hybrid learning which includes the use of ceiling microphones for both instructor and audience capture. These are Dante™ connected solutions that cover (on average) a 20' x 20' area per ceiling tile microphone. The number of microphones shall be dictated by the room size to be placed for coverage of all presenters and occupants of the space. Ceiling microphones shall be coordinated to match the ceiling conditions dictated by the space designer or shall default to white square model as a tile replacement.

Medium and large Meeting rooms require provisions to support web-conferencing. Depending on the layout of the space, this may require a ceiling microphone to cover the room for audio conferencing support over soft codec (Zoom, MS Teams, etc.) usage from either a dedicated or portable (laptop) computing device.

Wireless microphones and ALS equipment shall be tested to ensure there are no dead zones and that the contractor has coordinated channels around an RF spectrum analyzer for the best available spectrum and channel selection.

16.5.9 Distance Education Support & Web Collaboration

Updated LACCD directives following the 2022 AV standards update note that the majority of instructional spaces are to support hybrid learning programs. This includes real-time collaboration or conferencing to bring in a remote presenter or share the classroom experience or to just record the instructional session for later posting and viewing. Specific programmatic requirements for the building and its spaces may drive the need for other room types to use instructional capture technology. Specific room requirements may be further defined in the PPC.

Many inexpensive or free software options are available to accommodate this (Zoom, WebEx, Goto Meeting, etc.) and can be used on the room PC (District limitations on software installation and permissions apply).

Using a camera with either an HDMI, HD-base T or USB connection/output and a ceiling microphone attached to the PC through a "media hub", the "far-end" or remote participants can be displayed on the screen via the PC source and heard via the in-room speakers. Care should be taken to control the input

audio to prevent echo or feedback when using a voice-amplification system.

LACCD requires the use of an auto-tracking camera located at the rear of the room to follow the presenter moving along the front of the primary instructional zone for whiteboarding annotation capture. Refer to the updated Audio Support section preceding this section to provide guidance on the use of the overhead ceiling microphones for presenter and audience capture within the designated instructional spaces

16.5.10 Local Network Switching Support

Within each classroom and meeting space, etc. supporting an Audiovisual System, a small 8-12 port (or sized as required based on number of anticipated connected devices) dedicated edge network switch to support the network connected devices shall be included within the AV rack. This is to both minimize the increased amount of data ports on the wall and to ensure the system operation with all locally connected elements in the case where the network connectivity to the room is not available. This would be a managed switch to support the AV equipment on an AV VLAN (or virtual local network for support) while other devices including PCs, wireless presentation gateways for screen sharing, etc. are connected to the dedicated LACCD network. The network switch shall conform to the LACCD standards and be coordinated with the campus IT department for activation and authorization as well as for any specific switch configurations required.

16.5.11 Audiovisual System Control

The Audiovisual systems require control for all instructional, meeting space, and unique space that has integrated AV support. Based on the space type as well as the individual requirements for each campus, this may vary from being a physical touch control panel mounted on the desk, table, or in the wall, or to be an integrated soft-Graphical User Interface (GUI) used on a larger touch screen monitor for both mouse or finger touch control button activation.

In the case of a wall mounted control panel, this shall be a minimum of a 7" diagonal touch screen recessed within the dedicated manufacturer pre-installation wall box for a semi-flush (protruding no more than 1" from wall finish) installation.

Desktop control panels are 7" diagonal or larger depending on the complexity of the installed system being controlled. Typical classroom and meeting rooms require a 7" control screen whereas specialty spaces may require 10" or greater size for more complex functionality and button/display area which may include camera preview, multiple microphone controls, etc.

Desktop control screens shall be secured physically to the desk surface with a Kensington-style lock to provide flexibility in position or a fixed attachment to provide a more secure and non-moving position on an instructor station.

For the monitor version of the touch control surface, this will be the primary (or left monitor) of the two available mounted monitors located at the instructor station on an articulating arm VESA mount. This primary monitor would be used to display the soft-control user interface. Note that this soft-GUI requires the Contractor to provide an appropriate software license for the control option (Extron Link License).

16.5.12 Manufacturer Certifications

The Contractor shall be certified through Extron for digital switching and control systems and will retain current certifications for appropriate digital-based systems (either engineering and/or installation depending on requirement) for key implementation personnel or sub-contractors to the Contractor. All technical staff working on the implementation side shall hold current Extron technical certificates. The lead technician and programmer/commissioning personnel shall hold current Extron certifications. Specific certifications include Extron Electronics and shall be a dealer in good standing with the manufacturer. Relevant Extron certifications include XTP Systems, Extron ProDSP, Network AV Specialist, Extron Authorized Programmer and Extron Control. Dante™ certification for all networked audio, etc., devices using this protocol.

Installing Contractor shall also be certified as a dealer in good standing for all system components of values greater than $500. This includes projectors, cameras, microphones, monitors/displays, audiovisual furniture and connectivity, mounting solutions, speakers, projection screens, etc.

CHAPTER 17

Security Design

East Los Angeles College

CHAPTER 17 - SECURITY DESIGN

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17 Security Design

17.1 Introduction

The Los Angeles Community College District (LACCD) places a paramount emphasis on the safety of individuals and property across its campuses and buildings. To achieve this, LACCD implements a multi-layered approach to physical security, incorporating policies, procedures, and systems that bolster the overall security program of the District.

Refer to **Volume 3 Appendices | Acronyms, Terms & Titles** for a glossary of security related terms.

17.2 System Design & Procurement

The Security shall be designed by a board-certified Physical Security Professional (PSP) or Certified Protection Professional (CPP), accredited through ASIS International. The Security Designer shall create a set of biddable Construction Documents consisting of 100% CD drawings and CSI-formatted specifications.

The Construction Documents shall be bid by Security Contractors certified to install, program, and maintain the systems delineated in this standard. The construction project funds shall purchase and install the Video Surveillance System (VSS) components. The District shall not take ownership of the system until the Security Designer commissions and approves the system for Owner acceptance. Refer to Table 1 for the Responsibility Matrix.

All projects containing any security-related equipment shall contain dedicated drawing sheet sets for security-related equipment (TY series) as well as Division 28 specification sections. Security drawings shall include symbols for all hardware devices being installed in a particular project. Security drawings shall include a Site Plan that gives an overall view of the entire project site which shall include any fences, gates, utility yards, vehicle/pedestrian entry points, structures, and any other items that may impact physical security.

If a building is split across multiple sheets, an overall floorplan sheet shall be supplied for each floor so that security device placements can be adequately reviewed in correlation to one another. Roof level plans shall be included in security drawing sheets.

TY series drawings shall also contain the following symbols from other disciplines but be lighter line weights and notes included to signify they are noted for reference and coordination purposes only:

- Data Outlets assigned specifically for security devices (not all data outlets, just those used for security)
  - All Fire Alarm Panels (panels only not devices)
  - Door, Gate and Room Identifiers
  - Method of Lockdown used at each door
  - Fences and gates that affect physical access
  - Poles greater than 8 feet in height

All IP-based security devices shall utilize cabling meeting the same standards outlined in the LACCD Telecommunications/IT Standards section of this document. Security device cabling shall be terminated to their own patch panels for easy patching to dedicated security switches.

17.3 Codes & Standards

Please refer to **Chapter 1 Codes & Regulations** for details on compliance, code and regulations related to security design.

- 11.1 Security Design Codes and Standards

17.4 Security Design Standards & Requirements

Refer to **Volume 3 Appendices | Section 17 Security Design** for more information.

17.5 System Infrastructure

An important component of any security system is the cabling and containment infrastructure. The following requirements shall be followed:

17.5.1 Cabling

In some instances, a security camera may need to be placed at a distance that exceeds industry standard lengths for copper Ethernet style cabling, or the cabling must pass through underground conduit to reach its end point device. In either of these instances, hybrid fiber cabling with both single mode fiber strands and 12 AWG copper conductors shall be supplied for these devices. Refer to the LACCD Telecommunications/IT standards for more details on this solution.

17.5.2 IDF Rooms

The recommended practice is for all cabling to be routed towards the closest IDF Room. However, the preference is to route security cabling through the minimal number of data closets feasible, provided that the cabling remains within industry standards.

17.5.3 Construction Activity

An LACCD site may have other ongoing projects that impact the various security systems deployed at that site including cabling and pathway infrastructure. The Security Designer shall therefore coordinate closely with the District to understand all projects that are or will be taking place during the duration of their project to ensure they are not in conflict. Where existing or planned conduit and pull box infrastructure can be utilized, the Security Designers are encouraged to consider this within their design and coordinate with the appropriate District personnel for confirmation.

17.5.4 Crime Prevention Through Environmental Design (CPTED)

Crime Prevention Through Environmental Design (CPTED) is a design strategy that leverages physical and environmental aspects to incorporate security within a campus. These principles aim to invoke security before the use of technology. LACCD shall incorporate these principles, where possible, as coordinated with the Design Team (DT). The 4 principles of CPTED include:

- Natural Surveillance
- Natural Access Control
- Territorial Reinforcement
- Maintenance & Management

From a high-level perspective, Natural Surveillance is ensuring that sightlines are open, and trees and bushes aren't obstructing views in strategic areas that could encourage crime or vandalism.

Natural Access Control involves the strategic use of environmental designs such as plants, trees, bollards, or benches to guide and manage access to specific areas. This thoughtful approach influences how people and vehicles move through spaces. For instance, well-placed entrances, exits, fencing, landscaping, and lighting can subtly shape traffic flow, reducing risks and enhancing predictability for a safer environment.

The final two principles, Territorial Reinforcement and Maintenance & Management focus on fostering a deep sense of safety, pride, and ownership within the campus community. By instilling a feeling that this space belongs to each individual, we naturally encourage a collective effort to safeguard it. This approach significantly reduces opportunities for any unwanted activities or individuals such as vandalism, ensuring a secure and cherished environment for all.

17.5.5 Deviations

Deviations from this standard are not allowed. However, in special cases, a deviation may be required to best meet the intended security goals of a project. In those limited cases, written approval is required from the District. The Design Team shall submit a request describing the specific deviation entered for consideration with an explanation of the justification for the request. This request shall be provided through the College Project Team (CPT) and/or District Project Manager (DPM).

17.5.6 Video Surveillance System

An integral component of this comprehensive security program is the Video Surveillance System (VSS). LACCD has developed this document to standardize the components and requirements for the design and implementation of a complete security system, ensuring the safety and well-being of all within the District's premises.

17.5.7 Purpose

The purpose of this standard is to define the physical security requirements of the District, which are to be implemented on all projects that require security cameras. This standard will detail the software, hardware, infrastructure, programming, warranty, maintenance, and training requirements which shall be included in the specification section Division 28. Deviations from this standard are not allowed. If a deviation is required, it may only be approved by LACCD.

This standard does not include any LAN/WAN network design requirements that may be needed for the video surveillance system. For example, the types of switches, routers, or network configurations to create a VLAN or other network environment are not part of this standard.

17.5.8 Special Note

The VSS will require close coordination between the Security Designer and LACCD. Certain components may be the responsibility of the Security Contractor to provide while others will be furnished by the District. As such, the Security Designer needs to properly document these requirements in the Construction Documents (drawings and specifications) to ensure that proper bid responses are obtained. This document will describe the scope of work and responsibility of owners for each component. It is the responsibility of the Security Designer to understand and apply these standards and request confirmation from the College Project Team (CPT) and/or District Project Manager (DPM) for any items that may be considered special conditions

for the project. All communication with the CPT and/or DPM shall be via the proper channels outlined in your specific projects.

17.6 Video Surveillance Equipment

System equipment shall include head-end equipment, cameras, and workstations. The following requirements shall be followed:

17.6.1 Headend Software

The Video Surveillance System components added as part of a new project shall be integrated with LACCD's existing Milestone XProtect Corporate Video Management System. Any and all software licenses shall be included within a project that is expanding this existing system including those licenses that are required to achieve certain additional functionalities required by a particular design criteria.

Integration with the existing Lenel-S2 OnGuard ACS is required and shall be included with any design. Both systems shall be fully capable of seeing and utilizing each other's devices.

17.6.2 Headend Equipment

LACCD requires all video surveillance data to be retained for a minimum of 30 calendar days. Designs shall include sufficient Video Recording Servers to achieve this retention rate when the cameras are set to the highest possible resolution and frame rate and no greater than 30% compression using the H.264 or H.265 stream profile. Video Recording Servers shall match the existing system manufacturer and model utilized by the District.

17.6.3 Camera Types

All cameras shall be IP-based and PoE-powered. The following camera types shall be utilized where best applicable per the environment:

- Exterior Dome Camera – Min. 8MP Q series camera for general viewing.
- Interior Dome Camera – Min. 8MP Q series camera for general viewing.
- Exterior/Interior 180-Degree Camera – Min. 14MP P series for general viewing.
- Exterior/Interior 360-Degree Camera – Min. 4x8MP P series for general viewing.
- Pan, tilt, zoom (PTZ) cameras -Min 8MP with 4x5 independently adjusted lens for general viewing.
- License plate camera – Min 2MP for capturing and digitizing a vehicle plate number.
- Elevator camera – Min 3MP for general viewing.

All cameras shall have p-iris and auto-focus capabilities. A minimum IR range of 60ft in low light conditions. Have vandal-resistant and weatherproof housing (minimum IP67, NEMA 4X, and IK10-rated). Support basic video analytics functions without additional hardware or software. These functions shall include objects left behind, digital fence lines, face detection, and loitering.

All exterior cameras shall have integrated IR lenses for adequate nighttime image capture. IR lenses shall not require an additional power source or housing unless required for a specific application such as nighttime license plate recognition (see part III) or PTZ with 360-degree accessory.

17.6.4 License Plate Recognition Cameras

License Plate Recognition Camera (LPR) cameras shall be capable of handling speeds of up to 20 mph and a capture range of up to 40 ft and be positioned to capture the rear license plate of a vehicle entering and leaving a specific area.

17.6.5 Camera Locations

It is important to note that 100% complete coverage of a campus is not expected, as this would require an unsustainable number of cameras and storage.

The philosophy to be implemented is that an individual who enters the site with malicious intent shall be recorded on one or multiple cameras as he moves around the site, even if the specific act in question is conducted in an area that happens not to have dedicated camera coverage. An individual shall not be capable of accessing the site without being recorded on a camera and the system shall be designed such that multiple angles of an individual are captured on video.

The Security Designer shall recommend camera locations that meet the design philosophy, including the locations listed below, and address any unique high-risk areas of the campus. The Design Team shall survey the site with the District and assist in evaluating high-risk areas that shall be covered on camera per industry standards, best practices, and the District's familiarity of campus activities. Camera layouts shall be coordinated with the architectural layouts and building materials for best placement and constructability.

The list below represents the minimum requirements for placing cameras, acknowledging that each site will be unique and may require additional camera placement for specific problem areas or areas of concern. Cameras shall be located in the following

areas:

- Campus perimeter
- Building perimeter
- Parking lots/garages
- Building lobbies/waiting areas:
  - Administrative Office
  - Gymnasium
  - Library
- Cafeteria
- Cash handling areas:
  - Cashier's office
  - Any cash handling counters
- Restroom entry points:
  - Exterior restrooms
  - Public restrooms
- Main areas of congregation and traffic
- Main outdoor corridors/paths of travel
- Outdoor fields
- Emergency Phone locations
- Server Room
- Vehicle chokepoints
- Bicycle enclosures
- Additional critical areas identified by the District
- **Campus perimeter:** Cameras shall be mounted to a building or pole, looking outwards to view the campus approach and main entry points for general coverage.
- **Building perimeter:** Cameras shall be mounted to the exterior of the building, looking outwards or along the building perimeter to view the building's approach and main entry points for general coverage and specific view of building entry points.
- **Parking lots/garages:** Cameras shall be mounted to a building or pole, looking at the parking lots and areas of approach for general coverage.
- **Building lobbies/waiting areas:** Cameras shall be mounted on the wall or in the ceiling viewing the public lobby space only and not the interior office, class, or study areas. Cameras shall view the main entry and provide general coverage of the lobby space and points of interaction between visitors and staff, faculty, or students.
- **Cafeteria:** Cameras shall be mounted on the wall or ceiling viewing the cafeteria interior for general surveillance and situational awareness.
- **Cash handling areas:** Cameras shall be mounted to the wall or ceiling, observing the specific area of cash handling or cash transfer.
- **Restroom entry points:** Cameras shall be mounted to the exterior of the building or a pole looking towards the outside of the entry area only. The interior of the restrooms shall not be in the camera's field of view.
- **Main areas of congregation and traffic:** Cameras shall be mounted to the exterior of buildings or poles, viewing these areas for general coverage and situational awareness. It is possible that cameras meant for other purposes such as perimeter or entry points can be positioned to also provide coverage of these areas.
- **Main outdoor corridors/paths of travel:** Cameras shall be mounted to the exterior of buildings or poles, viewing main paths of travel through the campus for general coverage and situational awareness. It is possible that cameras meant for other purposes such as perimeter or entry points can be positioned to also provide coverage of these areas.
- **Outdoor fields:** Cameras shall be mounted to a building or pole, looking outwards to the open areas for general coverage of the approach from the fields onto the campus.
- **Emergency Phone locations:** Two types of emergency phones are utilized by the District, tower phones and wall-mounted phones. Emergency phone towers shall have:
  - 360-degree with PTZ camera at the top of the tower for general coverage
  - Strobe light
  - Mass notification speaker
  - Wall-mounted phones shall have a camera nearby to appropriately view the general area around the wall-mounted phone.
- **Server Room:** Camera shall be mounted to the ceiling or wall, viewing the entry point of the room.
- **Vehicle chokepoints:** Cameras shall be mounted strategically on buildings or poles to view vehicle license plates at chokepoints. This may include parking entry points,

intersections, and other areas where vehicles are funneled around the campus.

- **Bicycle Enclosures:** Cameras shall be mounted on the exterior of buildings around bicycle enclosures for general surveillance of the area.
- **Corridor Cameras:** Corridor/hallway intersections often benefit from multi-sensor cameras as they can look in multiple directions with only a single camera. In this application, the camera shall be positioned and programmed in "corridor format" (9:16 ratio) to minimize blank space and maximize the view down the long narrow corridor.

17.6.6 Camera Mounting & Intended Views

All cameras shall be mounted out of reach, as best as possible, to avoid vandalism or tampering, but shall not be mounted too high that a lift is required for maintenance and troubleshooting. Generally, cameras shall not be mounted under 10 feet or over 12 feet above the finished floor.

Cameras that are required to be higher than 12 feet for a better general viewing angle, can be mounted to the accessible roof of a building, on a swing-out parapet that could be retracted for maintenance. A camera that is mounted on a roof must have adequate resolution for proper viewing coverage from the mounted distance. Roof-mounted cameras shall be placed at corners and have both 360-degree fixed lenses and a pan/tilt/zoom capable lens to capture a wide-angle view of the surrounding area.

Mounts shall generally support a 1.5" NPT fitting to easily allow any camera to be attached to them without needing to replace the mount. Whenever it is infeasible to utilize this style mount (such as t-grid ceilings), a flush mounted junction box positively attached to the substructure shall be utilized instead. The Security Designer shall be responsible for specifying the best mount for a particular area. Below are some examples of acceptable part numbers:

- **Wall:** Axis Communications T91D61
- **Pole:** Axis Communications T91B67
- **Parapet:** Axis Communications T91D62
- **Corner:** Axis Communications T91A64 with T91D61
- **Ceiling:** Axis Communications T91bB51 with T91B52 (or custom size extension)
- **T-grid ceiling:** Nvent caddy 512HD with 4s box (screwed to t-grid and 12-gauge tie wire)

17.6.7 Video Analytics

The VSS shall take advantage of "edge-based video analytics" (processing within the camera). The Security Designer shall provide project-specific recommendations and coordinate the specifics of the following analytics with the District during the system design, to verify the project-specific requirements:

- **Camera Tampering Alarm:** Analytics to detect when someone is tampering with the physical camera.
- **Motion Detection Alarm:** Analytics to detect when motion is occurring in a user-defined area.
- **Camera Offline Alarm:** Analytics to detect when a camera stream is not being transmitted.
- **Object Analysis, Identification, and Classification:** Identifies types of objects detected to improve investigative abilities.
- **Digital Fence Guard:** Detecting when an individual has crossed into a secured area.
- **License Plate Verification:** Monitoring vehicle activity in a specific area.
- **People Counting:** Estimating occupancy levels to help dynamically adjust building management systems.

17.6.8 Security Workstations

The Los Angeles Community College District (LACCD) typically employs two types of security camera viewing systems:

- A full computer workstation, in line with District standards, is utilized when an authorized user needs to access live and recorded video from the system.
- A live view-only system, designed for public display monitors, operates without any end-user interaction.

For the full computer workstation setup, the system must include a 34" Curved LCD Screen with a minimum resolution of 3440 x 1440, a refresh rate of 160hz, and connectivity options such as DisplayPort, HDMI, and USB-C. Additionally, a Bluetooth wireless keyboard and mouse shall be provided.

In cases where a live view-only system is necessary, an IP Decoding box with all required licenses to integrate into the Video Management System shall be included. A monitor of appropriate size must be chosen based on system goals. For instances where a single individual views a few camera feeds (e.g., a

reception desk), a 34" monitor may suffice. However if the system is intended for displaying multiple camera streams to the general public or staff from a distance, the monitor must be at least 55" and rated for 24x7 use, supporting a minimum resolution of 3840 x 2160.

These specifications apply to standard users of the Video Surveillance System. For projects involving the construction of new Public Safety Offices, additional requirements come into play. These areas necessitate a video wall comprising an array of monitors, with multiple workstations set up for control. Specifically, a 4 wide by 2 high array of ultra-narrow bezel 55" monitors supporting a minimum resolution of 3840 x 2160 and rated for 24x7 operation is required. Close coordination with LACCD is essential to ensure the room dimensions and layout meet the LACCD's specifications.

17.6.9 Workstation Locations

Camera viewing locations shall be coordinated with the building user group and LACCD Safety and Security Services Director to confirm which locations in a particular project require the ability to view cameras.

The following types of locations typically require security camera viewing workstations and monitoring equipment:

- Public Safety Office
- Facilities and Maintenance Operations
- Child Development Center
- Bookstore and Other Point of Sale Areas
- College Administration Office

Not all of the above items will apply to each project. Some may already be implemented on the specific campus of your project. The Security Designer shall verify requirements with the District.

17.6.10 System Storage

The video surveillance system shall utilize network video recorders that are to be located in the Primary MDF/Server Room of each campus. The system shall be sized to store a minimum of 30 days of camera footage. 24/7 recording at a minimum of 12 FPS.

17.7 Video Management System (VMS) Software

17.7.1 Technical Requirements

The Video Management System (VMS) shall be an extension of the Milestone Xprotect Corporate on campus. The system will be accessed through a desktop computer with the proper credentials. Any cameras added to the VMS will require an adequate license per device as well as the corresponding Milestone CarePlus support agreement. If a camera requires additional licenses to achieve the required functionality, these licenses shall also be included within the design (for example Milestone LPR or Axis Analytic licenses).

The Security Designer shall include the total number of additional licenses needed in their specifications.

17.7.2 GUI Setup

Cameras shall be modeled in a 3D Revit model so that possible obstructions can be visually identified and mitigated using a digital virtual reality walkthrough. The expected camera coverage shall be included within the drawing and the anticipated levels of pixels per foot at a particular distance using the following industry standard (EN 62676-4: 2015) terms:

- Identification: 100 PPF
- Recognition: 60 PPF
- Observation: 40 PPF

Cameras shall be modeled in a 3D Revit model so that possible obstructions can be visually identified and mitigated using a digital virtual reality walk through. The expected camera coverage shall be included within the drawing and the anticipated levels of pixels per foot at a particular distance using the following industry standard (EN 62676-4: 2015) terms:

- Identification: 100 PPF
- Recognition: 60 PPF
- Observation: 40 PPF

17.8 System Documentation

17.8.1 Camera Labeling

Cameras shall be assigned a unique identifying label and shall be utilized on the project drawings and on the physical labels printed and affixed to the physical cameras. These labels shall implement the following format:

End Node Device Fiber Cable / Fiber Cassette / Fiber Enclosure Label Standard
<Fiber Type> - <Building> - <Room> - <(Rack# Panel# Module#)> to <Building> - <PullBox#> - <(Housing# Module#)>

Example: 6S SMF-STA-BDF1104 (R1PAM01) to STA-PB0101 (P1M1)

End Node Device Fiber/Copper Patch Panel Label
<Rack#>-<Panel#>

Example: R1PA

Security Camera Patch Cable Label (Copper or Fiber)
<DeviceType> - <VLAN>

Example: CAM-3016

Media Converter Label
<Owner> - <PullBox#> - <Converter#>

Example: SEC-PB0101-A or OIT-PB0102-A

Camera Device Label
<DeviceID>

Example: C0101

Software Label (Hardware Name)
<Site>_<Building>_<FloorRoom>_<Make Model>_<IPAddress>_<DeviceID>

Example: WLAC_A16_1EXT_AXIS P3719-PLE_ (10.224.16.123)_C0002

Software Label (Lens Name)
<Site>__<Building>_<FloorRoom>_<Room Description>_<Device Type>_<DeviceID>

Example: WLAC_A16_1EXT_Entrance (N)_CAM360_ C0002

All cameras shall also be programmed with a label which will be the ID plus an identifying description. This description shall give a clear indication of the area of coverage. All programming labels shall be provided by the Security Contractor for approval during the submittal phase of the project. The Security Designer shall capture this requirement in the specifications for the Security Contractor to include in their scope of work.

17.8.2 Camera Schedule

A camera load sheet shall be completed and provided to LACCD in Excel Matrix format prior to camera commissioning and prior to Substantial Completion of the overall project. The camera load sheet shall contain all of the following information for each camera:

- Drawing Sheet Number Device is Located on
- College
- Building
- Floor
- Room
- Room Description
- Device Make
- Device Model
- Device Serial Number
- Device MAC Address
- Device Type
- Device Unique ID
- Device Latitude (accurate to the seventh decimal place)
- Device Longitude (accurate to the seventh decimal place)
- Lens Direction (Unique Value for Each Independent Lens)
- Lens Field of View (Unique Value for Each Independent Lens)
- Lens Depth of View (Unique Value for Each Independent Lens)
- Mount Make / Model / Type
- Data Closet Serving Device
- Patch Panel and Patch Panel Port Number Serving Device
- Switch Port Serving Device

All cameras shall also be programmed with a label which will be the ID plus an identifying description. This description shall give a clear indication of the area of coverage. All programming labels shall be provided by the Security Contractor for approval during the submittal phase of the project. The Security Designer shall capture this requirement in the specifications for the Security Contractor to include in their scope of work.

17.9 System Training

Training plays a pivotal role in the successful implementation of any video surveillance system. The contractor tasked with system installation is accountable for delivering structured, instructor-led training sessions. These sessions will cover programming, operation, and troubleshooting of the video management system.

Each project requires a minimum of 16 hours of training, conducted at the same LACCD location where the project was completed. The training must be led by an in-person instructor directly employed by the system manufacturer, who dedicates their main job duties to training. Furthermore, all training sessions will be professionally recorded and edited for future reference.

The training can be categorized as follows:

System Administrator
The focus of this training shall be the full scope of programming and operating functions of the video management system. This shall include the set-up and editing of the system set-up, cameras,

profiles, etc. The goal is to allow the proper level of comfort for the user to be able to make any adds and changes to the system upon turnover. This training shall include instructions on how to utilize all plugins and add-ons such as the LPR, Video Wall, and Axis Optimizer plug-in.

Site-User
The focus of this training shall be the day-to-day operations specific to the school. This shall include the most used methods of viewing footage, pulling up specific cameras, searching through footage, etc. The goal is to allow a proper level of comfort and system familiarity to the user.

Troubleshooting
The focus of this training shall be the troubleshooting steps needed when a system failure is discovered. The user shall have a proper level of comfort to address the loss of camera footage, user login issues, and all other video management software-related items to successfully discern if an issue is one concerning a software, hardware, or network problem.

The Contractor shall provide printed training materials and conduct the training in a hands-on manner, utilizing the District's actual system in a live environment (using the actual video management system installed as opposed to a demo piece of software.)

The Contractor shall provide a full operations and maintenance manual documenting the steps and items being taught in the training, for reference in the future. The Contractor shall also provide a training schedule and curriculum to the District for approval prior to the commencement of any training.

Training shall be by engineers or technicians highly skilled in the systems installed and factory-trained and certified by the manufacturer as qualified to train in the particular systems. Training shall be provided in a "train the trainer" model as well as in sessions for general users.

Coordination with the District shall take place to verify the number of individuals/seats needed for the training phase of your project and the number of sessions/hours.

17.10 Warranty

17.10.1 Requirements

Contractor and product manufacturers shall guarantee installation, equipment, hardware, software, software support, licenses, and all parts and labor for 5 years from the date of written notification of project acceptance by the Owner.

Any new project warranty is in addition to and supplements any existing or future Service Level Agreement (SLA) and shall not be construed to diminish existing or future agreements in any way.

17.10.2 Contractor Responsibilities

The Contractor shall provide, upon notification of a problem, a field service technician to correct the problem within forty-eight hours of notification or as otherwise agreed to in an existing or future Service Level Agreement (SLA).

Contractors shall have cameras readily available for proper swap-outs during the 5-year warranty if needed. Swap out of a camera shall be completed within 5 business days of the reported camera feed issue.

90 days prior to expiration of warranty Contractor shall perform a complete system functionality testing as described below. The warranty shall not expire and shall remain in full force and effect until system functionality testing is completed and all identified problems and deficiencies are corrected, and the system is fully functional and completely operational.

Contractor must submit completed Device Matrix form to obtain IP addresses.

17.10.3 Testing and Validation

Conduct System Functionality Testing using manufacturer-certified personnel trained at the manufacturer's installation and testing school. Testing will be carried out using the manufacturer's specified test instruments and methodology. Deviation from the manufacturer's procedures will only be considered with agreement from the Owner, Security Designer, and manufacturer.

Before testing and validation, ensure camera views are adjusted and focused. For Pan/Tilt/Zoom cameras, configure Preset Positions and Home positions. These adjustments must be reviewed and approved in writing by LACCD's Safety and Security Director or designated personnel before testing begins. During testing and validation, thoroughly demonstrate each camera function to the LACCD-assigned Project Manager to confirm optimal system functionality.

If testing requires monitors, mouse, and keyboards, the contractor is to provide their own equipment at no extra cost to the client.

At a minimum, perform System Functionality Testing to demonstrate and document:

- Cameras
  - The camera video feed displays on client workstations without flickering due to

excessive latency greater than half of a second.

- The camera video feed displays on client workstations without pausing or freezing.
- The camera auto-focuses to display a clear image acceptable by LACCD.
- The day/night interior and exterior cameras adjust properly between day and night lighting conditions.
- The Wide Dynamic Range and auto-backlight compensation cameras adjust properly to challenging lighting conditions to produce clear, bright, and focused images.
- The camera produces a stable picture with no roll, flutter, or ghosting.
- The camera resumes operation and produces clear, bright, and focused images when PoE power or network connectivity is restored from a failure.

Upon completion of the System Functionality Testing Security Contractor shall submit written reports including but not limited to the following information:

- Certification that all devices and equipment meet or exceed the requirements of the System Functionality Testing.
- Certification that all equipment is properly installed, programmed, fully functional, and completely operational, and conforms to Specifications and Drawings.
- Complete Bill of Materials of all equipment installed including quantity, make and model as well as serial numbers, MAC addresses, and IP addresses/host names of major components. The bill of materials shall be broken down by building and include all cameras, card readers, access control panels, workstations, servers, and video wall components.
- Technician's field test reports of all cameras, cables, devices, and equipment.
- Test technician's name, company and date(s) of test.
- Exceptions shall be noted in a Punch List.

17.11 Access Control System

17.11.1 Introduction

LACCD prioritizes the safety of individuals and property across its campuses and buildings. To achieve this commitment, LACCD employs multiple layers of physical security, integrating policies, procedures, and systems that enhance the overall security program of the District.

Central to this effort is the Physical Access Control System (PACS). LACCD has developed this document to establish standardized components and requirements for the design and implementation of a comprehensive security system.

17.11.2 System Design & Procurement

The PACS shall be designed by a board-certified Physical Security Professional (PSP) or Certified Protection Professional (CPP), accredited through ASIS International. The Security Designer shall create a set of biddable Construction Documents consisting of 100% CD drawings and CSI-formatted specifications. The construction documents shall be bid by security contractors certified to install, program, and maintain the systems delineated in this standard. The construction project funds shall purchase and install the ACS components. The District shall not take ownership of the system until the Security Designer commissions and approves the system for Owner acceptance. Refer to Table 2 for the Responsibility Matrix.

17.11.3 Special Note

The ACS will require close coordination between the Security Designer and LACCD. Certain components may be the responsibility of the Security Contractor to provide while others will be furnished by the District. As such, the Security Designer needs to properly document these requirements in the Construction Documents (drawings and specifications) to ensure that proper bid responses are obtained.

This chapter will describe the scope of work and responsibility of owners for each component. It is the responsibility of the Security Designer to understand and apply these standards and request confirmation from the District for any items that may be considered special conditions for the project. All communication with the District shall be via the proper channels outlined in specific projects.

17.12 System Infrastructure

An important component of any security system is the cabling and containment infrastructure. The following requirements shall be followed:

17.12.1 Cabling

Access Control and Intrusion Detection devices shall each utilize 18 AWG copper plenum-rated cables with a minimum of two spare/unused conductors

included in each cable to each device.

Card Readers shall be wired and configured to utilize the latest available Open Supervised Device Protocol (OSDP) standard and cabling meeting RS-485 specifications. RS-485 cabling for card readers shall contain at minimum one pair of 22 AWG, 120 OHMS copper conductors for data transmission, and two 18 AWG copper conductors for power transmission. All Card Reader cabling shall be plenum-rated.

Any cabling that has the potential of coming into contact with water such as card readers located on an exterior wall or pedestal shall utilize an Outdoor Rated (OSP) cable with water blocking properties. This cable shall maintain all of the same property requirements as noted previously but also include an outdoor rating.

Siemon CAT 6A F/UTP required.

17.12.2 Pathways

Exposed cabling of any kind shall not be used in any location for any device. Where required, armored door loops shall be utilized to protect cabling that can otherwise not be concealed in traditional conduit systems.

Conduit cable pathway shall be integrated into the door frame assembly to allow access control wiring to safely traverse from an overhead enclosure to the various devices that require cabling after the doorway has already been fully assembled and the walls closed. Pull strings shall be left in each conduit for future use if a damaged cable ever needs to be replaced. Each conduit terminating to the enclosure above the door shall be labeled indicating to what device the conduit needs.

A conduit is required for each of the following devices:

- Recessed Door Contact mounted above the latch side of the door
- Electrical Power Transfer (EPT) hinge with a jamb box mounted behind the hinge (some doors may require multiple EPT hinges if an Automatic Door Operator (ADO) is also required)
- Card Reader Junction Box
- Automatic Door Opener Control Box (where applicable)
- Request To Exit Device if not built into lockset

17.12.3 IDF Rooms

All cabling shall be routed to the nearest BDF/IDF room where it shall terminate at the appropriate head end units. If utilizing traditional access control wiring, wall-mounted enclosures shall be provided to house both the Reader Interface Module boards as well as the power supply equipment. Each enclosure shall be no less than 48" x 36" x 8" and have a double door as well as be pre-wired to support 48 managed outputs with 20A of 12V and 20A of 24V power and Panduit or Siemon cable managers. Each enclosure requires 2 network data outlets to be terminated inside to a surface mount box. Each enclosure supports up to 12 Reader Interface Module boards, however, 3 spaces shall be reserved in each provided enclosure for future spare use and thus remain unused.

Data cabling used for security equipment shall be terminated to security-specific patch cables in each data closet to allow for easy routing of cabling to security network switches.

17.12.4 Construction Activity

Existing campuses may have ongoing construction during the implementation of a security project. In some cases, an existing construction project may be affecting existing infrastructure that is useful to the security project. The designer is responsible for coordinating with the District and understanding the construction activity and phasing on the campus, to assess how it may affect the security project. Where existing or planned conduit and pull box infrastructure can be utilized, the Design Teams are encouraged to consider this within their design and coordinate with the appropriate District personnel for confirmation.

17.13 Access Control Equipment

The PACS contains the following types of equipment:

- Access Control System Software Intelligent System Controllers
- Reader Interface Modules / Input Boards / Output Boards

17.13.1 Headend

The Access control system shall be an expansion of LACCD's existing LENEL OnGuard system. Integration with the Milestone VMS is required.

17.13.2 Headend Equipment

The following headend equipment shall be utilized where best applicable per the environment:

- LNL-X4420 – Intelligent System Controller.
- LNL-1320 – 2 reader interface door controller.
- LNL-1300 – Single door interface controller.

- LNL-1100 – Input Control Module.
- LNL-1200-Output Control Module
- LNL – 1324e – IP-Based Door I/O Module

Any required licenses shall be the Security Contractor's responsibility to provide. All equipment shall be installed according to the manufacturer's recommendations. All intelligent System Controllers shall connect to LACCD's network via an ethernet connection. Each power supply enclosure shall include backup batteries to provide 8 hours of reserved power. Batteries shall be manufacturer dated no longer than 90 calendar days prior to substantial completion. Lock and door power supplies shall be dual 12/24vDC powered.

17.13.3 Door Equipment

For future infrastructure, two data drops are required at each door opening that utilizes a card reader. Network cabling standards shall follow Div 27 cabling requirements. For ADA doors, the Security Contractor to fully integrate access control with the auto operator. Auto operator push pads, 120V connections, and installation by others. Doors with Automatic Door Openers require very close coordination between Div. 8 Contractors and Div. 28 Contractors.

17.13.4 Card Reader Locations

All card readers shall utilize the ODSP interface for secure bidirectional communication to the access control panel. The following locations shall be equipped with either a card reader and all associated hardware, or be equipped with an Exit Only lockset and contain an integrated Request To Exit Device, as well as Door Contact(s) to ensure the space can be properly monitored for intrusion. It shall integrate with the VMS for a complete district-wide system. The following locations shall have card readers as denoted below:

- All exterior building doors.
- All interior doors within a Childhood Development Center shall be included.
- Any interior or exterior door leading into a storage room that contains safes, large sums of cash, works of art, and/or other high-value items. These doors shall be secured via dual-factor authentication such as card and PIN (keypad).
- Any interior or exterior door leading into evidence storage, weapons storage, quartermaster, or other law enforcement equipment rooms. These doors shall be secured via dual-factor authentication such as card and PIN (keypad).

17.13.5 Workstation Locations

The following locations shall have workstations as denoted below:

- LACCD Sheriff's office at each campus
- Campus Safety
- Security Operations Center

Not all of the above items will apply to each project. Some may already be implemented on the specific campus of your project. The Security Designer shall verify requirements with the District.

17.13.6 System Storage

The access control system shall utilize a network connectivity at each building to integrate with the existing LENEL OnGuard system already in place.

17.14 Access Control System (ACS) Software

17.14.1 Technical Requirements

The ACS will be an extension of the LENEL OnGuard software on campus. The system will be accessed through a desktop computer with the proper credentials. The ACS shall be integrated with the VMS platform for a complete security system.

17.15 System Documentation

17.15.1 Access Control Cable Labeling

All doors shall be assigned a unique identifying label and shall be utilized on the project drawings and on the physical labels printed and affixed to the cable in the access control panel. These labels shall implement the following format:

D - XXX - ### - ## - Sequential Number

D = Door name

XXX = Campus name

= Building name

= Floor number

LACCD has a specific load sheet that must be utilized for all access control equipment.

17.15.2 Door Schedule

All Construction Documents shall include a door schedule with the following information:

- Door ID/Label
- Campus
- Building
- Drawing number
- Detail number
- Notes

This schedule shall be part of the Construction Documents, provided as part of the drawings. Additionally, the schedule shall be submitted in Excel format to LACCD and the Security Contractor. Refer to **Volume 3 Appendices | Section 17 Security Design**.

17.15.3 Door Programming Label

All doors shall also be programmed with a label which will be the ID plus an identifying description. This description shall give a clear indication of the door's function. All programming labels shall be provided by the Security Contractor for approval during the submittal phase of the project. The Security Designer shall capture this requirement in the specifications for the Security Contractor to include in their scope of work.

17.16 System Training

Training plays a role in ensuring the implementation of any access control system. The contractor in charge of installation is responsible for conducting thorough face-to-face training sessions. These sessions will cover everything from setting up and operating the access control system to troubleshooting any issues that may arise. Each project requires a minimum of 16 hours of training which shall take place at the project site itself. The training must be led by an instructor who is either directly employed or certified by the manufacturer of the access control system and who is dedicated to training responsibilities. Furthermore, all training sessions will be professionally edited for reference.

The training can be categorized as follows:

System Administrator
This part of the training will focus on programming and operating functions related to the access control system. It will include tasks like configuring system settings, managing user profiles defining access levels, and more.

Participants will learn how to make use of all system features, plugins, and additional functionalities such as access controls, integration with security alarms, and visitor management systems.

Site User
This segment will cover day-to-day procedures at the site where the system is installed. It will involve tasks, like granting or revoking access permissions generating access reports, and managing user credentials.

The main objective is to ensure that users feel at ease with the functions of the system and can efficiently carry out their tasks.

Troubleshooting
Participants will be taught the steps for troubleshooting problems that arise with the access control system. This involves handling access denials, system glitches, connection issues, and hardware failures. The training is designed to provide users with the ability to quickly identify and resolve system-related issues. It is the responsibility of the Contractor to supply printed training materials and conduct training sessions using the on-site access control system. This hands-on approach allows users to directly interact with the system they will use.

Furthermore, a detailed operations and maintenance manual must be provided by the contractor documenting all training topics for reference. The training schedule and content must receive approval from the District before commencement. Trainers are required to be engineers or technicians with experience in working with installed access control systems. They shall also have received training and certification from the manufacturer to lead these sessions. The training will include a "train the trainer" model as customized sessions, for general users. Collaborating closely with the District is crucial to figuring out how many people/seats are needed for the training phase of the project, and planning the sessions and timings.

Following these instructions will help the Contractor guarantee that users in the District buildings have a grasp of operating the access control system, which fosters a streamlined atmosphere.

17.17 Warranty

17.17.1 Requirements

Contractor and system and product manufacturers shall guarantee installation, equipment, computer hardware, software, software support, licenses, and all parts and labor for 5 years from the date of written notification of acceptance by the Owner.

Any new project warranty is in addition to and supplements any existing or future Service Level Agreement (SLA) and shall not be construed to diminish existing or future agreements in any way.

17.17.2 Contractor Responsibilities

The contractor shall provide, upon notification of a problem, a field service technician to correct the problem within forty-eight hours of notification or as otherwise agreed to in an existing or future Service Level Agreement (SLA).

Contractors shall have card readers and door controllers readily available for proper swap-outs

during the 5-year warranty if needed. Swap out of a card reader shall be completed within 5 business days of the reported access control issue.

90 days prior to the expiration of warranty Contractor shall perform a complete system functionality testing as described below. The warranty shall not expire and shall remain in full force and effect until system functionality testing is completed and all identified problems and deficiencies are corrected, and the system is fully functional and completely operational.

17.17.3 System Functionality Testing

Perform System Functionality Testing using manufacturer-certified personnel who have attended a manufacturer's training school for installation and testing of the systems. Perform testing with the test instruments and methodology as required by the manufacturer; testing by means other than the manufacturer's procedures will not be acceptable unless agreed to by the Owner, Security Designer, and manufacturer.

If testing requires monitors, mouse, and keyboards, the contractor is to provide their own equipment at no extra cost to the client.

At a minimum, perform System Functionality Testing to demonstrate and document:

- Card reader
  - Door opens upon valid entry. LED is green momentarily.
  - DPS sensor detects whether the door is closed or open.
  - When a door closes, the card reader LED is solid red indicating the door is locked. No forced alarms on the activity log.
  - Opening the door from the secure side – Rex prevents the forced door alarm.
- Doors with Automatic Door Opener and Card Reader
  - When the card reader is in Card Only or Locked, the exterior push plate does not try to activate the opener, interior push plate unlatches the lock and engages the auto opener.
  - When the card reader is in Unlocked mode or a valid Card Read is detected, both exterior and interior push plates unlatch the lock and open the door.

Upon completion of the System Functionality Testing Security Contractor shall submit written reports including but not limited to the following information:

- Certification that all devices and equipment meet or exceed the requirements of the System Functionality Testing.
- Certification that all equipment is properly installed, programmed, fully functional, and completely operational, and conforms to Specifications and Drawings.
- Complete Bill of Materials of all equipment installed including quantity, make and model as well as serial numbers, MAC addresses, and IP addresses/host names of major components. The bill of materials shall be broken down by building and include all card readers, access control panels, and workstations.
- Technician's field test reports of all devices, and equipment.
- Test technician's name, company and date(s) of test.
- Exceptions shall be clearly noted in a Punch List.

CHAPTER 18

Door Hardware & Automatic Swing Door Operators

Los Angeles Harbor College

CHAPTER 18 - DOOR HARDWARE & AUTOMATIC SWING DOOR OPERATORS

18 Door Hardware & Automatic Swing Door Operators

18.1 Door Hardware

LACCD's guidelines and standards for Door Hardware are organized around requirements for standardization, code compliance for accessibility, life safety, fire protection, and LACCD's security philosophy. Door hardware specifications must be written in accordance with LACCD Guidelines and Standards.

18.1.1 Standardization

Eight of the nine LACCD campuses (the exception being Los Angeles Valley College) utilize the same standards for locks, panic/fire exit hardware, and surface closers. Key systems standards vary for each campus.

Other less critical hardware items may be specified competitively but still limited to approved equals.

Refer to **Volume 3 Appendices | Section 18** for LACCD Door Hardware Standards Matrix.

18.1.2 Security Philosophy

Exterior Doors to Student or Staff Areas

Exterior doors that are normally unlocked during open hours and lead to instructional spaces, student gathering spaces, staff office suites, or corridors serving such spaces shall all have the capability of being locked from the inside to protect entry during a security risk event.

- Exterior doors designed for entry shall typically have card reader access and electrified locksets or electrified panic hardware. These may be set electrically unlocked on a schedule basis by the security system, yet locally or remotely locked down by means of a security switch without restricting free egress. Emergency entrance by key.
- Exterior entry doors for smaller spaces (e.g., bungalow classrooms) may utilize mechanical lockdown locksets or panic hardware as allowed by the District. This locking hardware shall feature interior American Disability Act (ADA) thumbturns to achieve lockdown without restricting free egress. An inside indicator will show the locked/unlocked status. Emergency entrance by key.
- Exit only doors allow free egress and are always locked from the outside. Entrance is only by key.

Interior Doors to Student or Staff Areas

Interior doors that are normally unlocked during open hours and lead to instructional spaces, student gathering spaces, staff office areas, or corridors serving such spaces shall all have the capability of being locked from the inside to protect entry during a security risk event.

- Interior doors designed for entry to larger rooms or areas with multiple doors shall typically have card reader access and electrified locksets or electrified panic hardware. These may be set electrically unlocked on a schedule basis by the security system, yet locally or remotely locked down by means of a security switch without restricting free egress. Emergency entrance by key.
- Interior entry doors for smaller spaces (e.g., a classroom with only one door) may utilize mechanical lockdown locksets or panic hardware as allowed by the District. This locking hardware shall feature interior ADA thumbturns to achieve lockdown without restricting free egress. An inside indicator will show the locked/unlocked status. Emergency entrance by key.
- Exit only doors allow free egress and are always locked from the outside. Entrance is only by key.

Critical Infrastructure Doors

Exterior or interior doors to critical infrastructure rooms (typically IT rooms or other rooms housing security control equipment) are always locked against ingress.

- The primary entry door to such rooms shall typically have card reader access and an electrified locksets or electrified panic hardware. Free egress is always allowed. Emergency entrance by key.
- Exit only doors allow free egress and are always locked from the outside. Entrance is only by key.

Coordination with Division 28 Security

All door hardware is to be coordinated with **Volume 2 Division 28, Volume 2 Campus Specifications Matrix,** and **Chapter 17 Security Design.**

18.1.3 Door Hardware Consultants

For each LACCD construction project, whether new

construction or remodel work, the Design Team (DT) shall engage a qualified door hardware consultant to develop the door hardware specification, including door hardware schedule, in coordination with the architectural plans, door schedule, life safety plans, and security plans. The Door Hardware Consultant shall be fully briefed on the campus door hardware standards. To ensure the District's best interests are preserved, the Door Hardware Consultant shall be a fee-based consultant, not an employee of any manufacturer or trade subcontractor.

18.2 Automatic Swing Door Operators

Automatic Swing Door Operators are organized around requirements for standardization, code compliance for accessibility, life safety, and fire protection, security. Automatic swing door operators are also beneficial at certain doors that will experience frequent cart traffic. Provision and installation of the automatic swing door operators shall be by a factory-authorized dealer whose primary business is automatic door operators.

18.2.1 Standardization

Each LACCD campus utilizes a campus-wide standard for the automatic door operators.

Refer to **Volume 3 Appendices | Section 18** for current District equipment make/model standards.

18.2.2 Code Compliance

The ANSI/BHMA A156.19 Standard for Power Assist and Low Energy Power Operated Swinging Doors applies to all automatic swing door operators. This standard is adopted in full by the California Building Code (CBC).

Accessibility

Compliance with the Americans with Disabilities Act (ADA), AA 202331125, and the Department of Justice's 2010 ADA Standards for Accessible Design, and with the permit edition of California Building Code Chapter 11B requirements are critical to LACCD door hardware selection and must be observed.

- Exterior doors providing primary student access to buildings are to be equipped with automatic door operators.
- Other exterior doors judged by the Design Team or District to be specially important for disabled access, e.g., multi-occupancy toilet rooms, are to be equipped with automatic door operators on a case-by-case basis.
- Doors that would not otherwise meet the CBC-required opening force requirements, e.g., heavy STC-rated acoustic doors, are to be equipped with automatic door operators.

18.2.3 Security Philosophy

Non-Primary Entrance Exterior Doors to Student or Staff Areas

Since the California Building Code (Chapter 11B) requires doors to open with no more than 5 lbs. force, automatic swing door operators are often required to meet both the accessibility and security requirements for the project. This may even include exterior doors that are not in the accessible path of travel, e.g., corridor doors to a stair landing.

Coordination with Division 28 Security

All Automatic Swing Door Operators shall be coordinated with **District Specifications, Division 28 in Campus Specifications Matrix**, and **Chapter 17 Security Design**.

18.2.4 Automatic Swing Door Operator Consultants

For each LACCD construction project, whether new construction or remodel work, the Design Team shall engage a qualified Automatic Swing Door Operator consultant to develop the Automatic Swing Door Operator specification in coordination with the door hardware specification, architectural plans, door schedule, life safety plans, and security plans. This consultant is also typically the door hardware consultant as well. The automatic swing door operator consultant shall be fully briefed on the campus Automatic Swing Door Operator standards. To ensure the District's best interests are preserved, the Automatic Swing Door Operator Consultant be a fee-based consultant, not an employee of any manufacturer or trade subcontractor.

18.2.5 Provision & Installation of Automatic Swing Door Operators

Provision and installation of the Automatic Swing Door Operators shall be by a factory-authorized dealer whose primary business is the sales and service of automatic door operators.

18.2.6 Warranty & Support of Automatic Swing Door Operators

Each project shall come with 5 years of on-site service, support, and warranty services for all Automatic Swing Door Operators. All parts and labor shall be included with this warranty at no additional cost to the District. These services shall be on-site to begin repair within 1 business day of a service ticket being submitted by the District.

CHAPTER 19

Whole Building Commissioning & Warranties

Los Angeles Mission College

CHAPTER 19 - WHOLE BUILDING COMMISSIONING & WARRANTIES

19 Whole Building Commissioning & Warranties

The purpose of whole building commissioning (WBCx) and warranties procedures is to ensure that LACCD projects are planned, designed and completed to be functional and comply with contract quality requirements. The program requires that the Design Team (DT) provide warranties and guarantees for applicable work, thus certifying that all work (materials and equipment) complies with contract documents. All construction projects within the District's nine colleges and their satellites, the Educational Services Center, and the Program Management Office (PMO) can comply with the LACCD Bond Program (LACCD).

The goals of the commissioning process are as follows:

- Deliver buildings and construction projects that meet the Owner's Project Requirements (OPR).
- Prevent or eliminate problems inexpensively through proactive quality techniques.
- Verify systems are installed and working as intended from Day 1.
- Lower overall first costs and life-cycle costs for the owner.
- Provide buildings and systems that can be maintained and operated by Facilities personnel.

19.1 Scope

WBCx is initiated at the project planning stage and continues until final completion. The commissioning process encompasses and coordinates system documentation; equipment startup; control system calibration, testing, and balancing; and performance testing and training.

All projects must comply with the WBCx standards defined in Division 1 General Conditions, and **Volume 3 Appendix | Section 19 Whole Building Commissioning & Warranties**. Generally, any project over $1 million requires WBCx (some small, one-off projects, such as a sidewalk improvement or a cabinet upgrade project may be ruled exempt by the PMO on a case-by-case basis). Individual project requirements can vary depending on specification versions and other project-specific requirements.

19.2 Sustainability

The list below includes mandatory sustainability features related to whole building commissioning.

- 3.5.11 Commissioning – Fundamental & Enhanced

Please refer to **Chapter 3 Sustainable Design** for details on whole building commissioning.

19.3 Regulatory Requirements

All work will meet or exceed the latest editions of applicable regulations and standards including the California Energy Code, T-24; ASHRAE 55; all local and state codes (whether they are enforced by local authorities or not); and the State of California-mandated energy efficiency requirements. The most stringent requirement will apply. Refer to **Chapter 1 Codes & Regulations** for more requirements.

19.4 Owner's Project Requirements & Programming and Project Criteria

The Program Management Office (PMO) and Commissioning Authority (CxA) will develop the Owner's Project Requirements (OPR) and coordinate the Programming and Project Criteria (PPC) created by the programming architect team. Both are created in the Predesign Phase and will inform the Basis of Design (BOD). The BOD will conform to the OPR and PPC. In the event of a conflict between OPR and PPC, the more stringent requirement will prevail.

19.5 Training Requirements

To ensure that efficient operation of the building is sustained after turnover, a fully trained and knowledgeable operating staff shall be in place at the outset. The training shall meet the needs of faculty and staff (teachers and trainers), technicians, and building maintenance staff for the use and operation of this building. This will be achieved through clear, detailed training requirements documented in the construction specification and input from trainees and their supervisors. Training sessions will be videotaped. The commissioning team will oversee training and prepare the training agendas used in the training sessions in conjunction with the operations and maintenance (O&M) personnel. All training must be completed prior to occupancy or substantial completion.

19.6 Warranties and Guarantees

19.6.1 Warranty Form

The WBCx team shall verify that all warranties are submitted using the District Warranty Form. The term of a warranty or guarantee starts on the date

of substantial completion, final completion, or occupancy, whichever occurs first.

19.6.2 Warranty Calls

The WBCx/warranty team records, tracks, and resolves warranty claims with the assistance of the College Project Team (CPT) and/or District Project Manager (DPM) as necessary.

19.6.3 Warranty Walk

The WBCx/warranty team (with the assistance of the CPT and/or DPM schedules, coordinates, prepares, and conducts the 10-month warranty walk before expiration of the project's 1-year warranty.

19.7 Relevant LACCD Standards

Refer to **Volume 3 Appendices | Whole Building Commissioning & Warranties** for the following documents:

- Basis of Design Template
- WBCx Standards
- Envelope Commissioning Plan
- Warranties
- Hydronics
- Controls
- Project Close Out
- WBCx Schedule template

CHAPTER 20

BIM & CAD

Los Angeles Trade Tech College

CHAPTER 20 - BIM & CAD

20 BIM & CAD

The integration of Building Information Modeling (BIM) and Computer Aided Drafting (CAD) has revolutionized the way we visualize, plan, and execute projects for the District. While CAD lays the foundation, BIM takes it a step further. BIM is not just a 3D model; it is a process that facilitates the generation and management of digital representations of the physical and functional characteristics of campuses and their buildings. It goes beyond the visual aspect, embedding key data related to the building's lifecycle, including construction and maintenance costs, project timelines, material specifications, and energy performance.

To streamline the process and enhance collaboration, BIM360 and its respective modules are utilized. This platform serves as a central hub for all project information, enabling seamless communication and file transfer among the Design Team (DT). It ensures everyone has access to the same up-to-date information, reducing errors and improving efficiency.

The purpose of using BIM is multifold. It allows for better visualization of the project, improved communication among teams, enhanced coordination of construction processes, and efficient facility management. By providing a detailed view of the project's physical and functional characteristics, BIM enables teams to foresee and address potential issues before construction begins, saving time and resources.

The BIM process begins with the creation of an intelligent 3D model of the building, which serves as a shared knowledge resource. This model is then used to make decisions about the building's design, construction, operation, and maintenance. The process is iterative, with the model being continuously updated as new information becomes available.

The integration of BIM and CAD, facilitated by platforms like BIM360, is transforming the way LACCD designs, builds, and manages buildings. It's a collaborative, data-driven approach that brings together all stakeholders, ensuring the successful completion of projects while maximizing efficiency and minimizing costs.

20.1 Project BIM Work Plan (BIM Execution Plan)

Because BIM is such a collaborative process each project shall establish and maintain a project BIM Execution Plan (BEP). The BEP is a comprehensive document that outlines the roles and responsibilities of all participants in a BIM project. The BEP is designed to optimize work and model flow across the project. It helps project participants move forward with clear roles and expectations, especially for large or complex projects with many collaborators.

The DT is required to submit a Design/Construction BIM Execution Plan to LACCD for approval. It shall include their BIM strategy, how the DT will complete all meetings, milestones, model reviews, BIM roles and responsibilities, BIM360, and all other procedures outlined in the BIM Standards.

20.2 LACCD Design Standards & Building Information Modeling (BIM) Standards

LACCD maintains a series of documents that detail the BIM Standards for all design and construction projects. This document lists the documents related to BIM Standards and a summary of what they are. The following documents can be found in **Volume 3 Appendices | BIM & CAD**.

LACCD BIMS 4.3 Design-Build
LACCD Building Information Modeling Standards for Design-Build projects has been developed to define a process and establish requirements, procedures, and protocols for the utilization of BIM in the various stages of LACCD Design-Build projects.

LACCD BIMS 4.3 Design-Bid-Build
LACCD Building Information Modeling Standards for Design-Bid-Build projects has been developed to define a process and establish requirements, procedures, and protocols for the utilization of BIM in the various stages of LACCD Design-Bid-Build projects. In addition to the traditional differences between the two project delivery methods, it adds the utilizationLA of 4D Technology and processes.

20.3 BIM & CAD Standards and Requirements

Refer to **Volume 3 Appendices | BIM & CAD** for more information.

CHAPTER 21

Special Project Technology

West Los Angeles College

CHAPTER 21 - SPECIAL PROJECT TECHNOLOGY

21 Special Project Technology

21.1 Summary

The District will be engaging in new and exciting programs utilizing new technology to support its academic mission. Potential areas of exploration include athletic venues using large digital displays. Virtual and Augmented Reality studios for instruction to simulate medical, nursing, and equipment repair procedures. As well as systems to enhance campus safety and security. These emerging technologies will be applied to specific project requirements developed with College Project Teams and District Project Managers.

Table 1 Special Project Technologies

Special Project Technologies	Description
Digital Display	Special campus digital display or branding (including campus marquees)
Athletic Monitoring Equipment	Large specialized displays including scoreboards
Simulations	Virtual and Augmented Reality studios for instructional simulations
Video and Broadcast Solutions	Facilities for creation of creative content
Building Automation	Exterior sun shades and electrochromic glass systems for energy management
Campus Security	Electronic sensor such as gunshot detection systems

CHAPTER 22

Integrated Automation

East Los Angeles College

CHAPTER 22 - INTEGRATED AUTOMATION

22 Integrated Automation

Leveraging the power of data collection and digital automation are powerful tools that have the potential to create a comprehensive District-Wide network capable of integrating a wide range of control systems. The District is in the process of analyzing the best methods to effectively manage the District's portfolio of more than 724 buildings. Details on the District's Building Management Systems (BMS) are described in **Chapter 11 Mechanical Design**.

- BMS
- HVAC Control
- Lighting Control
- Video Distribution
- Power Management
- Fire Alarm
- Water Usage

22.1 Overall Design Intent

Expanding the capabilities of stand-alone control systems by upgrading and integrating them into networks that operate at multiple scales. Operating facilities management systems at both the Campus and District scales to optimize the following:

- Energy Efficiency
- Maintenance and Operations
- Resilience
- Cost Savings

22.2 Systems Integration & Interoperability

Many existing systems may be integrated together to provide greater functionality including the following:

- Digital Twin
- DabbleFox
- Onuma
- Class Scheduling Software
- Security Operations


LOS ANGELES COMMUNITY COLLEGE DISTRICT


LOS ANGELES CITY COLLEGE
LACC
The City's College.


elac
EAST LOS ANGELES COLLEGE


LAHC
LOS ANGELES
HARBOR COLLEGE


LOS ANGELES
MISSION
COLLEGE


los angeles
Pierce
College


LOS ANGELES
SOUTHWEST COLLEGE


LATTC
LOS ANGELES TRADE-TECHNICAL COLLEGE


LAVC
LOS ANGELES
VALLEY COLLEGE


West
LA COLLEGE