PREFACE

This School Design Guide has been prepared to establish and sustain consistent representation of requirements and standards to all members of the Design Team. It presents design guidelines and criteria for the planning, design and technical development of new schools and modernization, and includes by reference the Facilities Space Program, the Educational Specifications, the Guide Specifications, and the Standard Technical Drawings of the District.

This new edition of the Guide has been updated, edited and designed to present the District’s Year 2006 insights and objectives. It incorporates new systems and environmental criteria, and contains updated requirements of earlier editions of the Guide, with former editions diligently compared and revised.
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Purpose and General Requirements
Purpose and General Requirements

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1.1 PURPOSE AND PRINCIPLES

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1.1 PURPOSE AND PRINCIPLES

A. PURPOSE

The Los Angeles Unified School District is committed to creating high-quality educational environments – places that provide well-planned, high-performing, healthy school buildings that foster student achievement and well-being, as well as being centers of community.

The “School Design Guide” has been prepared to establish and sustain consistent representation of requirements and quality standards for those environments to all members of the Design Teams for LAUSD school facilities. It is based on the current curricula, teaching methodologies, student groupings, and site constraints of the District. It reflects the District’s experience in building and operating schools to balance the needs for instructional functionality with aesthetics, practical comforts, accessibility, ease of maintenance and operation, and assurance of safety so that all students, staff and community members feel welcome, safe, and proud of their schools – all while reflecting the wise and efficient use of limited land and public resources.

Architects shall follow the requirements and standards presented here for the planning and design of new school construction or reconstruction. These are not intended, to stifle creativity or innovation, If an Architect feels that varying from specific requirements, while still meeting their intent, is desirable for a specific project, the variations may be incorporated into the design with written approval of the District’s authorized representative.

The “School Design Guide” incorporates and complements the requirements and standards of other LAUSD documents that direct the design of school facilities (see below), and which are also part of the District’s requirements and standards. The requirements and standards are updated on an annual basis. Interim changes will be published periodically.

B. ORGANIZATION OF DESIGN REQUIREMENTS

The content of the “School Design Guide” is divided into three sections: Book One deals with general items, purpose and principles; Book Two deals with functional and relational planning and design criteria, including general environmental and sustainability issues; and Book Three presents more detailed information on material choices and system design criteria and requirements, by chapters on each major technical discipline. Additional requirements are in the Appendix.

The other requirements and standards that are incorporated as part of the “School Design Guide” are:
1. “Facilities Space Program (Program):” Governs the capacity, size, and number of functional spaces of each school project.

2. “Estimating Guide:” Quantifies the quality levels of space, materials and systems for each school project.

3. “Educational Specifications” (Ed Specs): Detailed descriptions of the functional and facilities support requirements for each space defined in the Facilities Space Program, including prototype drawings and equipment lists. Available for High, Middle, and Elementary Schools.

4. “Guide Specifications:” These are construction specifications in CSI format that define the materials and systems acceptable to the District, including considerations of economy, performance, and maintenance and operations. The Guide Specifications often include alternative choices. These Guide Specifications must be edited by the Architect to suit the needs of each specific project.

5. “Standard Technical Drawings” (Std. Dwgs.): Construction details that provide District-wide consistent operational and safety standards.

The District also has Procedural Requirements that govern the work of the commissioned architects and engineers. Information on these is available from the District’s authorized representative.

C. DESIGN PRINCIPLES

1. Learning Environment: Schools should provide instructional spaces that facilitate student-teacher interaction in the educational process, with collaborative learning and working, flexibility to accommodate different teaching styles, and a health-enhancing environmental ambience.

2. Architectural Quality: The appearance and overall character of each school should be both pleasing and stimulating to students, teachers, parents and the surrounding community, providing a welcoming and attractive place to visit or to spend the day.

3. Pride in Ownership: Each school’s design should foster a sense of belonging and pride among the students, staff and community.

4. Flexibility: School planning should anticipate future growth on the site as well as provisions for equipment replacement and advances in technology.

5. Small Learning Communities: In planning larger schools, smaller schools must be created within the larger context, to reduce the perceived scale of the school for students and to provide integrated small learning communities with common affinities, such as common curricula, themed educational programs, or age and grade.

6. Accessibility: Schools must accommodate all students, staff and community members including the physically disabled and wheelchair-bound, deaf, visually or emotionally impaired.

7. Safety and Security: Schools must be safe and secure without appearing prison-like. Structures, fences and site amenities shall be designed to maintain safety, prevent unauthorized access and deter vandalism. Opportunities to climb to gain access to other floors, roofs, etc. shall be eliminated.
8. Community Focus: The school, as the center of the neighborhood, must be accessible on evenings and weekends for joint use of facilities by the community and provision of extended learning concepts.

9. Land Use and Site Planning: Scarcity of land demands innovative settings of buildings, playgrounds and parking to achieve educational goals on crowded urban sites.

10. Sustainability: Schools must assertively address long-term concerns for environmental impacts and energy conservation.
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B. SCHEMATIC DESIGN PHASE SUBMITTAL

C. DESIGN DEVELOPMENT SUBMITTAL

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I. GENERAL DRAWING & SPECIFICATION REQUIREMENTS
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A. GENERAL REQUIREMENTS

1. Coordination and Review of the Design

Coordination of all architectural, engineering and other associated design disciplines working on the project – including those provided by District staff or under separate contract to the District – shall take place throughout each design phase and shall be the responsibility of the commissioned Project Architect. Such coordination shall include processing and review of all drawings, specifications, cost estimates and other documentation necessary for the integration of all building trades and systems, equipment and furnishings, and resolution of constructability issues. **With each design submittal, the Architect shall certify in writing that all required coordination has occurred and shall accept responsibility for all changes in the design and construction work which result from failure to properly coordinate the efforts of the design entities.**

2. Other Contractual Terms

In some cases, the District’s A/E Contract may define different design phases and submittal terms. Adjust the requirements described below for submittals to the specific contract and as directed by the District’s authorized representative.

3. Jurisdictional Agency Regulatory Code Compliance

Architect shall be responsible for verifying that all design and construction documents submitted provide for compliance with all applicable jurisdictional agency codes and operating requirements.

4. Energy Review

In order for the District to apply for State Allocation Board’s energy grants, all new facilities projects and identified new buildings under existing facilities, shall apply for DSA “energy review”. Also see section 2.4 “Environment and Sustainability”.

B. SCHEMATIC DESIGN PHASE SUBMITTAL

1. Project Start Meeting:

   a. The District’s authorized representative will establish a project start meeting date with the Architect. At this meeting the Architect will receive the building program, design guidelines, available site and other relevant
information, and directives to allow the Architect to begin work on the assigned project.

b. Starting Date: The District’s authorized representative will issue a notice-to-proceed letter to the Architect indicating the start and completion dates of the Schematic Design Phase.

2. Information Gathering:

a. It is important that the public and utility agencies serving the school be involved in the design process from the beginning. During the Schematic Design Phase the Architect shall initiate contact with representatives of the following agencies, to inform them of the school’s needs and to establish relationships that will assure coordination of their requirements with the school’s design.

1. Division of the State Architect: Structural Safety, Fire Marshal and Access Compliance Sections for Title 24 regulations.
2. Local jurisdiction (City of Los Angeles, County, or other city) for off-site street profiles, curbs and walks, storm drains and utility services.
3. Local jurisdiction Traffic Department for driveway locations and passengers loading area.
4. Local Fire Department (City or County) for site access, dispersal areas, and on-site fire hydrants.
5. Utility agencies or companies for location of existing and proposed domestic water, reclaimed water, sewer, electric, gas, telephone and television cable services.
6. Utilities companies (Southern California Edison or Southern California Gas Company) for “Savings By Design” application.
7. County of Los Angeles Department of Health for kitchens and swimming pools only.
8. Other agencies for specific project conditions – for example, the use of reclaimed water.

b. A “Checklist of Offsite Work, Utilities & Easements” is available and shall be completed and submitted to the District’s authorized representative during various phases throughout the project.

c. A “CHPS Scorecard” is available and shall be completed and submitted to the District’s authorized representative at various phases throughout the project. See Section 2.4 for additional information.

3. Conceptual / Preliminary Schematic Design

a. The first submittal for the Schematic Design Phase shall present the District with three or more alternative conceptual design solutions to the District’s program and community requirements. One scheme will then be further developed and presented for schematic planning approval.

b. Documents submitted by the Architect for each alternative design approval shall include, but not be limited to:
1. Site analysis diagrams showing key influences, such as topographical characteristics, solar orientation, winds, views, traffic, and neighborhood context;
2. Proposed utilization study of each particular project site;
3. Schematic plans of each floor;
4. Simplified elevations indicating the fundamentals of the architectural concept;
5. Comparative cost estimates for each of the three designs.

c. The purpose of the conceptual / preliminary schematic-design review is to evaluate, first, the functional qualities of the proposed design to successfully fulfill the educational program of the school. Additional qualities to be considered include community impacts, energy and environmental issues, physical security, and general aesthetic factors.
d. Include the drawings and information indicated on the form “Submittal Requirements for Preliminary Schematic Design” (See Appendix).

4. Final Schematic Design Submittal

a. Documents submitted for the final schematic design phase shall include more detailed and refined drawings and a written report (Basis of Design) that includes such discussion of design factors, if any, as are pertinent in the opinion of the Architect and outline descriptions of proposed engineered systems, construction types, materials and work to be included in the construction contracts.
b. A Cost Estimate showing compliance with budget requirements and area calculations indicating compliance with the building program shall be included. Cost estimate and area calculations (SP-1A Diagrams) shall comply with the Estimating Guide.
c. Include the drawings and information indicated on the “Submittal Requirements for Schematic Design” (see Appendix). In addition to the boards, provide one set of printable transparencies (right reading) and three sets of prints.

C. DESIGN DEVELOPMENT SUBMITTAL

1. Procedure

a. After selection of the preferred design scheme and approval of the final Schematic Design, the Architect shall prepare and submit Design Development (DD) Documents.
b. Design Development Documents shall include drawings and a written report (Basis of Design) in more detail than the schematic documents and shall incorporate the Owner’s comments on the previous submittal.

2. Submittal

a. Include all items previously required in the schematic design, as well as dimensioned site development plan, floor plans, exterior elevations and typical sections indicating proposed construction as may be necessary, as well as all major finishes. Drawings shall also illustrate fundamentals of major engineering systems including civil, landscaping, structural,
mechanical, plumbing, fire protection, electrical systems and kitchen/food service.

b. Include the drawings and information indicated on the form, “Submittal Requirements for Design Development” (see Appendix). (Complete the form’s checklist to indicate completion of each item and submit with the other documents.)

c. The DD update of the narrative “Basis of Design” is particularly important at this stage, both to be sure that systems requirements and parameters are consistent with LAUSD goals, and to serve as the statement of design intent for the end-of-job commissioning and performance testing.

3. Architectural Presentation Drawings and Renderings

a. Drawings shall be in color, mounted on 30” x 40” boards, with Project and Architect's name. (Renderings are not required on modernization projects unless extensive changes are made to the exterior).

b. Rendering: Perspective view and technique, 20” x 30” minimum size, that adequately and accurately indicates scope of the project, mounted and matted on board with identification.

c. Site plan, floor plans, building elevations and sections, on boards.

d. Vicinity Plan and Photographs: As described above under "Schematic Design Phase Submittal".

D. CONSTRUCTION DOCUMENTS -- 50 % SUBMITTAL

1. Procedure and Submittals

a. After written approval of the Design Development Phase, the Architect shall further develop and submit Construction Documents to a stage of at least 50% completion.

b. Include the drawings and information indicated on the form “Submittal Requirements for Construction Documents – 50%” (see Appendix). (Complete the form’s checklist to indicate completion of each item and submit with the other documents.) See Section 1.2.”General Requirements” for deliverables.

E. CONSTRUCTION DOCUMENTS -- 100 % SUBMITTAL

1. Procedure and Submittals

a. The Architect shall continue development of the Construction Documents, incorporating the comments received on the 50% C.D. submittal to a stage of 100% completion.

b. Include the drawings and information indicated on the form, “Submittal Requirements for Construction Documents – 100% -- DSA Submittal” (see Appendix), ready for submittal to the Division of the State Architect. See Section 1.2 “general Requirements” for deliverables. The following are required:


   2. Final CHPS Scorecard signed by the design principal.
3. Specifications with General Conditions (6 bound sets or 7 sets if project has a kitchen). District furnished "boiler plate" material to complete the project manual need not be included.

4. Structural Calculations, signed by the Structural Engineer (2 sets).

5. Energy Calculations (2 sets).

6. Construction Cost Estimate on State forms 506B or 706B (3 sets).

7. Form SP3A, Area Diagrams and Tabulations (3 sets).

2. Coordination Check
   a. The Architect shall have completed an "in-house" interdisciplinary coordination check, dimension check, terminology and spelling check, and detailed technical check of the Construction Documents.
   b. Submit the marked up set of prints used in preparing the interdisciplinary coordination* check.

F. DISTRICT REVIEW AND PLAN CHECK

1. DSA Plan Check
   a. The District will file Drawings with appropriate State agencies and will inform the Architect when State plan check comments have been received.
   b. The Architect shall pick up Drawings and comments from the District and meet with the District's authorized representative to review plan check comments as well as the District review comments, and to establish a written schedule for correcting the documents and meeting with appropriate governmental agencies to obtain their approvals.

2. District Review
   a. The District review is not a "plan check", but a general review of the 100% Construction Documents. The Architect is responsible for accuracy and coordination of the work, including work of the Consultants, to avoid conflicts and change orders.
   b. Review of 100% C.D.’s by District staff will include:
      1. Architectural
      2. Civil
      3. Structural
      4. Electrical
      5. Mechanical
      6. Landscape
      7. Specifications
      8. Food Services
      9. Other applicable disciplines (Acoustics, Theatre, etc.)
3. **Corrections and Back-Check**
   a. The Architect shall complete corrections indicated by the District and DSA (SSS, FLS and AC) as required to receive clearance and signed approvals from each agency. This includes compliance with Division of Industrial Safety, (Cal/OSHA) Title 8, and Energy Conservation Standards and Regulations.

G. **FINAL BID DOCUMENTS**

1. **Completion Procedures**
   a. After completing the revisions required by the review comments, the Architect shall return one copy of the review materials with the Architect’s acknowledgement on how each District comment was resolved, with a letter of transmittal to the District’s authorized representative.
   b. The Architect shall deliver the approved 100%-complete Construction Documents to the District’s authorized representative with the completed form “Submittal Requirements for Final Construction Documents.”
   c. Submit one set of revised Structural Calculations, if revisions or additions have been made after the 100% DSA submission, for the District records.
   d. Submit 3 copies of Final Construction Cost Estimate. If this final estimate differs from the agreed (or revised agreed) preliminary estimate, itemize and explain reasons and amounts. Submit SP 3A diagram ONLY if changes made after 100% submittal are great enough to require revision. Provide a brief written explanation describing each change and why it is required.
   e. Submit a letter of Acknowledgement of the District Corrections. Return one set each of the District review marked up drawings and project manuals indicating resolution of comments.
   f. Submit completed DSA Structural Tests and Inspection form.
   g. Submit the following:
      1. Complete and sign S.A.B. Form 390. Copies available from OAR.
      2. Draft of deductive or additive alternates.

2. **Printing**
   a. The District will be responsible for printing Drawings and Specifications for bidding, unless otherwise stated in the Contract.

H. **ADDENDA**
   a. When an addendum is required, submit original copies of addendum material. Addenda cannot be dated later than 14 days prior to bid date.

I. **GENERAL DRAWING & SPECIFICATION REQUIREMENTS**
   (FOR DESIGN DEVELOPMENT AND CONSTRUCTION DOCUMENTS)
   a. For all Design Development and Construction Documents include the project name, LAUSD ID number and logo, and 1/8” minimum lettering height, and meet the following additional requirements.
b. All plan drawings shall include scale, graphic scale, north arrow, and key plan when plans are split.

c. Site and floor plan drawings of the same areas by different disciplines shall be the same scale and have the same orientation.

d. Orientation shall be the same for all similar plans.

e. All plans shall be done on or be compatible with the most recent AutoCAD version.

f. Drawings shall be formatted to AIA CADD Layer Guidelines.

g. The District maintains “Guide Specifications” in order to establish a consistent level of quality for its schools. The commissioned architect is to edit these specifications and add sections as may be necessary to cover the entire scope of work for the project. Red-marked (or edited in MS Word while “Track Change” and “High-Lighting” features are on) to reflect the specific work of project, plus additional sections to recognize unique materials or assemblies. Any deviation from “Guide Specifications” shall be high-lighted in Submittal and brought to the attention of District Representative. Review all Divisions 1 through 16 and Division 25. Use of these specifications does not relieve the Architect from responsibility to verify the information contained is, applicable, accurate, and up to date. New materials may be submitted for District approval.

h. Design Deliverables – Submittal Requirements

1. Design Development Submittal
   a.) **For Existing Facilities Projects:**
       Three sets of prints, and a CD with electronic CAD files (*.dwg, bind all drawings) and PDF files of all drawings.

   b.) **For New School Construction Projects:**
       Provide prints of each drawing bundled and labeled in accordance with Table A, and a CD containing specifications and electronic CAD files.

2. Construction Documents – 50% Submittal
   a.) **For Existing Facilities Projects:**
       Three sets of prints and a CD with electronic CAD files (*.dwg, bind all drawings) and PDF files of all drawings.

   b.) **For New School Construction Projects:**
       Provide prints of each drawing bundled and labeled in accordance with Table A, and a CD containing specifications and electronic CAD files.

3. Construction Documents – 100% Submittal
   a.) **For Existing Facilities Projects:**
       Three sets of prints and a CD with electronic CAD files (*.dwg, bind all drawings) and PDF files of all drawings.

   b.) **For New School Construction Projects:**
       Provide prints of each drawing bundled and labeled in accordance with Table A, and a CD containing specifications and electronic CAD files.
Table A: Submittal Requirements for New Construction Projects

Each bundle shall be bound separately and clearly labeled on the outside with the project name, bundle number and discipline. Drawings shall be printed full-size, unless noted otherwise for design development. Submit full specification package according to submittal requirements.

<table>
<thead>
<tr>
<th>Bundle #1 – Design Manager (all submittals)</th>
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<tbody>
<tr>
<td>1 Full Drawing Set (½-size)</td>
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<tr>
<td>Off-site Drawings (½-size)</td>
</tr>
<tr>
<td>Full Specifications</td>
</tr>
</tbody>
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<table>
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<tr>
<th>Bundle #2 – Architectural Review (all submittals)</th>
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<tbody>
<tr>
<td>Architectural Drawings (½-size)</td>
</tr>
<tr>
<td>General Drawings (including Title Sheet, Drawing Index, General Notes, Code Analysis, Accessibility, etc.)</td>
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</tbody>
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<table>
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<tr>
<th>Bundle #3 – Civil Review (all submittals)</th>
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<tbody>
<tr>
<td>Civil Drawings</td>
</tr>
<tr>
<td>Off-site Improvement Drawings</td>
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<tr>
<td>Divisions 1 &amp; 2 Specifications</td>
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<tr>
<th>Bundle #4 – Landscape Review (all submittals)</th>
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<tbody>
<tr>
<td>Architectural Site Drawings Only</td>
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<tr>
<td>Civil Drawings</td>
</tr>
<tr>
<td>Landscape Drawings</td>
</tr>
<tr>
<td>Division 2 Specifications</td>
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<th>Bundle #5 – Electrical Review (all submittals)</th>
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<tbody>
<tr>
<td>Electrical Drawings</td>
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<tr>
<td>Kitchen Drawings</td>
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<tr>
<td>Divisions 11, 16 &amp; 25 Specifications</td>
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<tr>
<th>Bundle #6 – Low Voltage Review (all submittals)</th>
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<tbody>
<tr>
<td>Electrical Drawings</td>
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<tr>
<td>Divisions 16 &amp; 25 Specifications</td>
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<tr>
<th>Bundle #7 – Structural Review (all submittals)</th>
</tr>
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<tbody>
<tr>
<td>Structural Drawings (½-size)</td>
</tr>
<tr>
<td>Divisions 3, 4 &amp; 5 Specifications</td>
</tr>
</tbody>
</table>
Bundle #8 – Mechanical Review (all submittals)
Mechanical Drawings
Plumbing Drawings
Kitchen Drawings
Division 15 Specifications

Bundle #9 – M & O Review (all submittals)
Full Specifications
Cut Sheets
2 Full Drawing Sets (½-size) bound by
discipline (i.e. 2 Civil sets, etc.)

Bundle #10 – QA/QC Team (all submittals)
1 Full Drawing Set (½-size)
Full Specifications
Geohazards Report
Geotechnical Report
Hydraulic Calculations
Hydrology Report
Lighting Calculations
Lighting Cut Sheets
Structural Calculations
Title 24 Report

Bundle #11 – Estimating Review (all submittals)
1 Full Drawing Set (½-size)

Bundle #12 – Hall & Forman Review (all submittals)
Civil Drawings
Off-site Drawings

Bundle #13 – CDE Review (100% CD’s only)
1 full-size & 2 ½-size drawing sets including
General Drawings
Architectural Drawings
Civil Drawings
Landscape Drawings

Bundle #14 – Constructability Review (100% CD’s only)
2 Full Drawing Sets (full-size)
Full Specifications
Geotechnical Report
Geohazards Report
Hydrology Report
Hydraulic Calculations
Structural Calculations
Title 24 Report
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E. FUNCTIONAL REQUIREMENTS – SCIENCE LABORATORIES
F. FUNCTIONAL REQUIREMENTS – LIBRARY MEDIA CENTER
G. FUNCTIONAL REQUIREMENTS – PHYSICAL EDUCATION
H. FUNCTIONAL REQUIREMENTS – MULTIPURPOSE AND FOOD SERVICE
I. FUNCTIONAL REQUIREMENTS – RESTROOMS
J. FUNCTIONAL REQUIREMENTS – LOCKERS
K. FUNCTIONAL REQUIREMENTS – CORRIDORS AND STAIRWAYS
L. FUNCTIONAL REQUIREMENTS – SUPPORT
M. FUNCTIONAL REQUIREMENTS - BUILDING SECURITY
2.1 SCHOOL BUILDING DESIGN

A. INTRODUCTION

The following standards complement the Facilities Space Program and the Educational Specifications, and deal with general planning and design issues.

B. GENERAL

1. District Criteria
   a. The guidelines and criteria of this chapter must be closely coordinated with those of the “Educational Specifications.”

2. Referenced Codes and Standards
   a. Legislative and regulatory requirements affecting schools in California include:
      1. Title 5 of the California Code of Regulations (especially Sections 14001 and 14030)
      2. Title 24 of the California Code of Regulations (State Building Code).
      3. Title 22 of the California Code of Regulations for Children’s Centers.
      4. American With Disabilities Act (Public Law 101-336, Title II)
      5. Education Code Section 39113.5 for “before and after-school Child Care Programs”.

3. General Planning Requirements
   a. High Schools and Middle Schools shall be planned and designed in accordance with the “Planning & Design Guidelines for Small Learning Communities” for Los Angeles Unified School District Secondary Schools (Available on LAUSD Website: http://www.laschools.org/employee/design/plan-des-guidelines ).
   b. Pest Management
      2. Birds (pigeons, gulls, others) are a persistent and provoking maintenance problem for the District, as well as a health and sanitary hazard. Exercise care in the design of all exterior facades and structures to eliminate roosting or nesting of birds. Any
protrusions architectural, structural or otherwise that are greater than 1 1/2” shall be protected with bird deterrent devices or be designed to be bird unfriendly.

a. Do not use exposed truss members, flanged beams, cantilevered beams or other elements that provide such roosting. Important everywhere, it is especially so in Lunch Shelters.

b. Where essential building elements may provide such roosts, such as solar shades or light shelves, open ladders where necessary, entry covers, security devices, and similar structures, minimize the risks by sloping the element, providing, open uninviting surfaces, installing edge barriers, and similar measures.

c. This is an important District concern, and must be addressed at both the Schematic Design and Design Development stages, together with the elements of concern described above.

c. Room Access

1. Do not provide entry to any room through another room – for example, a low-voltage electrical room through a power electrical room.

2. Exceptions are teachers’ workrooms from classrooms, administrators’ private offices from an open work room, or smaller rooms serving a general kitchen area.

d. Building Access

1. At all building entrances and access windows, provide shelter from stormy weather (rain, hail, ice, etc.) by providing overhead cover with appropriate roof drainage.

2. At all such access, provide non-slip floor (walking) surfaces to improve safety when wet or icy.

e. Energy and Sustainability

1. The principles of sustainable design and energy conservation, as embodied in these requirements and in the CHPS criteria, represent important District goals, and shall be applied in all aspects of school planning and design, including building orientation and configuration, envelope and fenestration selection, and selection of building systems and equipment. (See the section 2.4 “Environment and Sustainability”.)

C. FUNCTIONAL REQUIREMENTS – ADMINISTRATION

1. Administration Unit

a. The Administration Unit provides core-area space for staff functions; provides spaces for interaction between staff, parents and students; and serves as the main public entry to the school.

b. Spaces and functional needs include:

1. Private offices for principal, assistant principals, and other appropriate staff.
2. Open office for clerical assistants, volunteer workers, computer operators.

3. Public lobby with a waiting/seating area and a counter control center. (Separate the counter area and the back-of-house clerical operations.)

4. Counter heights appropriate to the population age at both standing and wheelchair levels.

5. Seating and writing surfaces for staff or students to fill out forms.

6. Conference space for staff meetings, staff-teacher conferences or visitors.

7. Staff/faculty work room(s) for copying, assembling and binding, and for ample storage of supplies, sized and equipped appropriately for the school size.

8. Spaces for office supplies, reprographics equipment, staff and teachers’ mail boxes, LAN central location, radio receiver/transmitter equipment, and additional spaces as programmed, such as police offices, athletic director’s office, etc.


10. Adult toilet rooms for principal, staff and visitors.

11. Mail boxes shall be provided at the rate of 1.5 times the number of classrooms. Size shall be 4”h x 12”w x 15”d each, with an area for larger boxes at each location. In small learning communities provide mail boxes in satellite administration office at the same rate. Total number of mail boxes required may be divided between the satellite administration office(s) and the main administration office, proportional to the number of classrooms each serve (or number of staff for Main Administration).

c. Location:

1. As the main entrance to the school campus, the Administration Unit must be prominently located and directly accessible to the public. This unit, together with Counseling and Health, may need after-hour or weekend accessibility, and should be secured against access to other school areas.

2. Counseling and Attendance Unit

a. The Unit functions as an integral part of counseling and guidance programs, and as a service center for families dealing with enrollment, transfers, transportation and work permits. Counselors confer with students and parents, administer psychological examinations, and maintain files and records for each student. The Attendance Office maintains attendance records and students’ files. (The unit functions partly as an accounting department.)

b. Spaces and functional needs for this unit typically include:

1. Counselors’ offices with work area, guest seating, computer workstation and window.

2. Student Waiting Area with controlled supervision, shared with Attendance Unit.
3. Work room and guest waiting area for the Psychologist’s Office.
4. Interview and Testing Stations.
5. Other workstations as programmed.
6. Enclosed bulletin board outside the unit in a highly visible location.

c. Location: Counseling and Attendance activities are integrated into the Administration Unit adjacent to the main entry. (These functions are reduced and combined in the Administration Unit at elementary schools.)

3. Health Unit

a. A centrally located Health Unit provides health services to students, storage for students’ health records, and information for use by teachers, counselors, school administrators and aides. Student privacy and confidentiality are important when accessing health services.

b. Spaces and functional needs for this unit typically include:
   1. Nurse’s desk within the health office.
   2. Cot room or space.
   3. Accessible restroom within the health office, provide a space for a changing table (3’X7’) for high school and middle school.
   4. Student waiting area.
   5. Private storage within the health office for medical supplies and students’ special medical devices and medications.
   6. Exam space for visiting healthcare professionals.
   7. Ten-foot long eye exam lane.
   8. See LAUSD’s Educational Specifications Drawings for typical suggested layout.
   9. First aid area with lockable cabinets and space for a refrigerator.

c. Location: Adjacent to the main Administration Unit, with accessibility for the public. At elementary schools there shall be a viewing window from Administration’s clerical area to the Cot Room.

4. Faculty and Staff Lounge

a. The Faculty and Staff Lounge provide space for relaxation, private work, meetings, and dining when a separate faculty dining room is not available or convenient.

b. Spaces and functional needs for this unit typically include:
   1. Ample seating and table space, sized appropriately for the school.
   2. Sink, tack board, payphone, and space/utilities for a refrigerator, coffee station, microwave, and vending machine.

c. Location: Centrally and conveniently located, often near food service in elementary schools, and near the Administration Unit in middle and high schools.
D. Functional Requirements – Classrooms

1. General Education Classrooms
   a. Classrooms are the most important single element in the school. They must be designed to flexibly accommodate varied activities and future technologies. Designs should reflect concern for the way children work and learn in the room. Adaptability of the room to various grade levels is provided through selection and arrangement of furnishings.
   b. Refer to other sections of this Guide and to the Educational Specifications for such items as lighting, acoustics, finishes, air quality and communications.
   c. Size: The minimum classroom size is 960 square feet unless the Facilities Program provides an alternative size.
   d. Location: Classrooms are laid out in groups, in linear form or clusters, accessed either by external walks and balconies or by internal corridors. They need convenient access to the library/media center especially, as well as to administration, multipurpose/food service, and physical education or playground areas.
   e. Flexibility: Consider measures to allow some classrooms to be easily altered in size or shape at reasonable cost (for example, to accommodate changes in class-size policy).
   f. Outdoor study areas: Consider for Elementary School Classroom clusters.
   g. Storage units: Provide as shown in Educational Specifications. The top shelf of units shall not exceed 72” in height.
   h. All elementary school classrooms must have sinks, soap dispensers and paper towel dispensers.

2. Small-Group Instruction Areas
   a. Small group instruction areas are sometimes provided in the vicinity of the classrooms – typically one for each four to six general classrooms, as programmed -- to allow for various collaborative learning opportunities as appropriate within the regular education program.
   b. Space and functional needs: Minimum size of 480 sf. Provide tables and chairs for small group activities, tack- and white-boards, computer stations, and extra storage space for special materials.
   c. Location: Close to groups of classrooms, with windows into classrooms for supervision.
   d. Small group instruction areas are not included in the computation of classroom size unless as integral parts of the classroom, visually supervised by a teacher from the classroom.

3. Year-Round Education Needs:
   a. Define specific space for off-track teachers’ storage cabinets.
   b. Provide additional storage for supplies and projects for off-track students.
   c. Provide adequate work surfaces in the space, including a counter.
4. **Kindergarten Classrooms**
   a. The Kindergarten unit is specialized and self-contained so that children may participate in active and varied learning experiences. Space and furnishings should provide flexibility for a variety of indoor and outdoor activities. Special attention should be paid to visual lines of supervision of the classroom and play yards, and provision of a safe, interactive environment.
   b. Spaces and functional needs: Minimum Kindergarten Classroom size is 1,350 square feet, including storage, wet and dry areas, and restrooms self-contained within the kindergarten complex.
   c. Location: Close to parent drop-off and bus loading areas.
   d. Safety: Ensure that electrical outlets are designed as “child-proof” and have safety protection measures integral to the outlet.

5. **Kindergarten Outdoor Play Space**
   a. The Kindergarten Play Space is an extension of the classroom, directly accessible and fenced for exclusive use by Kindergarten students. It accommodates a variety of outdoor activities for the development of large motor skills, including running, climbing, sliding, cycling, and dancing. Innovative design solutions are encouraged, but with maximum safety in mind.
   b. Size: A desirable play area to classroom area ratio is 2:1. (Typically, play yard may be length of the building and approximately 60'-0” wide.)
   c. Provide resilient mat area at play equipment or more as required by play structure design.
   d. Provide play equipment as programmed and as specified in District Guide Specifications.
   e. Provide shade for quiet activities.

6. **Special Education Classrooms and Areas**
   a. Refer to the Facilities Program and the California Education Code, Section 17747(a), for space allowances for classrooms and other spaces to support special education programs. Spaces for the special education program include Special Education Classrooms, a room for the Resource Specialist, specially equipped classrooms where applicable, as well as those in other units such as the speech therapist, psychologist, counseling offices and conference area.
   b. Properly equip the classrooms for the students who will occupy them, their age and their disabling conditions, as defined in the Space Program and code.
   c. Provide 240 square feet minimum for the Resource Specialist, or as programmed.
   d. Provide 200 square feet for individualized instruction in the speech and language program.
   e. Distribute Special Education classrooms, when programmed, throughout the campus with age-appropriate regular education programs.
f. Provide access to a conference area to conduct individualized education program meetings for each special education student.

g. Locate medical therapy units, if planned for the site, close to visitor parking areas and with after-school-hour accessibility.

7. **Specialized Classrooms**

   a. Refer to the Educational Specifications for additional criteria and information specific to other classroom types, such as visual and performing arts, technology labs, business or industrial arts.

8. **Early Education Center**

   a. The EEC, Preschool classroom shall provide opportunity for different activities, interaction and resting. This should be located directly adjacent to the outdoor play area, toilet and storage. Provide space for storage of clothing, bedding and personal belongings.

   b. Size: There shall be at least 35 square feet of indoor activity space per child. Floor space occupied by shelves, built-in cabinets and office/teacher equipment shall not be included in the indoor calculation of indoor space.

   c. Children lavatories shall deliver hot water with controls to automatically regulate hot water temperature to not less than 105° degrees Fahrenheit and not more than 107° degrees Fahrenheit.

   d. One flushometer style toilet and one hand washing lavatory shall be provided for every 15 children or fraction thereof. Toilets shall be flush valve type, 10 ½” high to rim. Toilet partitions or screens shall be 3’-0” high.

   e. A fixed window shall be provided between classroom and toilet for observation.

9. **Early Education – Outdoor Play Space**

   a. The outdoor activity space shall be situated to provide a shaded rest area for the children. Equipment and activity areas shall be arranged so that there are no hazards from conflicting activities.

   b. Size: There shall be at least 75 square feet per child for outdoor activity. Areas around and under play equipment shall have a resilient mat.

   c. The playground shall be fenced to protect the children and to keep them in the outdoor play area.

   d. All play equipment and materials used by the children shall be age-appropriate.

E. **Functional Requirements – Science Classrooms**

   a. Space and functional needs: Science laboratories typically are 1300 sf or more, with room for students around fixed learning stations and with adequate space for lectures at or adjacent to the lab benches.

   b. Location: Cluster science classrooms together and locate away from other rooms. In multi-story buildings, locate on top floors to minimize vent and exhaust plumbing and ducts.
c. Preparation Rooms: Provide separate rooms directly accessible from classrooms, usually one for every two laboratories, for teacher preparation and for storage of supplies and equipment.

d. Hazardous Materials:

1. Provide science laboratory design that is consistent with the requirements for proper hazardous materials management specified in California Department of Education publications:
   a. 1993 “Science Facilities Design for California Public Schools”
   b. Latest edition of “Science Safety Handbook for California High Schools”.
2. Provide secure storage areas for volatile, flammable and corrosive chemicals and cleaning agents.
3. Provide work surfaces/countertops with splash guards composed of epoxy resin wherever volatile, flammable or corrosive chemicals or cleaning agents may be utilized.
4. Accommodate necessary safety equipment and supplies, including emergency deluge shower, and eyewash with floor drain, master disconnect valve for gas, fire extinguishers, and first aid kit and eye goggle cabinet. In the Teachers’ Preparation Rooms immediately accessible to a science classroom that contains an emergency deluge shower/eyewash, provide a supplemental flip-down eyewash at sink.
5. Provide appropriate ventilation for hazardous materials, including exhaust fume hoods, and a high volume purge system in the event of accidental release of toxic substances that may become airborne.
6. Provide special plumbing, including isolated waste lines, for hazardous liquids.
7. Provide floor and ceiling ventilation in secure areas where chemicals are stored.
8. Refer to later sections, to the “Guide Specifications” and the “Standard Technical Drawings,” for more detailed information on many of these requirements.

F. Functional Requirements -- Library Media Center

a. The Library Media Center is an information laboratory serving the instructional needs of the entire school. It should be an aesthetically pleasing environment inviting purposeful activity for the development of positive attitudes toward reading and learning.

b. Space and functional needs: Library space is planned in proportion to the maximum planned enrollment, as programmed, but not less than 960 square feet. Needs include:
   1. Space and technology for computer terminals for student use, research and report writing, including electrical outlets and data network connections for each computer terminal.
   2. Security for technology and media equipment.
3. In Middle Schools and High Schools, provide book-theft detection system at entrances.

4. Visual supervision from the circulation desk to study areas, stack space and student work centers.

5. Open and closed-circuit television, dedicated phone lines and electrical/data outlets for stand-alone as well as networked computers.

6. Area for multi-media presentations.

7. At Middle Schools and High Schools provide a private office space for the librarian adjacent to circulation desk and staff work area.

8. Staff workroom with counter desk, counter sink, shelving, copy machine, and space for library book carts.

9. Secure storage for special collections, technology and media equipment.

10. Freestanding display case near entry.

c. Location:
   1. Central to the academic areas of the school, easily accessible from classrooms.
   2. Directly accessible to the public for community use and extended hours of operation. Secure the Library / Media Center from other parts of the campus to allow evening and weekend events without intruding on other school spaces
   3. Locate on the first floor unless exceptions for specific reasons are given. Assure adequate floor strength and thickness for book-shelving support and overturning anchorage.

d. Collection storage appropriate to the school, and as shown in Educational Specifications. Considerations include:
   1. Bookshelves: appropriate in height for the age of the children served.
   3. End panels for exposed ends of bookshelves (may be tackable surface).

G. FUNCTIONAL REQUIREMENTS – PHYSICAL EDUCATION

1. Gymnasium
   a. Physical education provides directed training toward the development of physical and social skills. Activities include individual and team sports, rhythmic instruction, body mechanics, health, first aid, and safety.
   b. Space and functional needs include:
      1. Spaces in accordance with the Facilities Program, including sports areas, lockers, showers, team rooms, and such spaces as lobby or
foyer, ticket booth, sound equipment room, press box, kitchenette, snack bar and laundry spaces.

2. In High Schools and Middle Schools, male and female faculty offices with line of sight to respective locker rooms.

3. Toilets for public use other than in the shower/locker areas.

4. Gyms, aerobics rooms, fitness centers, locker rooms and other activity areas must have durable, abuse resistant walls. Do not use gypsum board unless it is abuse-resistant.

5. Gyms with play lines under 5 foot space from walls shall be equipped with wall padding as per ASTM F2440-04 for impact resistance.

6. For lockers, see Section 2.1 - J. “Functional Requirements - Lockers”.

c. Location:
   1. Adjacent to play fields.
   2. Directly accessible to the public for community use and extended hours of operation, with clearly defined entrance and access control for events. Secure the gymnasium and outdoor sports areas from other parts of the campus to allow evening and weekend events without intruding on other school spaces.

2. Physical Fitness Center

   a. Particularly on small urban sites, specialized P.E. Teaching Stations may be programmed. These may include a specially equipped fitness center or cyberobics lab with integrated computer technologies and physical fitness equipment, together with the necessary multiple electrical and data drops.

H. FUNCTIONAL REQUIREMENTS – MULTIPURPOSE ROOM, AUDITORIA AND FOOD SERVICE

1. Multipurpose Room

   a. The Multipurpose Room functions as a combination assembly hall, lecture hall, testing room, indoor dining area, performing arts classroom, physical education classroom, and a general activity room. It may also serve community youth groups, civic organizations or professional events. (In some schools, especially high schools with auditoria, there may be a separate indoor dining area in the cafeteria. See the “Space Program” and “Educational Specifications” for specific requirements.)

   b. Space and functional needs include:
      1. Accessible Platform or stage serving as performance space or podium, complete with rigging and lighting.
      2. Assembly area with acoustical treatment and lighting- and sound-system controls for assemblies and performances.
      3. Movable chairs for assemblies or dining, with storage space for carts.
4. Folding tables for dining, with storage space.
5. In-wall tables and benches may be provided in Elementary Schools.
6. Lobby or foyer.
7. Public restrooms.
c. Location:
   1. Directly accessible to the public for community use and extended
   hours of operation. Adjacent to Kitchen/Serving Area if used for
   indoor food service. Secure the areas from other parts of the
   campus to allow evening and weekend events without intruding on
   other school spaces. Ground level locations are preferred.

2. **Kitchen**
   a. Spaces and functional needs for this unit include:
      1. Food preparation area.
      2. Space for a cafeteria/serving line to accommodate the flow of
         traffic for each lunch period.
      3. Office, changing and restroom areas for food preparation staff, in
         compliance with local Health Department requirements.
      4. Door widths to accommodate large equipment, including a service
         door of minimum 3’-6” by 7’-0”.
      5. Insect screens for operable windows.
      6. Coiling counter doors (shutters) at serving windows, both interior
         and exterior.
      7. Stainless steel sinks and work surfaces, with adequate pitch to work
         surfaces and sink bottoms to ensure drainage.
      8. Stainless steel counter tops for all serving stations.
      9. In secondary schools with dishwashers, a dish shelf on dining room
         side aligned with soiled dish counter in kitchen.
     10. Range hood with filters for combination supply and exhaust air
         system.
     11. Wet chemical fire extinguishing system.
     12. Floors in all following rooms should be 6 x 6 quarry title (no grit)
         with quarry tile base. (Restrooms can be ceramic tile):
        a. Serving/Scramble/Window Service
        b. Kitchen/Prep
        c. Walk-in Refrigeration/Freezer
        d. All storage rooms (If the office is in the storage room, it is a
           storage room and not an office by law)
        e. Corridors, hallways, etc. in the food service area.
        f. Locker Room(s) (for the Food Service area)
        g. Janitor/Custodian (for the Food Service area)
     13. Walls in Kitchen and Food Preparation Area shall be FRP
         (Fiberglass Reinforced Plastic) sanitary wall panels or stainless steel.
All other walls are to be smooth (no texture) washable semi or gloss white 70% LRV (Light Reflectance Value) min.

14. Ceilings shall have smooth and washable finish. Hard lid (Gypsum Board) ceilings shall be painted semi-gloss or gloss. If ceiling tiles are specified they shall be of the appropriate type for this area and meet all code requirements (See Guide Specifications Section 09500 2.02 Materials, E. ACT 3).

b. Plan the kitchen areas not only for functional efficiency, but also for economical sharing of services such as power, water supply, and floor sinks and drains.

c. Provide convenient access for service and delivery vehicles, separated from student areas.

d. Provide door bell and a view port at service entry door to the kitchen. Buzzer shall sound in the kitchen’s office and kitchen's work area.

e. BOS Permit – All school sites must receive, in writing, Bureau of Sanitation’s (BOS) approval on necessity and sizing for a Grease Interceptor tank. Architect to initiate and fulfill this requirement early during the design process and forward a copy of BOS approval letter to the OAR. Tank Design shall be based on Drainage Fixture Units (DFU) sizing criteria, with minimum tank size of 750 GPM (when a tank is required).

f. Warming Kitchen – is a kitchen with out grease generating fixtures or appliances. (among others, three-component sinks and ranges are considered grease generating fixtures and appliances)

3. Cafeteria

a. Spaces and functional needs for this unit include:
   1. Ample area for the cafeteria waiting line, oriented to provide a smooth traffic flow.
   2. Covered rain and sun protection at waiting line and food serving area. Covered access to Lunch Shelter.
   3. Serving windows at the appropriate height for grade levels served.
   4. Space for trash and recycling receptacles in designated areas throughout the dining areas.
   5. Adjacent storage for cleaning supplies.

b. Location: Adjacent to playground with student restrooms easily accessible.

4. Lunch Shelter:

a. Spaces and functional needs for this unit include:
   1. Concrete slab sloped to adequate floor drains so that all food products drain to sanitary sewer system.
   2. Roof structure providing shelter from rain and sun, designed to prevent birds from perching on rooftop areas in and around the lunch shelter. Shelter’s height shall be proportional to its size. Design shall consider side exposure to elements and provide for
maximum protection while maintaining an open and airy atmosphere.

3. Conveniently located drinking fountain with multiple bubblers and hose bibb.

4. Provide lighting and P/A speaker system (connected to school’s P/A system).

b. Location: Immediately adjacent to cafeteria, playground, and outdoor eating areas.

5. Outdoor Eating Areas:
   a. Outdoor eating areas are intended to supplement cafeterias and lunch shelters.
   b. Provide space for umbrella tables and chairs, low wall seating or benches.
   c. Consider ways to reduce heat reflection and glare, especially shading.
   d. Consider details that provide protection against birds.
   e. Drains shall be provided based on requirements of this Design Guide, see section 3.2 – “Civil Engineering”.

6. Outdoor Assembly Area
   a. The Outdoor Assembly Area accommodates the student body for informal and instructional presentations and graduation exercises, as well as outdoor dining. (See section 2.2 - “Site Design”)
   b. Location: Central to campus. Preferably near cafeteria and lunch shelter.

I. FUNCTIONAL REQUIREMENTS – RESTROOMS & DRINKING FOUNTAINS

1. Fixture and General Requirements
   a. Restroom stalls shall be sufficient in number to accommodate the maximum planned enrollment, staff and visitors, and located on campus for both convenience and supervision. Follow the requirements of the California Plumbing Code, except where modified below.
   b. Restrooms must be designed and equipped to comply with all Title 24 Accessibility Requirements, including access and usability for all fixtures, mirrors, and accessories.
   c. ADA requirements specify and differentiate the mounting heights for adults (including Middle Schools and High Schools), Elementary and Kindergarten students. Comply with correct ADA mounting heights for the project type.
   d. Refer to Guide Specification Section 10810 “Toilet Accessories” for additional requirements.
   e. In student restrooms (except kindergarten and early education centers), provide electric hand dryers in lieu of paper-towel dispensers and waste receptacles. Locate hand dryers along exit path from restroom. See also Section 3.4 “Plumbing” for specific requirements for student restrooms.
For other restrooms, surface-mounted paper towel dispensers are standardized throughout the District (see the Guide Specifications Section 10810). Provide space for free-standing trash containers.

Plans shall include a tabulated Fixture to Occupant load calculation for all fixtures, including Drinking Fountains, Water Closets, Urinals and Lavatories.

Mirrors – In lieu of individual mirrors above the lavatories, provide a larger mirror in an adjacent area for use by all. Be mindful of “Line of Sight” and privacy issues when locating the mirror.

FIXTURE REQUIREMENTS:

<table>
<thead>
<tr>
<th>Type of Occupancy</th>
<th>Water Closets (Fixtures per Person)</th>
<th>Urinals</th>
<th>Lavatories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male or Female</td>
</tr>
<tr>
<td></td>
<td>2 : 21-50</td>
<td>Over 50,</td>
<td>2 : 26-50</td>
</tr>
<tr>
<td></td>
<td>add 1 fixture for each add'l 50 persons.</td>
<td>add 1 fixture for each add'l 50 persons.</td>
<td>add 1 fixture for each add'l 50 persons.</td>
</tr>
<tr>
<td>Elementary Schools</td>
<td>1 : 30</td>
<td>1 : 25</td>
<td>1 : 75</td>
</tr>
<tr>
<td>Secondary Schools</td>
<td>1 : 40</td>
<td>1 : 30</td>
<td>1 : 35</td>
</tr>
<tr>
<td>Staff and Visitor Use – All Schools</td>
<td>1 : 1-15</td>
<td>1 : 1-15</td>
<td>1 : 50</td>
</tr>
<tr>
<td></td>
<td>2 : 16-35</td>
<td>2 : 16-35</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 : 36-55</td>
<td>3 : 36-55</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 55, add 1 fixture for each add'l 40 persons.</td>
<td>Over 55, add 1 fixture for each add'l 40 persons.</td>
<td></td>
</tr>
</tbody>
</table>

The total number of water closets for females shall be at least equal to the total number of water closets and urinals required for males in each location. Where the above ratios do not match this requirement, increase the number of fixtures for females to achieve equity.

Provide one drinking fountain per each 150 occupants, with a minimum of one per floor.

*The total number of fixtures required for students shall not include dressing room toilets, health unit toilet and public restrooms to be located in gymnasium’s lobby and multi-purpose room lobby. Provide restrooms in these areas as indicated in the space program.

*For student restrooms provide a minimum of 3 fixtures
- Boys – Two (2) toilets and one urinal.
- Girls – Three (3) toilets

OCCUPANT LOAD FOR FIXTURE COUNT:

<table>
<thead>
<tr>
<th>Type of Occupancy</th>
<th>Type of Space</th>
<th>Person/Space</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students, Elementary Schools</td>
<td>Classrooms, including Kindergarten, Special Day Classrooms, Set-Aside Rooms (for total school fixture count)</td>
<td>25</td>
</tr>
<tr>
<td>Students, Secondary Schools</td>
<td>Classrooms, including Special Day Classrooms, Set-Aside Rooms (for total school fixture count)</td>
<td>30</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------</td>
<td>----</td>
</tr>
<tr>
<td>Staff (and Visitors)</td>
<td>Classrooms, including Kindergarten, Special Day Classrooms, Set-Aside Rooms (for total school fixture count)</td>
<td>2</td>
</tr>
</tbody>
</table>

2. **Location Criteria**

   a. Provide separate restrooms for students and faculty. Student restrooms may be used by the public for public events.

   b. Locate restrooms and at least one drinking fountain on each floor as a minimum.

   c. Provide a custodial room adjacent to each student restroom.

   d. Distribute staff restrooms to locations proximate to their work stations, with maximum walking distance for any employee of 200 feet or less.

   e. Locate restrooms and drinking fountains appropriately to serve such areas as multi-purpose and dining areas, media center, auditoria, lunch shelters, and athletic facilities and playfields. Make provisions for them to be fully accessible to students and staff during the day, and to the public after school and for special events without violating school security. Size restrooms to handle the anticipated capacity of each facility area.

   f. Provide drinking fountains in the following locations:
      1. Adjacent to all student restroom entries, both interior and exterior.
      2. Interior, as well as exterior, adjacent to each Gymnasium.
      3. Adjacent to exterior play areas, including courts, play yards, and athletic fields.
      4. Adjacent to lunch shelters and outdoor eating areas where students have their lunch or breaks.
      5. Other public areas where students will congregate.

   g. Drinking fountains subject to direct sunlight exposure shall not be Stainless Steel due to heat build-up on the unit.

   h. Entries to restrooms shall be only from public spaces, corridors, lobbies, or vestibules, and not through other rooms or functional spaces. All restroom entries shall have doors and screen walls or vestibules to prevent visibility of interior areas from the exterior when doors are open.

   i. Restroom entrances shall be visibly prominent for ease of supervision.

   j. Restrooms having direct access from the exterior shall have entries that are visible from the playground and easily supervised.

   k. Drinking fountains in corridors or along busy sidewalks shall be located in alcoves at least 15” deep; alcove walls shall be surfaced with water-resistant material such as Ceramic Tile. Provide water-resistant and slip-resistant flooring in alcove that extends minimum of 3 feet into the passageway.’
J. **Functional Requirements – Lockers**

1. **Book Lockers**
   a. In secondary schools provide one book locker for each student enrolled, with enrollment based on 32 students per classroom.
   b. Locate lockers in locker recesses in corridors, covered walks, or in special covered kiosks within secured areas and in highly visible and supervisable places.
   c. Lockers shall be 18” high by 12” wide by 15” deep, four high with a sloped top, mounted on a 3 ½” high concrete curb.
   d. Construction shall be sheet steel, without vent openings, factory-applied enamel or powder-coat finish.
   e. Locks shall have built-in combination locks with options for multiple combinations and openable with a master-key.

2. **Physical Education Lockers**
   a. In secondary schools provide student lockers for the percent of enrolled students listed below, with enrollment based on 32 students per classroom – 50% in boys’ locker room and 50% in girls’ locker room.
      1. Middle Schools: 100% of enrollment.  
      2. Senior High Schools 60% of enrollment.
   b. In Senior High Schools provide two team locker areas with additional team lockers in each of the boys’ and girls’ locker rooms.
      1. Team Room: 100 team lockers.
      2. Team Secure Caged Area: 60 team lockers.
   c. Provide faculty lockers for PE instructors and coaches.
   d. Locker sizes:
      1. See Technical Specification - Section 10501 for sizes.
   e. Verify the PE and athletic program planned for each project to confirm these allotments.
   f. Construction shall be sheet steel, with vent openings, factory-applied enamel or powder-coat finish.
   g. Locks shall have built-in combination locks with options for multiple combinations and openable with a master-key.
   h. Lockers shall be installed on a 4” high concrete base. Base shall be flush with the face of the lockers.

K. **Functional Requirements – Corridors, Stairways and Exterior Walkways**

a. Width: Corridors and stairways shall be designed to accommodate peak student traffic flows between classes, but with a minimum width face-to-face of wall finishes or closed locker doors of 12 feet in secondary schools and 9 feet in elementary schools.
b. Finishes: Corridor and stairway walls shall have durable finishes – minimum finish construction of “abuse and impact resistant” gypsum wall board. (Not required behind or above lockers.)

c. Provide full height corner guards to protect corner edges of interior corridors, stairways and high abuse areas. Corner guards shall meet flame spread requirements and be vandal resistant.

d. Exterior walkways shall be designed to be hosed down. On upper floor exterior walkways provide recessed hose bibs and floor/area drains. Upper floor exterior walkways shall have a concrete walking surface with waterproofing system underlayment. Elastomeric walking surface coating systems shall only be used with Districts approval, due to high maintenance issues.

L. FUNCTIONAL REQUIREMENTS – SUPPORT

1. General

a. The Support Unit serves the operational and maintenance needs of the school. It includes the Central Support Unit (Plant Manager's office, central custodial receiving room, and central custodial supplies storage room), Gardening and Exterior Maintenance Equipment Room, Trash and Dumpster Enclosed Area, and the Custodial Closets.

b. See “Educational Specifications” for space criteria for each school level.

2. Central Support Unit

a. Plant Manager’s Office

1. Elementary Schools: Must accommodate one desk with computer, three chairs, file cabinet, wall and base storage cabinets and a hopper (laundry tub) sink with drench hose/emergency eye wash.

2. Secondary Schools: Must accommodate two desks with computer, six chairs, three file cabinets, wall and base storage cabinets.

3. Locate adjacent to storage rooms and to provide visual oversight of the receiving area.

b. Central Custodial Receiving and Storage

1. In Elementary Schools and Early Education Center’s (EEC’s), custodial receiving and storage may be combined as one space.

2. In secondary schools, provide separate receiving and storage rooms. Receiving must have space for receiving, inspecting and breaking down shipments, adjacent to the loading dock or exterior receiving area. Cleaning chemicals may be mixed or repackaged in this room, so it must have non-recirculated ventilation. Provide a hopper sink in this room, and a deluge shower/eyewash combination unit.

3. Storage Room must have adjustable metal shelving and a lockable metal cabinet for custodial supplies.

4. Provide six-foot wide door openings into both rooms, with pairs of three-foot doors.

5. Provide secure facilities for flammable liquid storage. In secondary schools where gasoline drums are stored (quantities greater than 55
gallons), this must be a separate building area with required fire-
resistive separation and with direct truck access for refilling drums.
This structure shall be completely separated from buildings used by
students. For small quantities see OEHS recommendations.

6. Fueled Equipment Storage – Storage for Gardner’s fueled
equipments and other fueled equipment shall be in a structure
completely separated from buildings used by students. This storage
could be part of gardener’s equipment building if it is an
independent building or it could be a separate structure. However,
truck access must be provided. Storage shall be located away from
transformer, trash area, and a minimum of 25 feet from any spark
generating source. Provide grounding as required by code.

7. For additional On-Site storage requirements see sections 2.2.- B
and C.

c. Locate the Central Support Unit away from the general classroom and
food-service areas, to avoid material and staff congestion, reduce
misdirected deliveries, and keep custodial chemicals and odors well
separated from students and food preparation.

d. Provide access from a street entrance, separate from student areas, with
adequate yard space for deliveries and truck turnaround.

e. At secondary schools, provide toilet facilities and lockers.

f. Provide an outside area adjacent to Receiving for the future placement
of 8’ x 40’ containers for future storage: one for elementary schools
/about 500 sf/ and two for secondary schools (about 800 sf).

3. Gardening and Exterior Maintenance Equipment Room

a. Gardener’s Storage shall include workspace, equipment storage area,
and equipment (shelving, cabinets, and racks).

b. Exterior Equipment Storage space shall be adequate for equipment
(mowers, sweepers, vacuums, etc.) with an overhead rolling door

c. Locate adjacent to or near the Central Support Unit where feasible, but
it must be easily accessible to areas to be maintained.

d. When gardening unit is removed from Central Support Unit provide a
hopper sink.

4. Trash and Dumpster Enclosure

a. Provide trash enclosures that are secured by walls and lockable gate and
that screen the area from public view.

b. Provide:

1. Hose bibb and dual-mode drainage (see Section 3.4 “Plumbing”).
2. Electrical outlet and exterior lighting.
3. Trash compactor with container, concrete slab floor, and electrical
power (all to be included in the Construction Documents).
4. Direct truck access to all containers and dumpster.
5. Enclosures shall be freestanding, with minimum 5’-0” distance
from any occupied structure.
c. Location:
   1. Remote from student activities and food service areas.
   2. Accessible to street for truck pick up.
   3. Convenient to trash-generating activities.
   5. Trash enclosure area shall be located with direct access from outside the campus/parking area for easy pick-up and without interfering with school activities. Direct access from the campus shall be provided and shall not require passing through any building space.

d. Details:
   1. For additional information for trash area with trash compactor see “Standard Technical Drawings”.

e. Trash Area Calculation:
   1. Avoid placing the dumpster storage area near kitchen, cafeteria, and/or lunch area for more effective pest management. Where no trash compactor is provided, provide storage for one 3 cubic yard dumpster, for each 140 enrolled Elementary students or 125 enrolled Middle or High School students. This quantity may be distributed between one, two or more locations on the site if direct truck access is provided to each storage area. The number of bins may be as follows if a trash compactor is provided:
      2. Primary Centers & Elementary Schools: 4 trash bins (2cy each)
         Middle Schools: 6 trash bins (2cy each)
         High Schools: 8 trash bins (2cy each)
   3. Recycling trash bins –. Provide bins specifically for recycling.

5. Custodial Closet/ Hopper Room
   a. See “Educational Specifications” for space and equipment criteria. Custodial Closets are not to be used for supplemental uses (water heaters, access ladders, other building services) without enlarging the space and assuring the full function of the custodial activity.
   b. Provide:
      1. Floor sink with hot and cold water and custodial faucet with standard garden-hose threads on the spigot.
      2. Electrical GFCI receptacle.
      3. Light fixture with guard to prevent lamp breakage.
      4. Outswinging door.
      5. Exhaust air to outside (non-recirculated)
      6. Tool / mop rack and metal storage with adjustable shelves and space for custodial carts.
   c. Provide custodial closets in the following locations:
1. Adjacent to all Student Restrooms; one per floor minimum.
2. One per each 15 classrooms.
3. Boys and Girls Locker Rooms at Gyms
4. Multi-Purpose Room/Auditorium
5. Kitchen/Cafeteria
6. Other locations when necessary to assure adequate custodial coverage of building areas (Administration, Library, etc.).

M. **BUILDING SECURITY**

1. **Windows**
   
a. The following security measures must be addressed in the initial design concepts, and shall be integrated with the overall building design.

b. All windows accessible from the exterior shall have security measures as described in Section 3.1, “Architectural”, to prevent breaking, entering and vandalism. Accessible windows include any windows with:
   
   1. Bottom sills less than ten feet above grade.
   2. Bottom sills less than ten feet above balconies, stairs, or other circulation means.
   3. Bottom sills less than ten feet above roofs that have any portion less than ten feet above grade, adjacent walls, or other access points.

c. Do not locate windows within 48 inches of exterior doors unless protective security screens have been utilized to prevent an intruder from gaining access to door hardware.

2. **Doors**
   
a. Do not locate exterior doors in recesses or alcoves that would provide cover for an intruder attempting to enter the door.

b. Provide exterior security lighting that illuminates all exterior doors.

c. Provide overhead rain protection overhangs for all unprotected exterior doors.

d. Glass on exterior doors shall be protected against vandalism and to deter breaking and entering by use of security grilles. Laminated or wired glass is not sufficient.
2.2 SITE DESIGN

A. INTRODUCTION

B. BUILDING PLACEMENT AND CIRCULATION

C. OUTDOOR SPACE AND FUNCTIONAL REQUIREMENTS

D. LANDSCAPING

E. SECURITY

F. SIGNAGE
2.2 SITE DESIGN

A. INTRODUCTION

1. General Requirements
   a. The site design process must balance many diverse requirements including
      convenient circulation, accessibility, security, ease of supervision, and
      community image. Context, adjacencies, aesthetics as well as the physical
      and geotechnical characteristics of the site must be considered.
   b. Sites are to be designed to conform to the requirements of the “Guide to
      School Site Analysis and Development (Latest Edition),” to the
      “Small School Site Policy” of February 28, 2001, both published by the
      California Department of Education, and to the Rodriguez Consent
      Decree.
   c. Playgrounds, playfields, and outdoor instructional spaces are essential to
      the instructional program, and must be carefully integrated into the site
      plan.
   d. The circulation system, both on- and off-site, must safely separate
      pedestrians, bicycles, cars, buses and delivery vehicles while providing
      immediate access for emergency vehicles.
   e. Plan pedestrian circulation carefully to reduce opportunities for short cuts
      over planting areas, which greatly increase maintenance.
   f. Skating or skateboarding is not allowed on school property. Paving and
      other site structures such as raised planters, benchers, and low walls shall
      be designed to discourage such use.
   g. Careful consideration should be given to consolidating building program
      elements into a compact, space-conserving floor plate in order to
      maximize open space and enable a more energy-efficient building shell.
   h. LAUSD has a “Greening Program” that recommends lawn and other
      planting on at least 30% of the outdoor space on each school site. On
      tight urban sites, this is not always achievable, but space for planting must
      nevertheless be given high priority in site planning. Opportunities exist at
      school entries and perimeters, kindergarten play spaces, instructional
      gardens, and other strategic planting areas.
   i. See Section 2.4, “Environment and Sustainability,” for additional site
      design criteria. The reduction of storm-water runoff is an important
      component of sustainable design, and is greatly improved by more
      planting and water absorption areas.
   j. Site Signage: See section 2.2, F “Signage” for the requirements for site
      perimeter and other building signs and integrate them into the site design.
Signs must be reviewed, through the District’s authorized representative, with the school principal or other local district staff to assure the correct content.

2. Future Expansion
   a. Site layouts shall have the capacity for future expansion without substantial alterations to existing structures or playgrounds. Indicate future building locations on site plans.
   b. Make provisions in utilities systems to accommodate future growth without rework of installed components.
   c. Exits, walkways, stairs, and elevators must be sized and located to accommodate capacity of future growth, particularly in multipurpose, cafeteria, gymnasium and auditorium facilities.

3. Site Plan Information
   a. Plans shall clearly identify and reference the limits of all project related contract work including site lighting, landscaping, paving, utility system connections and improvements, etc., to specific benchmarks, property lines and/or existing significant site improvements (buildings, street center-lines, etc.) with easily understood and straightforward dimensioning.
   b. Locations of buildings, site improvements (including shoring needed to develop structures or features), underground/sub-surface structures, etc., shall be referenced to specific benchmarks, property lines and/or existing significant site improvements (buildings, street center-lines, etc.) with easily understood and straightforward dimensioning.
   c. All grades, slopes, required cuts/fills shall be appropriately depicted dimensioned, and quantified. Over-excavation requirements shall be defined with both horizontal and vertical dimensions sufficient for accurately calculating cut and fill quantities.
   d. Plans shall clearly identify locations for staging of construction materials, site access for the contractor’s workforce and delivery of materials, and temporary fencing and barricades for site security and safety. On sites with existing school functions/facilities, construction staging and work areas shall be separated from the school functions/facilities by temporary fencing and/or barricades. The location of this area shall be coordinated with District staff.

B. BUILDING PLACEMENT AND CIRCULATION
   1. Building Location
      a. Site layout of buildings, parking, driveways and physical education areas shall be planned to meet the instructional, security and service needs of the Facilities Program prepared by the District.
      b. Place buildings to be compatible with adjacent functions. (For example, do not place the band room adjacent to the library.)
      c. Physical relationships of classrooms, auxiliary and support areas must allow unobstructed movement of staff and students around the campus, and provide optimum patterns for pedestrian traffic flow around and
within buildings. (For example, students should not have to pass through one building to get to another.)

d. Place buildings to have favorable relationships to wind, sun, and natural light and to optimize the effects of sun light and solar loads. Provide an analysis of sun effects on energy consumption and on interior day lighting.

e. Provide a system of covered walkways between all buildings.

f. Consider location of buildings relative to parking areas and other paving to minimize solar reflectance and dust impacts on the buildings.

g. Locate restrooms to provide easy access from playgrounds and classrooms with a minimum of supervision.

h. Locate buildings in ways that improve campus security.

i. Exit doors and stairways from buildings shall be located so there is no direct exit from the building to the street. Students must be able to circulate to an emergency assembly area without exiting the school grounds.

C. OUTDOOR SPACE AND FUNCTIONAL REQUIREMENTS

1. Playground and Field Areas

a. The Facilities Program governs the number, types and sizes of outdoor Physical Education spaces, which includes a variety of physical education teaching stations, including hard courts, fields and apparatus areas.

b. Plan outdoor play areas and fields to accommodate public access and joint use with other public agencies.

c. Locate buildings (including relocatable buildings) so they do not impair observation or obstruct play field supervision.

d. Minimize potential for distraction or harm to occupants of lunch shelters, outdoor classrooms and assembly areas, by Physical Education spaces and related activities, including balls, noise, incidents, etc.

e. Provide resilient protective surfacing at playground structures as shown in District Standard Details.

f. Athletic competitive facilities are regulated by the National Federation of High Schools (NFHS). These facilities should also comply with CDE and California Interscholastic Federation (CIF) standards. Support facilities such as spectators seating, lighting, etc. shall be provided per program.

g. Turf areas should be located and graded to accommodate drainage of on-site surface runoff.

h. Athletic Equipment Storage – At High School fields provide space for a 40' container for storage of athletic equipments.

2. Outdoor Assembly Area:

a. The Outdoor Assembly Area is the heart of the campus. It may serve as a theatre area for outdoor programs, assembly for graduation ceremonies, an informal gathering space, and outdoor dining.

b. Locate it near the cafeteria and lunch shelter, preferably.
c. Provide a central lawn area large enough to accommodate the enrollment wherever site size permits. Create compact alternatives for smaller urban sites.
d. Minimize walks crossing grass area.
e. Plan a raised stage considering solar orientation, preferably facing away from morning sun.
f. Slope ground toward stage for amphitheater-style seating.

3. **Outdoor Classroom Patio:**
   a. The Outdoor Classroom Patio is an intimate cost effective space for outdoor teaching, as well as a good meeting place for parent-teacher meetings and student groups. It serves multiple occupants and is intended to grow into a place of outdoor beauty that offers an enhanced environment for instructional activities.
   b. As space permits provide paving, grass and seating (benches or low walls).
   c. Locate near classroom clusters.

4. **Outdoor Eating Spaces:**
   a. Outdoor eating spaces supplement cafeterias and lunch shelters. See section 2.1 “School Building Design” – Multipurpose and Food Service.
   b. Integrate with lunch shelter and outdoor assembly area.

5. **Emergency Assembly Area:**
   a. Designate an “Emergency Assembly Area” (EAA) on the site with a net area of six square feet for each programmed student (6 sf/occ.) or 3 SF per calculated exiting load, which ever is greater.
   b. Edge of EAA shall not be less than 50 feet from the face of the nearest structure.
   c. EAA shall have a gate that discharges directly to the sidewalk. Use a single 4'-0” gate to swing in the direction of egress.
   d. Gates shall not be closer than 15'-0" from the edge of a vehicular drive gate unless separated by a perpendicular fence or wall.
   e. Grades to, and within the EAA shall conform to accessibility requirements.
   f. Provide additional space for emergency supply containers (standard 20-ft. or 40-ft. shipping containers.). The primary unit stored is emergency water supply for three days for the entire site population (students, teachers and staff). The requirement is one barrel of water for each 35 people. A 20-ft. container will hold 30 water barrels. A 40-ft. container will hold 60 barrels. Calculate the size and number of containers and provide a flat, smooth-graded area for the containers, containers will be provided by the District.
   g. Access to EAA shall be designed in such a way that would not require students to go off campus and street to get to EAA.

6. **Bicycle Parking Area:**
   a. Identify a designated area for bicycle parking. Location and the number of bike racks for employees and students are at the discretion of the local districts.
b. Bike racks shall be installed on hard-surfaces.

c. Location shall be visible for security and designed for minimized vehicular and pedestrian traffic conflicts.

D. LANDSCAPING

1. Planning
   a. Because schools represent important visual elements in the community, a well-conceived landscape design is essential – one that provides a naturally beautiful campus that enhances its neighborhood yet still is physically secure and economically maintainable.

   b. Landscape and planting standards must be adapted to the specific site, with designs scaled to fit the ecological, cultural and economic requirements of the project.

   c. In addition to the aesthetic considerations, an important role of trees and large shrubs is providing shade – for buildings, for play areas, and for paved heat islands. Use trees to provide:
      1. Year-round shading of outdoor teaching, dining, gathering and play areas.
      2. Seasonal shading of buildings to reduce cooling energy requirements, while allowing winter warming of buildings in the cooler climatic areas.

   d. Use trees and shrubs to provide wind-breaks on those sites exposed to strong winds, but without disrupting favorable summer wind patterns.

   e. Identify existing trees and plant structures that should be saved, and, so far as possible, incorporate them in site planning.

2. Planting
   a. Based on long experience with landscaping maintenance, the District has prepared a list of plants that are appropriate to the region, are not hazardous to students or staff, and require relatively little maintenance. Select plants appropriate to the site from this list: LAUSD “Approved Plant List”, See Section 3.9 for additional information.

   b. The District is committed to a long-term program to conserve water. Therefore, select drought-tolerant planting, with durable, long-lived plants requiring the least amount of maintenance and water.

   c. The District’s “Integrated Pest Management Program” has requirements for plant locations to be not closer to buildings than:
      1. Mature canopy of trees: 5 feet.
      3. Ground cover or jute matting: 3 feet.

   d. Use low spreading shrubs and vine-type plants on slopes.

   e. Avoid all poisonous plants and shrubs with dangerous thorns.

   f. Allow space for normal growth of plants.

   g. Do not locate large shrubs in front of windows or so they hide the school sign.
h. In front of graffiti-prone walls, provide trees, shrubs and ground treatments that will deter taggers and reduce visibility of applied graffiti.

3. Trees

a. Provide for fast-growing shade trees on perimeter of Elementary School Playgrounds, surrounding Outdoor Assembly Areas, in Outdoor Eating Areas, in Kindergarten Play Areas, and in selected areas for outdoor instruction and small group gatherings.

b. Provide trees to shade buildings, where other conditions permit, as follows:
   1. On south exposure, tall deciduous trees to provide shade for high summer sun and warming from low winter sun.
   2. On east exposure, deciduous trees for morning shading in summer and warming in winter.
   3. On west exposure, evergreen trees for year-round shading.

c. Provide at least one mulberry tree on each Primary Center or Elementary School Campus, in the Kindergarten or Primary Grade Play Areas.

d. Provide trees to shade parking and other large paved areas to reduce the heat-island effect.

e. Keep trees out of drainage flow lines and 20'-0" feet away from vitrified clay sewers.

f. Avoid trees that drop excessive fruit, leaves, or pods.

g. Space trees to have a maximum of 5-feet overlap of full canopies.

h. Location of trees shall be designed to avoid providing access to upper floors, roof and impacting building foundation and sidewalks.

i. No tree box smaller than 24 inches is to be specified.

j. Trees provided by DWP (15 gallon) shall be located in areas away from student activities and access to maximize their survival.

4. Mowing Strips and Paving:

a. Separate lawn and planting areas with 8-inch minimum concrete mow strips.

b. Provide a continuous concrete mowing strip, 12" wide, on each side of a fence which separates two adjacent lawn areas, and for lawns next to raised planters, buildings, fences, walls or curbs.

c. Provide a continuous mow strip, 8"wide, for lawn or turf areas next to fences by extending concrete or asphaltic paving outside fence into lawn or turf areas.

d. Pave corners of planting areas at walk intersections.

e. Adjacent to buildings, provide a separating strip from plant areas that is 6”-thick concrete and not less than 24” wide.

f. All covered and main circulation walks shall be of concrete or similar durable surface.

5. Middle and High School Physical Education Fields:

a. Provide turf fields for Middle and High School Physical Education Areas that may include space for football, soccer, baseball and track and field.
Where programmed, these facilities may be used for interscholastic athletics as well as physical education.

b. Coordinate location of backstops, pitching mounds and skinned areas with sprinkler layouts.

c. Design grading so that surface drainage from sprinklers will not channel across skinned infield area of baseball and softball diamonds.

d. Pave small areas behind back stops where large mowers cannot operate efficiently. Provide mow strips if planted with turf.

e. When possible, turf area shall be located and graded to accommodate drainage of on-site surface runoff.

f. Provide a scoreboard outside of the playing field and track.

g. Provide an area to place a storage bin for athletic equipment.

6. High School Running Track:

a. Track Length: The running track shall be not less than 400 meters (1,312.34 feet) in length.

b. Track Width: A track width of 28 feet (8.53 meters) / 8 lanes is required for Synthetic and D.G. (decomposed granite) track surfaces unless approval is obtained by the District’s Athletic Department. (Refer to Standard Technical Drawing Track and Field Quadrant – Overall Plan - TF1.0)

1. Overall Track Width: Outside dimensions of track shall not be less than 262.86 feet (80.12m): 2 x 104.43’ (track radius) + 2 x [28’ (track width) – 1’ (distance to measurement line)] = 262.86’.

2. There shall be a 4’-0” high fence between the track and the bleacher areas. This fence should not encroach into the track and shall be located a minimum of 18” from the outer lane of the track. The public viewing area shall not be blocked by the fence.

3. Distance to Bleachers and Fences: A minimum clear distance of 18 inches (45.7cm) shall be provided from the track edge to any vertical obstacle, such as the fence or light standard. Ground level bleachers shall be provided a minimum 5 foot distance from the front row of the bleacher to the fence.

c. Lane Width: Lanes shall have the same width including the white line to the right. A minimum lane width of 42 inches (1.07 m) is required unless approval is obtained by the District’s Athletic Department. (Refer to Standard Technical Drawing Track and Field Quadrant – Track Detail - TF1.1)

1. Track Lane Measurement: Distance which are run in lanes and which involve a curve shall be separately measured for each lane. The measurement shall be based upon a line 8 inches (20cm) from the nearer edge of the lane line which is on the runner’s left, except the lane next to the inside raised curb shall be measured 12 inches (30cm) into the lane from the raised curb.

2. Inside Curb: The track may be bordered on the inside by a concrete curb. If exposed the edges of the curb shall be rounded.
3. Lane Edge Lines: Lanes shall be marked on both sides by white lines 2 inches (5.08cm) wide. The lanes shall be numbered with lane one on the left when facing the finish line.

d. In Field Surface: The playing field area and radius ends within the track should be natural grass or synthetic turf. A synthetic track surface is recommended when synthetic turf is used. The minimum distance from the curb to the active soccer / football playfield is 10ft. Runways for long jump and pole-vaults should be placed in the radius ends of the field and have synthetic surface when synthetic turf is used. For natural grass fields, runways may be either decomposed granite or synthetic surface.

e. A separate decomposed granite or natural grass fenced area should be provided for shot put.

f. Wind: Prevailing wind conditions should be considered when planning running tracks.

g. Minimum Considerations: On very small sites and with District approval practice and local competition meets may be run on 6 lanes of 42”.

7. Outdoor Assembly Area:

   a. Provide lawn at the Outdoor Assembly Area amphitheatre area.

   b. Plant perimeter trees for shade while maintaining interior line of sight toward stage.

   c. Plant screening foliage behind stage as a visual backdrop.

   d. Plant shade trees on either side of stage to cast protective shadows.

E. SECURITY

1. Gates and Fencing

   a. See section 3.2 “Civil Engineering” for heights and details of walls, fencing and gates.

   b. Provide full perimeter fence or wall (8’ 0” height) enclosure for school campus. Buildings may be used in lieu of a fence when located within 5’-0” of the sidewalk or entry plaza if classroom windows are not positioned so that pedestrians are a distraction to classroom students.

   c. At adjoining residential areas, provide CMU walls.

   d. Provide full perimeter fence enclosure for all parking areas.

   e. Design special gates for main entry to school with direct line of site from main office.

   f. In general, provide swinging gates rather than sliding. Emergency gates shall be swing gates. Use sliding gates for large openings where normally open swinging gates would cause obstructions. Ensure that sliding gates are designed to open with minimal effort and that the track will not deteriorate under normal use and traffic.

   g. Enclose the Trash Yard with solid walls or fencing and gates. Locate it for easy access and trash pick-up, away from student areas, and out of direct view of neighboring property owners.

   h. All perimeter gates to outside of campus are typically locked during school hours. These gates and their location should be designed in such a way so
they are not considered legal exit thus not requiring panic hardware compromising security to school site.

2. **Utilities Protection**
   a. Wherever pipe-and-valve assemblies are exposed above grade, provide a secure locked enclosure to protect them from unauthorized use or vandalism. These may be walls, fences, or manufactured enclosures that are made for this purpose.

3. **Site Lighting**
   a. Provide exterior lighting to enhance site security, including area lighting, walkway lights, and building perimeter illumination. See section 3.7 “Electrical Power and Lighting” for illumination levels.
   b. Eliminate direct-beam projection off-site or glare off buildings into adjoining residential areas or other occupancies.

F. **SIGNAGE**

1. **Identity**
   a. Provide metal letter signs at the main entry of school to identify the name of the school and street address. Signs shall be visible by both pedestrian and vehicular traffic.
   b. Identify an area on site plan for locating a future electronic marquee near the main entry. Marquee to be visible by pedestrian and vehicular traffic. Contract documents shall include a stub out at this location and installation of conduit only for future power requirements. Another conduit shall be provided for data from this location to MDF room and shall be identified accordingly.

2. **Vehicular Directional**
   a. Provide signage and striping as necessary to provide rational and safe vehicle flow in parking and vehicular traffic area.

3. **Pedestrian Directional**
   a. Provide sufficient directional signs to accommodate way finding of joint-use facilities. Special signage may be required.

4. **Regulatory**
   a. Provide signage identifying ADA accessible routes, exits, stairwells, room occupancy, evacuation plan, Assistive Listening Device availability, and other code-required signage.

5. **Perimeter**
   a. Identify location of “WELCOME TO OUR SCHOOL SIGNS” on plans at the main entry and all vehicular and pedestrian entry points to the school. Signs are approximately 2’-0” by 3’-0” and are owner furnished/contractor installed.

6. **Room Numbering**
   a. Architect shall follow LAUSD room numbering guidelines to identify each room on the construction documents. See the following link: http://www.laschools.org/employee/design/fs-studies-and-reports/
b. Provide room number and room identification signs per LAUSD Specification Section 10400.

7. **Roof Address**
   
a. Provide school’s street address numbers in contrasting color roofing material on the roof of main administration building. See specification Section 07552 – “Roofing” for additional information.
2.3 VEHICULAR ACCESS AND PARKING

A. PARKING SPACE REQUIREMENTS

B. GENERAL PARKING GUIDELINES

C. VEHICULAR ACCESS AND PEDESTRIAN SAFETY

D. PARKING STRUCTURE SECURITY
2.3 VEHICULAR ACCESS AND PARKING

A. PARKING SPACE REQUIREMENTS

1. School sites vary greatly in terms of size and configuration. In order to accommodate staff and student parking the District uses a variety of site-specific parking solutions, including:
   a. Surface Parking
   b. Free Standing Structures
   c. Underground Structures
   d. Rooftop Parking
   e. Leased Parking on Adjacent Sites

2. Because of limited site space for recreational use, high-intensity parking solutions are encouraged

3. Provide parking spaces based on the following ratios to programmed classrooms.
   a. Elementary School 2.25 per Classroom
   b. Middle School Classroom 2.25 per Classroom
   c. High School Classroom 2.50 per Classroom

4. Provide Handicapped Accessible Parking in the following ratios:
   a. 1-25 Spaces 1 Accessible Space
   b. 26-50 Spaces 2 Accessible Spaces
   c. 51-75 Spaces 3 Accessible Spaces
   d. 76-100 Spaces 4 Accessible Spaces
   e. 101-150 Spaces 5 Accessible Spaces
   f. 151-200 Spaces 6 Accessible Spaces
   g. 201-300 Spaces 7 Accessible Spaces
   h. 301-400 Spaces 8 Accessible Spaces
   i. 401-500 Spaces 9 Accessible Spaces
   j. 501-1000 Spaces 2% of total
   k. 1001 or More 20 plus 1 for each 100 or fraction over 1001

5. Visitor parking: Allocate surface parking spaces for visitors adjacent to the Administration Unit.

6. Provide secure Bicycle Parking. Also see section 2.2."Site Design" - C.2.6
B. **General Parking Guidelines**

1. On small urban sites, seek creative parking solutions to maximize usable land for educational and recreational functions.

2. Parking layouts shall conform to good design practices. Los Angeles City requirements shall be used as minimum criteria. See Parking Standards drawings in the District’s “Typical Standard Drawings.”

3. Avoid placing student parking in remote areas where there is little supervision. In general, locate student parking near the classrooms.

4. Parent’s student drop-off and pick-up, bus loading areas, and parking areas shall be separated to allow students to enter and exit the school grounds safely.

5. Driveways shall not be located in a bus-loading area or a student drop-off or pick-up area.

6. Parking stalls shall not be located, or parking patterns so designed, so that a vehicle must back into a public street, a bus-loading area, or a student drop-off or pick-up area.

7. Avoid herringbone-pattern parking layouts and tandem parking. (Tandem parking may be used in special circumstances with District permission.) Requirements for accessible parking shall conform to Title 24.

   a. When one stall for handicap parking is provided the space shall be 14'-0" wide and striped to provide 9'-0" wide parking and 5'-0" wide loading.

   b. When more than one stall for handicap parking is provided, 2 parking spaces can be provided within a 24'-0" wide area lined to provide a 9'-0" wide parking space on each side and a 6'-0" wide loading area between.

   c. Minimum length of each parking stall shall be 18'-0".

8. Percentage of Compact Cars shall conform to Los Angeles City, Department of Building and Safety Requirements in parking areas or garages containing 10 or more spaces, up to 40% of the total required parking spaces and 100% of the non-required parking spaces may be compact. Compact-car stalls shall be clearly marked and appropriate signs installed at all entrances to parking areas.

9. Provide a wheel stop for each parking stall wherever stalls are head-on to fencing, wall, building, and planting area or other obstructions.

   a. Wheel stops shall be reinforced precast concrete, 6'-0" long.

   b. Locate wheel stops with a minimum setback of 3'-0" from fences, walls, and buildings.

   c. Straight-line arrangement of wheel stops is preferred.

10. Placement of speed bumps in parking areas is allowed only in long driveways where it is necessary to protect pedestrians crossing the aisles.

11. Secure surface parking areas with an 8'-0” high fence or wall.

12. Provide aesthetically pleasing perimeter walls, fencing and planting.
14. Provide lighting levels for surface parking areas that will create a secure environment for nighttime users of school facilities.

C. Vehicular Access and Pedestrian Safety

1. Ensure adequate and safe access for students, staff and visitors, walking, entering and circulating on the campus. Vehicle traffic patterns shall not interfere with major pedestrian traffic patterns. Foot traffic shall not pass through entrance driveways. Crosswalks must be clearly marked.

2. In general, orient the primary site and building entrance toward the street with the least traffic volume and activity.

3. To optimize the traffic flow to and from the school site and to minimize traffic hazards to pedestrians, meet with representatives of the Los Angeles Department of Transportation (or other local traffic authority) early in the design process to review the schematic site design.

4. Provide safe and clearly indicated student drop-off and pick-up provisions by car or bus.
   a. For new schools, provide on-site drive lanes or curb inset lanes for parent and bus drop-off and pick-up wherever space permits. Comply with ADA requirements for curb drop-off and site access as well as LAUSD’s Office of Environmental Health and Safety’s (OEHS) “Traffic and Pedestrian Safety Requirements for New School” requirements.
   b. Provide the parent’s student drop-off area adjacent to the main entry gate.
   c. Locate the main gate in the farthest forward position along the curb to maximize curb space for stacking vehicles and to allow visual supervision of the greatest number of vehicles.
   d. Provide adequate curb length for expected drop-off and pick-up traffic, with a minimum of 160 feet for Elementary Schools and 200 feet for Secondary Schools. Use curb cuts and inset drop-off lanes when site space permits.
   e. Separate parent’s student drop-off and bus loading areas to minimize traffic conflicts and to allow more effective supervision of waiting areas.
   f. Locate bus drop-off space at a separate secondary entry or from a perpendicular street wherever possible. Provide adequate safe waiting space for students.
   g. Provide adequate curb length for expected bus parking for drop-off and pick-up, with a minimum of 100 feet for Elementary Schools and 200 feet for Secondary Schools.
   h. Locate bus drop-off areas for special education students in the same area as regular education students to provide equal access and the least restrictive environment.
   i. Provide curb cuts for accessibility at both bus and automobile loading zones.
j. Provide appropriate “Passenger Loading” signs at all passenger loading zones.

5. Delivery and Utility Areas
   a. Provide vehicular access that does not jeopardize staff and student safety. Separate access from bus and parent loading areas and parking areas.
   b. Delivery and utility vehicles shall have direct access from the street without crossing playgrounds or fields.
   c. Isolate trash pick-up from student activities.
   d. Design the trash pick-up area for maneuverability to accommodate 2 axle - 35 foot trash truck. See Standard Technical Drawings for minimum requirements.
   e. Delivery trucks are approximately 50 feet and need approximately 60 feet of turn radius. Design the Service Area to accommodate turn around, backing and forward movement of truck.

D. Parking Structure Security
   a. Provide automatic Overhead Coiling Shutters for all parking structure entrances to prevent any unauthorized access once gates have been closed. Provide Separate Entrance and Exit Shutters with minimum 3'-0” space in between. Minimum width for each gate shall be 11'-0”.
   b. Provide gates that shut immediately following the entrance of each car or pedestrian.
   c. Entrance gate into parking structures shall be activated by Proxy Card Reader pads. Connect entry to Administration Clerical Offices, Adult School Office, and/or security personnel by 2-way speaking/listening device (see Section 3.8 “Electrical Communications and AV Systems”).
   d. Locate gate enclosure, motor, safety edge cords, and electrical power supply lines inside the secure garage structure and so that they are protected from access or vandalism.
   e. Provide bollards to protect garage ventilation ducts, as well as other features, such as doors, gates, card readers, elevator lobby, etc.
   f. Protect garage electrical and mechanical rooms by raising 6 inches above garage floor.
   g. Parking structures, whenever possible shall be designed to allow maximum degree of visual surveillance from outside the structure.
   h. Parking structure design shall avoid creating dark corners or other spaces where assailants may conceal their presence.
   i. Provide closed circuit television cameras encased for protection against vandalism, to link parking areas to a monitor in the Administration Clerical Office and in Adult School Office (see Section 3.8 “Electrical Communications and AV Systems”).
   j. Provide microphones throughout the structure linked to the Administration Clerical Office to monitor noises in the parking areas.
k. Provide lighting levels to create a safe environment for users at all times. Photoelectric devices shall control lighting.

l. Provide adequate night lighting throughout the site, especially to and from parking areas.
2.4 ENVIRONMENT AND SUSTAINABILITY

A. GENERAL

B. NEW CONSTRUCTION

C. EXISTING FACILITIES
2.4 ENVIRONMENT AND SUSTAINABILITY

A. GENERAL

1. LAUSD is committed to sustainable or “high performance” design in all of its schools. A well-designed high performance school enhances student and teacher performance, reduces operating costs, and protects the environment. The LAUSD Board of Education recognized these advantages in its October 2003 High Performance Schools Resolution. The Resolution directs staff to “continue its effort to ensure that every District new school and modernization project, from the beginning of the design process, incorporate high performance school criteria to the extent feasible.”


3. High performance schools have the following characteristics:

   a. **Optimal Lighting & Daylighting:** Research has repeatedly shown that students learn 20 to 30% faster in classrooms that take full advantage of daylight and optimum electric lighting. Daylight and electric light should be integrated and glare eliminated. Lighting should be "designed," not simply specified.

   b. **Healthy Indoor Environment:** A healthy indoor environment is essential. According to the Environmental Protection Agency, indoor air is frequently up to five times more polluted than outside air. Children are particularly susceptible to indoor pollutants. The key factors are proper ventilation using outside and filtered air and low-emitting materials such as flooring, ceiling tiles and paint.

   c. **Comfort:** Classroom comfort includes thermal, visual, and acoustic comfort. Thermal comfort ensures that students and staff are neither hot nor cold. Visual comfort means lighting that makes visual tasks easier and visual stimulation and a connection to the out-of-doors through the use of eye level windows. Acoustic comfort means teachers and students can hear one another because ventilation system and outdoor and indoor noise are minimized.

   d. **Energy Efficiency:** Energy efficiency saves money while conserving nonrenewable resources and reducing pollution. Space conditioning systems should use high efficiency equipment, be "right sized" for the estimated demand, and include controls that boost system performance. Lighting systems should use high efficiency lamps and ballasts, optimize the number of light fixtures, incorporate controls that ensure peak system performance, and successfully integrate electric lighting and daylighting. Building shells must integrate and optimize insulation, glazing, shading, thermal mass, air leakage, and light-colored exterior surfaces.
e. **Water Efficiency:** Reducing indoor and landscaping water use minimizes the use of this scarce resource and saves money. Indoor strategies include water efficient toilets, faucets, showerheads and appliances. Landscaping strategies include drought tolerant plants and water efficient irrigation systems.

f. **Storm Water Management:** Minimizing and cleaning stormwater runoff can further reduce water demand and help clean the Pacific Ocean.

g. **Environmental Materials:** Schools should incorporate materials and products that are durable, nontoxic, grown sustainably, have a high-recycled content, and can easily be recycled. Properly specified materials that can meet these goals include flooring (linoleum, carpet), ceiling tiles, insulation and concrete containing fly ash.

h. **Waste Management:** Schools should be designed with appropriate spaces for the storage and collection of recyclables. Construction and demolition waste should be recycled to the maximum extent feasible.

i. **Easy to Maintain & Operate:** Schools should be easy to use and maintain. Surfaces and equipment should be durable. Teachers should have control over classroom temperature and lighting, and, along with Maintenance and Operations staff, be trained in their effective use.

j. **Commissioned:** Commissioning helps ensure that schools operate as designed. Commissioning tests, verifies, and fine-tunes key building system performance so that it reaches the highest levels of efficiency.

k. **Schools That Teach:** Permanent educational displays that describe the school’s high performance features further enhance learning. Schools can be tools that illustrate a wide spectrum of scientific, mathematic, and social issues. For example, mechanical and lighting systems can illustrate energy use and conservation, and daylighting systems can help students understand the sun’s daily and yearly movements.

l. **Community Resource:** The most successful schools have a high level of parent and community involvement. Involvement can be enhanced by designs that facilitate the school’s use for neighborhood meetings and other community needs.

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**B. NEW CONSTRUCTION (NEW SCHOOLS AND NEW BUILDINGS ON EXISTING CAMPUSES)**

1. **High Performance School (CHPS) Requirement**

   a. All new schools and new occupiable and conditioned buildings on existing campuses shall, at a minimum qualify as a CHPS project as defined in the version of CHPS “Best Practices Manual Volume III, Criteria”, applicable at the time the project is submitted to the Division of State Architect (DSA). (CHPS Volume III is available at [www.chps.net](http://www.chps.net))
b. The District seeks to meet as many CHPS criteria as economically feasible. Defining characteristics are listed in Section A.3, above. Some are referenced in this “School Design Guide” as specific LAUSD requirements for new schools. Others are included in the CHPS Best Practices Manual, “Volume II, Design” and “Volume III, Criteria.”

c. To achieve these goals, the District advocates an integrated "whole building" design approach to maximize the interactive affects of good practice and the District’s criteria and requirements. Key systems and technologies must be considered together from the beginning of the design process, at preliminary schematic design and optimized for long-term performance.

d. Architects shall submit a CHPS Scorecard (see Appendix “A.1”) at the following milestones:

1. **Schematic Design:** Forecast of CHPS points anticipated to be achievable supported by project Basis of Design and preliminary plans.

2. **Design Development:** Detailed account of CHPS points achieved in the school design with supporting references to specific narratives, plans, specifications and cut sheets in the submittal.

3. **Construction Drawings (50%):** Detailed account of CHPS points to be achieved in the school design with supporting references to specific narratives, plans, specifications and cut sheets in the submittal.

4. **Final Design (100% Construction Drawings):** Final accounting of CHPS points achieved with the signature of the registered project architect.

5. **Construction Completion:** Final accounting of CHPS points achieved with the signature of the registered project architect.

2. **CHPS Specifics**

1. CHPS Best Practices Manual “Volume III, Criteria” defines many prerequisites and optional credits that address a wide range of high performance design opportunities. The following topics address key areas of priority to the District.

a. **Lighting and Daylighting**

1. Electric lighting standards and control requirements are described in the Electrical Power and Lighting section of this “School Design Guide.”

2. Adequate daylighting, integrated with electric lighting and controls, is required in all classrooms.

3. Lighting and daylighting shall be designed and calculated in accordance with the criteria and examples included in the Southern California Edison “Classroom Lighting Guidelines.” For daylighting, this approach requires computer analysis — utilizing a CHPS-approved methodology (see CHPS “Volume III, Criteria, IEQ Credit Daylighting”).
b. Energy Performance

1. By integrating the design of all building components to increase energy efficiency, the source energy requirement of each proposed new school shall be a minimum of 15% better than required by the California Energy Efficiency Standards (Title 24) in force at the time the project is submitted to DSA, unless compelling justification is provided to the District for a lower efficiency. Under no circumstances shall any new school perform less than 10% better than Title 24.

c. Acoustics

1. Analyze the acoustical environment of the site (such as traffic) and the characteristics of planned building components (such as HVAC), and design to minimally achieve a classroom acoustical performance of 45 dBA background noise level (unoccupied with HVAC system on) or better (see CHPS “Volume III, Criteria,” IEQ Prerequisite Minimal Acoustical Performance and Credit Improved Acoustical Performance).

2. While the desired performance target of 35 dBA may not be practicably achievable, the Architect shall explore innovative design options for obtaining its speech cognition goal with wall and ceiling reflective surfaces, strategically placed absorptive surfaces, and voice reinforcement systems.

3. For additional criteria, refer to the District’s “Acoustical Requirements” (in Appendix “A.3”).

d. Indoor Air Quality

1. Appropriate design strategies shall be utilized to ensure healthy indoor air quality (see CHPS “Volume III, Criteria,” IEQ Prerequisite Indoor Air Quality Minimum Requirements). The issues that shall be addressed include minimum outside air ventilation, HVAC design and air filtration, and moisture control.

2. During construction, steps must be taken to provide CHPS-mandated temporary construction ventilation; dust protection; product preconditioning; sequencing; vacuuming and duct cleaning; building flush-out; and post-occupancy ventilation (see CHPS “Volume III, Criteria,” IEQ Prerequisite Indoor Air Quality Minimum Requirements).

e. Commissioning

1. The District will provide CHPS-compliant commissioning services for all new school building construction (see CHPS “Volume III, Criteria, Energy Prerequisite Fundamental Building Systems Testing and Training and Credit Enhanced Commissioning”). The Architect shall assist the District-appointed Commissioning Agent as required, and incorporate in the Contract Documents the necessary provisions specifying the General Contractor commissioning-related tasks, including Division 1 to 16 Specification Section(s), Commissioning...
Plants, and other documents. Contact the District representative for further information.

2. The required “Basis for Design” must be complete with all design parameters, assumptions and criteria (not simply a reference to LAUSD design guidelines) so its intent is fully available to the Commissioning Authority.

f. Water Efficiency

1. To the maximum extent feasible, incorporate landscaping and interior water efficiency strategies as listed in Section A3e, above. Develop a water use budget for exterior and ornamental water use as specified in design Guide Section 3.9.D.1 Planting and Irrigation, Irrigation Design Requirements (see CHPS “Volume III, Criteria,” Water Prerequisite Create Water Use Budget).

g. Storm Water Management


h. Construction Waste Management

1. Establish a minimum non-hazardous construction and demolition debris recycling requirement of 75% by weight as defined in Specification 01340, Construction & Demolition Waste Management (see also CHPS “Volume III, Criteria,” Materials Prerequisite Construction Site Waste Management).

i. Materials


j. Educational Displays

1. Provide at least one permanent education display on the school site that describes the high performance features that are part of the school’s design (see CHPS “Volume III, Criteria, Prerequisite Educational Display”).

k. High-Performance Schools

1. For specific schools or buildings, the District may elect to increase the utilization of CHPS “Best Practices” – especially those in “Volume III, Criteria” – to improve “green” performance and obtain incentive funding.

3. Incentive Programs

1. As directed, the Architect shall submit each project to the applicable high performance related incentive programs. Savings by Design,
LADWP Energy Program, State Energy grant and High Performance School grant, etc. may be available.

C. EXISTING FACILITIES (MODERNIZATION PROJECTS)

1. Overview

2. Specifics
   a. Lighting and Daylighting
      1. When designing classroom lighting and daylighting systems, seek opportunities to incorporate the criteria and examples included in the Southern California Edison “Classroom Lighting Guidelines.”
   b. Energy Performance
      1. To the maximum extent feasible, all relevant projects shall incorporate energy efficiency measures. Whenever the building envelope (roofs, walls), space conditioning or water heating system is upgraded, opportunities for improving energy efficiency shall be identified and implemented.
   c. Acoustics
      1. Incorporate strategies to maximize classroom acoustics in all projects that impact classroom acoustics, such as space conditioning systems, exterior and interior walls, and floor, ceiling and wall finishes.
   d. Water Efficiency
      To the maximum extent feasible, incorporate interior and landscaping water efficiency strategies as identified in Section A.3e, above.
   e. Storm Water Management
f. **Construction Waste Management**

1. Establish a minimum non-hazardous construction and demolition debris recycling requirements of 75% by weight as defined in Specification 01340, Construction & Demolition Waste Management (see also CHPS “Volume III, Criteria, Materials Prerequisite


g. **Materials**


3. **Incentive Programs**

As directed, the Architect shall submit each project to the applicable high performance related incentive programs. Savings by Design, LADWP Energy Program, State Energy grant and High Performance School grant, etc. may be available.
Book Three
Technical Criteria
Technical Criteria

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3.1 ARCHITECTURAL

A. GENERAL REQUIREMENTS

B. MATERIALS AND FINISHES

C. MODERNIZATION AND ALTERATIONS

D. HISTORIC PRESERVATION
3.1 ARCHITECTURAL

A. GENERAL REQUIREMENTS

1. Architectural Discipline

There is some overlap of requirements in this section and the sections of Book Two of the “School Design Guide.” The architectural personnel must review all sections for all disciplines and coordinate the requirements. If discrepancies are found, bring them to the attention of the District’s authorized representative for resolution.

Refer to the District “Guide Specifications” for materials and installations approved by the District. Unless approved in writing by the District, project specifications shall utilize the District “Guide Specifications” provided and approved by the District to specify materials, equipment and installations. The District “Guide Specifications” shall be edited to reflect the conditions and requirements of each specific project. Variances from the District “Guide Specifications” must be approved by the District in writing.

a. Specify at least three manufacturers. Where the “Guide Specifications” identify less than three manufacturers, identify additional manufacturers’ products to provide a minimum of three manufacturers for each item. Inform the District’s authorized representative of any such additions and of any difficulties in identifying equivalent products.

b. Where optional material or equipment choices are presented in the “Guide Specifications,” select the items to be used in the project and edit the specification sections appropriately.

c. If requirements in this “School Design Guide” do not match those in the “Guide Specifications,” edit the “Guide Specifications” to conform to the requirements of the “School Design Guide.”

d. The final Project Specifications and Drawings that are submitted shall be specific and dimensions quantitative. Use of generalities or ambiguous descriptions, directions or dimensions, e.g., “as required”, “per manufactures recommendations”, “install to meet all codes” and “squish to fit”, is not acceptable.

2. Other Design Disciplines

a. There are requirements in this section that affect the requirements for the other design disciplines. Because the architectural discipline is responsible for the compliance and coordination of all work, the architectural personnel must assure the full communication of design conditions and requirements to the other disciplines and be certain the
other disciplines are in compliance. (Examples include requirements for insulation, monolithic single glazing, and room-surface reflectances.) In return, the architectural personnel must be familiar with the requirements for the other disciplines to be certain their needs are incorporated into the design. (Examples include amply sized relief air openings at each classroom, fire-protection measures where ducts or raceways penetrate fire-resistive walls, protective enclosures for exposed valve assemblies or control devices, and location of large noise-generating equipment remotely from classrooms.)

3. **Seismic Bracing and Anchorage**
   a. Assure provision of seismic restraints, anchorage or bracing, for all casework, display cases, equipment, signage, or special finish materials (e.g., suspended ceilings), including Owner Furnished items, in accordance with requirements of the California Building Code.

B. **MATERIALS AND FINISHES**

1. **General**
   a. Materials shall be sustainable, affordable, durable, aesthetically pleasing, and require minimal cleaning and maintenance.
   b. Avoid complicated special details.
   c. Use standard systems and materials in standard sizes produced and readily available from manufacturers based in the United States.
   d. Use vandal-resistant and graffiti-resistant materials and finishes.
   e. Provide heavy or permanent (fixed) trash receptacles.
   f. Provide non-slip surfaces for all exterior paths of travel and for interior floor areas specifically subject to wetting.
   g. Treat exposed and visibly prominent building features (such as grilles, pipes, ducts, or similar elements) and accessible to vandalism to blend with the building exterior to avoid creating an attractive target.
   h. When more than one item of material or equipment are specified (as in “three or more manufacturers”), provide adequate facilities and coordination to assure that all spaces are sized to accommodate any item specified and that structural, mechanical and electrical elements will provide adequate support to any of the items.
   i. Avoid materials and details with sharp and jagged edges, especially near entrances and circulation pathways.
   j. Intumescent paint may not be used unless approved by the District. Do not use Intumescent paint where it is accessible or susceptible to vandalism. Vandalism such as scraping, graffiti, etc. can compromise integrity of Intumescent paint and become a maintenance problem.

2. **Site Elements**
   a. Provide one flagpole at each school – 35'-0” for one-story buildings, 50'-0” for two-story and above.
b. Show location and provide details for school signage. Keep signs above Students’ reach.

c. If flag pole is located in the landscaped area, a concrete pad around the pole and access to it shall be provided.

3. Concrete
a. Provide proper moisture barriers for slab on grade.
b. No exposed painted or stained concrete is allowed as floor finish in classroom and or kitchen area.
c. Provide adequate controls and expansion joints.

4. Metals
a. Typical handrails are constructed of 1-1/2 inch diameter metal pipe. Exterior handrails are to be unpainted galvanized steel pipe. Handrails may be powder coated provided they are designed in a manner that will not require field welding installation. Interior handrails may be powder coated steel. Handrails shall be designed in such a way as to deter skateboarders or students from sliding down them while maintaining ADA handrail requirements.
b. Use 12- to 14-gage galvanized steel or extruded aluminum for exterior louvers, 16-gage for interior.
c. Use galvanized chain link fencing and gates for all fencing except for main entries, or special public exposures where more decorative fencing would be appropriate (with District approval).
d. Do not use metal siding in areas where it might be vandalized by graffiti, damaged by impact, or subject to heat gain that could cause injury to students or staff.
e. Guardrails

1. The California Building Code requires guardrails at unenclosed floor and roof openings, open and glazed sides of stairways and ramps, balconies or porches, which are more than 30 inches above grade or floor below. Roofs used for other than service of the building shall be protected by a guardrail.

2. The Code states that the top of the guardrails shall not be less than 42 inches in height. However, the architect should determine the appropriate height necessary to provide security for the students particularly in high traffic areas such as stair landings that serve a large volume of students or where a turn in direction is required.

3. Roof areas, service areas or other buildings areas that would be accessible to students by climbing over a guardrail, must be protected by an appropriate barrier that will prevent students from accessing these areas.

4. Typical guardrails are constructed of 1-1/2 inch diameter galvanized metal pipe (as describe in the CBC). Flat top rails wider than 2 inches that might encourage sitting or placement of books or other objects should not be used. Guardrails that are placed on curbs must be designed so that the curb cannot be used as a step by students.
5. Guardrails must be designed to resist kicking and other abuse. Open guardrails shall have intermediate rails or an ornamental pattern such that a sphere 4 inches in diameter cannot pass through. Intermediate rails and ornamental patterns should be designed so that they do not provide a “ladder” for students to climb on. Vertical pickets spaced 4 inches on center, a metal mesh material that complies with the CBC, or a low wall should be installed.

f. All exterior exposed metals shall be galvanized.

5. Wood

a. Do not use wood trims, fascias, moldings, etc. except for Existing Facilities projects where it is unavoidable to match existing.

b. Specify grade and finish for all exposed wood to minimize maintenance where wood is being specified.

c. For additional information on finish carpentry and architectural woodwork, see, Guide Specifications.

6. Thermal & Moisture Protection

a. Slope roofs at a minimum of 1/2” per foot to roof drains. Clearly show drainage patterns and elevations on roof and discharge areas.

b. Use roofing material meeting UL requirements for Class "A" fire rating and FM 1-90 wind uplift rating.

c. The roof system shall meet the FM 1-90 wind uplifting rating.

d. Roof system shall meet the “Cool Roof” criteria, as outlined in the California Energy Code Section 118.

e. Avoid the use of pitch pans for roof penetration flashing. All roof types have specific details for all types of roof penetrations. Consult with manufacturer for specific details.

f. All roof penetrations including, but not limited to; equipment platforms plumbing vents and base flashings are to be a minimum of 8” above the finished roof level.

g. It is recommended that a Weather Resistant Barrier of polyethylene or polypropylene (such as, Typar or Tyvek), be used instead of building paper. This is to provide greater assurance of resisting moisture intrusion, and to remove a nutrition source for mold. Provide details and installation instructions per manufacture’s recommendations. When plywood is used for exterior sheathing, comply with the code requirements by providing two layers of appropriate materials.

h. At concrete floor slabs on grade that support interior finish materials, provide, as a minimum quality standard, a vapor barrier of 10-mil-thick HDPE with taped or sealed joints, in a sandwich of 2 inches of sand top and bottom, over 4” of select gravel drainage fill.

i. Do not use interior downspouts and gutters without District authorization.

j. Do not project downspouts into pedestrian areas.
k. Direct downspouts into planting areas or other site elements that will reduce or slow storm-water runoff from the site. Special attention shall be given to planter details to divert the water away from the building and the building's foundation.

l. On structures with sloped roofs, provide gutters, downspouts and other associated accessories as required to facilitate efficient water runoff and ensure adequate drainage.

m. Avoid running conduit and piping on the roof. Where it is unavoidable, the length shall be minimized and shall be detailed appropriately to accommodate roof replacement.

7. Doors and Entryways

a. Door swings shall not overlap, conflict or otherwise interfere with use of adjacent doors or other areas requiring access.

b. Exterior doors shall be out-swinging and protected by a covered walk or canopy with appropriate roof drainage.

c. All exterior entrances shall be designed to allow safe access during stormy weather (rain, hail, ice, etc.) by providing a non-slip, code-compliant, sloped-for-drainage walking surface.

d. Exterior balcony entryways:
   1. Provide security at entries to balconies to prevent unauthorized access when school is closed.
   2. Provide slopes and drainage means for washing down of balconies.

e. At all major or frequently used entries, including doorways directly from the outdoors to any habitable school room, provide permanent walk-off mats to reduce the amount of dirt, dust, pollen and other particles entering the building.

f. Configure major entry approaches to channel foot traffic away from dirt and grass areas for at least the last fifteen to twenty feet prior to entering the building.

g. Do not provide glazed openings in exterior doors, unless glass light is adequately protected with a security screen.

h. Provide concrete slab or equivalent surfacing outside of all exterior doors, of width sufficient to take doorstop when door is opened 180 degrees against building wall.

i. Door frames and cased openings shall be hollow metal.

j. Use solid-core wood doors at interior and overhead-protected exterior openings, except where fire-ratings require hollow-metal doors. Do not use hollow-metal doors for classroom doors in one-hour fire-rated walls.

k. Use insulated hollow-metal steel doors at unprotected or minimally protected exterior openings, and where fire-protection rating requires them.

l. Use paint-grade doors, except in areas of low abuse with special design conditions (administration areas, for example) where stain-grade may be used.
m. Double doors at building exteriors shall have a removable center jamb for more secure engagement of the locking mechanism.

n. Interior double doors should not have a removable center jamb.

o. Doors with panic hardware shall be 3'-4" minimum width to meet handicapped accessibility “clear width” requirements.

p. Panic hardware on wood doors shall be surface mounted with no bottom rod.

q. Plan doors to avoid interference with drinking fountains, downspouts, light fixtures, walk ramps, and other components or equipment.

r. Do not locate exterior doors adjacent to windows or window areas that can be broken to provide access to door hardware.

s. Provide bug sweeps on doors to food preparation areas.

t. Do not use electric door openers for ADA accessibility without prior District approval in writing.

u. The District “Guide Specification” for finish hardware is extremely comprehensive and must be edited carefully by an experienced hardware specifier for each project. Contact the District authorized representative to obtain the manufacturer of the lockset cylinder that will be furnished by the District for each project.

v. For parking structure doors see Section 2.3 - D “Parking Structure Security”.

8. Windows and Openings

a. Windows shall be aluminum or steel.

b. Use of Hollow-Metal (HM) windows is not recommended due to districts experience with HM window leaks. If HM windows are used, care must be taken in detailing to prevent any water penetration.

c. Windows preferably shall be double-hung, single-hung, or projection type.

d. Projection windows shall not intrude into circulation areas to cause a hazard.

e. Provide a minimum of one operable 30”-wide window in each classroom that can be used both for emergency ventilation and for emergency egress. This window shall have a minimum clearance opening of 6 square feet. Maximum sill height for egress window shall be 44 inches.

f. Provide roof-top anchors to support window-washing equipment for washing of windows above the second floor, unless it can be demonstrated that windows can be safely washed from inside or via an extension ladder. They must be provided for buildings higher than four stories or 48 feet above exterior grade (Title 8, General Industrial Safety Orders, Exception 2).

g. In all schools, the minimum window sill height shall be 3'-0” above floor for classrooms located above first floor.

h. Do not use large glazed openings.
i. Security: All windows accessible from the exterior shall have special security measures to prevent building access by breaking glass and entering through the window or by reaching door or window hardware. Accessible windows include any windows with bottom sills less than ten feet above grade, balconies, roofs with any portion lower than ten feet, or other access points.

1. Provide closely spaced mullions or provide protective custom bars or grills that are integrated compatibly with the building design. Mullions are to be not more than 5 inches apart when used for security measures.

2. Window and grill must be openable at one operable window for emergency egress.

3. Operable windows with latching mechanism shall be protected to prevent vandalism and entering.

4. Avoid use of storefront type window systems where they are susceptible to vandalism.

j. Do not locate windows or sidelights within reach of door hardware.

k. Glazing: To optimize both daylighting and energy conservation, use monolithic ¼ -inch glass with a Visible Light Transmittance (VLT) of approximately 65% and a Solar Heat Gain Coefficient (SHGC) of approximately 0.50. (These glasses typically have a blue-green tint.) Other glazing combinations may be considered by the District if they can be justified with life-cycle cost and energy savings.

l. Do not use insulating glass (dual- or triple-glazed) without life-cycle-cost and energy-saving justification and District approval. The maintenance cost for replacement is excessive. Do not use insulating glass for noise reduction – it is not effective.

m. If justified by acoustic considerations, laminated glass may be used. Do not use thermal insulating dual glazing for noise abatement – it doesn’t work. Special acoustical glazing may be used where needed and must be designed by an Acoustical Consultant.

n. For daylight factor required in classrooms see Section 2.4, “Environment and Sustainability” of this guide. To achieve specified daylight factor, it may require both high windows and interior and/or exterior light shelves (to reflect daylight onto the ceiling and to block direct sunlight on desktops). Exterior light shelves must be designed to prevent bird roosting.

o. Stops shall be removable only from interior using vandal proof screws. Exterior stops shall be integral with frame.

p. Screens shall be mounted to the inside of windows.

q. Insect screens must be installed on all operable windows in food preparation areas.

r. For light control, provide room-darkening venetian blinds on all classroom windows, multi-purpose, library and other spaces with windows to be used for video presentations. Provide motor operated blinds for high windows and clerestory windows.
s. For most classroom HVAC systems, a large, louvered air-relief opening must be provided in the exterior wall of each classroom (and sometimes a smaller outside air intake opening). These openings must be recognized, and incorporated into the design of the façade. (Ducting classroom air relief to exhaust fans is not acceptable, both for energy efficiency and acoustical reasons.)

9. Acoustical Ceilings

a. Sound absorption provided by ceilings is the major provider of reverberation control in classrooms and other spaces. In addition, ceilings provide a major part of the illumination in classrooms and other spaces with indirect lighting. These factors influenced the selection of the following criteria, and must be recognized in the design of instructional spaces.

b. In most classrooms, 90% to 100% of the area has a suspended acoustical ceiling. The ceiling tiles in classroom ceilings shall have the following characteristics:
   1. Noise Reduction Coefficient (NRC): 0.70
   2. Light Reflectance: 0.85

c. In classrooms that do not have suspended acoustical ceilings, provide equivalent sound absorption by other means.

d. Suspended Ceiling Construction:
   1. Provide seismic bracing for all suspended ceiling grid components and lighting fixtures.
   2. Provide adequate clearance for all beams, piping, cable trays, ducts, and fixtures located above suspended ceilings.
   3. Provide adequate clearance for maintenance and repair of utility system components and support elements located above suspended ceilings.
   4. Ceiling tiles that provide access to serviceable equipment shall be appropriately marked with a tab or other indicator.
   5. All wiring above ceilings must be in raceways, except that low-voltage wiring may be supported by hangers in an organized manner – not on the ceiling grid.

10. Finishes

a. Exterior stucco or similar finishes that are accessible from grade or are otherwise graffiti-susceptible shall be painted to match integrally colored stucco and separated by control joints so that each area does not exceed 144 s.f., per Plaster Institute’s recommendation. Also, so that each area can be easily repainted to cover graffiti and that slight differences in paint color will not look patched. Plaster finish shall not be heavily textured. Light to medium dash or fine sand float are preferred. Very smooth, steel troweled finish is not permitted.

b. The basic flooring material shall be vinyl composition tile (VCT).

c. Provide carpet appropriately only at administration and kindergarten areas.
d. Provide ceramic tile floors and wainscots at major restrooms. Ceramic tiles shall be extended up to the ceiling in Middle School and High School boys and girls restrooms. In Elementary Schools the wainscot shall be extended to the top of partitions.

e. Provide quarry tile floors and base throughout food service areas, except toilets which will receive ceramic tile.

f. In corridors finished with drywall, provide abuse and impact resistant gypsum board.

g. For ceilings over 10'-0" in height, lay-in acoustical panels shall be limited in size to 4 square feet.

h. Provide clips for acoustical ceiling panels. Do not use acoustical tile in toilets and stairways.

i. For VCT flooring in instructional areas and corridors, use medium color and tone (light colors are difficult to maintain).

j. To comply with the District’s lighting standards, provide reflectance values of 85% for ceilings, 60% for walls, and 20% for floors.

k. Provide gypsum panel sheathing substrate for installation of exterior Portland Cement Plaster, except where plywood sheathing is being used for structural reason.

l. Provide 4'-0” high ceramic tile wainscot on walls adjacent to the sink in the hopper room.

m. Ceramic floor tiles shall be set on mortar bed. Ceramic tiles in restroom walls may be installed on cementicious backer board, however, in wet areas (such as showers) the ceramic tile walls shall be installed on mortar bed.

n. Shower Rooms – Walls shall be ceramic tile over full grout bed. Ceiling shall be ceramic tile or cement plaster with smooth finish.

o. Locker Rooms – Walls shall be CMU, cement plaster, ceramic tile or high impact / abuse resistant gypsum board. High impact / abuse resistant gypsum board only needs to be in exposed areas and not behind lockers.

p. Locker Rooms - Floor shall be concrete with non-slip, non abrasive finish with sealer coat.

11. Colors

a. Because the classroom becomes a background for the display of students' work, color schemes should be simple and minimal.

b. In general, limit the number of interior paint colors to six for smaller schools. In individual classrooms, limit the number of different paint colors to two, and the number of different classroom color schemes to two or three.

c. When using bold colors, limit them to trim or accent features.

d. In selecting colors of factory-finished items, such as folding partitions, use reasonably neutral colors to allow flexibility for future color-scheme changes.
e. Ceilings, in general, shall be white, and especially in classrooms, restrooms, and similar rooms.

12. Specialties
   a. Casework shall conform to the Woodwork Institute standards.
   b. In display cases, avoid large glass sizes at hazardous locations, or glass below 3'-0". Display case doors shall be laminated glass without frames and provided with locks. Provide illumination of display cases.
   c. Ensure that mirror heights are proper height for various areas and grade levels.
   d. Provide a large directory board with map at or near main entry. Show layout of buildings, offices and special facilities in order to orient school visitors.
   e. At all building entries provide walk-off mats as Indoor Air Quality (IAQ) measure to reduce source pollution.
   f. Provide full height corner guards to protect corner edges of interior corridors, stairways and high abuse areas. Corner guards shall meet flame spread requirements.

13. Special Construction
   a. Gates that require panic hardware shall be at least 7'-0" in height and shall have coverings to prevent easy access to panic device from locked side of gate.
   b. Roof access shall be provided from interior spaces, not by exterior ladders.

14. Conveying Systems
   a. Elevators shall comply with Access Compliance requirements usually adjacent to all required stairways.
   b. Except as required for the elevator itself, no electrical, plumbing, or mechanical items shall be housed in elevator shaft, pit, or machine room.
   c. Design pit to prevent water from entering through walls or floor.
   d. In pits over 36" in depth, a permanently installed galvanized steel ladder is required.

C. MODERNIZATIONS AND ALTERATIONS

1. General:
   a. In all work at existing facilities, it is critical to visit the Site and to assess existing conditions. Field verify accuracy of any Record Documents or As-Built Documents, to the extent possible, prior to commencing the work.
   b. Existing wood door frames may remain in corridors with automatic fire sprinkler systems. If fire sprinklers are not used, replace wood frames with hollow metal frames designed so that rough opening does not
have to be reframed. Door opening may have to be widened to meet ADA requirements.

2. **One Hour Corridor Requirements:**
   a. In major alteration projects to existing schools, exit corridors must be brought into compliance with current code requirements for one-hour construction.
   b. Existing wood door frames may remain in corridors with automatic fire sprinkler systems. If fire sprinklers are not used, replace wood frames with hollow metal frames designed so that rough opening does not have to be reframed.

3. **Exit Stairs**
   a. Interior stairways serving three or more floors shall be enclosed in one-hour fire rated construction.
   b. Existing open exterior stairs shall be reviewed with DSA to develop acceptable methods of compliance.
   c. Fire sprinkler systems for the entire building may be an acceptable substitute for stair enclosure.

4. **New Suspended Ceilings**
   a. Where new suspended ceilings are provided in existing corridors or classrooms, the method of installation must be clearly detailed and acceptable to DSA.
   b. If the existing ceiling is part of one-hour fire resistive construction, penetrations or partial removal must maintain one-hour construction.
   c. Verify that existing construction will support new ceiling and lighting fixtures.
   d. Provide structural support for all new ducts, piping and air conditioning equipment.

5. **Coring or Saw-Cutting Existing Concrete and Masonry**
   Responsible structural engineer shall approve locations of core holes or saw-cut openings in walls or floors of existing concrete or masonry structures for alteration work, air conditioning ducts, fire sprinkler piping, or other work.

6. **Air Conditioning Units Above New Ceilings**
   a. Where air conditioning units are concealed above new ceilings, provide service access.
   b. Coordinate size, location and type of access panel with location and requirements of air conditioning unit specified.
   c. Access for filter replacement or other frequent service, should be hinged panels or lay-in material less subject to damage than acoustical ceiling panels, such as perforated metal panels. (Occasional access may be through acoustical lay-in panels in a suspended T-bar grid ceiling.)
D. Historic Preservation

a. Retain and preserve the historic character of a building, structure or site.

b. Distinctive architectural features or examples of skilled craftsmanship that characterize a building shall be treated with sensitivity.

c. Reinforcement required for structural stability or the installation of life safety or mechanical systems shall be concealed.

d. Surface cleaning of historic structures shall be undertaken with the gentlest means possible. Avoid sandblasting and chemical treatments.
3.2 CIVIL ENGINEERING

A. GENERAL REQUIREMENTS

B. DEMOLITION

C. GRADING

D. PAVING

E. STORM AND SANITARY DRAINAGE

F. WATER DISTRIBUTION

G. FENCING, WALLS AND GATES

H. OFF-SITE CHECKLIST
CIVIL ENGINEERING

A. GENERAL REQUIREMENTS

1. The civil-engineering site design and documents must realistically implement the provisions of the overall site design, integrating the requirements of buildings, walls and fences; grading and paving; storm-water management; utilities (including gas, electrical and communication network distribution locations); earth and soil requirements (including compaction, modification, topsoil, and mitigation of hazardous ground conditions); as well as all offsite work related to the project, including streets, driveways, walks, utilities connections, and other off-site development.

2. All such work shall be clearly delineated, located and dimensioned (horizontally and vertically) to the appropriate site reference, as part of the work of this discipline, and all utilities points-of-connection (POC) clearly shown and located.


4. The District will provide the Architect-Engineer with a current site boundary and topographic survey, with encroachments, and including adjoining streets and properties and on-site and public utilities line locations, sizes and elevations. Other site plans or site information that may exist is available in the District office for consultants’ research. The Architect must visit the site to verify the indicated information and to obtain information not indicated on the drawings.

5. Off-site work or work within easements shall be designed in accordance with the requirements of the agency having jurisdiction. The work shall be shown as part of the construction documentation and shall include all project-related off-site improvements, such as curb cuts, turnout lanes, signage, utilities connections, and all other such work.


B. DEMOLITION

1. Demolition work must be documented as a separate contract item, with a separate and complete package of bidding and contract documents.
2. Coordinate any demolition or relocation of existing improvements, such as fences, walls, structures, etc., that are encroaching into the District property, with the District representative who will request the Real Estate Section to obtain necessary permits from adjacent property owners.

3. Provide temporary fencing to secure property boundaries wherever work might breach closure of adjacent property.

4. Investigate existing conditions to assure that full extent of demolition work is included, especially with regard to sub-surface conditions such as concrete paving overlain with asphalt, building basements, foundations of demolished buildings, and utilities lines. If existing data is insufficient, request pot-holing or other investigation from the District.

5. Clearly identify and define in the demolition documents all existing site features (structures, walls, fencing, walks, pavements, site utilities, plants, terrain, etc.) that are (1) to remain, with defined protection measures, and (2) to be removed, with the required disposition and responsibilities for removal and/or relocation.

C. GRADING

1. For ease in staking and construction, grade with uniform planes (not warped surfaces) and minimize grade changes.

2. Slope all areas for drainage. Slope walks, stairways, ramps, and other surfaces away from buildings.

3. Slope planes for drainage typically between 1% and 2% with 1.5% considered optimum.

4. Other slope standards are:
   a. Within building areas, 1.5% - 2.0%.
   b. Within play areas, 2% maximum, with 1% considered optimum.
   c. Entrance walks and ramps (along path of travel): 5% maximum (8.33% with handrail).
   d. Driveways: 15%, with vertical curves of 10 feet at top and 5 feet at bottom of ramp.
   e. Slope along sliding gate: 2% maximum, for chain link gates. Steel and wrought iron gates shall be set no more than 1/2% slope.
   f. Walks, porches, study terraces, etc.: Crossfall of 1% to 2% maximum.
   g. Door landings, paved lunch areas, and similar areas: ½% to 2% maximum. Shape planes to accommodate tables and benches.
   h. Agricultural Areas: 1/2 % minimum.
   i. Asphalt paving flow lines: 0.75%. If less, use concrete gutter flow line with minimum slope of 0.4% (do not use in striped play areas).

5. Slope play fields and play areas as follows (see also District standards for playfields):
   a. Turf or lawn areas: 1/2% minimum, 2% maximum, 3/4% optimum.
   b. Concrete tennis courts: 0.83% to 1% maximum, in one plane only, preferably from side to side.
c. Handball courts: 0.5% to 1% maximum, in one plane only (when necessary).

d. Infield of High School baseball and softball diamonds: 1/2% maximum. Baseball pitcher's mound: 10" above home plate. (Locate drainage structures to minimize hazards to players.)

e. Track and Field Areas: Maximum inclination for tracks, runways, circles, and landing areas for throwing events: not over 1:100 in a lateral direction and 1:1000 in the running or throwing direction. For high jump: not over 1:250 in the direction of the center of the crossbar. See IAAF Rules for other track dimensions and information.

6. Slope banks as follows:
   a. Planted banks 2H to 1V (50%) maximum.
   b. Paved and gunite banks 2 to 1 (50%) maximum with special exceptions permitted.
   c. Lawn areas 15% maximum.

7. Provide protective fencing and an 18-inch minimum shoulder at tops of banks sloping steeper than 10%.

D. PAVING

1. Provide paving, base and sub-base preparation as recommended by the Geotechnical Engineer. Refer to District “Technical Standard Drawings.”

2. Paving minimum standards include:
   a. Playgrounds (new construction): 2 inches asphaltic concrete over 4 inches select base course.
   b. Playgrounds (resurfacing): 2 inches asphaltic concrete over 3 inches select base.
   c. Service Roads: 4 inches asphaltic concrete over 4 inches select base.
   d. Parking Area: 3 inches asphaltic concrete over 4 inches select base.
   e. Trash Pick-up Area: 6 inches reinforced concrete over 4 inches select base.
   f. Sidewalks: 4 inches unreinforced concrete.
   g. Banks: 2 inches asphaltic concrete over compacted sub-grade.

3. Provide for the special paving requirements of bus-loading zones, truck loading and dock areas, trash pick-up areas, and fire lanes.

4. Pave parkways and narrow strips adjacent to sidewalks at property lines as concrete sidewalks.

5. Separate asphalt paving from planting or turf areas with a reinforced concrete mowing strip minimum 6" by 8.”

6. Provide driveway approaches in accordance with commercial driveway requirements of the local governing jurisdiction, with minimum width of 20 feet.

7. Provide integral curb and 2'-0" gutter on service roads within bus unloading area.
8. Provide paving of full width and turning area needed for all delivery trucks and trash pick-up vehicles. Also, check width of drive aprons providing access to these areas. Provide turn around area for vehicles, if required.

9. Provide 4-inch wide striping for parking stalls and other roadway markings. Mark fire lanes in accordance with the local Fire Marshal’s requirements. See District’s “Standard Technical Drawings” for parking layouts.

10. Provide ramps for sweepers and mowers to reach raised areas.

11. Lunch shelter area, arcade and all lowered walkways shall be concrete.

E. STORM AND SANITARY DRAINAGE

1. Design site for maximum retention of storm water run-off, within the general limits of other design guidelines and code requirements. Use surface drainage to the maximum extent reasonable. See District’s Post Construction Storm Water Management Plan (BMP Selection White Paper) and accompanying Check List for guidance. See “Section 3.4, Plumbing” of this School Design Guide for additional criteria.

2. Parking lots of 5,000 square feet or more, or with 25 or more parking spaces, and exposed to storm water runoff, shall be designed to meet the intent of the Standard Urban Storm Water Mitigation Plan (SUSMP) for Los Angeles County. SUSMP mitigation measures include infiltration of runoff before it reaches the storm drain system, treatment of runoff to remove oil and petroleum hydrocarbons before it enters the storm drain system, and control of peak flow discharge to provide stream channel protection. Plans for provision of these measures must be included in the Design Development phase, and details of the mitigation facilities included in the Construction Documents.

3. For sanitary sewers show fixture units at building and street points of connection. Size sewer lines per code prescriptions, or provide hydraulic calculations.

4. Surface Drainage:
   a. Direct sheet flow from paved areas onto planted areas.
   b. Direct roof downspouts into planting areas (via splash blocks) where feasible, onto paved surfaces only when the flow does not adversely affect pedestrian traffic.
   c. Locate flow lines to avoid concentrations on pedestrian walks.
   d. Locate flow lines to avoid sand boxes, tree wells, playground equipment and other objects that might obstruct drainage flow and cause ponding.
   e. Do not drain from planting areas across paved areas.
   f. Do not drain over public sidewalks. Avoid concentrated flow over driveways and pedestrian walkways.
   g. Do not drain over planted or unpaved banks.
   h. Do not drain through or over roofed areas, electric or communication vaults, walk-off mats, or other similar functional areas.
   i. Intercept off-site drainage to prevent it from flowing across site.
j. At interior courts or sump areas near buildings, provide for surface overflow from the court that is 3 inches or more below finished floor elevations to avoid flooding if catch basins are blocked.

5. Catch Basins, Floor Drains and Culverts:
   a. Select catch basin grate to withstand the load to which it will be subjected; otherwise use lightweight grates and frames. Grate openings: ½ inch maximum.
   b. Offset a catch basin from main storm drain line to minimize its size and depth, and to minimize blockage of system (i.e., no in-line “flow-thru” type catch basins).
   c. Use cast-in-place or precast concrete catch basins.
   d. Maximum depth of catch basin: 30 inches, unless specific project approval given in writing by the District.
   e. Use rectangular cast-iron or fiber-cement pipe culverts under walks in place of formed concrete structures. Provide minimum 4-inch thick concrete encasement, but with 2 ½ inch cover under walks. Calculate size for flow.
   f. Do not locate catch basins in the middle of play yards, pedestrian pathways, or close to playground equipment.
   g. Use trench drains only when required; for example, at parking structure entrances.
   h. In trash-disposal areas and open lunch areas, provide floor drain and sediment buckets to collect storm and wash-down water. Locate drain next to hose bibb and provide dual drainage, with a diverter valve to flush wash-down water to sanitary drain and storm water to storm drain. (See District “Standard Technical Drawing.”)
   i. In covered lunch shelters, provide floor drains with no trap primers.

6. Underground Drainage:
   a. Storm drain pipe shall be concrete (CP), reinforced concrete (RCP), ductile iron (DIP), cast iron (CIP), or high-density polyethylene (HDPEP).
   b. Design drainage structures and piping systems based on hydrologic and hydraulic calculations, with minimum flow velocity of 3 feet per second.
   c. Provide capped stub-outs for drains in new construction to accommodate future construction based on the Master Plan.
   d. With less than 1'-0" of cover over top of pipe, encase pipe in concrete or use iron pipe.
   e. With less than 1'-0" of cover over top of pipe in vehicular traffic areas and in asphalt paved areas, encase pipe in concrete, reinforced as necessary to support imposed loads.
   f. Food waste drainage from wash-down in lunch shelters must flow into sanitary sewer. Rainwater from roof covering lunch shelter must flow into storm drain system. Site drainage shall be designed such that, the flowing site drainage water does not run through the lunch shelter and the outdoor eating areas.
g. Drain trash enclosure through pipe to storm drain system and to sanitary sewer (using dual drainage valve system described above).

h. Install cleanouts at maximum spacing of 100 feet in straight runs and at each aggregate change of direction exceeding 135 degrees. A catch basin may substitute. Install cleanouts in yard boxes.

i. Where transition is made from round pipe to rectangular pipe, provide cleanout hand hole or manhole for maintenance purposes.

j. Depths of sanitary sewer lines below finished grade shall be not less than 12 inches and not less than 6 feet at property lines. (Use greater depth if service to future buildings should require it.)

F. WATER DISTRIBUTION

1. Water Service:
   a. At new facilities, provide one meter each for domestic water, fire-protection water, and irrigation water service. (See “Plumbing” and “Planting and Irrigation” sections of this guide book for gas piping and other related criteria.)
   b. Contact water supplier for main, pressure and flow information.
   c. Meter locations must be approved by the District and the water supplier. Indicate meter locations at curb.
   d. For domestic water services that require any of the following component devices: Service Control (shut off) valve, strainers, pressure reducing valves, backflow prevention assemblies, etc., said devices shall be installed as follows: Group component devices into a dual (parallel) configuration to avoid service interruptions during testing and servicing of devices. Devices shall be designed and installed in an above ground, compact, low profile and serviceable valve station.
   e. Meter assembly and details must conform to District “Standard Technical Drawings.”

2. Piping and Design
   a. Provide a water-load schedule for each meter including existing, new and future load in fixture units and gpm. Coordinate with the plumbing engineer.
   b. Provide hydraulic calculations for water distribution system. Show water demand and residual pressure at building and street point of connection.
   c. Where pressure-reducing valves are required, coordinate location with plumbing engineer and with the District.
   d. On domestic water service provide tandem installations of pressure regulators, backflow preventers and strainers, to avoid shut-down during testing and servicing of equipment. See Standard Technical Drawings.
   e. Provide thrust blocks and ties for bell-and-spigot piping.
   f. Before specifying piping, review corrosivity of soil with the District’s soils report to verify appropriate pipe material selection.
g. Wherever pipe-and-valve assemblies are exposed above grade, provide a secure locked enclosure to protect them from unauthorized use or vandalism. These may be walls, fences, or manufactured enclosures that are made for this purpose.

G. FENCING, WALLS AND GATES

1. Provide full perimeter fence enclosure for school campus.
2. Provide full perimeter fence enclosure for all parking areas.
3. At adjoining residential areas, provide CMU walls.
4. All CMU walls, shall be painted.
5. Fence, wall and gate dimensions:
   a. Perimeter and parking area walls and fences: 8'-0” height.
   b. Interior security fences: 8'-0” height.
   c. Interior playground fences: 4'-0” height
   d. Pedestrian gates: 5'-0” width in 6-foot or higher fences, 4'-0” in 4-foot.
   e. Drive gates: 20'-0” wide.
   f. Tennis court gates: 6'-0” wide (to accommodate sweepers).
   g. Clearances for all gates and doors shall be according to good industry practice and in no case large enough to permit entry or bypassing security measures.
6. Design special gates and fencing for main entry to school.
   a. Entry Gates and Security Fences shall be designed to maximize security while at the same time enhancing the appearance of the school.
      1. If concrete planters or other climbable elements are adjacent to an entry fence or gate, the fence height must be adjusted accordingly.
      2. The design of the entry gates and security fences should minimize horizontal bars and low curbs so that they do not provide a “ladder” that allow the gate or fence to be easily scaled.
      3. When gates are required to have emergency push bars for exiting, the gates and adjacent fencing must be designed to prevent activation of the push bar from the outside.
7. In general, provide swinging gates rather than sliding. Emergency gates shall be swinging gates. Use sliding gates at drives and for large openings where normally open swinging gates would cause obstructions. Rolling gates must be designed with gate stops to prevent gates from rolling past the mid-closure point and clear of vertical supports. Provide one stop on the track and another welded to the top rail.
8. Provide sliding gates to control pedestrian traffic into field bleacher areas.
9. At tops of banks, set fence line back 18” minimum if bank is paved, and 24” minimum if bank is not paved.
10. Fence service yards. Provide sliding drive gate where possible.
11. Enclose the Trash Yard with solid walls or fencing and gates. Locate it for easy access and trash pick-up, away from student areas, and out of direct view of neighboring property owners.

12. Because of safety and maintenance concerns, motorized gates at perimeter fences are not allowed without prior written approval from the District. Sides of ramps leading to subterranean garages shall be fenced off to prevent access to the rest of campus when the perimeter gate is open.

13. Rolling metal gates shall be engineered to account for its weight, in order to provide safe and smooth operation.

H. Off-Site Checklist

1. “Checklist of Off-Site Work, Utilities & Easements” – See Appendix for the list. This list is comprehensive; however, there might be other site specific issues that have to be addressed, such as “specific community plan”, landscaping, etc.
3.3 STRUCTURAL

A. GENERAL REQUIREMENTS

B. DESIGN CRITERIA

C. BUILDING SYSTEMS

D. CONCRETE AND MASONRY STRUCTURES

E. FOUNDATIONS AND CONCRETE OR MASONRY ON EARTH

F. STEEL STRUCTURES

G. WOOD FRAMED STRUCTURES
3.3  STRUCTURAL

A. General Requirements

1. The design for structural safety of school buildings in California is governed by the requirements of the Field Act beginning in Section 17280 of the Education Code and the California Building Code, Title 24.

2. The structural engineer shall be responsible for the design, or review of designs, of connections to the basic structure of such building elements as veneer materials, window walls and steel-stud assemblies, decorative block screens, mechanical and electrical equipment and components, library shelving, and similar items.

3. Testing and Inspection (T&I) shall meet the requirements of Title 24. After plans are approved by DSA, submit one copy of the DSA Tests and Inspection List to the District’s authorized representative.

4. Assure that provisions are made for seismic anchorage or bracing of all building elements and equipment, including Owner Furnished equipment.

B. DESIGN CRITERIA

1. Codes:
   a. The governing building code for structural design is the current edition of the California Building Code (CBC -- part of the CCR, Title 24, California Building Standards Code), with modifications by the Division of the State Architect/ Structural Safety Section (DSA/SS) for school design and construction.

2. Design Criteria:
   a. The requirements of the California Building Code and DSA shall govern except where specifically defined below.
   b. Deflection: Maximum allowable deflection for structural members shall be that defined in the CBC, except as follows:
      1. To reduce long-term deflection and cracking of finished surfaces, where floor members of engineered-wood support floor finishes of ceramic tile, terrazzo, or similar materials, maximum deflection shall be limited to 1/540.
   c. Roof design loads shall provide for the weight of one re-roofing if the roofing designed can be re-roofed without removing the original roofing.
d. Indicate on plans key design criteria used, including Code edition, seismic design factors, and soil profile type.

C. BUILDING SYSTEMS

1. The following criteria and suggestions reflect policies and preferences of the District derived from experience with economy and durability. Exceptions may be made with justification and specific authorization of the District’s Project Manager.

2. The structures of all buildings, including non-bearing partitions, shall be of incombustible materials. Wood structures may be acceptable for one-and two-story primary and elementary schools and additions, but with special permission in writing from the District.

3. Three-story and higher school buildings, and all middle and high school buildings, shall be steel framed with floors of concrete on metal deck supported by composite beams, or of reinforced concrete. The lateral force resisting system should be the most effective structural systems allowed by code.

4. Gyms and auditoriums preferably should have masonry or concrete walls and steel-framed roofs with steel decking without concrete fill.

D. CONCRETE AND MASONRY STRUCTURES

1. Use a minimum concrete ultimate compressive strength of 3000 psi at 28 days.

2. Concrete mix design must comply with CBC Section 1905A.2.3; Method B is commonly used for typical school building projects.

3. Specify size of aggregate and slump. Use 1-inch or 3/4-inch minimum aggregate size, with smaller sizes only in very special cases.

4. Control cracks in concrete by joints, construction joint separations, and other means.

5. Avoid thin sections or projections that may crack off when forms are removed. Chamfer column corners, exposed corners and edges.

6. Provide typical construction joint locations for concrete beams, joists, and slabs.

7. Provide expansion joints, control joints and seismic-movement joints as required by the design, indicate their locations and details on drawings, and coordinate with architectural enclosures and finishes.

8. Joints must be weather tight and provide lateral stability across the joint.
9. Where a concrete beam is monolithic with a concrete wall and negative beam reinforcing steel is embedded in the wall, include a detail that shows the preferred pour line and alerts the contractor not to pour wall without negative reinforcing in place.

10. Indicate openings, depressions and curbs on structural floor and roof plans. Curbs must be a minimum of 5" wide if located under walls.

11. Maintain a full depth of slab under depressions for ceramic tile, electric ducts, or other construction.

12. Provide a typical column drawing indicating bar maximum slopes, locations of splices, and reglets for shear-wall reinforcing.

13. When setting a rail post use non-shrink grout or equivalent (“Por-Rok” but not sulfur). Provide a #4 bar on each side of post in concrete.

14. If wood or steel studs are used in concrete buildings, indicate clear relationship between “face of concrete” and “face of studs”.

15. In masonry walls, base dimensions on modular size of the unit.

16. In concrete masonry walls, fill all cells except on free-standing site walls retaining no earth. Avoid bars larger than #8.

17. Clearly show the minimum concrete cover required for the intended fire protection rating.

E. Foundations and Concrete or Masonry On Earth

1. The structural engineer shall visit the site and visually confirm the existing conditions as represented on the survey and geotechnical report. (Include the geotechnical engineer’s name and report date on drawings.)

2. Provide special recommendations for dealing with expansive soils beneath the structure.

3. Foundations of buildings must not be partly on fill and partly on natural grade. Make clear on drawings all areas of fill.

4. Show bottom of footing elevations on foundation plan, including building walls, columns, flagpoles, lighting structures, retaining walls, etc.

5. Provide structural elevations and details of all retaining walls and site walls over 3'-6" high showing bottoms of footings, steps, joints, sleeves and drainage. Footings may be sloped 5% maximum to avoid steps.

6. For building walls that retain earth, use a minimum thickness of 10 inches and provide waterproofing and drainage outside the walls. Coordinate structural design with waterproofing and sub-drain design to assure water resistance.
7. Retaining walls higher than 12 feet as measured from the top of the foundation shall be designed to resist the additional earth pressure caused by seismic ground shaking.

8. Floor slabs on grade shall be 5-inch thick minimum reinforced with #4 bars @ 24" o.c. each way.

9. For floor slabs on grade that will carry interior floor finishes, provide a vapor barrier. See “Architectural” section for requirements.

10. Utilities trenches that impact foundations shall be recognized in design and shown on structural drawings. Backfill trenches below footings with controlled compacted fill or, if not more than three-feet deep, with lean concrete.

11. Requirements of the paragraphs on “Concrete and Masonry Structures” also apply.

F. STEEL STRUCTURES

1. Provide top-of-steel elevations at each column and change of level on structural drawings for ease of reference by steel detailers and erectors.

2. For exterior steel work specify sections with a thickness of ¼" or greater.

3. Indicate required camber on all tapered steel girders and steel trusses.

4. Keep steel floor beams to L/d equal to or less than 24.

5. Provide erection bracing for tapered girders. Web thickness for all built-up sections shall be at least 3/16". Provide flange to web welds to comply with AISC Specification. Use stiffener plate welded to top flange and to web where ridge occurs.

6. Comply with maximum width-to-thickness ratio requirements of AISC for projecting elements under compression. Apply requirements to railing parts.

7. Field weld or use cadmium plated counter-sunk flat head machine screws, to prevent warping in galvanizing bath.

8. Specify cost effective size, length and type of welds. Use standard weld symbols and consider fillet welds where adequate.

9. Make groove welds "full penetration" on structural welds such as tapered girders.

10. On welded assemblies to be hot-dip galvanized, avoid shop welding large areas, such as stair platforms, to prevent warping in galvanizing bath. Field weld and retouch galvanizing, or use cadmium plated counter-sunk flat head machine screws for field assembly.
11. Do not support steel members with wood columns.

12. Provide means of leveling for base plates, such as double nuts on anchor bolts.

13. Avoid steel joists. (Because of DSA’s special testing and inspection requirements, most steel joist fabricators will not bid DSA jobs.)

G. WOOD-FRAMED STRUCTURES

1. Provide camber in structural members in accordance with DSA requirements. Use a stiffer member in preference to using excessive camber.

2. No horizontal member depth to thickness ratio shall exceed 7.

3. Bottoms of sills on exterior foundation walls shall be not less than 12" above finished grade.

4. Standardize hold down bolt sizes.

5. Structural I plywood is preferred. Use at least CD Grade with exterior-type glue.

6. Provide drawings of wall elevations to indicate typical framing. Provide special framing elevations where large openings occur, where columns pass through wall plates, or where framing is otherwise complex.

7. Provide complete roof framing plans showing walls. Clearly indicate corner framing and slope of roof.

8. Stud walls or partitions around shower or toilet rooms with more than two fixtures, and stud walls adjacent to exterior ground or paved areas, shall bear on concrete curbs extending at least 6" above finished floor or paving level. (Curbs and sills must meet DSA’s special curb requirements.)

9. On wood-joist floors, provide 2"-thick concrete fill, 6" curbs, and a floor drain on the floor of heater rooms using gas-fired boilers.

10. Use nominal 6" wide studs for walls with the exception of non-bearing walls with no piping.

11. Clearly indicate connection of vertical shear elements to diaphragms. Be sure these shear elements do not produce a high concentration of stress over a small length.

12. Where pipes pass through top plates, provide a detail on both structural and plumbing drawings.

13. Use minimum 1/2" thick plywood for roof sheathing. Indicate stagger of panels required for horizontal diaphragms.
14. Standardize on one or a few bolt sizes. Do not permit a mixture of several tie-down bolts because they can be too easily mixed on the job.
3.4 PLUMBING

A. GENERAL REQUIREMENTS

B. SEWER SYSTEMS

C. WATER SYSTEMS

D. HOT WATER SYSTEMS

E. WATER VALVES AND OTHER DEVICES

F. GAS DISTRIBUTION SYSTEMS

G. COMPRESSED AIR SYSTEMS

H. CATHODIC PROTECTION

I. SEISMIC RESTRAINTS
3.4 PLUMBING

A. General Requirements

1. Plumbing systems shall be installed in accordance with the current California Building Code and Plumbing Code (CBC – part of California Code of Regulations, Title 24), as well as CCR Titles 19 and 8, District Guide Specifications; other chapters of this School Design Guide, and District Standard Technical Drawings.

2. Design systems to be simple, durable, easy to operate and maintain, with ready accessibility for servicing, maintenance and replacement, all in a manner that will avoid interruption of educational schedules during working hours.

3. Contact each utility supplier to determine the requirements for the most cost effective service connection. Provide separate meters for domestic, fire and irrigation water supplies. See Section 3.2 - “Civil Engineering” of this Design Guide for additional information relevant to the work of this section.

4. Fixtures must comply with State water conservation guidelines and standards, including maximum flow as follows:
   a. Water Closets: 1.6 gpf
   b. Urinals: 1.0 gpf
   c. Lavatory Faucets: 1.5 gpm
   d. Showers: 2.0 gpm
   e. Kitchen Sink Faucets: 2.0 gpm

5. Student Restrooms:
   a. Provide in all student restrooms the following features to reduce maintenance, conserve water and minimize student tampering:
      1. Shut-off valve for all fixtures in each restroom, located above the upper terminal water closet and behind a locked access panel.
      2. Water-saving battery-operated infrared-sensored flush valves, with manual override, on all water closets and urinals. Infrared sensors must be mounted and adjusted at heights and distances appropriate to the grade level and student height to insure automatic actuation.
      4. Hose-bibb with vacuum breaker in recessed box with locking cover.
      5. Urinals with stainless-steel strainers attached to the drain inlet.
6. Floor drains with trap primers with floors sloped to drain.
7. Clean-outs above all urinals, lavatories, and water closets (above upper terminal water closet when there is more than one).

b. Verify that the following are provided and coordinated with plumbing work.
1. Electric hand dryers in lieu of paper-towel dispensers (except in kindergartens and early education centers).
2. A dual GFCI outlet behind a locked access panel.

6. Faculty and Visitor Restrooms:
   a. Provide in all faculty/adult restrooms the following features to reduce maintenance and conserve water:
      1. Shut-off valve for all fixtures in each restroom, located above the upper terminal water closet and behind a locked access panel.
      2. Urinals with stainless-steel strainers attached to the drain inlet.
      3. Floor drains with trap primers sloped to drain.
      4. Clean-outs above all urinals, lavatories, and water closets (above upper terminal water closet when there is more than one).

7. Conceal and properly secure all piping behind building finishes. Exception may be made in equipment and custodial rooms and CMU or concrete construction. Where necessarily exposed in renovation projects, paint all piping and insulate hot water and condensate piping.

8. All lavatories shall be Cast Iron with acid resistant backed on enamel finish. Vitreous China units are prohibited.

9. All lavatories shall have three (3) holes 4 inches center set faucets. Single-hole configuration is not allowed.

10. Access Panel – Plumbing access panels shall have the same fire rating as the wall, ceiling, or surface they are installed upon. Identify and call out rated panels as such on construction documents.

11. Underground Cleanouts – Underground waste piping with 90 degrees or greater change in direction, shall provide a cleanout to grade.

12. Hopper Sinks – All service and custodial sinks shall be Cast Iron with baked on enamel finish. No other type will be accepted.

B. Sewer Systems

1. Industrial Wastewater Permits must be obtained from the City of Los Angeles Department of Public Works, Bureau of Sanitation, Industrial Waste Management Division, in accordance with the Los Angeles Industrial Waste Control Ordinance for all schools. A permit is required for each
point of discharge to the City’s sewer system. (For other jurisdictions the local ordinances must be addressed, but the standards required by Los Angeles shall be the minimum standard for all LAUSD schools.

2. Sewer Lines  
   a. Specify cast iron soil pipe at all following locations:  
      1. Within the building and 5'-0” outside the building line.  
      2. Running parallel to and within 2'-0” of any building or structure.  
      3. Within 20'-0” of any tree centerline.  
      4. Not less than 1'-0” below finished grade.  
   b. Provide clean-outs above all urinals, lavatories, upper terminal water closets, and sinks.  
   c. Provide cleanouts to grade in yard box at:  
      1. Upper terminal cleanout within 5 feet of building line connection.  
      2. Every 100 feet or change of direction over 22.5 degrees.  
      3. At property line connection.  
      4. Do not provide cleanouts overhead in subterranean parking lots. They are neither manageable nor accessible for use.  
   d. Provide uniform slope of 1/4" fall per foot whenever possible, but never less than 1/8” per foot.  
   e. Indicate invert elevations of new sewer lines at buildings, changes in direction, locations where sewer lines join and at property lines. Indicate sizes of existing utility lines on the plans.

3. Private Disposal Systems  
   a. When private disposal systems are required and programmed, verify requirements with the local health authorities and obtain written approval.  
   b. Clearly define the extent and locations of system elements.

4. Science Classrooms, Flexible Classrooms and Prep Room/Work Room Wastes:  
   a. All science, chemistry, flexible science classrooms and science prep/workrooms shall have chemical waste piping.  
   b. These are defined as chemical or industrial liquid wastes that are likely to damage the public sanitary sewer system or increase its maintenance cost, or detrimentally affect sewage treatment, or contaminate surface or subsurface waters. They shall be pre-treated to render them innocuous prior to discharge to the sewer system unless an approved Best Management Practices program is in effect at the school.
c. Provide an independent waste drainage system to the building exterior for plumbing fixtures in laboratories and associated workrooms which could receive corrosive chemical waste.

d. Piping for this system shall be of corrosion-resistant material as specified in the Guide Specifications – either Type 316L stainless steel or Los Angeles City Test Laboratory-approved CPVC that does not require wrapping pipe in plenums or Polypropylene.

e. Based on science teachers following an approved Best Management Practice (BMP), a pretreatment neutralizing tank for Science Laboratory waste is not required. However, provide an easily accessible exterior sampling box, together with accommodations for future addition of a neutralization system, before connection to the public sewer. The future neutralizing system shall be a digitally monitored type that can handle both caustics and acids and preferably above ground.

f. No chemical vent shall interconnect with vents of other services.

g. Details shall meet the requirements of the Los Angeles City Bureau of Sanitation (see “Industrial Waste Permits” above).

5. Food Service Establishments (FSE’s) Waste:

a. Cafeterias shall comply with the City of Los Angeles’ Fats, Oil and Grease (FOG) Control Program. Consult and obtain approval of Bureau of Sanitation’s (BOS) approval.

b. Grease interceptors shall comply with the City of Los Angeles’ Plumbing Code, and must be provided for all grease-producing equipment. (A three (3)-compartment sink all hand sinks including the floor drain, floor sink, prep sink and mop sink within the Kitchen prep area are to be tied to the grease interceptor.).

c. Do not provide garbage disposals in school cafeterias (which are classified as FSE’s).

6. Other Special Wastewater Provisions:

a. Other areas requiring special pretreatment of wastewater before discharge into the City sewer system include:

1. Auto Shop floor drains, sinks and cleaning tanks: Oil Interceptor and Clarifier.


4. Film Processing: Neutralization, Silver Electrolytic Recovery Unit, Sample Box.


7. Subterranean Parking Garage Drains to sump pumps: Oil and Solids Interceptors, when required by Los Angeles Sanitation Bureau. Interceptors are not required in garages where hose bibs are not installed. Provide explosion proof motors on sump pumps.

b. Interceptors and separators must be located and installed so they are easily accessible for inspection, cleaning, and removal of intercepted material.

7. Floor Drains, Area Drains and Floor Sinks:

a. Where drains or sinks are required, slope floor to drain at 1/8” per foot.

b. Floor drains with trap primers are required at:
   1. Student and Staff Restrooms. One floor drain shall be provided front and center for two or more urinals. One floor drain is required for water closets in all restrooms with an additional floor drain when a total of four or more water closets are provided.
   2. Shower and locker rooms and adjacent drying rooms.
   3. Custodian closet – locate floor drain near hopper sink.
   4. Mechanical Room.
   5. Electrical Room.
   7. Uncovered Trash Areas. These areas are required to be provided with a special floor drain system that normally drains the storm water to the storm system, but diverts the drainage to the sewer system when the trash containers are being washed, using a special valve system. See Storm and Sanitary Drainage in the Civil Engineering section.

c. Floor sinks with trap primers are required at:
   1. Boiler Rooms.
   2. Kitchens, at cooking areas and where preparation sinks have an indirect waste drain rather than a direct connection.
   3. Coffee urns.
   4. Food preparation sinks (minimum 3").
   5. Milk-shake machines.
   6. Refrigerators of 30-cubic-foot capacity or over.
   8. Water heater relief valves and hot water storage tank drains. (All water heaters shall be installed with drip pans).
   9. Wherever required by the California Plumbing Code or the Los Angeles City Plumbing Code.
d. Elevator pit drains are not required.

e. Primary condensate drains from HVAC units shall be discharged into a receptor that is approved by code and the local jurisdiction in a manner that is in compliance with the code requirements. The preferred receptors by LAUSD are floor sinks, custodial sinks and lavatory tail pieces. Drywells may be used when the above receptors do not exist in the vicinity. Draining directly into the sewer with air gap fittings is prohibited. Secondary drain pans are required under all indoor HVAC units that are installed above finished ceilings or suspended exposed above occupied spaces. These drains are required to discharge at locations where the discharge will be noticed so that service personnel could be notified to fix the clogged primary drains. The point of discharge should be above a sink if available and if not, direct the discharge away from locations where it may cause harm to students and damage to electronic equipment, and books. Also, provide high condensate level unit shut-off switches to prevent or minimize drainage from secondary pans. In addition provide freeze stats for DX equipment.

f. Provide Di-Electric union at condensate drain pipe connection, if steel meets cooper.

g. In the subterranean parking garage, provide an adequately sized emergency drain for every 4000 square feet. Within ten feet around each floor drain provide 1/8”/foot slope of drain.

8. Combination waste and vent systems shall be used only where structural conditions preclude installation of conventional systems and when permitted by the District.

a. Use only with clear liquids and not on kitchen sinks, lunch shelter floor drains, or for any contaminated wastes.

b. Provided adequate vents to ensure free circulation of air. Any branch more than 15'-0" in length shall be separately vented.

c. Waste and vent pipes shall be oversized to assure full venting.

d. Vent connection shall be downstream of last fixture.

e. No water closet or urinal shall be installed on any combination waste and vent system.

9. Waste Piping Traps – All parts of traps shall be Cast Brass with polished Chromium plated finish. Tubular traps are not allowed.

   Exception: Concealed traps and 17 gauge tailpieces may have rough brass finish, unless noted otherwise.
C. WATER SYSTEMS

1. Water Service:
   a. Coordinate with civil engineer to define and request water service from the utility supplier. See Section 3.2, Civil Engineering of this Design Guide.

2. Design Criteria:
   a. Provide water service to all fixtures and outlets, designed in accordance with National Bureau of Standards Reports 66 and 79 with not less than 25 psi at farthest and highest fixture or the pressure required for the highest and farthest flushometer-operated water closet to operate properly.
   b. Allowable water velocity shall be 5 feet per second for hot water and 5 feet per second for cold water in copper and non-metallic piping.
   c. Size pipe based on the number of fixture units and demand load curves in the California Plumbing Code.
   d. Outside Stem and Yoke (OS & Y) are only to be used for Fire Protection Systems. Exception: OS & Y valves may be used in equipment rooms, at seven (7) feet or higher for visual identification of Open or Closed conditions. In such cases provide a chain operator to allow for operating the valve without a ladder.

3. Use Type L hard copper pipe inside buildings (with no under-slab water piping if at all possible).

4. Provide a shut-off valve to isolate all fixtures in each restroom, laboratory, cafeteria and any other room with multiple fixtures. Valves shall be in recessed boxes with locking covers, located above the upper terminal water closet for restrooms and above fixtures in other areas.

5. Run water lines to outside drinking fountains underground and to interior drinking fountains isolated from hot-water lines to provide cool water at the fountains. Provide separate isolation valves at each fountain.

6. Provide thrust blocks and ties for bell-and-spigot water pipe at fittings for sizes 2 ½” and larger.

7. Slope pipes up in direction of water flow to air-elimination devices, or up to a nearby expansion tank, to provide for air elimination from water lines.

8. Water hammer arrestors are required for lavatories, sinks, fountains, water closets, urinal headers, and other fixtures or devices with quick-closing valves, such as clothes washers.

9. Fixture Supply Lines – Water supply to faucets shall be via Iron Pipe Size (IPS) with brass nipples and brass escutcheons with polished chromium
finish. No braided stainless steel or flexible supply lines shall be used to connect water supplies to faucets.

10. Each faucet shall have its own angle stop. No angle stop should serve more than one faucet at a time.

11. Victaulic type mechanical butterfly valves for copper are considered a reliable method for shut off above ground and inside buildings.

D. Hot Water Systems

1. Hot water or tempered water is required (as indicated, in addition to cold water) for the following areas, but not limited to these areas:
   a. Administration and Health Offices – Hot.
   b. Cafeteria, Kitchen, Lunch Units, and other food service facilities – Hot (No tempered water)
   c. Collaboration Faculty Workrooms and Prep Rooms – Hot.
   d. Art Instruction Rooms, Consumer Home Economics, and Automotive Labs – Hot.
   e. Custodial Room Service Sink – Hot.
   f. Shower Rooms for Students – Tempered for students, hot and cold for faculty, plus one therapeutic station with hot and cold.
   g. Shower Rooms for Faculty plus Therapeutic Station – Hot
   h. Handicapped-Accessible Showers – Tempered.
   i. Restrooms adjacent to eating facilities – Tempered.
   j. Faculty Restrooms – Hot

2. Provide cold water only at:
   a. Student Restrooms.
   b. General Classrooms.
   c. Kindergarten Rooms.

3. Hot water temperature regulation:
   a. To reduce the potential for bacterial contamination (see ASHRAE Standard 12-2000 – Minimizing the Risk of Legionellosis Associated with Building Water Systems) provide the following temperatures and control devices:
      1. General Hot Water Outlets: 120°F at the heater and 115°F at the furthest outlet from water heater.
      2. Tempered Water Outlets: 95° to 100°F mixed from 115°F to 120°F hot water from the storage tank and cold water through a tempered regulator valve. Locate the regulating valves as close to
the outlet as possible. This is especially important for Special Education, Elementary Schools and Children’s Centers. Locate the valves in Custodians Rooms or similar rooms, not readily exposed in restrooms or shower rooms.

3. Cafeteria Sink Outlets: 120°F.

b. Provide a circulating pump and insulated hot-water circulation loop (supply and return) to the furthest fixture on the following:

1. Provide circulating pump for faculty restrooms with metered faucets and nurse offices, when they are farther than 15 feet from water heater.

2. Provide pumps for runs longer than 50 feet for food service areas. Custodial sinks and other areas with high flow faucets.

3. Indicate aquastat to control pumps and to make at 100 °F and break at 108 °F.

4. Hot Water Heaters And Tanks:

a. Water heaters shall be certified by the California Energy Commission and meet Title24, AQMD Low NOx Rule 1121, and 1146.2. Water heating boilers 1,000,000 BTU and larger shall be registered with South Coast Air Quality Management District (SCAQMD) per rule 222 to meet 114 6.2 requirements.

b. Do not use multi-flue water heaters, nor booster or instantaneous type water heaters.

c. Water heaters shall heat with gas. Electric water heaters may be used as a last resort for isolated locations and in small sizes. All gas fired water heaters shall meet the flammable vapors ignition resistance requirements (FVIR).

d. Use 100-gallon, or smaller, high-recovery gas-fired domestic-type water heaters. Use in series with manifold to avoid the use of separate storage tanks.

e. Use hot water storage tank with external heater only where storage requirements exceed 200 gallons and where central-plant capacity or other conditions indicate.

f. Provide ball valve with plug at water heater drain outlet.

g. Provide seismic anchorage for all equipment. Do not bolt down the water heater legs.

h. Provide drip pans at all water heaters and drain the pan to an approved receptor.

i. Instantaneous tank-less water heaters of any kind or size are prohibited.

5. Hot-Water Circulating Pumps:

a. Circulating hot water pumps shall be time controlled so they will operate only when building is occupied.
b. Hot water circulating pumps over 1.5 hp shall have cast iron bodies. Pumps 1.5 hp and less shall have hard bronze water chambers and impellers.

c. Size hot-water circulating pump and piping for water velocity not to exceed 5 feet per second for hot and 8 feet per second for cold.

6. Hot-Water Piping And Utilization:

a. Provide tempered water to student showers piped in series and connected with an insulated circulating supply manifold.
   1. Provide isolation valves for each battery of showers.
   2. Provide push-button metered-type shower valves.
   3. Specify showerheads with a maximum discharge rate of 2.0 gpm.

b. Reduction in lines connected to pumps shall be made as close as possible to the pumps.

c. Install straight length of pipe without bends or restrictions at least 10 diameters long on the suction side of all pumps unless inlet diffusers are used.

d. Insulated Return lines are required for domestic hot water systems when the length of run is over 15 feet to the furthest fixture.

e. Provide a check valve after the pump, for the hot water return line.

f. Avoid running dead-leg piping.

E. Water Valves and Other Devices

1. Uninterrupted Service:

   a. All domestic water supply mains shall be designed in an above-ground valve station with a minimum of two parallel branch lines – a primary and secondary – to provide for uninterrupted service to the site during maintenance of a backflow preventer or a pressure regulating valve. Each branch shall include a backflow preventer with strainer and when the street pressure exceeds 80 psig, a pressure regulator with strainer.

   b. A separate service shall be provided for landscape irrigation, with an above-ground valve station that includes a backflow preventer and a pressure regulator with strainer when the street pressure exceeds manufacturer’s or design suggested range but never exceed 100 psi. Two parallel branch lines are not required, but may be used to incorporate the use of 2” backflow assemblies and pressure reducing valves in parallel for more cost effective design.

   c. Coordinate this design with the Civil Engineering and Planting and Irrigation sections of this “School Design Guide.”
2. **Pressure Regulating Valves:**
   
a. Install pressure-regulating valves with strainers when street line pressure is over 80 psig to reduce pressure to approximately 80 psig.

b. Pressure regulating valve (PRV) stations shall include a minimum of two District-approved pilot/diaphragm actuated control valves with strainers (in lieu of a series of 2” direct acting regulators). Valves shall be flanged and sized to provide uninterrupted service to school site when valves are being serviced. Wafer-lug type butterfly valves and pre-assembled valve stations may be used to minimize space needs. (Services over 6 inches may require a third, smaller PRV for constant low-flow demands.)

c. Provide removable gages with ball valves for isolation stops on both inlet and outlet of valve stations (for inlet pressure and reduced pressure).

d. Provide an epoxy-coated wye strainer ahead of regulators.

e. Locate pressure regulating assemblies and strainer assemblies above grade in a shielded enclosure and in a service area. Where exposed to students, enclosure shall be a secure structure or cage.

3. **Backflow Preventers and Vacuum Breakers:**
   
a. Use backflow prevention valves having the lowest possible friction loss.

b. Use reduced-pressure principle backflow assemblies for domestic, irrigation, and fire services for 2" and larger service.

c. Provide an epoxy-coated wye strainer ahead of regulators.

d. Vacuum breakers or other required backflow prevention valves which are required, but not limited to, the following locations:
   1. All flush valves and urinals.
   2. Direct connections to boilers and tanks.
   3. Water-cooled refrigerator condensers.
   5. Hose bibbs and sill cocks.
   6. Demonstration tables.
   7. All laboratory equipment.
   8. Dark room equipment.
   9. Hose bibbs for uncovered combination storm-and-sewer area drain diverter valves require a Reduced Pressure back-flow assembly.
   11. Silver soak sinks.
   12. Garbage can washers.
   13. Most types of animal drinking water devices.
14. Various types of processing equipment (check with City).
15. Cooling towers and evaporative coolers (or provide air gap).
16. Sewage pumps.
17. Fire sprinkler systems.
18. Irrigation systems.

4. Hose Bibbs and Sill Cocks (Loose key):
   a. Provide loose key sill cocks under exterior drinking fountains with isolation valves. (Sill cocks are faucets with a hose connection installed approximately at the sill line of buildings.)
   b. Provide loose key hose bibbs or sill cocks at approximately 75'-0" spacing around buildings, and within 25 feet of entrances with walk-off mats. Install in recessed boxes without covers. (Coordinate desired locations with Landscape Architect.)
   c. Provide sill cocks (with isolation valves) in Shower and Locker Rooms so that a 50'-0" long hose can be used to wash down entire area.
   d. Hose bibbs are not recommended in kitchens or other interior areas except as noted above.
   e. Provide loose key hose bibbs or sill cocks, with isolation valves, at outside eating areas, in boiler rooms, on rooftops with skylights or air-cooling equipment for washdown of equipment and pads, and on rooftops for washdown of bird droppings and debris on ladders and façade projections.

5. Isolation and Shut-Off Valves:
   a. All shut-off valves shall be accessible from the room in which fixtures are installed, and shall be located at approximately 3'-0", but not more than 70", from the floor. These valves shall control only fixtures in the room in which they are installed.
   b. Provide shut-off valves for:
      1. Each group of fixtures.
      2. Each science laboratory or preparation room.
      3. Each restroom.
      4. Each floor of each building.
      5. Each building, located at the entering point of building with yard box.
   c. Provide a remote-control solenoid shutoff valve for gang-shower tempered-water; located down stream of manual shutoff valve. Locate remote control at coach’s office
   d. Use gate or ball valves for plumbing isolation shut-off.
6. **Emergency Shower and Eye Wash:**
   a. Emergency shower and eye wash equipment shall be installed in the following areas where eye or skin irritants exist and must comply with California Code of Regulations (CCR), Title 8, Section 5162.
      1. Science and teacher's chemistry/laboratory workrooms.
      2. Pool mechanical equipment rooms.
      3. Central Custodial supplies storage area. In middle and high schools install in receiving area. In elementary schools, install in plant manager's storage or office if there is no separate storage.
   b. A flip-down eye wash at sink shall be installed in the Teachers’ Science Rooms/Preparation Area/ Workroom, but only as a supplement to an approved Emergency Shower and Eyewash in the classroom, as stated in Title 8 Section 5162.

7. **Drinking Fountains:**
   a. Drinking fountains are required by the California Plumbing Code on every floor, as well as in other specific locations.
   b. Install fountains in locations, and above floor surfaces, where water falling from the fountain on to the floor does not cause a slipping hazard. (See Section 2.1 School Building Design for specific location and design requirements.)

**F. GAS DISTRIBUTION SYSTEMS**

1. **Gas Service:**
   a. In general, Elementary School systems are low pressure, (8" of water column), and Secondary School systems are medium pressure (3 psi at the meter and 1 psi maximum drop to most remote outlet) but medium pressure systems are allowable for site gas distribution for elementary schools with multiple buildings when the gas company permits. A properly vented pressure regulator with approved accessible gas shut-off valve must be provided.
   b. Locate gas meters:
      1. Where a straight service run from the street can be made by the gas company.
      2. Where it is accessible by truck for service and replacement.
      3. As central as possible to the major gas loads (main boiler rooms, relocatable classrooms groups, etc.) to minimize size and length of main pipe runs.
   c. Meter locations must be approved by the District and the gas company.
d. Meter enclosure and assembly must conform to District Standard Drawing and should have asphalt or gravel flooring (not concrete) with meter, valves and PRV above grade.

e. Use of medium-pressure gas requires design with “Polyflo Calculator” for gas-company approval.

f. Provide on plans a gas-load schedule for each meter including existing, new and future load in cfh.

2. Gas Piping:

a. Gas pipe:
   1. In buildings or above ground at least 6 inches: Steel
   2. Underground (30” minimum cover): Polyethlene, fusion welded, embedded in 6 inches of sand all around (per District Standard Drawings). Include tracer wire (yellow insulated No. 18 AWG). Connect to steel pipe with Central Plastics Company prefabricated transition fitting or equivalent.

b. Gas line locations:
   1. Above grade within the building and underground to each building whenever possible.
   2. Through attic spaces, within covered walkways, and in ventilated crawl spaces.
   3. Avoid lengthy horizontal rooftop mounted piping wherever possible.
   4. Avoid running gas lines through one building to serve another.
   5. In isolated cases such as Kitchens and Science Rooms where gas branch lines must penetrate a concrete slab, run pipes in a concrete trench with steel checkered plate cover and frame.

c. Provide a gas service stop in an accessible location outside each building at the point where a gas line enters the building.
   1. For permanent buildings, locate on the riser with swing joint at point of entry.
   2. For portable buildings, locate in yard boxes.
   3. Provide only one entry per building unless unusual circumstances exist.

d. Gas Valves:
   1. Provide an accessible shut-off valve for each gas outlet or group of outlets within a room.
      a. Use an approved gas cock when valve is readily accessible.
      b. An approved ball valve may be used when it is not accessible to students.
2. Provide individual check valves for gas outlets or turrets adjacent to air or water outlets, such as for laboratory stations.

3. Provide a master shut-off valve for science labs in a secure area not accessible by students.

4. All laboratory gas valves shall be protected by an “accessible”/Serviceable electrically operated, normally closed gas solenoid valve and remotely operated by emergency push button controller. Locate as close as possible to the teachers work station, at 48” height (ADA reach height).

5. Provide an isolation valve for each floor in each building.

6. Provide isolation valves at each regulator.

7. Provide DSA-approved seismic gas shut-off valves properly strapped to avoid student tampering.

8. Provide a shutoff valve on each gas line entering a building immediately outside point it enters the building.

9. All shut-off valves must be secured from student or public tampering.

e. Provide DSA approved Earthquake Shut-Off valve for each gas meter.

G. Compressed Air Systems

1. Provide air compressors as follows:
   a. Shop Areas: 3 HP minimum.
   b. Senior High Schools Shops with car hoists: 7 ½ to 10 HP. (Two or more car hoists require at least a 5 HP compressor.)
   c. Other areas requiring air: 1 ½ HP.

2. Air pressure:
   a. Hose connection for paint spray gun: 20 psi.
   b. Other locations: 124 to 175 psi.

3. Paint Spray Facilities:
   a. Provide an electrically controlled valve in the air line to paint spray booths so that no air is supplied to the spray gun when door is open.
   b. Spray guns, pressure-reducing valves, gages, straineners, hose and hose racks are furnished by the District.

H. Cathodic Protection:

1. For a site where cathodic protection is indicated, use non-metallic piping, unless unusual conditions and District directions indicate otherwise.
2. Check to ascertain if cathodic protection is in use when designing for existing sites.

I. **SEISMIC RESTRAINTS**

1. Provide seismic restraints for mechanical equipment and piping systems in accordance with applicable codes and guidelines.

2. For liquid filled steel pipe, use the following guidelines:
   b. Hanger spacing as specified in “Guide Specifications”.
3.5 FIRE PROTECTION

A. GENERAL REQUIREMENTS

B. LOCAL FIRE AUTHORITY REVIEW

C. FIRE SPRINKLER SYSTEMS

D. STANDPIPES

E. FIRE EXTINGUISHERS

F. KEY SAFES OR KNOX BOXES
3.5 FIRE PROTECTION

A. GENERAL REQUIREMENTS

1. This section contains criteria and information for local fire authorities’ review procedures, fire-sprinkler systems, fire extinguishers, and related fire- and life-safety requirements. Other criteria and guidelines include applicable portions of the California Fire Code, NFPA Standards, and the District Guide Specifications and Standard Details.

2. Fire protection for range hoods is provided by a fire suppression system that is integral with the hoods.

3. All Fire Department connections shall face the street and be free of any obstructions.

4. Hydraulic calculations for fire flow shall be provided as part of the Design Development Submittal. If pump is required, provisions for pump housing, tank and electrical requirements shall be provided.

B. LOCAL FIRE AUTHORITY REVIEW

1. The Division of the State Architect (DSA) requires that local fire jurisdictions review and approve all new construction projects prior to DSA final approval. The local approval includes:
   a. Access from the public street to each new building within the site (CCR Title 19, Section 3.05, “Access Roads”).
   b. Perimeter fencing and gated entrances (CCR Title 19, Section 3.16, “Gate Entrances to School Grounds”).
   c. Fire hydrants, if required.
   d. Standpipe locations.
   e. Emergency Assembly Area (EAA) and Evacuation Plan.
   f. Fire Department connections to automatic fire sprinkler systems.

2. For local review, provide a full site plan indicating all buildings, both existing and proposed, fences, drive gates, retaining walls, EAA, and other construction affecting Fire Department access. Indicate approved unobstructed fire lanes for access to buildings on the site plan.
3. The local Fire Department must signify approval on drawings and sign a standard approval form furnished by DSA.

4. Principal agencies for Los Angeles schools are:
   a. Los Angeles City Fire Department
      Fire Prevention Bureau, Access & Hydrants Unit
      213-485-5964
   b. Los Angeles County Fire Department
      Fire Prevention Engineering
      213-720-5141

C. Fire Sprinkler Systems

1. An automatic fire-extinguishing system shall be installed in every new school building in accordance with the current California Building Code (CBC – part of California Code of Regulations, Title 24), NFPA 72, NFPA 13, LAUSD's Guide Specifications division 15300, and requirements of the Division of the State Architect (DSA).

2. The fire sprinkler system must be interconnected with the school fire alarm system.

3. On fire mains, provide a reduced principle backflow assembly before the fire-department connection.

4. Fire sprinkler systems with 100 heads or more are required to have 24-hour monitoring by an approved Central Monitoring Station, in accordance with California Fire Code (CFC) 1003.3 and California Building Code (CBC) 804.2.5 and 904.3.1.

5. Fire sprinkler system shall be designed and installed so that they are readily serviceable. Every building shall have a fire sprinkler riser valve located 5'-0" above the floor. In multi-story buildings, every floor shall have a separate shut-off valve, tamper switch and flow switch at an accessible location, with an Inspector's Test Valve at the opposite end of the building.

   Exception: If each floor has an independent shut-off valve located at the riser assembly, then a main building shut-off valve will not be required.

6. Fire sprinkler main drain valve discharge line shall be piped into a sump pit or to a storm drain. Main drain lines shall never discharge into a sanitary plumbing fixture, not even into a floor sink or floor drain.

7. The Fire Department Connection (FDC) shall be located before the fire sprinkler riser assembly, not downstream of the riser assembly. A secondary FDC may be located on the address side of the building, downstream of the riser assembly provided it is only a secondary FDC provision, with a sign above it clearly stating what FDC serves.
8. A shut-off valve on a fire main backflow prevention assembly shall not be considered the building’s main shut-off valve. Each building shall have its own separate shut-off valve as part of the riser assembly.

9. Post indicator valves are not required to be provided along with backflow prevention assemblies on fire mains. The shut-off valve on the backflow preventor provides a reliable method of system shut-off. The Outside Stem and Yoke (OS & Y) valves provide a visual indication of those valves being in the open or closed position.

10. Post indicator valves (PIV) are required, outside the building, where a fire sprinkler main passes through the building foundation.

11. If a fire pump is required. Provide calculations on drawings and specifications.

D. STANDPIPES

1. Fully sprinklered buildings do not require Class II standpipes or fire-hose cabinets.

2. A class I Standpipe shall not connect to a fire main to become a combination standpipe/sprinkler system. They shall be kept separate as Class I Dry standpipes.

Exception: Class II standpipes are required for stages over 1,000 sq. feet in size, even for fully sprinklered buildings. See California Building Code (CBC), Table 9-A, Standpipe Requirements.

3. Class I dry standpipes are required for buildings 4 stories or more.

4. Dry standpipe outlets shall be unobstructed and readily accessible to the Fire Department, and all connections shall conform to Code and fire authority’s requirements.

E. FIRE EXTINGUISHERS

1. All areas of all buildings must have portable fire extinguishers within 75 feet of any point. Provide fire extinguishers in accordance with CCR Title 19 and the District Guide Specifications.

2. Extinguishers shall not be located on the exterior of buildings. Extinguishers in corridors, stairs or other unsupervised areas shall be avoided. All extinguishers shall be secured in a locked, UL listed fire extinguisher cabinet.

3. Portable fire extinguishers and notification signs shall be supplied as part of the contract for construction. They shall meet minimum requirements for acceptance by the State Fire Marshal and local fire authority.
F. Key Safes or Knox Boxes

1. For installation of all key safe (Knox Boxes), follow City of Los Angeles Fire Department Requirement 75. To standardize Districts procedures, Requirement 75 shall be followed for Los Angeles county Fire Department sites with the exception that the box must be ordered for the Authority Having Jurisdiction (AHJ), so that the factory installed lock matches the Master Key of the appropriate jurisdiction. Typical mounting height shall be 8'-0” min. to 10'-0” above ground.

2. A key safe Knox Box is only to be provided and installed for Central Station Monitored site. Architect/Engineer to confirm the need for Knox Box with local Fire Authority and to identify a mounting location and mounting height as required. Mounting height could be min. 8'-0” above finished floor (AFF), preferred mounting height shall be 10'-0” AFF.
3.6 HVAC SYSTEMS

A. GENERAL REQUIREMENTS
B. SYSTEM DESIGN CRITERIA
C. HVAC SYSTEM SELECTION
D. CONTROLS AND ZONING
E. AIR DISTRIBUTION
F. COILS AND PIPING
G. COOLING SOURCES
H. HEATING SOURCES
I. SOUND AND VIBRATION CONTROL
J. SPECIAL CONSIDERATIONS
3.6 HVAC SYSTEMS

A. GENERAL REQUIREMENTS
   a. The HVAC system shall comply with the current California Code of Regulations, Title 24, the standards of ASHRAE, SMACNA, and NFPA, as well as the requirements of the local authorities having jurisdiction and LAUSD’s Design Guide.
   b. All interior spaces shall be air conditioned unless specifically excluded in this Guide or in writing by the District.
   c. HVAC design shall comply with Title-24 energy efficiency requirements for all construction and exceed Title-24 energy efficiency requirements by a minimum of 15% or more, in conjunction with envelope and lighting design for new construction. Consult with utility suppliers to take full advantage of incentives for higher energy efficiency such as the Savings by Design Program of Southern California Edison and The Gas Company. Indicate the required equipment energy efficiencies clearly in the equipment schedules in a separate column.
   d. Refer to The Collaborative for High Performance Schools “Best Practices Manual” (available at http://www.chps.net) for additional criteria that may be appropriate to the project. Appropriateness of the criteria will be as determined by the District.
   e. Refer to chapter 2.4, “Environment and Sustainability,” for additional requirements and specific requirements for commissioning.
   f. Systems and equipment shall conform to District’s Guide Specifications, Division 15.
   g. Assure maintenance and accessibility provisions for servicing and replacement.
      1. Where practical, all equipment shall be housed on the roof or in Mechanical Rooms within the building.
      2. Provide adequate working area around equipment for service.
   h. Where HVAC units are roof mounted or require roof openings, verify that all structural provisions are made to assure adequate capacity for load bearing and diaphragm capacity.
B. SYSTEM DESIGN CRITERIA

1. Calculations and Load Criteria
   a. Provide design criteria and calculations as follows:
      1. Heating and cooling load calculations shall be performed on an industrially recognized computer program such as Trace 700, HAP or Energy Pro that will demonstrate compliance with Title 24. The calculations shall be done for each room and each system.
      2. Indoor and outdoor design conditions and other relevant data shall be in accordance with current ASHRAE publications.
      3. Provisions for internal heat gain from occupants and equipment within a space shall be as determined by LAUSD.
      4. A field survey of actual field conditions and assessment of current demand is required for existing facility projects such as modernization and equipment replacement. Submittal of an existing condition assessment report is required.
   b. When requested by the District, also submit calculations for equipment and system selection criteria such as life-cycle cost and energy analysis, duct friction and pipe friction loss calculations, fan and pump selection curves, heating and cooling coil selection data, chiller and cooling tower selection data, etc...
   c. The California Energy Commission’s (CEC) Certificate of Compliance for Non-Residential Buildings with the necessary backup forms shall be completed for submittal to the Division of the State Architect (DSA) and for review by the District. The Title-24 Compliance calculations shall be performed on the performance basis using the whole building approach, and integrating the building envelope, mechanical and electrical systems as designed, on a CEC approved program such as Energy Pro or Perform.

2. Ventilation and Outside Air Control
   a. Provide outside air to each room through the HVAC system in compliance with current CEC Standards and ASHRAE recommendations.
   b. Clearly indicate how outside-air is provided and how much for each HVAC unit. Also indicate with calculations how air is relieved from the building, on regular cycle and economizer cycle, to balance the fresh outside air make-up and maintain building pressures to assure compliance with CBC door closer settings for accessibility.
   c. Provide ventilation for electrical rooms with transformers.

3. Air filtration
   a. Provide air filters with a minimum efficiency of Merv 7. New schools constructed in areas with low outdoor air quality such as near freeways shall be provided with air filters of a minimum efficiency of Merv 11.
C. HVAC SYSTEM SELECTION

1. Criteria

a. HVAC systems shall be selected based on the following considerations:

   1. Project Characteristics that includes but not limited to the following:
      a. New building vs. modernization project.
      b. Construction Materials: Wood frame, concrete, steel or masonry construction.
      c. Single story vs. multi-story.
      d. Roof type: Flat vs. pitched.
      e. Building size and configuration.
      f. Building a new plant vs. building on an existing school site.
      g. Single building projects vs. multiple building projects.
      h. Operating Schedules.
      i. Location on site with regard to adjacent buildings and uses.

   2. Easy to install.
   3. Easy to operate and maintain.
   4. Energy efficient.
   5. Proven reliability.
   6. Designed upon well established principles, explicit approval shall be obtained from the district for experimental designs before commencement.
   8. Acceptable procurement lead time.
   9. As low an initial cost as practical.
   10. Low Operating cost.
   11. Low Maintenance cost.
   12. Lowest life cycle cost for highly energy efficient installations that incur a higher initial cost. The life cycle cost calculations shall be performed on an industrial standard program such as Trace 700 or DOE-2. The calculations complete with all input and supporting data shall be submitted to the district for review. The life cycle cost shall consider the incremental cost of building enclosure, structure, electrical service and other utilities as well as the HVAC systems. Cost estimates shall be made in an industry-recognized format and using manufacturer’s cost data or data from a nationally recognized source such as Means. Utility costs shall be as obtained from the
utility providers and shall include historical cost escalation trends. Maintenance cost shall include a breakdown of labor and materials for each piece of equipment or system component based on nationally recognized references.

15. Susceptibility to vandalism.
16. Degree of disruption of occupants during modernization.

b. Submit a system selection report (Design Intent Narrative) that addresses all the considerations above, based on the guidelines of Chapter 1, HVAC System Analysis and Selection, of the 2004 ASHRAE (American Society of Heating, Refrigerating and Air Conditioning Engineers) Handbook.

2. Overview of HVAC Systems

a. Decentralized Systems

Decentralized systems are systems where the primary source of cooling, heating or supply air is provided from independent sources scattered throughout a building or a campus. Decentralized systems may consist of the following:

1. Small Single Zone Type Unitary Systems:
   a. Packaged Rooftop Heat Pumps, Packaged Rooftop Air conditioning Units with gas heating, split system heat pumps, split system air conditioning units and wall mounted heat pumps or air conditioning units of less than 25 Tons capacity normally fall under the category of Small Single Zone Type unitary systems. Small Single Zone Type Unitary systems are usually controlled by a dedicated thermostat, but means of providing multiple zone controls for unitary systems, such as Carrier’s VVT controls systems, are available. Such systems are categorized under Small Single Zone Type Unitary Systems because they cannot heat and cool simultaneously.

   b. When single zone type unitary systems are provided for classrooms, one dedicated unit shall be provided for each classroom.

   c. Positive means for fresh air make-up and sufficient means of relief to maintain door opening and closing pressures that comply with CBC accessibility requirements must be provided for classroom units.

   d. VVT type controls may be used for administrative and support areas. With VVT type controls, rooms of dissimilar thermal profiles such as interior and exterior zones, north and south exposures, etc. shall not be served by a common unit.
e. Window- or wall-mounted units shall not be used for classrooms.

f. Rooftop packaged units are preferred over split systems.

h. Gas heating is preferred over air-cooled heat pumps.

i. Do not use heat pumps where 24 hours operation is required or where the ASHRAE Bin weather data indicates heating design temperatures below 40 degrees for more than an hour at a time during the normal hours of school operation.

2. Multi-Zone Type Unitary Systems:
   a. Roof-mounted, self-contained triple-deck multi-zone unit systems are categorized under Multi-Zone Type Unitary Systems.
   b. These systems are normally provided only for replacements.

b. Centralized Systems

Centralized systems are systems where the primary source of cooling and heating is provided from a central source for a building or a campus. Centralized systems may consist of the following:

1. Central chilled water plants:
   a. Central chilled water plants may be air cooled or water cooled.
   b. Water cooled systems are preferred over air cooled systems due to higher energy efficiency.
   c. Air cooled systems shall be used only where practical limitations exist for a cooling tower.
   d. Evaporative condensers are not allowed due to the tendency to lose efficiency rapidly from scale formation on the wetted tubes from hard water.
   e. Modular chillers are not allowed.
   f. A minimum of two independent chillers, working on lead lag, and associated accessories shall be provided for a campus wide central chilled water system.
   g. Campus wide central chilled water system shall be designed as variable flow constant temperature systems for energy savings and dehumidification effectiveness.
   h. The location of the central plant shall not be so remote that the energy savings of the water cooled chiller system is offset by the additional energy consumption of the pumps.
i. Cooling towers shall be located away from HVAC outdoor air intakes, openings into buildings and areas normally occupied by students.

j. The air delivery energy consumption can also offset the energy savings of the water cooled chiller system. Air delivery energy consumption is usually the largest energy consumption component of the building air conditioning system. Design the air delivery systems to limit energy consumption due to excessive duct friction. Also analyze the feasibility of using low temperature supply air systems to reduce energy consumption.

k. Do not use variable air volume systems for classrooms unless a means for ensuring that each classroom is adequately ventilated and that indoor air quality is maintained -- for example, by use of carbon dioxide monitors that are interfaced with the air-handling-unit controls to modulate the outdoor air intake dampers. (VAV boxes should be located outside the classroom area to reduce noise.)

2. Central boiler plants that provide heating hot water or steam.
   a. Hot water boilers are preferred over steam boilers. Steam boilers are normally provided only for replacements.

   b. A minimum of two independent boilers and associated accessories shall be provided for a campus wide central hot water system for redundancy.

   c. Hybrid Systems:

      Hybrid systems are systems where a common water loop for heating, condensing or heat exchange is provided from a central source for a building or a campus whereas primary cold or heat generators may be scattered throughout. Hybrid systems may consist of the following:

      1. Water source heat pumps
         a. Follow guidelines regarding location of cooling towers.

         b. A minimum of two independent cooling towers, two boilers and associated accessories shall be provided for a campus wide central condenser water system for redundancy.

      2. Geothermal heat pumps

         a. Obtain approval from the LAUSD’s Office of Environmental Health and Safety before using geothermal heat pumps.

      3. Large packaged roof top variable-air-volume units with heating hot water from a central boiler plant.

         a. In general, VAV units shall be limited to administrative or support areas and preferably not used for classrooms. If needed, review application and mitigation measures with the District.
3. Unitary vs. Central Systems Comparison

a. Although central systems frequently offer many advantages over unitary systems, when all factors have been weighted and evaluated, unitary systems are usually chosen for schools because of their lower initial cost.

b. Advantages of a Central System include:
   1. Central system equipment often has more technical advantages and capabilities
   2. The total installed cooling or heating capacity of a central plant is normally less than that of unitary equipment.
   3. The central cooling equipment offers better operating efficiency than unitary equipment.
   4. Longer life.
   5. Better temperature control.
   6. Lower noise levels.
   7. Better indoor air quality due to better air filtration flexibility.

c. Disadvantages of a Central System include:
   1. High initial cost.
   2. Need for more highly skilled maintenance and repair personnel.
   3. Larger space requirements.
   4. Entire system would be affected by the failure of one component. Larger areas would be shut down due to the failure of one large air handling unit. The failure of one chiller or boiler could reduce the cooling and heating capacity by half.
   5. Multiple source responsibilities for installation.
   6. Long lead times for obtaining equipment and replacement parts.
   7. After-hour or off-schedule operation is not usually convenient or efficient. The energy consumption and cost operating a cooling tower, a chiller and associated pumps to service a few hours of the after hours or holiday operation of a few classrooms could offset the annual energy and cost savings of the entire system.
   8. Even though the cooling (refrigeration) energy of a central plant is more efficient, the air moving energy is usually twice that of cooling energy in a typical school building. Some central systems are less efficient than unitary systems because the air distribution systems are not designed to be energy efficient.

d. For modernization or expansion of existing school plants, the addition of central systems is rarely cost effective. And, in modernization projects, carefully chosen and designed unitary systems can be installed with minimum disruption to the ongoing educational process.
D. CONTROLS AND ZONING

1. General
   a. Provide an automatic system of temperature control for all systems.
   b. Each classroom shall be a separate air-conditioned zone.
   c. Small rooms such as adjacent offices on the same exposure and other small spaces of similar thermal profile may be combined under one control zone. Zone control shall be located at the most representative space temperature location.
   d. A common air handling system shall not serve areas that are not on similar operating schedules.
   e. Thermostats shall not be located in areas that are accessible to unsupervised students after school hours such as classroom building hallways, corridors and lobbies.
   f. Thermostats in Gymnasiums shall be protected from possible damage from the impact of balls etc. or provide remotely located thermostats with temperature sensors in the conditioned space or return air ducts.
   g. All thermostats shall be provided with lockable vandal-resistant covers.
   h. Each unitary HVAC unit shall be provided with a factory preprogrammed school-type digital thermostat with a manual push-to-start switch. This switch shall also stop the unit when held for 30 seconds. The program shall enable the units to stay on after being started, on school days, until the end of the school day, unless they are manually turned off (to open operable windows or other reasons). For after-hours or off-schedule operation, the unit shall stay on for a preprogrammed duration after being started.
   i. Wireless controls are not allowed.
   j. For existing facility projects such as modernization and equipment replacement, replace existing pneumatic control systems with direct digital controls.

2. Environmental Control System
   a. Provide for all central heating and cooling systems a fully automated, integrated and programmable Direct Digital Environmental Control System for system control and energy management functions.
   b. Make provisions for the future addition of a Direct Digital Energy Control and Management System. For unitary equipment, provide a junction box in the conduit for each thermostat above the ceiling to allow the future installation of LAN cables for a daisy chained system.
   c. Integrate the ECS system with the Information Technology System when it is beneficial in cost or security measures.
   d. The specified ECS shall be an open system that is capable of interfacing with systems by other manufacturers.
e. Control system and equipment including provisions for future shall be fully presented in the contract documents and, when an ECS is specified, the ECS manufacturer shall furnish and install the complete system.

f. An override must be provided to by-pass the system in order to provide continuous service if service on the system is required during school hours.

E. AIR DISTRIBUTION

1. Ventilation and Outside Air
   a. Provide outside air to each room through the HVAC system in compliance with current CEC Standards.
   b. Clearly indicate outside-air provisions and flow rates for each HVAC unit, and relief provisions to balance the fresh outside air make-up and to relieve exhaust air in all operating cycles.
   c. Fresh Air Intakes:
      1. Locate fresh air intakes to prevent contamination from kitchen exhaust, garage exhaust, or any process exhaust by locating the intakes on the upstream (prevailing wind) side of exhaust openings, as distant as possible.
      2. Limit intake velocity to 750 FPM through net free louver area at 100 percent fresh air quantities to keep noise, pressure drop and rain carryover to a minimum.
      3. Provide a floor drain at the fresh air intake into larger air handling unit rooms.

2. Ducts
   a. Comply with current code and SMACNA Guidelines for duct construction. Thicker metal gauges for ducts and hanger straps, as specified in the Guide Specifications, must be used for exposed ductwork and other special considerations.
   b. Size ductwork for conditioned air on equal-friction method based on 0.08" WC per 100 feet with a high velocity limit of 1,000 FPM above occupied areas (850 FPM for unitary equipment above classrooms) and 1,500 FPM inside shafts, or as directed otherwise by the Project Acoustical Consultant. Changes in sizes at every branch or every interval are not warranted economically unless branch represents a substantial percentage.
   c. Size return-air and exhaust air ducts on equal-friction method based on 0.08" WC per 100 feet with a high velocity limit of 1,000 FPM above occupied areas (850 FPM for unitary equipment above classrooms) and 1,500 FPM inside shafts or as directed otherwise by the Project Acoustical Consultant.
d. Allowable air velocities for ducts above acoustically sensitive areas shall be determined by an Acoustical Engineer.

e. Duct return air, Ceiling-plenum return is not allowed, in order to improve indoor air quality.

f. Sound attenuators or lined ducts should be installed on inlet and outlet side of fans, and between fans and ducts, to prevent fan noise entering rooms through the duct system. Do not locate duct sound attenuators inside the building above (the ceiling of) occupied spaces where the breakout noise will increase indoor sound levels above acceptable limits.

g. Fire dampers or combination smoke-fire dampers must be installed in all ductwork as required by the State Fire Marshal. Indicate damper locations clearly on drawings. Provide disconnect switches for automatic fire dampers.

h. If used Indicate the location of duct smoke detectors used for shut down of larger HVAC units and combination smoke-fire dampers clearly on the floor plans. Coordinate with the project Electrical Engineer to take advantage of total coverage smoke detection systems and save the duplicate cost of installing smoke detectors separately for the HVAC system.

3. Air Inlets and Outlets

a. Select and layout supply-air outlets and exhaust and return-air inlets in accordance with current ASHRAE Guidelines and acoustical requirements.

4. Fans

a. Select fans to minimize noise and to meet noise level criteria in occupied spaces.

b. Provide direct drive fans for smaller exhaust fans of the centrifugal roof exhauster, ceiling, inline or cabinet type.

c. Special Exhaust Fans: Exhaust from kitchen hoods, fume hoods, kiln hoods, spray booths, and dust and sawdust collection systems require special attention to construction details, explosion hazards, noise and location.

   1. Roof fans handling exhaust from kitchen hoods require a shaft seal and a special insulated plate to separate fan from motor compartment.

   2. Fans exhausting fume hoods require spark resistant construction, and special coatings to prevent chemical action on fan and housing. The motor shall be explosion proof and located outside of the air stream.

   3. Fans exhausting paint spray booths require spark resistant construction. The motor shall be explosion proof and located outside of the air stream.
d. Pre-fabricated duct collection systems shall be used for removal of saw dust in wood shops.

e. Exhaust from kiln hoods requires special fans with force-vented motor compartment and special construction to withstand high temperature.

5. **Economizers for Outside Air**

a. **General:**

1. The California Energy Commission prescribes 100% outside-air economizers for equipment with supply-air capacities over 2,500 cfm or 6.25 tons cooling capacity. That is the usual low limit for satisfactory payback at locations where weather conditions are least conducive to 100% outdoor air economizer operation with fan-assisted relief. For units of 7 ½ tons capacity and higher, which are usually used for administrative areas, multi-purpose rooms and gymnasiums, the District requires outside-air economizers and recommends power-exhaust systems.

2. The District also prefers 100% outdoor-air economizers for classroom small rooftop unitary systems (3, 4 & 5 Ton capacities) to achieve energy savings and to more easily comply with CHPS Energy Prerequisite 1 and IEQ Credit 4.2 (both for the ability to more effectively flush out the building prior to occupancy and for the increase in fresh air during the economizer cycle). However, they are to be used with gravity relief of exhaust air, not with power exhaust systems. Small split systems are not required to be provided with 100% outdoor air economizer systems. Do not provide 100% outdoor air economizers when the outdoor air quality is low or when the outdoor ambient sound level is higher, such as for schools that are very close to a freeway. Also, economizers may be omitted when the CHPS Energy Prerequisite could be satisfied through other measures and the incorporation of gravity relief openings into the Architecture imposes substantial hardship.

3. Power exhaust is not recommended for small unitary systems for several reasons. First is capital cost and energy-cost savings:

   a. The maximum cost of a typical 4-ton rooftop gas-electric HVAC unit is about $4,000 (plus installation). The cost of a power exhaust accessory for these units is about $4,000. This is a substantial increase in construction cost per classroom, and the energy savings will be substantially less because of the energy consumed by the exhaust fan.

   b. The cost of a gravity-relief economizer is about $700, so the cost justifies the benefit.

4. In addition, the noise generated by the power exhaust fan adds to the classroom sound level.

5. Further, the differential pressure sensors in a power exhaust system require frequent calibration, increasing maintenance costs.
b. Design Criteria for Economizers and Gravity Relief Systems:

1. For small rooftop unitary systems, provide units with downward duct discharge, and with manufacturer-installed and warranted economizer equipment.

2. The total pressure drop through the relief system shall not exceed 0.075” water gauge.

3. Relief Louver size: The pressure loss through the louvers should not exceed 0.02” water gauge static pressure. Catalog data indicates that the majority of the commercially available louvers will have about 0.02” water gauge static pressure drop at about 250 feet per minute free area velocity.

4. Ceiling Grille size: The pressure loss through the grilles should not exceed 0.02” water gauge static pressure. Catalog data indicates that the majority of the commercially available registers will have about 0.02” water gauge static pressure drop at about 300 feet per minute free area velocity.

5. Duct size: The relief duct should be sized for 0.01” water gauge static pressure loss per 100’ of ductwork maximum for 100% of the unit capacity. The relief duct pressure loss should not exceed 0.01” water gauge static pressure.

6. Backdraft dampers. Provide the counter-balanced type that opens at about 0.01” water gauge static pressure. Check if they are opening properly and not stuck in the closed position. The total pressure loss through the damper should not exceed 0.02” static pressure.

7. The pressure loss through each component of the system is required to be adjusted so that the total does not exceed 0.075” water gauge static pressure.

c. Commissioning Measures

1. Air Balance: Systems must be balanced for both the regular and economizer modes.

a. Most unitary systems are specified with a safety factor in the static pressure. The Contractor must be required by the specifications to replace the drive sheaves and slow the fan down to achieve the required air balance and prevent energy waste and noise. If this is not done, the air flow is left higher creating higher static pressure and noise levels, as well as excessive pressure on doors and door closers.

b. If the system is not also balanced for the economizer mode, when the outdoor air dampers open fully much more air is delivered than the design capacity.

2. Corridor pressure: If the corridor HVAC unit is off, or the corridor unit is not in the 100% economizer mode when the classroom is operating on the economizer cycle, the corridor
pressure will be lower than normal operating conditions, further contributing to the door-closing difficulty. Design system to prevent this occurrence.

3. Door closer pressure: During testing and balancing, door closer pressures must be set properly and not too low just to more easily achieve access compliance.

4. Remedial Measures for Incorrect Design:
   a. If gravity relief is not sufficient during the 100% outdoor air economizer operation after the above commissioning is done, the maximum operation of the return and relief dampers in the economizer system should be adjusted to reduce the amount of outdoor air and return some air to the unit. An 80% outdoor air system is still more energy efficient and conducive to fresher indoor air than a minimum outdoor air system with 30% outdoor air. If this is not possible, the economizer operation is required to be deactivated.

F. COILS AND PIPING

1. Cooling Coils and Piping
   a. Use maximum 550- FPM face velocity for the calculated quantity of air passing through direct-expansion cooling coils and chilled-water cooling coils.
   b. Pipe all cooling coils for counter flow of refrigerant against direction of airflow for most effective heat transfer. Chilled water or refrigerant shall enter on the airflow downstream side of coil and work through rows opposite the airflow. Design for water to enter at bottom and exit through top connection of the coil to relieve possible air binding. Install air vents at top of return riser.
   c. Use 2-way control valves to provide a variable-flow chilled water system. Provide variable-speed drives at the pumps to save energy where economically feasible. Provide 3-way valves at the end of each pipe loop for continuous water circulation. Provide a sufficient number of 3-way valves to maintain the minimum flow requirements of chillers. Provide multiple chillers so that they may be staged.
   d. Variable speed drives must be provided for the secondary pumps in primary - secondary chilled water systems.
   e. Provide all coil sections with thermometers, a 3/4" globe drain valve piped to floor drain at system low point, a water strainer ahead of control valve, and gate valves in main chilled water supply and return for shutoff and repair of control valves.
   f. All valves, fittings, strainers and pipes (up to the coil) shall be the same size, except for control valves which shall have reducers at valve inlets and outlets. Provide flexible connections at inlets and outlets to coils.
g. Provide Griswold Flow Control valves or equivalent at the inlet side all cooling coils downstream of the shut-off valves. Clearly emboss flow rating on a metal plate fixed on valve housing.

h. Provide a venturi flow measurement device, Barco-aeroquip or equivalent, on main chilled water line. Clearly emboss flow requirement on a metal plate fixed to venturi housing. Show direction of air flow through coils on diagrams.

i. Size chilled water coils on a basis of 12°F to 16°F water temperature rise.

j. Use direct expansion (DX) coils where close temperature control is not required; otherwise, use chilled water coils. DX coils make control of cold plenum temperature erratic and present operational difficulties.
   1. Provide as many steps of capacity with solenoid valves as possible and use individual suction risers with oil traps.
   2. Pipe liquid lines with stop valves, strainers, solenoid valves, and external equalizing thermal expansion valves.
   3. Install sight glasses ahead of thermal expansion valve to observe a premature flashing condition.

2. Heating Coils and Piping
   a. Size heating coils at 700 FPM maximum.
   b. Use hot water as the preferred heating medium rather than steam because of relatively poor heat distribution across face of a steam coil, particularly on low heat demand.
   c. Use 2-way control valves to provide a variable-flow hot water system. Provide variable-speed drives at the pumps to save energy where economically feasible. Provide 3-way valves at the end of each pipe loop for continuous water circulation. Provide a sufficient number of 3-way valves to maintain the minimum flow requirements of boilers. Provide multiple boilers so that they may be staged.
   d. Arrange heating coils for counter flow and upward flow for best heat transfer and natural venting. Tailor coils for each project with sufficient allowance for warm-up and fresh-air load.
   e. Size water coils for 20°F minimum water temperature difference, and entering water temperature of 180°F. Piping to hot water coils shall be the same as that required for the chilled water coils.

G. COOLING SOURCES

1. Refrigeration Systems
   a. Direct Expansion (DX) Systems, because it is difficult to obtain modulating control of capacity, should be used only for single-zone units and other applications where modulation is not necessary.
b. Chilled Water Systems should be used for most multi-zone units and larger systems, where more precise control and better modulating capacity control is needed.

c. Package-type units with compressor, chiller, condenser, and controls all provided as a unit should be used when possible to simplify installation.

d. An absorption type machine may be considered only if steam is available from a central plant that will be operating during summer or special gas incentives are available.

e. Machines should be piped for parallel flow.

f. Size piping at a friction loss of 5 feet of water per 100 feet of pipe maximum with maximum velocity not to exceed 9 feet per second.

g. Select evaporators and condensers so water velocity through tubes is 9 feet per second maximum.

h. Thermal energy storage systems and co-generation systems shall be considered only when substantial incentives are offered by the utility providers to offset the additional cost.

2. Chilled Water Pumps:

a. Size pumps for the total pressure drop through the system, including piping, chiller evaporator, coil, three-way control valve and "Griswold" flow control valve.

b. Use two chilled water pumps in parallel for large systems of more than 75 tons, or where a critical operation needs a standby. Design system for 100% capacity with both pumps operating; so one pump will then provide 75 to 80% of capacity.

c. Use end-suction, pedestal-mounted pumps with mechanical seals and flexible couplings for all except very large systems, where it may be necessary to use double suction pumps.

d. Install a gate valve and strainer on the suction side and a balancing cock on the discharge side of each pump, and a chemical feeder from the supply to return line.

e. Bolt pumps directly to a concrete base unless located over or under a critical occupied space, when they should be mounted on inertia anti-vibration bases. Install flexible connections in piping to pumps.

3. Cooling Towers

a. Size cooling towers for 120% to 150% of required capacity, to guarantee full capacity from chiller at any wet bulb conditions and to allow for fouling of tower.

b. Provide a bleed-off system and a chemical feeder to prevent mineral build-up and to maintain water quality.

c. Provide for make-up water to replace evaporation and bleed.
d. Locate cooling towers to avoid unsightly conditions and so that noise generated by fan will not be objectionable in adjoining buildings. Provide louvered screens, masonry walls, or planting for concealment.

e. Locate cooling towers so that the discharge air from the cooling towers will not contaminate air handling unit outdoor air intakes, openings into the building and pedestrian or student occupied areas to minimize the possibility of Legionnaires’ Disease.

4. **Condenser Water Pumps:**

a. Use two condenser water pumps in parallel for large systems of more than 100 tons, or where a critical operation needs a standby. Design system for 100% capacity with both pumps operating; so one pump will then provide 75 to 80% of capacity.

b. Size pumps for the actual capacity of the chiller requirements -- approximately 3 gpm per ton of refrigeration.

c. Design condenser water piping the same as for chilled-water piping. Make sure that cooling tower elevation or suction pipe sizes are adequate to provide a positive suction head at the pump.

H. **HEATING SOURCES**

1. **Boilers**

a. Use Low Nox hot-water boilers to avoid expense of heat exchangers.

b. Use two or more gas fired package-type boilers, cast-iron or steel water-tube with burner and controls all mounted as a unit, for larger systems and one for smaller systems.

c. Operate at 180°F to 200°F minimum with a temperature drop of 30°F maximum to prevent condensation of flue gases in breeching and stack.

d. Provide a combination low-water-cutoff and boiler-feed control with alarm mounted above centerline of boiler relief valve discharge. Connect boiler feed to full domestic cold water line pressure, taking care to see that CW pressure is greater than boiler operating pressure.

e. Pipe blowdown from low-water control and feeder to a hopper drain located adjacent to boiler.

2. **Central Boiler Plant**

a. Steam from a Central Plant should be used if available. Provide heat exchanger to convert steam to hot water for heating buildings.

3. **Hot Water Heating System**

a. Circulating System:

1. When using a heat exchanger for one coil bank, use a single pump to circulate a constant quantity of water through coil and heat
3.6 HVAC

1. For larger systems, where more than one coil bank is served by one heat exchanger or where a hot-water boiler is used, use a primary reverse-return hot-water heating system wherever economically feasible. A secondary circuit and secondary pump at each heating unit or coil bank should be used if close temperature control is required. Secondary pump should circulate a constant quantity of water through heating coils. In most instances, though, a secondary pump is not required.

2. Supply water at 180°F with a 20°F temperature drop minimum.

b. Pumps:

1. Use two pumps in parallel on primary circuit for all but very small systems. Design system for 100% capacity with both pumps operating; one pump will then provide 75 to 80% of capacity as standby.

2. If close temperature control is required, select circulating pumps first and size piping to fit available pump head. In most cases, this will permit use of pipeline-mounted pumps for all secondary circuits. Close temperature control is usually not required and secondary circuit pumps are usually not necessary.

3. Use end-suction, pedestal-mounted pumps with mechanical seals and flexible couplings for all except very large systems, where it may be necessary to use double suction pumps.

4. Bolt pumps directly to a concrete base unless located over or under a critical occupied space, when they should be mounted on inertia anti-vibration bases. Install flexible connections in piping to pumps.

c. Piping:

1. Design for water velocity of 8 feet per second maximum, with pressure drop 5 feet per 100 feet of pipe maximum.

2. Arrange piping so heat source, expansion tank and cold-water make-up are on suction side of pump as indicated in latest ASHRAE handbook, Systems Volume.

3. Install a small chemical feeder on each system.

d. Expansion Tanks:

1. Size expansion tanks in accordance ASHRAE Guidelines, for 100 psi ASME Code working pressure. Expansion tanks shall be of the bladder or diaphragm type.

e. Relief Valves:

1. Provide ASME Code-rated relief for maximum heat input to hot water boiler.
2. For steam heat exchangers, capacity for relief valve may be sized for 25% of heat output providing steam pressure to heat exchanger is not greater than working pressure of weakest component in system.

3. Relief setting is limited to boiler working pressure or working pressure of weakest component in system.

4. Pipe discharge to 12" maximum above floor.

f. Air-Vent Valves:
1. Provide manual air vent valves at all high points in system or wherever air might be trapped in system. Locate valves on drawings.

4. Steam Heating System
a. Steam may be used for a single-zone heating and ventilating unit piped directly to steam coil. Steam pressure available is normally 10 psi and steam valve sized for approximately 7 psi pressure drop at full load.

b. Use steam distributing-type coil sized on 2 psi steam supply. All coils and other steam-heated equipment should be located so they can be drained by gravity to receiver of condensate pump. Use condensate pumps and avoid vacuum pumps.

c. Design steam and condensate piping systems to accommodate capacity and other requirements of equipment to be served and to allow for future expansion.

d. Steam and Condensate Piping:
1. Size piping in accordance with the ASHRAE Fundamental Handbook.

2. Design steam so total pressure drop in steam line does not exceed 20% of initial pressure.

3. After establishing total pressure drop, determine allowable loss per 100' of equivalent pipe. For radiator systems having a number of fittings, assume equivalent length to be twice the measured length. For coil systems having a small number of fittings, assume equivalent length to be 1-1/2 times measured length.

4. Pitch steam mains down in direction of steam flow ½ " in 10'.

5. Drip all low points of steam mains through suitable traps. Provide a schedule of steam traps indicating pounds of condensate per hour, differential pressure, operating pressure, and type of trap. Oversize traps 2 to 5 times the hourly rate of equipment to allow for pickup and intermittent operation of trap.

6. Size branches to heating equipment according to charts supplied and as directed by District.
7. Slope branches back toward main not less than 1" in 10'. Where runouts or branches are over 10' long, make them one size larger than indicated on chart. Do not use bullhead connections.

8. Design for thermal expansion using expansion loops in preference to expansion joints wherever possible. Divide piping into sections with anchor points at the beginning and end of each section, and at the boiler and major pieces of equipment. Calculate the stress on the piping in each section and add expansion joints if the allowable piping stress is exceeded.

9. Where steam mains must be pitched so that condensate flow is counter to direction of steam flow, check allowable steam velocity and oversize pipes in accordance with ASHRAE Fundamentals Handbook.

10. Design condensate piping for gravity flow to receiver of condensate pump.

e. Condensate Pumps:

1. Use duplex condensate pumps sized so one pump will handle load running one-third of time with other pump as standby. Provide a mechanical alternator to alternate pump operation and to activate second pump in case first cannot handle load.

2. Design system so that condensate pump receiver is below all traps and equipment to obtain gravity flow. Elevate equipment such as heat exchangers and hot water tanks so they are higher than pumps.

3. Design pump to meet all discharge pressure requirements, including piping friction losses, vertical lift to elevated receivers or feed water heaters, and the intermittent discharge of other pumps into the same piping system.

5. Cold Water Make-Up

a. Cold water make-up to boilers, hot-water, chilled-water, and condenser-water systems should be made from a common line which has a reduced pressure backflow-prevention device installed under plumbing work.

b. Install a gate valve, strainer and check valve at make-up connections to closed systems, except that make-up to combination boiler-water feeder and low water cut-off on boilers should be full line pressure.

c. Provide water treatment for all closed heating and cooling systems and at all cooling towers.
I. **SOUND AND VIBRATION CONTROL**

1. **Criteria**
   
a. Because mechanical systems and equipment are a major source of disturbing noise within buildings, sound and vibration control measures must be incorporated to the maximum extent economically practical. In general, refer to current ASHRAE guidelines, District Guide Specifications, chapter 2.4 “Environment and Sustainability” of this Guide, and the following recommendations.

b. Since the District desires to achieve noise levels from HVAC systems better than 45 dBA, especially in instructional spaces, plan and describe in the “Basis of Design” narrative how this improved acoustical quality will be achieved together with the associated cost impacts.

2. **Equipment Sound Levels**
   
a. Schedule the sound level of the design base HVAC equipment on the drawings. These sound levels must be at the design conditions and tested per applicable current standards such as ARI Standards 260, 270, 370 and AMCA 300.

3. **Duct and Fan Noise**
   
a. Ductwork:
   
1. Use ducts of thicker sheet metal gauge and sound attenuators to reduce fan and equipment noise. Lined ductwork may be used when recommended by the Project Acoustical Engineer. Duct lining, acoustical panels in ductwork and sound attenuator media when used shall be of the type that inhibits the growth of mold, mildew and fungi and shall not contain harmful VOC’s or contain glass fiber.

2. Provide flexible connectors for ducts at fan connections

3. Do not locate sound attenuators above spaces where the self generated noise of the attenuator will increase the space sound level above requirements.

b. Fans:
   
1. Fan-noise in occupied spaces is typically caused by poorly constructed roof fans, roof fans operating at too great a tip speed, fan noise traveling through air intake louvers and then into adjoining spaces, and fan noise traveling to occupied spaces through inadequately treated return systems. Fan noise also comes from rooms without sound-attenuating walls or from roof-top units with inadequate sealing of roof openings and duct chases.

2. Locate fan and equipment rooms away from classrooms and other noise-sensitive spaces.
3. Make fan and equipment room walls of dense material, poured concrete or concrete block with all voids filled where feasible – or sound-attenuating walls of studs and gypsum board.

4. Provide details to assure adequate sealing of duct penetrations through roof or mechanical equipment room walls.

5. At roof fans exhausting from ceiling plenums over occupied areas, provide a sound attenuator installed at fan inlet.

4. Equipment Mounting and Isolation
   a. For roof-top HVAC units, no roof penetrations are allowed except the minimum necessary for ducts and electrical conduit. All such openings shall be acoustically sealed with acoustical sealant. In addition, beneath the units provide a sound-isolation barrier of a close-fitting layer of ¾” waterproof plywood or cement board, sealed with acoustical tape to the curb.
   b. For fans over 24" provide inertia type concrete bases with spring isolators. For smaller fans provide spring-type vibration isolator rails under fan and motor.
   c. Floor-mounted pumps shall be bolted directly to concrete bases and shall have flexible pipe connections, except when located over or under an occupied area where noise could be transmitted by piping or building structure to occupied space. In this case, they shall be mounted on inertia type concrete bases with spring-type vibration isolators and shall have flexible connections rigidly anchored and braced to prevent elongation of the flexible connections.
   d. Air compressors shall be mounted on spring-type vibration isolators, except larger sizes shall also have concrete inertia bases and flexible pipe connections.

5. Pipe, Conduit and Duct Connections to HVAC Equipment
   a. Pipe, duct and electrical conduit connections to HVAC equipment with rotating or reciprocating components shall be provided with flexible connectors.
   b. Provide spring, neoprene or rubber in shear type hangers as required for pipes and ducts near connections to HVAC equipment that are located near or serve acoustically sensitive spaces as directed by an acoustical engineer.

6. Classroom HVAC Sound Control:
   a. To meet District standards, HVAC systems must be designed so that noise from the system does not cause the ambient noise in a classroom to exceed the level of 45 dBA as measured in accordance with ANSI Standard 12-60. Make design recommendations to the District to achieve a lower sound level, within reasonable economic limits.
b. ASHRAE recommended design criteria for classroom HVAC sound control is Noise Criteria (NC) Curve NC-35. An HVAC system will probably meet the District 45 dBA criteria when no portion of octave-band spectrum of noise lies above NC-35 curve. (This is approximately equivalent to a sound level of 45 dBA from a standard sound level meter reading.)

c. Refer also to chapter 2.4 “Environment and Sustainability” of this Design Guide for additional standards and reference to CHPS Best Practices.

J. SPECIAL CONSIDERATIONS

1. HVAC and Refrigeration for Food Service:
   a. Kitchen ventilation systems shall comply with the current CMC requirements.
   b. The basic design concept of the Kitchen Ventilation Systems shall be in accordance with the District Standard Design. Drawings for these standards are available from the Design Manager upon request.
   c. The kitchen ventilation system shall be capable of maintaining the kitchen temperature above 68 degrees F during heating and below 80 degrees F during cooling.
   d. The kitchen ventilation system shall operate at a lower speed to deliver less air (only the amount necessary to maintain the room temperature) in order to conserve energy when the kitchen hood exhaust fans are off.
   e. Locate control switches for HVAC equipment to prevent unauthorized use.
   f. Kitchen Hoods:
      1. Provide U.L. listed stainless steel hoods of the 100% exhaust type. Short circuit hoods where make up air is introduced directly into the hood are not allowed.
      2. Provide a State Fire Marshal approved fire protection system inside hood.
   g. Refrigeration Equipment For Walk-In Refrigerators:
      1. The District does not provide standby refrigeration equipment for walk-in boxes, so accessibility is critical for repairs.
      2. Do not locate in areas difficult to reach or service. Best location is a shaded area outside at grade level.

2. HVAC for Science Classrooms
   a. Science classrooms include chemistry, physics, biology, physiology, physical earth, and earth science study facilities, flexible science labs, preparation/workrooms next to labs.
b. Where hazardous or toxic substances are used in the classrooms, special precautions must be taken, including the following:

1. Direction of airflow must be controlled to prevent spread of airborne contaminants and to protect personnel from exposure to toxic and hazardous substances.
2. If contaminants are exhausted to the atmosphere, the exhaust air must be treated.
3. Exhaust 100% of air supplied with no re-circulation.
4. Maintain constant airflow volume with exhaust operating at full capacity.
5. Air supply system must satisfy thermal requirements and provide necessary air balance.

c. Exhaust system:

1. Exhaust fans must remove a fixed air quantity from each hood. Hoods that have doors must have individual bypasses for air volume and face velocity regulation.
2. Exhaust system may consist of an individual fan for each hood or a fan serving a group of hoods.
3. Determine if there is a need for off-hour operation of hood exhaust system, and design the system accordingly.
4. Locate exhaust fans near the point of discharge to atmosphere so ducts will be under negative pressure and any leakage will be into duct.
5. Locate discharge openings with respect to fresh air intakes to avoid re-circulation.
6. Exhaust ducts and fans must be of non-corrosive construction. Motor shall be explosion proof. In all cases, follow the hood manufacturer's recommendations for exhaust fan sizing and system design.
7. Provide fire rated enclosure or fire wrap around fume hood duct, as required by applicable codes, when duct crosses other areas.

3. HVAC for Computer Rooms:

a. Provide HVAC to MDF, IDF, and any other computer rooms having special requirements for temperature and air-quality control.

b. The computer room HVAC units shall be for 24 hours operation, independent from the central system.

4. HVAC for Arts Classrooms:

a. Photography Classrooms: Supply dark rooms with 100% outdoor air for control of odor. Since air must be extremely clean to avoid spotty film, use high-efficiency filters. Duct systems into dark rooms must be light tight.
b. Art Classrooms: Provide 100% exhaust system, minimum six air changes to remove fumes from cleaning solvents, etc.

c. Ceramic Classrooms: For kiln, products of combustion must be removed, and a source of combustion air provided for indoor, gas-fired models. Since they emit large quantities of heat, that load must be considered in HVAC design. Provide 100% exhaust system, minimum six air changes to remove fumes from cleaning solvents, etc.

5. HVAC for Industrial Arts Classrooms:

   a. General:

      1. Industrial Arts Classrooms are spaces provided for instruction in construction, maintenance, and repair of industrial products. In addition to California Code of Regulations, Title 24, refer to CCR, Title 8 - “Industrial Relations” for additional design criteria.

   b. Power Energy Technology:

      1. Power Energy Technology shops require large amounts of heat to replace losses through large and frequently opened doors.

      2. Since work is often done underneath the automobile or other equipment, floors should be kept warm by radiant heaters or other devices.

      3. Provide an under-floor carbon monoxide exhaust system to remove engine exhaust gases.

      4. If a paint spray booth is installed, it must be exhausted in a safe manner. Makeup air to spray booth must be tempered for best painting results.

      5. If a steam cleaning area is provided, it must be exhausted.

   c. Construction Technology Shops:

      1. Dust produced in wood working operations is both a health and fire hazard. In smaller installations, a packaged dust collector using a vacuum cleaner principle may be provided. Large groups of wood working machines will require a ducted, central collection system with a centrifugal separator. In either case, collection equipment must be located so that disposal of collected dust is easy and economical. Dust collection system should include the following:

         a. Exhaust pipe system including dust collector and skimmer are covered in Guide Specifications for use in Senior and Junior High Schools.

         b. Avoid under-floor piping, if possible.

         c. Keep flexible exhaust piping to a minimum. Where flexible piping is used, a non-collapsible type of piping should be installed.

         d. Drop exhaust piping along columns or walls.
e. Note minimum height of hopper outlet for placement of 55-gallon drums.

f. Note maximum height of exhaust piping inlet to dust collector on existing building where exhaust piping may penetrate existing building window.

g. Coordinate exhaust piping with suspended light fixtures which are free to swing a minimum of 45 degrees from vertical in all directions.

h. Provide seismic restraints for exhaust piping per provisions of NFPA pamphlet 13.

i. Refer to standards and requirements of ACGIH Industrial Ventilation - A Manual of Recommended Practices -- AMCA, and SCAQMD, as applicable.

2. If spray painting is to be done, a bench type or floor type spray booth should be installed.

3. Heating system must be large enough to accommodate outdoor air introduced to equal exhaust.

d. General Manufacturing Shops:

1. General manufacturing shops may contain high-heat producing equipment such as furnaces and ovens. These must be shielded or ventilation must be provided to control local environment.

2. Welding and soldering operations produce toxic fumes which must be removed through hoods or other local exhaust.

3. Dip tanks and plating tanks must be hooded to prevent spread of toxic vapors.

6. Underground Parking Ventilation

a. Ventilate underground parking areas continuously by forced air exhaust systems in compliance with current codes.

b. Provide carbon monoxide monitors to control the exhaust fans and to annunciate an alarm on high CO levels as required by code.

c. Do not provide exhaust ducts outside garage fan room, unless garage is very large and odd in shape, thus requiring some ducts. Locate fan in fan room or enclose fan with chain link fence for vandal protection.

d. Assure that exposed ducts or equipment are protected by bollards or other enclosure.

7. Restroom Ventilation

a. Provide a minimum of 10 air exchanges per hour in restrooms.

b. Provide conditioned air to multi-occupant restrooms utilizing relief air from large adjacent classrooms with backdraft damper.
c. Toilet exhaust duct shall be routed to the roof. Sidewall toilet exhaust is prohibited.

d. Toilet exhaust fans smaller than 1000 CFM are preferable to be direct drive.
3.7 ELECTRICAL POWER AND LIGHTING

A. GENERAL REQUIREMENTS

B. LIGHTING SYSTEMS

C. ELECTRICAL POWER SYSTEMS

D. EMERGENCY POWER SYSTEM
3.7 ELECTRICAL POWER & LIGHTING

A. General Requirements

a. Life safety and preservation of property are two critical factors in the design of the Electrical System. Safety to personnel cannot be compromised and only the safest systems must be considered.

b. For existing facilities the Architect-Engineer shall procure from District all available electrical drawings and underground utility plans. Other site plans or site information that may exist are available in the District office for consultants’ research. The Architect-Engineer must visit the site to verify plan information against site conditions to obtain information not indicated on the drawings. New designs shall reflect existing conditions and applicable modifications made to address the project’s requirements.

c. Off-site work or work within easements shall be designed in accordance with the requirements of the agency having jurisdiction.

d. All power wiring shall be in conduit or raceways. Low-voltage communication or signal wiring shall be continuous without splices between devices, and shall be in conduits or raceways.

e. Electrical receptacles and light switches shall be located to allow easy access by users, reflect probable area(s) usage, and equipment locations. Receptacles or switches serving equipment must be accessible, and located in compliance with CEC requirements.

f. Provisions shall be made for wire management of power cords accessing the receptacles and shall be coordinated with the work surfaces, counters, cabinetry, storage units, etc.

g. All panels and control equipment must be readily accessible.

h. The District “Guide Specifications” complement the “Design Guide” and must be reviewed concurrently with these criteria.

i. Avoid running conduit on the roof unless it is absolutely necessary, the length of conduit run shall be minimized and installation shall be detailed appropriately to accommodate roof replacement.
B. Lighting Systems

1. General Guidelines

   a. Lighting design shall conform to California Energy Commission Energy Efficiency Standards for nonresidential buildings, and shall achieve greater efficiency in accordance with the requirements described below.

   b. Lighting design shall comply with guidelines and follow recommendations and procedures of the Illuminating Engineering Society of North America (IESNA) in its “Lighting Handbook” and “Recommended Practice on Lighting for Educational Facilities, ANSI/IESNA RP-3-00,” as well as other documents referenced herein.

   c. Refer also to alternative design approaches and daylighting requirements presented in the “Environment and Sustainability” section of the “School Design Guide.”


   e. Provide uniform light distribution in all learning and working spaces. Interior lighting systems shall provide illumination without discomfort caused by glare. Consider reflectance of room surfaces and coordinate with architectural finishes.

   f. Avoid harsh or extremely bright lighting. Minimize veiling reflections in task details.

   g. Utilize daylighting to the maximum extent feasible in all spaces, integrated with electric lighting and photo sensors to reduce electricity use.

   h. Utilize high color-rendering source in which appearance of people and spaces is enhanced.

   i. Consider maintainability of lighting system, including susceptibility to dirt collection, ease of cleaning and relamping.

   j. Provide in all display cases lighting to illuminate each shelf and back individually.
2. **Illumination Criteria**

In general, design to achieve the following maintained average foot-candle levels on the task plane at levels not lower than those indicated below, unless alternative lighting designs are submitted and approved by the District that demonstrate compliance with these criteria.

### Interior Spaces:

<table>
<thead>
<tr>
<th></th>
<th>Foot Candles</th>
<th>Light Source</th>
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</thead>
<tbody>
<tr>
<td>a. General Classrooms (See special section covering all classrooms):</td>
<td>30-50</td>
<td>Linear Susp. Fluorescent</td>
</tr>
<tr>
<td>b. Science and Technology Classrooms:</td>
<td>30-50</td>
<td>Linear Susp. Fluorescent</td>
</tr>
<tr>
<td>c. Shops and Drafting Classrooms:</td>
<td>50</td>
<td>Linear Susp. Fluorescent</td>
</tr>
<tr>
<td>d. Library:</td>
<td>30</td>
<td>Linear Susp. Fluorescent</td>
</tr>
<tr>
<td>e. Auditorium (higher level is for lecture/testing uses):</td>
<td>30</td>
<td>Halogen/Fluorescent</td>
</tr>
<tr>
<td>f. Multi-Purpose Room:</td>
<td>30-50</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>g. Gymnasium (see special section):</td>
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<td>Fluorescent</td>
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<tr>
<td>h. Locker, Exercise and Weight Rooms:</td>
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<tr>
<td>i. Dining Areas (on dimmers):</td>
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<td>j. Food Preparation Area:</td>
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<td>Fluorescent</td>
</tr>
<tr>
<td>k. Custodial Rooms:</td>
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<td>Fluorescent</td>
</tr>
<tr>
<td>l. Offices:</td>
<td>30-50</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>m. Corridor/Stairways (1 FC min. Emergency Exit Lighting):</td>
<td>10</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>n. Restrooms:</td>
<td>10</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>o. Parking Garage:</td>
<td>5</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>p. Parking Garage Entry Zone (Daytime Only):</td>
<td>50</td>
<td>Fluorescent</td>
</tr>
<tr>
<td>q. Machinery and Equipment Rooms:</td>
<td>50</td>
<td>Fluorescent</td>
</tr>
</tbody>
</table>

### Exterior Spaces:

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<table>
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<tbody>
<tr>
<td>a. Building Exterior (Walks, General Areas):</td>
<td>2</td>
</tr>
<tr>
<td>b. Exterior Corridors (Covered Walks):</td>
<td>10</td>
</tr>
<tr>
<td>c. Parking Lots:</td>
<td>1 min.</td>
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<tr>
<td>d. Athletic Fields:</td>
<td></td>
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</tbody>
</table>

*Refer to “Guide Specifications” for lighting levels.*
3. **Specific Lighting Criteria**

a. **Classroom Lighting Systems**

1. Follow the recommendations of the Southern California Edison’s “Classroom Lighting Guidelines,” except as modified herein.

2. Classroom lighting shall be an integrated combination of daylighting and electric lighting providing energy conservation through lighting controls. (See also the “Environmental and Sustainability” section of these guidelines.)

3. The typical classroom model to meet or exceed the criteria will consist of two rows of continuous suspended indirect or indirect/direct fluorescent luminaires parallel to the window wall. (Do not use three rows.)

   a. Each row 20 feet long, plus a 12-foot white board luminaire. (preferred system in order to provide greater illuminance of the white board area), or

   b. Each row 24 feet long, arranged to provide illumination of the teaching-wall and white boards.

4. Lamps in each row for general illumination shall be two high-output T8 lamps or one dimmable T5HO lamp with matching ballasts. Ballasts will usually have a normal ballast factor and characteristics in compliance with specifications section 16500-2.02. (Refer to “Controls” for switching or dimming.)

5. Align suspended rows and supporting cables with the ceiling grid. In a typical classroom rows will be spaced 14 feet apart; however, vary the length and spacing of the two continuous rows of luminaires to suit the size and shape of the classrooms and their specific functional needs.

6. For larger science, technical and art classrooms, use a similar model, but use longer rows. Since these rooms sometimes have perimeter work counters, and the illuminance should be greater over the counters, adjust the spacing to adequately illuminate the counters. Use a higher ballast factor if necessary to increase the illumination.

7. In High and Middle School Science Classrooms use the suspended dual-mode fixture with two high-output T8 indirect lamps for general illumination and one dimmable T8 downlight for AV presentations, switched so that both lamp sets cannot be on at the same time. Use a whiteboard luminaire in these classrooms.

8. Luminaires must illuminate the ceilings and walls as well as the task plane (desktop).
9. Uniformity of illuminance on the desktop is important – especially on the core desk space, beginning four feet from walls. Generally, a max: min ratio of 2.5: 1.0 should not be exceeded.

10. Provide ceiling illuminance equal to or greater than the desktop illuminance. Uniformity of ceiling illuminance is important, and the maximum to minimum ratio should not exceed 12:1. Provide wall illuminance (opposite the window wall) approximately 50% or more of ceiling illuminance.

11. Provide teaching wall and white board illuminance at 20 fc minimum. When using wall-washing whiteboard luminaires, illumination of the instructional wall (whiteboards, maps, etc.) should be 30 fc minimum to 40 fc maximum.

12. Wall-washing whiteboard luminaries shall be provided in accordance with IESNA recommendations, to avoid reflections in the board to the nearest viewer, to avoid a bright patch above the board, and to evenly illuminate the board without a steep fall-off toward the bottom.

13. During the design development phase provide point to point lighting calculations to graphically demonstrate the light levels on all room surfaces. Use the input data presented in the SCE “Classroom Lighting Guidelines,” except for any modifications in this Guide. (Note that the “Architecture” section of this Guide calls for the following minimum surface reflectances: Ceilings – 85%; Walls – 60%; Floors – 30%.)

14. Lighting power density (LPD) in the classroom shall not exceed 0.85 watts per square foot (w/sf) connected load.

b. Gymnasium Lighting

1. Illuminate gyms with top daylighting for daytime use (not side lighting through windows), using skylights or tubular daylighting devices.

2. Using average lumen output of the daylight device for the brightest 2,400 hours of the year (based on TMY2 weather data), design daylighting to provide 30 to 35 fc average on the floor with a max./min. ratio of 2:1 (all within reasonable tolerances).

3. Provide electric lighting for nighttime use and daytime supplementary lighting using high-bay or high-output fluorescent luminaires (T5HO lamps), accompanied by daylight sensors to selectively switch or dim the lamps in response to the daylight illuminance. Lamps shall be switchable to four (or three minimum) different levels (including “OFF”). The Architect/Engineer of Record may propose fixtures with alternative light sources,
justification and approval in writing from the District will be required.

c. Site Lighting

1. Campus and parking areas and building perimeters must be lighted to provide for the safety of people and the security of property. Provide adequate light, properly distributed to reveal such hazards as curbs and steps, and to illuminate dark and potentially dangerous areas. Preferred light sources are Metal Halide and High Pressure Sodium.

2. Provide safety and security lighting on exterior walls of buildings, building entrances, parking lots, covered walks, and where needed to meet specific project requirements.

3. Provide lighting for parking lots using pole-mounted full cut-off light fixtures.

4. Luminaires must be installed in such a manner as to minimize glare for pedestrians and drivers, and to avoid light spilling onto adjacent properties.

5. Exterior luminaires and controls, including those located in stairwells open to the exterior, shall be weather and vandal resistant. Locate luminaires and sensors at 10 feet or more above grade wherever feasible, or otherwise as high and out-of-reach as possible.

d. Sports Fields

1. For sports fields the luminance must satisfy the requirements of players and spectators. Uniformity of horizontal and vertical illumination over the entire playing field is especially important for such high-speed sports as baseball, football, and tennis.

2. Important factors include glare, luminance contrast, color contrast, flicker and spill light.

3. Luminaires must provide spill and glare controls to minimize offsite illuminance and glare and sky glare.

4. Refer to IESNA standards for specific requirements of each sport activity.

e. Stages, Auditorium, and Multi-Purpose Rooms

1. A Theatrical Lighting and Sound Consultant must be engaged for the design of these systems; particularly for Middle Schools and High Schools.

2. Lighting and controls are required for stages and platforms, house lights, work lights, and orchestra pit lights.
3. All stage, auditorium, and multi-purpose rooms lighting must be easily and safely accessible for relamping and servicing. Such provisions must be clearly indicated on the drawings.

4. Proscenium stages and platforms require lighting from the front, side and back.

5. Stage lighting equipment should not be visible to the audience; however, in cases where existing conditions makes it necessary the Architect/Engineer shall obtain approval from Design Manager prior to proceeding with the design. If the equipment is mounted in visible locations, consider instrument spill light, glare and nearby reflective surfaces in the design.

6. The most common stage front lighting in the auditorium and multi-purpose room ceiling is commonly referred to as the ceiling cove or beam position. This is plotted on a 45-degree angle from head height at approximately 5 feet of an actor standing at the proscenium line to the auditorium or multi-purpose ceiling. Lights located in this position provide the basic illumination for the downstage acting area. In a large auditorium or multi-purpose room, several ceiling slots may be required to provide adequate lighting on the forestage or apron, and the area immediately behind the front curtain.

7. Side lighting supplements the front lighting to give three-dimensional properties to the performers and setting. This lighting equipment consists of ellipsoidal spotlights mounted on a pipe frame secured to the wall, at each side of the auditorium or multi-purpose room. These positions are called box booms and the lighting is intended for the apron area only or cross lighting for deeper into the stage.

8. Side light for the remaining acting area (behind the proscenium arch) can either be from positions on the end of electrical battens in the air or on separate movable boom poles in between each wing (this low side light is most commonly utilized in dance).

9. On-stage lighting provides front, upstage, top, high side, back lighting, scenery and cyclorama lighting. The lighting equipment for on stage lighting consists of rows of PARs, ellipsoidal spotlights, fresnels, and cyclorama lighting on overhead electric battens. The number of rows and lighting equipment depends on the size of the stage. Typically, one electric batten is supplied for each 8 feet of acting area depth for front lighting fixtures. At a minimum one additional electric batten is needed for the last row of acting area back and side light fixtures. If there is a cyclorama, or background scenery, another electric batten will be needed for those light fixtures.
10. In the on-stage area, 2 and 3 circuit wall pockets need to be provided for low side lighting. Typically, for a medium size stage, provide approximately 8 wall pockets distributed along the side and backstage areas. In addition, floor plates or movable booms with weighted bases and side arms should be provided.

11. Coordinate stage lighting with curtains, draperies, grid beams, counter-weight suspension, and light battens to assure that border lights and cables are concealed and properly supported.

12. In addition to the stage lights, dimmable house lights and switchable stage work lights must be provided for general illumination during rehearsals and other activities outside performance.

13. Every space with a stage should include front lighting with dimming controls. The following elements can be included as the program and budget allows, in order of priority as follows:
   a. Back light
   b. Background scenery light
   c. High side light
   d. Box boom
   e. Low side light

14. For a larger auditorium or multi-purpose room, every effort should be taken to include as many elements above as possible, working down the list to insure that the highest priority takes precedent. The smaller the space gets (along with the budget), the more elements can be taken off the list.

15. For auditoria and multi-purpose rooms to be also used for lectures and testing, provide supplemental fluorescent lighting. (Pulse-start metal halide may be considered.) The supplemental lighting shall be turned off automatically by dimmer bank controls during performance.

16. Elementary schools Multi-purpose Room stage lighting shall consist of:
   a. One (1) 3 circuit 20 foot power track with a minimum of five light fixtures with (1) 200 watts PAR lamps each. Locate power track in Multi-Purpose Room seating area to illuminate forestage and curtain. Provide another 20 foot power track with a minimum of six light fixtures with (1) 200 watts PAR lamps each, this power track shall be located over the stage side, at a minimum of 2 feet behind the main curtain. In addition, provide two (2) two circuits power tracks on each side of the stage area, each power track is to be equipped with a minimum of two light fixtures with (1) 200 watts PAR lamps each.
b. Provide a dimmer panel with a minimum of twelve (12) 1000 watts dimmer circuits. Panel shall be recessed mounted.

c. Refer to Elementary School Multi-Purpose Room Educational Specifications for additional information.

17. Provide orchestra-pit lighting and receptacles for pit lights when pits are provided.

18. If campus does not have an emergency generator, provide emergency lighting supplied from central battery/inverter system to provide a minimum one foot candle throughout the area. In existing facilities, perform emergency power load analysis to make sure the existing generator or central battery inverter system is capable of handling the emergency lighting load addition.

   a. Provide overhead fixtures (some of the non-dimmed house or supplemental fixtures), which are normally off, and only turned on automatically in case of loss of power.

   b. Provide LED aisle lighting at stairs and aisles in Auditoria.

   c. Provide interface controls between lighting controls, central public address, autonomous public address, and fire alarm systems. In case of fire alarm, the central PA system must override the autonomous PA system, and lighting must be set to evacuation mode as needed.

19. Each theatrical fixture should be hung by theatrical c-clamp onto a schedule 40 black pipe. This shall allow the re-location of each fixture depending on the performance or designer’s needs.

20. Provide each hanging fixture with a theatrical safety cable.

21. Provide each fixture with a cord and theatrical plug. (Twistlock or stagepin – which ever matches outlets specified on raceways)

22. Provide each fixture with gel frame for color.

23. Provide a variety of accessories such as barn doors or pattern holders.

24. Near each position pipe or attached to each pipe, provide distributed electrically housed outlets provided by the supplier of the theatrical lighting and control system. Each theatrical raceway should house enough circuits and receptacles to plug in each fixture located there separately, with a minimum of 1 or 2 spares. Raceways can be provided with pigtails (if not seen by the audience) or with flush receptacles.

25. All circuits should be clearly labeled. Circuit numbers should begin at the front of house and increase sequentially as they progress towards the stage. Circuit numbers should correlate one – to-one with the dimmer that they are connected to.
26. Provide at least a single dimmer for each circuit. Common dimmer rack sizes are 96, 48, 24 and 12, or any combination thereof. Typically, they consist of 3-phase power and accept a 40-200amp feed depending on size and load.

27. To control the operation of the lighting equipment, a dimming system and control system must be provided. The dimming system typically consists of dimmer racks that include dimmer modules and control modules; a lighting control console, and stage manager's panels.
   a. Locate dimmer racks in a locked, well ventilated room where the ambient temperature does not exceed 30°C (86°F).
   b. Locate the control console in a control room at the rear of the auditorium seating area.
   c. Locate stage manager's panels within the stage area, hidden from view of the audience, and in the control booth.
   d. Provide a portable lighting control console to set up cues and lighting scenes. Provide control receptacles located in the house and on the stage so that the lighting console can be moved to those areas if needed.
   e. In addition to the control receptacles, a 120V, 20-amp duplex receptacle must be provided near the control receptacles.
   f. Entrance stations to activate the house lighting, at the two entrances to the auditorium, must be wired to the control units in the dimmer racks.

28. The dimming system must be interlocked with the fire alarm system. In the event of a fire emergency the house lights will come on at full brightness.

29. If there is an attic over Multi-Purpose Rooms and Auditoria, provide top access lighting fixtures, catwalks and attic lighting.

4. Lighting Controls
   a. Refer to Specifications Section 16515 for technical requirements. Provide a Central Lighting Control System for on-off inputs to lighting in the following areas:
      1. Corridors and Stairs.
      2. Locker Rooms.
      4. Auditoria and Multi-Purpose Rooms.
      5. Cafeteria/ Kitchen.
      6. Laboratories and Shops with controls similar to classrooms.
7. Restrooms lights and exhaust fans (fans interlocked with lights).

8. Main Office, attendance office, and other offices where clerks are always present. (Provide non-locking local switching for manual operation. In addition, use light-intensity sensing units to reduce electric light levels in areas where daylighting contribution is significant.)

9. Private Offices and conference rooms. Provide also a wall-mounted occupancy sensor with automatic on-off switch as well as manual switches. Provide a daylight sensor in larger windowed offices to switch off half the lamps.


11. Covered walks.

12. Building exterior, parking lot, and parking garage lights. (Inputs to perimeter and parking lot lighting shall have astronomic clock capabilities.) Controls for these areas shall be equipped with key operated override switches to turn lights either on or off for non-recurring events.

13. Attic lights, roof lights, and remotely controlled equipment: provide local switches with pilot lights, and capability for 2hrs override.

14. Provide lock-type and vandal-resistant switches for local manual operation.

15. Lighting control panels shall be equipped with control relays for normal and if required emergency circuits.

16. The lighting control system shall “sweep off” all controlled interior lights and selected exterior lights at pre-determined programmable intervals during unoccupied times.

17. Time-clock programs shall allow seven-day programming functions, summer and holiday schedules and special events.

18. All the clocks for lighting controls shall be of the astronomic type.

19. Lighting control equipment shall be locked, located, or otherwise made secure against vandalism.

b. Classroom Lighting Controls

1. Provide low-voltage lighting controls for each classroom as prescribed in the Southern California Edison “Classroom Lighting Guidelines.” Include the teaching wall switch and dimming or selective-switching controls.
2. Provide dual technology occupancy sensors (infrared and passive sonic) with auto-on-off capability. Motion sensor(s) shall turn off all lights in the room after a pre-set but programmable interval with no motion.

3. Light fixtures shall have wall-mounted dimmer switching devices for manual light reduction when daylighting is adequate or for darkening of the room for AV presentations. Provide dimmer switches adjacent to the classroom entrance door and at the teaching wall, easily accessible to the teacher.

4. Light fixtures within 15'-0" of windows shall be separately dimmed and shall also be controlled by a ceiling-mounted daylight photo sensor to adjust the light intensity in the classroom to a uniform level.

5. Provide for classroom lighting controls to be connected to the Central Lighting Control System in the future (or initially if specifically authorized by the District).

6. The lights may be manually turned on or off at any time by the wall switches, and at pre-determined times by the lighting control system.

7. The lighting control system shall cause the lights to “blink” at pre-determined but programmable intervals prior to sweeping the lights off.

8. Provide a separate switch to control the white board light. Locate switch together with other switches on teaching wall.

c. Corridor lighting

1. Corridor lighting shall be controlled by dual technology occupancy sensors. Emergency lighting in corridors shall be switched together with normal lighting via appropriate relays in the lighting control panel. Upon failure of normal power, emergency lighting fixtures shall automatically operate from the emergency power source.

2. Strategically located occupancy sensors shall turn off the lights after preset but programmable intervals with no motion in the area.

3. A switch under staff control may override the motion sensors for preset but programmable intervals (if specifically authorized by the District)

4. Emergency lights shall turn-on in case of power failure. Upon return of normal power all emergency fixtures shall return to their prior state.

d. Emergency Lighting
1. Emergency lighting controls shall be equipped with bypass circuitry that will bypass all manually operated switches, lighting control systems, dimmers and occupancy sensors during power failure situations. Design shall comply with applicable codes and regulations. Each area of luminaries or groups of luminaries shall be equipped with and controlled by a UL924 listed emergency lighting control unit such as the Legrand/Watt Stopper Model No. ELCU-100 to allow the detection of localized power failures.

2. LED exit sign luminaries shall operate continuously. All other emergency lighting luminaries shall either be switched with its associated general lighting luminaries or be normally off and only operate during a power failure. Continuously operating luminaries other than LED exit luminaries is not permitted.

3. All emergency lights shall be powered by the emergency power source, and may be controlled by the lighting control panel.

4. Emergency lights shall be switched together with the general lighting for the same area, but shall turn on (at full brightness for dimmable fixtures) upon loss of general power.

5. Areas such as Gymnasiums that utilize HID lighting and also require emergency lighting shall be equipped with normally off emergency luminaries. These luminaries shall remain on after the restoration of utility power for a period long enough to allow a majority of the HID luminaries to cool down and restrike (20 to 30 minutes). The use of the quartz restrike option within the HID luminaries shall not be specified or used.

6. All emergency system luminaries shall be labeled as being part of the emergency lighting system with labeling similar to that required for fire alarm devices located above ceilings. The labels shall be placed directly onto or adjacent to the luminaries and be visible from the floor. The labels shall read “EMERGENCY LIGHTING FIXTURE”.

7. Provide connection details for each style of control for the emergency lighting on the drawings. Also indicate on the drawings adjacent to the luminaries or groups of luminaries the style of control that is required for the luminary.

e. Security Lighting

1. Use a separate lock-type switch to control security lighting. Security lighting shall be a separate zone in the lighting control system.

2. Security lighting shall operate from dusk until dawn, seven days per week.
3. All lights designated for security shall be labeled “SL”.

4. Night lights shall operate from dusk until pre-determined but programmable time to accommodate night staff and special school functions.

5. All lights designated for night lighting shall be labeled “NL”.

6. Provide local override switch(es) in a location available only to staff. Override switch(es) shall force lights on or off when required for non recurring events.

5. Lighting Power
   a. Lighting branch circuits shall be 20 ampere, unless otherwise required by the system.
   b. Provide a distributed balanced load on all phases for panels and branch circuits.
   c. Lighting panel boards shall be 480/277-volt, 3-phase, and 4-wire, with thermal-magnetic bolt-on type branch circuit breakers. (Small sites or smaller buildings at large sites may use 208/120-volt, 3-phase, and 4-wire panels.)
   d. Provide approximately 30% spare capacity in all new panels installations.
   e. The energy budget for all connected lighting loads in all buildings shall not exceed nine-tenths of a watt per square foot (0.9 wsf).

6. Luminaires
   a. Selection of luminaires shall be made on the basis of lighting characteristics (including uniform distribution and glare), appearance, cost, maintainability, energy efficiency, and resistance to vandalism.
   b. Each luminaire shall be fully specified and correlated with the Fixture Schedule. Provide not fewer than three manufacturers’ products for each application. On the Schedule, provide full data for each luminaire on lamps, ballasts, input wattage, and mounting type.
   c. All installed luminaires shall meet the requirements of the CBC for seismic anchorage.
   d. Applications.
      1. Classrooms, Science and Technology Classrooms, Libraries: Linear Suspended Indirect or Indirect/Direct Fluorescent Luminaire.
      2. Shops: Same as classrooms, or industrial surface-mounted, or suspended open fluorescent luminaire if appropriate to the architectural design. Specify appropriate fixtures to eliminate dust collection in high dust concentration areas; such areas may include wood and metal shops.

4. Offices: Same as classrooms, or recessed 2’x4’ recessed troffer fluorescent luminaire.

5. Teachers Workrooms: Same as classrooms, or recessed 2’x4’ recessed troffer fluorescent luminaire.

6. Gymnasium: Suspended or ceiling-mounted fluorescent troffer with protective cage and six T8, or T5HO lamps, switched in pairs. (Luminaires with alternative light sources will be considered.)

7. Shower Rooms, Locker Rooms, Other Damp Locations: Fluorescent luminaire with acrylic lens, vandal-resistant, with IP (“Ingress Prevention”) Rating of IP 64.

8. Multi-purpose Room: Suspended indirect/direct fluorescent luminaire or recessed fluorescent luminaire with lens, as appropriate to architectural design.


10. Corridors/Stairways: Wall or ceiling-mounted fluorescent luminaire with polycarbonate lens.

11. Lobbies: Wall or ceiling-mounted fluorescent luminaire with polycarbonate lens.

12. Student Restrooms: Fluorescent luminaire with polycarbonate lens, vandal-resistant, with IP (“Ingress Prevention”) Rating of IP 64.

13. Equipment Rooms, Custodial Closets: Fluorescent luminaire, with occupancy sensor.

14. Elevator Pits: Fluorescent luminaire with guard, and with IP (“Ingress Prevention”) Rating of IP 64.

15. Display Cases: LED strip lighting.


17. Hazardous Classified Areas (flammable liquids, others): Luminaire with suitable classification.

18. Exterior Canopies, Arcades, Overhangs: Recessed or surface-mounted fluorescent luminaire with polycarbonate lens, vandal-resistant, with IP (“Ingress Prevention”) Rating of IP 64.
19. Lunch Shelter: Vandal-proof recessed or surface-mounted ceiling- or wall-mounted compact fluorescent luminaire with lens and two 13-watt twin-tube lamps.


22. Exterior Stair and Wall Lighting: Low-mount step light fluorescent luminaire with clear tempered glass lens.


25. Exit Signs: LED type. Due to the high rate of vandalism, specify only wall mount vandal resistant exit sign luminaries. Canopy or pendant mount exit luminaries are not acceptable. When a wall is not available and a sign is needed at a particular location, utilize a flag mount luminary with additional support from the ceiling or wall.


27. Sign Fixtures: Fluorescent sign.

C. Electrical Power Systems

1. Design Principles

   a. Basic design concerns include life safety, protection of property, reliability, voltage regulation, maintainability, and flexibility for future expansion (including changes in service voltage).

   b. Preventive maintenance requirements must include accessibility and availability for inspection and repair with safety. Provide clean, well-lighted, temperature-controlled space with working spaces and access doors in front of all electrical equipment.

   c. All electrical equipment and components shall be designed for exposure to the elements, or protected from them, including flooding. Electrical distribution equipment and control panels should not be located in subterranean areas.

   d. All electrical equipment and components shall meet requirements for seismic anchorage and bracing.

   e. Each building shall include a main power distribution panel.
f. Should concentration of electrical load in administration building office area exceed 50% of the administration building power panel capacity, a dedicated panel for that area should be included in the design.

2. Electrical Service
   a. The Architect shall consult and coordinate with the electric utility provider in requesting electrical service, and shall include in the contract documents the drawings and specifications provided by the utility. Requests must be made early in design, to allow sufficient time for obtaining the utility engineers’ input.
   b. When designing the electrical service for existing facilities, the Architect/Engineer shall coordinate with their project management to determine current and future power needs requirements for the site.
   c. Removal of utility poles and their guywire may be necessary whenever new property is acquired. If poles serve other private properties then utilities must be re-routed. Coordinate the relocation of all utilities on the poles (power, telephone, cable television) and provide for the relocation of power poles from the school site as directed by the utility. (Rerouting will be designed by the utility provider.)

3. Electromagnetic Fields
   a. The design of new school facilities, and modernization projects must include measures to minimize the building occupants’ exposure to high electromagnetic fields emitted by electrical equipment such as transformers, switchboards, panel boards, and building wiring. The following guidelines can help minimize electromagnetic field exposure and interference.
   b. Locate equipment in dedicated spaces that are not normally occupied: equipment rooms, storage rooms, and supply rooms.
   c. Locate transformers, switchgear, and large panels remote from occupied spaces. If outdoors or in parking structures, be sure they are separated with walls or fences and are well drained to prevent flooding. Provide required clearances and work space according to code and utility company requirements.
   d. Locate equipment and equipment rooms so not to be adjacent to, or directly above or below, classrooms, offices, libraries, and similar spaces.
   e. Do not install underground feeders beneath occupied spaces; where underground feeder(s) has to pass underneath the concrete slab to terminate at the distribution panel inside the building, install conduits 24 inches below finished floor.
   f. Reduce current by using higher voltages where practical.
   g. Utilize balanced three-phase systems.
   h. Provide barriers to limit access and approach to outdoor electrical equipment – walls or fencing.
4. Planning Criteria

a. The preferred main power distribution system is 480/277-volt, 3-phase, 4-wire grounded WYE.

1. In very large campuses two 480/277-volt, 3-phase, 4-wire grounded WYE services may be installed if approved by the serving utility company.

2. In very large campuses with the buildings very far apart, 5 KV medium voltage switchgear and power distribution may be used.

3. In very small campuses, 208/120-Volt, 3-phase, 4-wire, grounded WYE service and power distribution may be used.

b. All loads (in KVA) must be identified during design, such as lighting, HVAC equipment, kitchen equipment, shop equipment, computer equipment, and general receptacle load. For preliminary system design, when the loads have not been identified, use the following loads for estimating purposes only:

1. Lighting (California Building Codes, Title 24, Energy Efficiency standards limit power density to much lower levels. The power allocation is based on National/California Electrical Code, or LAUSD requirements. The differential between allocated and connected load may be calculated toward required spare capacity, to reduce the service size if possible).
   a. Classrooms and Offices 3.0 VA/ft²
   b. Cafeteria 2.0 VA/ft²
   c. Auditorium / Multi-Purpose Room 6.0 VA/ft²
   d. Kitchen 2.2 VA/ft²
   e. Gymnasiums 2.5 VA/ft²
   f. Toilets, Storage, Equipment 1.0 VA/ft²
   g. Corridors 1.0 VA/ft²
   h. Locker Rooms 1.0 VA/ft²
   i. Laboratories 3.0 VA/ft²
   j. Shops 3.0 VA/ft²

2. Air Conditioning.
   a. HVAC Refrigeration Tons x 2.5 = KVA
   b. Ventilation Fans 1.0 W/ft²

3. Small Appliance/Computer/General Purpose Receptacle
   a. Auditorium 1.0 VA/ft²
   b. Cafeteria 1.0 VA/ft²
   c. Gymnasiums 1.0 VA/ft²
   d. Offices 5.0 VA/ft²
3.7 Electrical Power & Lighting

4. Food Preparation.
   a. Kitchen: 20 VA/ft²
   b. Cafeteria: 10 VA/ft²

5. Shop Buildings (Machines): 20 VA/ft²

6. In existing facilities, the demand load calculations shall comply with CEC requirements. Architect/Engineer shall include all necessary information to evaluate the existing system and its suitability to handle the proposed load addition.

c. Distribution Concept:
   1. For most schools, a radial distribution system is adequate.
   2. Depending on critical load requirements, other system types may be considered, such as primary selective or secondary selective.

d. The maximum voltage drop in each power feeder shall be no more than 3%, and the total drop including feeders and branch circuits shall be no more than 5% overall.
   1. Length and voltage drop percentages must be indicated for all feeders on the single line diagram, or in a feeder schedule.

e. Short circuit calculations shall be made for all system components. Indicate results on the single line diagram, or in a feeder schedule.

f. Design distribution to minimize the generation of, and exposure to, magnetic fields. Appropriate magnetic field management techniques shall be considered for all new and/or retrofit installations.

g. Plan future system expansion during design. Do not design the system so that it is difficult or impossible to expand its capacity. Be sure future capacity is clearly identified on diagrams, plans, and in the narrative “Basis of Design.”
   1. Architect shall provide electrical room layouts depicting equipment footprints, working clearances around equipment, and space for future expansion.
   2. For new campuses allocate minimum 30% spare capacity over connected load to size main service equipment.

5. **Grounding**

a. Cold water or other utility piping systems shall not be used as grounding electrodes; Grounding electrodes shall be “made” electrodes, either concrete-enclosed-electrode type (UFER) or ground rod type.
   1. UFER ground system as described in the Guide Specification shall be the primary grounding electrode for new campuses.
Architect/Engineer shall provide a complete grounding block diagram of the facility including but not limited to peripheral systems such as Public Address, Computer Network, Television, etc.

2. Ground rod(s) installed in concrete box(es) as described in the guide specification shall be the primary grounding electrode for existing campuses that do not have a UFER system.

b. All metallic objects that enclose electrical conductors or that might be energized by electrical currents, including all metal equipment parts such as enclosures, raceways, building metal structure, and equipment grounding conductors, must be effectively grounded. All earth grounding electrodes must be solidly joined together into a continuous electrically conductive system connected to the main grounding electrode system. Individual building grounding systems must be interconnected to the campus grounding system.

c. Provide “made” electrodes (as described in paragraph “a.” above) at each individual building. The grounding systems of remote buildings must be interconnected to main campus grounding system thru the equipment grounding conductor(s) of the feeders serving the remote buildings. Bond all enclosure and metallic objects to the building ground system (as described in paragraph “b” above).

d. Bond the grounded conductor (Neutral) of the main service and the secondary of all step-down transformers to the building ground system. The bonding of the neutral conductor to ground must ONLY BE DONE AT ONE LOCATION at each voltage level to avoid creating grounding loops.

e. All electrical conducting surfaces must be effectively grounded.

6. Conductors

a. Select conductors based on the ampacity tables in the California Electrical Code for low and medium voltage cables. Consider the temperature rating of the conductor, future load growth, voltage drop, short-circuit heating, number of conductors within the raceway and ambient conditions.

b. Ambient temperature ratings for conductor selection:

1. Indoors, within air-conditioned spaces, 30° C. ambient temperature may be used without temperature derating the conductor.

2. Indoor areas, such as equipment rooms, where the ambient temperature will exceed 30° C., conductors must be derated to the worst possible ambient temperature condition.

3. Outdoors, for low voltage conductors in metallic raceways in the shade, use a derating factor for an ambient temperature of 45° C; in the sun, use a derating factor for an ambient temperature of 50° C.
4. For Medium Voltage Power Distribution underground applications, the ambient temperature used for conductors within a raceway shall be 30° C. This means the appropriate ampacity from the tables in the California Electrical Code must be derated to this temperature. The thermal characteristics of the medium surrounding the conductors are important to determine the current carrying capacity of the conductors. Factors that will affect the current carrying capacity of the conductor include the following:

   a. The type of soil in which the duct bank is buried and its thermal resistivity.
   b. The moisture content of the soil. In dry sections the conductors must be derated to compensate for the increase in thermal resistance that is due to the lack of moisture.
   c. The type and number of raceways and number of conductors per raceway within an overall concrete duct bank.
   c. Derating of the conductors may be necessary under high fault currents. Thermal and mechanical stresses can result in permanent damage to the insulation and undesirable cable movement. The minimum conductor size requirement shall be determined based on the maximum available short-circuit current and the type of overcurrent protective device used.

7. Conduit

   a. Install conductors in metallic conduit above ground and in schedule 40 PVC underground, and comply with the following additional requirements:

      1. Use rigid steel conduit at all exterior locations and where conduit may be exposed and subjected to damage or water intrusion, including all locations in parking garages.

      2. EMT is allowed for all interior concealed applications. Exposed EMT may be used in the following areas:

         a. In mechanical and electrical rooms.
         b. Above 8 feet in spaces other than offices, classrooms, libraries, and similar spaces with District approval.
         c. Above 8 feet in enclosed parking garages.

      3. Use flexible steel conduit only indoors and where concealed.

      4. Metal Clad (MC) cable system is not allowed.

      5. Use liquid-tight flexible steel conduit for final connections to motors, devices that require adjustment of locations, or equipment that require frequent interchange. Liquid-tight flexible steel conduit may not be used in place of thermal, expansion, or expansion/deflection fittings.
6. Underground conduits must be encased in concrete 3 inch thick on all sides with multiple conduits spaced 3 inch apart. Bury conduit banks not less than 24" below finished grade to top of the concrete envelope.

7. The minimum underground conduit size shall be 2 inches; except for conduits feeding a single dedicated device where future growth is not expected.

8. Conduits on arcades or roofs are not allowed without prior District approval; if approved, Architect/Engineer shall provide structural calculations and installation details.

8. Distribution Equipment
   a. In selecting distribution equipment, electrical ratings must have adequate capacity to serve the connected load, and future expansion.
   b. Equipment short-circuit ratings must be selected to withstand the maximum fault current at the equipment terminals or busses. In existing facilities perform complete fault current level calculations to determine amperes interrupting capacity for new equipment. The calculation shall be based on utility company available fault current at the main service.
   c. Series rated distribution switchboards and panel boards are not permitted. Specify only fully rated equipment.
   d. Locate all power equipment and panels in equipment rooms that are completely separate from signal and communication equipment.
   e. Review physical dimensions of the equipment to determine adequate space allocation requirements to serve connected loads and future expansion. Provide working clearances around the equipment to comply with code and working requirements.
   f. Consider and plan to mitigate appropriately environmental conditions surrounding the equipment. Adequate ventilation must be provided in all cases. Locate Central Battery/Inverter systems in an air-conditioned room. Calculate and submit the heat load created by the electrical equipment to the mechanical engineer to properly size HVAC equipment serving the electrical rooms.
   g. Indicate infrastructure for electric utility facilities including transformer pad, underground vaults, customer stations, pull sections and metering compartments in main switchboard, underground conduits, pull boxes and grounding, as required by electric utility.
   h. All equipment must be secured from unauthorized access and from vandalism, and must be protected from harmful environmental conditions, including flooding.
   i. Do not install equipment in hostile/corrosive environments such as pool equipment, boiler rooms, and the like; unless it is properly listed for the application.
j. Provide floor drains within 10 feet of floor mounted equipment in subterranean locations subject to flooding.

k. Provide 4 inches high concrete house keeping pads for floor mounted equipment in below grade or exterior installations; the pad is to extend 4 inches all around equipment. Pads for electrical services and power company equipment shall conform to the requirements of the serving utility company.

l. Electrical power service to each building shall be achieved through one feed point to a panel, or distribution panel located in the building.

9. Capacity Criteria
   a. All new main and distribution switchboards, panelboards and motor control centers shall have minimum 30% spare capacity above connected load and physical spaces for additional protective devices to be added in future.

10. Circuit Protection and Motor Controls
   a. All switchboards, motor control centers, and power panel boards shall include a main circuit protective device.
   b. Panel boards serving each floor in a building shall be equipped with a main circuit breaker.
   c. Subpanels located in the same electrical room and within sight of its power source do not need to be provided with a main circuit breaker.
   d. Provide a heavy duty fused disconnect switch at all HVAC units, including heat pumps, condensing units, chillers, package units, etc.
   e. Provide combination fused switch-starters for all pump-motors, fan-motors, cooling towers, and dust collectors. Provide a control-circuit transformer with 120-volt secondary, hand-off-auto selector switch and on-off indicating lights in each starter.
   f. Provide control wiring and interlocking for operation of motor loads, as required by each motor circuit.

11. General Requirements & General-purpose Receptacles and Circuits
   a. All receptacles shall be wall-mounted at 15 inches above floor level unless otherwise indicated for specific purposes.
   b. Do not use floor receptacles except where expressly approved in writing by the District’s authorized representative. Where used, they shall be recessed.
   c. Do not locate receptacles behind appliances or other equipment that must be served.
   d. Corridors: At intervals of 50 feet maximum and switched with a lock-type switch in a custodial closet or workroom.
e. Building exterior walls and parking garage interior: Weather-proof GFI receptacles at 50 feet intervals on each wall; install receptacles within a lockable box or cabinet, and switched with a lock-type switch in a custodial closet or workroom. Do not provide receptacles in Kindergarten play areas.

f. Restrooms: One GFI receptacle mounted 80 inches above finished floor near the door in each student restroom. In faculty restrooms, provide a GFI receptacle next to the sink, locate receptacle 48 inches above finished floor.

g. Any room with a light fixture shall be provided with at least one receptacle.

h. Science Classrooms: General-purpose duplex receptacles (computer receptacles and circuits are already separate.) every six feet over the counter on the wall on a separate 20-amp branch circuit per counter. Use GFI receptacle within six feet of the sink(s).

i. Auditorium/Multi-Purpose Room: On walls spaced at 20 feet on center maximum.

j. Gymnasium: Eight minimum, two in each wall minimum.

k. Music, Instrumental Practice, and Choral Rooms: On walls same as classrooms.

l. In Photographic Darkrooms, provide separate circuits for special darkroom lights and for room lights, with room lights on a lock-type switch.

m. Cafeteria Window Service Area, Scramble Area, and Faculty Service Area: One, minimum.

n. Within 72 inches of a sink or in any similar conditions (such as custodial closets), use GFI receptacles.

o. Make provisions for two 1 inch conduits for marquee sign power and data, extend one conduit from nearest electrical panel, and one from MDF to the designated location for the future marquee sign. Label conduits power and data respectively. Coordinate marquee location with Architect.

12. Receptacles in Classrooms

  a. Provide a separate branch circuit for general-purpose duplex receptacles in each classroom, with a minimum of five general-purpose duplex receptacles in each classroom, one in each wall and one at the teacher’s desk location.

  b. Provide separate receptacles or connections on a separate circuit for other electrical equipment.

  c. For new construction do not use floor outlets without approval in writing from the district. (Wiremold should only be used in existing facilities, except where indicated in educational specifications)
d. Do not locate receptacles or switches in bulletin boards, tackboards, or markerboards.

13. Special-Purpose Receptacles And Separate Circuits

a. See “Electrical Communications and AV Systems,” “Computer Networks and Power Systems,” for power provisions for computer systems. Provide receptacles and circuits as follows:

b. Copier equipment in staff/faculty work rooms require provision of a dedicated 220-VAC circuit with 3#10 AWG and a code sized ground wire, unless advised otherwise in writing by the District Design Manager. Locate receptacle next to copier data outlet.

c. Gymnasium scoreboards. Provide for remotely controlling scoreboards from side lines with 3/4 inch empty conduit from scoreboards to floor boxes located 5 feet out from sidelines near midcourt. Provide 120V receptacle in floor box.

d. Domestic cooking electric ranges (for gas ranges provide 120-volt circuit for ignition).

e. Science Classrooms exhaust fume hoods.

f. Science Preparation/Storage Room refrigerator and freezer.

g. Industrial Education Classrooms and Shops: Conduit drops from overhead wireways to a receptacle at each workbench and to each electrically driven machine.

h. First Aid Room: refrigerator, and receptacle and switch for eye chart.

i. DH Storage and Laundry Room washer and dryer.

j. Special Education Therapy Unit refrigerator and cooktop.

k. Kitchen equipment and exhaust hoods. All electrical equipment under kitchen hoods shall be automatically disconnected upon activation of the fire suppression systems.

l. Provide a separate branch circuit for the fire suppression Ansul System installed in kitchen hoods. If Ansul System is activated, power to all electrical appliances under kitchen hood shall be automatically disconnected. Appliance circuits shall be wired thru shunt trip circuit breakers or contactors that are interlocked with the Ansul System.

m. Automatic lawn sprinkler controllers, one each as shown by the Landscape Architect.

n. Electric drinking fountains: one each.

o. Rooftop: Provide exterior convenience outlet with lock-on cover on a pedestal approximately 18 inches above roof within 25 feet of HVAC equipment, and adjacent to any other rooftop equipment that might need servicing or repair.

p. All other appliances and special equipment where necessary.
q. Provide power and controls for athletic field score boards. Terminate control conduit in announcer booth.

D. Emergency Power Systems

1. General
   a. Emergency power systems must be part of the design of the electrical system for egress illumination and signage, fire alarm, security, public address and telephone systems, and computer networking system, and must provide continuity of operation for specifically identified systems or equipment.
   b. Provide emergency exit illumination of one foot-candle minimum in the following areas:
      1. Corridors, stairs, lobbies, and exterior paths of travel for exiting.
      2. Administration Unit.
      3. Classrooms larger than 1000 square feet.
      5. Gymnasiums.
      7. Any rooms with an occupant load of 50 or more.
      8. Other occupancies required by code.
   c. Exit signs connected to the emergency power system shall be provided in compliance with applicable codes. Master-Slave exit signs are required. Low level exit signs for existing facilities where master-slave is impractical shall be self-luminous type. If self luminous type is used, Architect/Engineer shall obtain approval from the District. Exit signs shall be vandal/high impact resistant.

2. Emergency Systems Requirements
   a. For emergency lighting and exit illumination, in each building provide a central inverter system consisting of AC sensing equipment, automatic transfer switch, battery charger, batteries and DC to AC inverter to provide a minimum of 90 minutes continuous emergency operation.
   b. For PA/Intercom/PABX system, provide an UPS with a minimum of 90 minutes continuous emergency operation.
      1. Also see “Electrical Communications and AV Systems” for UPS requirements for PA systems.
   c. For Fire Alarm System, provide integral emergency power supply for 24 hours minimum continuous operation.
d. For Security Alarm System, provide integral emergency power supply for 4 hours continuous operation.

e. For computer networking system, See “Electrical Communications and AV Systems” for requirements of rack mounted UPS units for Computer Networking Systems.

f. Modernization Projects at Existing School Sites: In areas illuminated by fluorescent fixtures, provide emergency exit illumination by power packs installed in channel of lighting fixtures to provide 90 minutes of continuous emergency operation. Utilize existing inverter emergency power or generator in lieu of battery packs if the school is equipped with such systems. Perform load analysis to make sure the existing system is adequate to support the new emergency lighting loads. UPS capabilities for PA/Intercom/PABX, Fire Alarm, Security and Computer Systems shall be same as for new school construction.

3. Emergency Generator System

a. An emergency diesel generator system is required when the project includes a subterranean area that requires the installation of sump pumps, when needed to supply secondary power for a fire pump or when a project has a sufficient quantity of large emergency lighting inverters that would be more costly to install and maintain versus the installation of a generator. In such cases:

1. Eliminate central battery/inverters and use the generator for emergency lighting.

2. Provide emergency power for all elevator cab lighting and power for selected elevator(s).

3. Provide emergency power for subterranean sump pumps (garage areas).

4. Provide emergency power for all signal headend equipment.

5. Provide emergency power for fire/ life safety systems such as fire pumps and other systems as required by codes.

6. UPS systems as described in previous paragraphs for various systems still will be required.

7. Clearly mark all equipment being served from emergency power, Identify the power source.

8. Provide calculations for emergency power demand; calculations shall include a minimum of 20% spare capacity. Size equipment accordingly.

9. Provide diesel engine generator set(s) with battery chargers.
10. Provide a common trouble annunciator in the main office. Do not provide an annunciator that indicates what is wrong only one that indicates that something is wrong with the generator.

11. Provide an emergency stop button at a location close to the main service disconnect; in a place such as an electrical room or a similarly controlled access location. Provide a tamper cover similar to the covers required for fire alarm pull stations.

12. Provide all components, accessories, necessary parts needed to meet system expected performance.
3.8 ELECTRICAL COMMUNICATION & AV SYSTEMS

A. GENERAL REQUIREMENTS

B. FIRE ALARM SYSTEM

C. CLOCK AND PROGRAM SYSTEM

D. COMPUTER AND NETWORKING SYSTEM DESIGN

E. TELEPHONE SYSTEM

F. PUBLIC ADDRESS/INTERCOM/CLASS CHANGE SIGNALING SYSTEM

G. SECURITY INTRUSION ALARM SYSTEM

H. CLOSED CIRCUIT TELEVISION AND AUDIO SURVEILLANCE SYSTEMS

I. GARAGE AND MAIN DOOR ENTRY SYSTEMS

J. TELEVISION DISTRIBUTION SYSTEM

K. DIGITAL OVERHEAD PROJECTORS

L. SOUND ENHANCEMENT SYSTEM

M. SCHOOL RADIO COMMUNICATION SYSTEM

N. SIGNAL SYSTEMS RACEWAYS AND TERMINAL CABINETS
3.8 ELECTRICAL COMMUNICATIONS & AV SYSTEMS

A. GENERAL REQUIREMENTS

a. Refer also to Section 3.7, Electrical Power and Lighting.

b. The District "Guide Specifications" complements the "Design Guide" and must be reviewed concurrently with these criteria.

c. All signal wiring and related power shall be in conduit or raceways except as indicated below. Conduits and raceways shall be metallic, except in underground applications where PVC conduits are encased in concrete. Low-voltage communication or signal wiring shall be continuous without splices between devices, and shall be in conduits or raceways. Refer to section B.4.F for fire alarm system raceway requirements.

d. When adding new buildings and systems to an existing campus, the Architect must, from a site visit, determine the types of existing systems on the campus, and then include in the construction documents details of the appropriate interfaces necessary to integrate the operation of the new and existing systems.

e. All panels and control equipment must be accessible from floor level, without the need for ladders or other access equipment.

B. FIRE ALARM SYSTEM

1. General

a. Fire alarm system shall be an automatic local fire detection, and addressable signaling system with central station reporting with electrically supervised signal-initiating circuits and alarm circuits, including control panel(s), remote power supplies, remote annunciator panel, manual pull stations, bells or horns, visual alarm units, sprinkler flow and tamper switches, smoke detectors, heat detectors, beam detectors, terminal cabinets and wiring. Refer to DESIGN GUIDE Appendix A for a sample of the fire alarm system sequence of operations; modify or revise it according to the particular project requirements.

b. The specified control panel shall be Notifier NFS-3030, NFS-640, or combination. Equivalent panels manufactured by Edwards Systems Technology, Simplex Grinnell, Johnson Controls, Siemens Building Technologies, Inc., or Gamewell-FCI are acceptable. For Early Education and Parent Centers specify a Notifier AFP-200 panel, or equivalent manufactured by Edwards Systems Technology, Simplex Grinnell, Johnson Controls, Siemens Building Technologies, Inc., or Gamewell-FCI
When multiple panels are specified in a single site, one of them shall serve as master, and the others will serve as network nodes.

c. For system expansions or building additions modify specifications to reflect designs that take into consideration the existing conditions; for example, if in a school the original system is a Notifier panel, then any additional panels shall also be Notifier. Panels manufactured by different manufacturers are not acceptable.

d. Alarm indicating device's UL maximum current draw must be utilize in the design.

e. Provide 20% spare capacity per loop for future growth.

f. Where the capacity of the control panel will be exceeded including spare capacity, two or more panels must be provided. These panels must be connected in a network configuration as one complete system.

f. Fire alarm systems shall comply with NFPA, DSA Fire and Life Safety requirements, and Education Code Section, and be UL and CSFM listed, power-limited, battery backed, electrically supervised systems.

h. Fire alarm system shall be designed with addressable initiating and electrically supervised indicating (audio/visual) devices.

i. The fire alarm system shall be interfaced with the clock program controller and Central PA system to deactivate program/classroom change signals during fire alarm condition. All manual, autonomous PA and automatic program signals shall be deactivated during fire alarm condition. In addition, provide interconnection and required control features between fire alarm system and chemical fire extinguishing system, water based fire sprinkler system, damper control or smoke management systems, ventilation systems where required for the purpose of fan shutdown, any other systems required by code.

j. Fire alarm system shall not be interfaced to any of the following:

1. Sump warning systems.
2. Carbon monoxide detection systems.
3. Methane gas detection systems.
4. Elevator car alarm bell circuit.
5. Any other unrelated system.

k. Provide a 120-volt, 20 amps, dedicated circuit and terminate in each of the following cabinets: Fire alarm control panel(s) and remote power supply (ies). Circuit breaker at panelboard shall be equipped with a handle lock-on device. Provide surge suppressor at input of control panel.

1. Provide a permanent label in all fire alarm panel(s), transponder(s), or remote power supply(ies) indicating the electrical panel and circuit designation as well as a description of the physical location of the electrical panel. All labels shall be affixed to the inside of the panel door.

l. A remote annunciator panel with LCD Display shall be provided in the Administration Building main office, and in satellite administration areas
where they are accessible by office personnel only; the annunciator shall be provided with an integral keyed locking switch to disable/enable the annunciator controls. For network systems, locate the Network Annunciator Control Panel (NAC) next to main fire alarm control panel in administration building.

m. When replacing and existing fire alarm system, a new fully addressable system must be installed.

n. When replacing an existing fire alarm system, indicate on drawings the extent of existing work to be demolished.

o. Provide automatic detection devices in accordance with codes and applicable regulations.

p. Provide a California State Fire Marshal approved voice evacuation system in assembly areas (Gymnasium, Multi-Purpose Rooms, etc.) with an occupant load of 1000 or more.

2. Initiating Devices

a. Provide smoke detectors in every room. Smoke detectors shall be the primary means of automatic alarm initiation. Heat detectors may be used in those spaces where a smoke detector would not be suitable.

b. Do not provide smoke detectors in areas that are exposed to the weather.

c. Provide heat detectors above suspended ceilings of every room and in accessible attics that contain combustible materials; such as building structure, flexible ducts, exposed cables, etc. (Refer to currently enforced NFPA 72 Section 2.1.4.2.1). Heat detectors are not required when sprinklers will be provided in these areas.

   1. In existing facilities non-accessible attics spaces that contain combustible materials shall be made accessible and be protected by heat detector(s).

   2. Provide identification tags for devices not in field of view or above ceilings, and for devices containing end of line resistors. Tags shall conform to specification section 16715-3.03-k.

d. Design and installation of automatic fire detectors shall conform to NFPA 72, as amended in Article 91 of the California Fire Code section 1006.2.4.2.1.1 and ADAAG.

e. Provide smoke detectors at each interior elevator lobby and elevator machine room. Smoke detectors are used to recall elevator cars to pre-assigned floor levels and to initiate a general alarm. Each elevator lobby smoke detector must report as one address to the fire alarm system. A machine room smoke/heat detector is always required.

   1. A rate-of-rise/fix temperature heat detector shall be provided in the elevator machine room and be installed within two feet of the sprinkler head to shut off power to elevator equipment. Provide an addressable relay module to interface with shunt trip circuit breaker providing power to elevator equipment. By activation of heat
detector, power to elevator equipment shall be shut down. The activation temperature of the heat detector shall be lower than that of the sprinkler head. A smoke detector in the machine room for elevator shall cause elevator to recall to specified floor if required.

2. When required provide automatic detection device(s) in elevator hoist-way. Indicate all requirements and necessary provisions to make the detector(s) accessible without entering the elevator hoistway. Access shall be provided through an approved enclosure with self-locking fire rated door. The detector(s) shall be so placed as to allow service to them without service personnel having to reach into the hoist-way in the way of travel of the elevator.

3. An automatic fire alarm initiating device is not required in the elevator pit.

4. When there is a fire sprinkler installed at the top of an elevator hoistway, a heat detector is required at the top of the elevator hoistway; in such cases an external hatch must be provided to safely access the detector and an UL approved cage must be provided. If there is no fire sprinkler at the top of the hoistway, then a detector is not required. Activation of the detector shall recall elevator and cause a general alarm. If a sprinkler head exists at the top of the hoistway, a heat detector must shut down the elevator's power. A smoke detector is always recommended for elevator recall whenever possible when a heat detector is present for shunt trip service.

5. In the sequence of operation chart, clearly indicate the alarm/recall/power shut down requirements. All Fire Alarm detectors report to the Fire Alarm System. The Fire Alarm System shall be interfaced with the elevator controller.

F. If combinations smoke/fire dampers or duct smoke detectors are required, this work shall be part of the fire alarm system and all components and wiring shall be indicated on Electrical Drawings. Smoke detectors may be used in lieu of duct detectors to shut down HVAC systems or to control combination smoke/fire dampers if ALL areas served by the HVAC system are protected with smoke detectors. The Fire Alarm System shall be programmed to shut down the HVAC system or close the smoke/fire damper if one or more of the area smoke detectors are activated. All detectors must be accessible for yearly testing. Provide addressable relay modules to interface with HVAC or smoke/fire damper controls in order to shut down the HVAC unit or close the smoke damper. (Coordinate this work with that of the HVAC system to avoid duplication of systems.)

G. In Existing Facilities renovation projects remove existing duct detectors; provide controls to shut down Air Conditioning units with a CFM rating of 2000 or more. Shut down of units shall be accomplished via smoke detector(s) in the area(s) being served by the air conditioning unit(s).
h. Provide flow and tamper switches at each sprinkler riser assembly. Flow and tamper switches shall be addressed individually per building and per floor level. Provide a separately addressed tamper switch at each post indicating valve (P.I.V.).

1. Provide a red outdoor 24 volt DC 10 inch bell on the street side of the building for the each sprinkler riser flow switch or groups of flow switches within each building. The sprinkler water flow bell shall be controlled by dry contacts within the flow switch and powered by 24 volts directly from an FACP or a remote NAC power supply. Proper signage should be provided adjacent to the bell indicating what action should be taken when the bell sounds.

i. Since automatic initiating devices are provided in all rooms and attics as part of Automatic Fire Alarm System, avoid installing pull stations, except in areas with an occupant load of 50 or more or as required by codes. Areas requiring manual pull stations include assembly areas such as gymnasiums, auditoria, kitchen/dining areas used for assembly, and multi-purpose rooms. Install one manual pull station within five feet of each exit door.

1. Provide one manual pull station within five feet of the fire-alarm annunciator in the main office of the Administrative Unit.

2. All manual pull stations, except the manual pull station in the office by the FA annunciator, shall be provided with a protective cover.

j. Connect automatically/Manually activated dry chemical fire extinguishing system such as is provided in prefabricated kitchen hood to fire alarm control panel as a separate fire alarm point/zone.

k. Provide protective covers for pull stations, smoke and heat detectors, and audible and visual devices located in areas that can be subjected to vandalism such as gyms, restrooms, locker and shower rooms, and all hallways and corridors associated with these spaces.

l. Beam smoke detectors shall be utilized in large areas with high ceilings such as auditoriums and gymnasiums in lieu of multiple smoke detectors. Do not use beam smoke detectors in small confined areas such as classrooms that have large beams that will require multiple smoke detectors to provide proper coverage.

m. When heat detectors are mounted in attics with catwalks or tall dimensions to the bottom side of the roof structure, accessibility shall be provided for testing and servicing of the detectors.

3. **Alarm (Indicating) Devices**

a. Provide sufficient alarm sounding device coverage for entire plant including interior and yard areas. Avoid exterior of school site except near entrances to buildings to minimize disturbance of neighborhood.

b. Alarm sounding devices at each facility shall be of the same type. All audible alarm signals connected to an FACP shall be synchronized by an internal to the FACP coder and within the notification zone in which they are located. The use of coders within a remote NAC power supply
or within an individual audible appliance shall not be acceptable. In facilities not receiving a complete new fire alarm system, the existing type of coded sounding devices if currently bells shall be changed to horns.

c. Alarm sounding devices shall be capable of sounding alarm at a level of 15 decibels above ambient noise or 75 decibel minimum, whichever is higher; measured 4 feet above floor and in the center of the room or space.

d. Provide strobes and horns as required in classrooms to meet visual and audibility requirements. When both audible and visual devices are required use combination type devices unless the audible device is a speaker used in an EVAC system.

e. In areas requiring speakers for voice evacuation systems provide a sufficient quantity of speakers to minimize reverberation and the distance between the speakers and the occupants. A gymnasium or auditorium would typically have 9 to 12 ceiling mounted 8 inch speakers and other areas such as associated lobbies, restrooms, dressing rooms etc. shall be equipped with one or more 4 inch wall mount speakers. The speaker circuitry in the main seating area shall be configured in an alternating checkerboard pattern to split the speakers between the two amplifier outputs.

f. A sixty-second silence inhibit shall be imposed on audible and visual alarm circuits to insure that the building occupants perceive any alarm. There shall be an audible and visual fire and trouble indication at annunciator panel.

1. Provide visual alarm devices in classrooms, toilets, rooms with high ambient noise, special education rooms such as classrooms for deaf and hard of hearing, dining areas, locker rooms, shower rooms, gymnasium, auditorium, assembly areas, corridors and hallways, public areas of main office, band and music rooms, shops, and any room where ambient noise exceeds 105 decibels. Visual alarm devices belonging to different circuits, but within a single plane of view or flashes from more than two devices on different circuits shall be synchronized.

g. Install bells and horns 8'-0" above finished floor. Visual appliances shall be mounted 80" above the finished floor to the bottom of the lens or six inches below the ceiling, whichever is lower.

h. Provide magnetic door holders and dedicated 24 volt DC power supplies with addressable relay modules to close normally open fire doors upon detection of smoke in the area of the door. The wiring between the door holder power supplies and the door magnets is not power limited and shall be in separate raceway not containing the power limited fire alarm wiring. The door holder power supplies shall be controlled directly by the associated FACP or with an addressable relay module. Connections to the trigger circuit of the door holder power supply shall be configured in the fail safe mode.
4. **Zoning, Panels and Wiring**

   a. In addressable systems, each initiating device shall be one point. For example, smoke detector in Building B, Classroom No. 213, shall be considered as one point.

   b. Provide a note on drawings: “The fire alarm system shall pass tests required by local fire department, including CHIEF'S REGULATION NO. 4 PROGRAM required by City of Los Angeles Department of Fire and administered by LAUSD.”

   c. Provide a digital Communicator at Main Fire Alarm Control Panel to report alarm conditions to a UL approved 24-hour manned certified central monitoring station. Use District UTILITY ORDER REQUEST FORM to determine Central Monitoring Station that will be used. Instruct the contractor to coordinate with the owner to arrange for the monitoring. Provide a UD ACT and two dedicated telephone lines for central station service. Terminate the telephone lines to the UD ACT. Indicate all wiring and raceway routing from Main Telephone Terminal, or telephone closet data distribution point to UD ACT.

   d. Provide at least one terminal cabinet inside each building for termination of all fire alarm system wiring. Buildings with a walkway or arcade that divides footings of the buildings shall have a terminal cabinet in each of the buildings. Provide a main terminal cabinet in main building, near fire alarm controller, for routing all fire alarm system wiring for entire school site.

   e. Fire alarm system control panel and main fire alarm terminal cabinet shall be located in LAN equipment room as first choice, other suitable locations are temperature controlled rooms, work rooms, and similar areas. Do not locate fire alarm control panel in mechanical or electrical equipment rooms. Remote power supplies shall not be located in restrooms, multi-purpose rooms, gymnasium, auditoria, or similar areas. Installation of power supplies in classrooms shall be avoided.

   f. All wiring shall be in conduit or approved raceways. Wiring shall be continuous between devices or terminal cabinets. Splicing of fire alarm system wiring is not allowed.

5. **Construction Documentation Requirements:**

   a. Construction Drawings shall include the following information at a minimum:

      1. Applicable code information, DSA, and LAUSD project numbers.

      2. Site plans, floor plans and complete riser diagrams indicating all components, and required raceways and wiring. Block diagrams, in addition to the complete riser diagram are recommended but not required.

      3. Show all necessary components for PIV, flow and tamper switches monitoring. Indicate all related work for a complete installation in construction documents.
4. On each floor plan, indicate the type of ceiling construction and all accessible and inaccessible ceilings and attic spaces. Provide adequate information to evaluate design conformance with applicable codes and regulations.

5. Location of required access panels and reference to construction details.

6. Complete symbol list of all components with devices’ CSFM listings numbers. LAUSD standard fire alarm symbols shall be used.

7. Complete sequence of operations.

8. Required power connections for all control panels and remote power supplies.

9. Voltage drop calculations for each visual and audible circuit. Voltage drop cannot exceed 6.0% for each circuit to allow addition of future devices.

10. Mounting details for control panel(s), power supplies, terminal cabinets, and peripheral devices such as horns, strobes, detectors, and pull stations, including backing details for protective covers.

11. Provide point to point wiring diagrams and construction details for smoke detectors, heat detectors, pull stations, audible and visual devices, duct smoke detectors (both addressable and non-addressable), HVAC interface details; projected beam detectors, elevator shunt trip, recall and control, power monitoring, ansys system interface, flow and tamper switches, remote power supplies, control and annunciator panels, PA system interface, elevator recall, and other automatic extinguishing system monitoring.

12. HVAC system shut-down provisions when required by code.

13. Detail of through-penetration of fire stop systems.

14. At existing schools, disconnection and removal of existing fire alarm components and wiring that is not to be part of the new system.

15. Plans shall be stamped and signed by the responsible electrical engineer.

16. Battery calculations for each control panel and remote power supply. 30% spare capacity is required for future growth.

17. Prior to DSA approval, the Architect/Engineer shall obtain District’s designated QA/QC group approval.
C. CLOCK AND PROGRAM SYSTEM

a. Clock and Program System shall be an hourly supervised, minute impulse, 24-volt direct current, multiple-wire connected system, with a master time control which controls and once each hour, automatically and individually, corrects each secondary clock and program time circuit.

b. In new school construction, and in new building additions to existing school sites and modernization projects, Program/Classroom Change will be announced using the P.A. speakers. Provide connections from clock system terminal cabinet to main P.A. Rack.

c. Provide connection to Fire Alarm Control Panel. Provide lock out for both manual and automatic tone when fire alarm system is in alarm.

d. Eight separate Program/Classroom Change zones shall be provided.

e. Provide a dedicated 120-volt, 20-amp circuit to clock controller.

f. Interior clocks shall be 12" diameter, round, semi-flush and mounted at 8'-0" above floor unless shown otherwise.

g. Provide interior clocks in all Classrooms, Administrative Unit offices, Cafeteria, Kitchen, Locker Rooms, Teacher's Lounge, Library, Auditorium and Gymnasium.

h. Exterior clocks shall be 15", round, with weatherproof housing with polycarbonate protective cover.

i. Wiring shall be in conduit, separate from network cabling. Clock circuit wiring shall consist of 3 #14 AWG typically.

j. Provide visual units, which are substantially different in appearance from a fire strobe indicating appliance to indicate Program/Classroom Change in Classrooms for the deaf and hard of hearing, and rooms with high ambient noise. The applicability of this requirement must be approved by the district. If required, the engineer must develop specification for appliances and power supplies.

k. Master clock controller shall be located in LAN/ Signal Equipment Room of Administrative Unit (new schools only).

l. Provide a terminal cabinet, complete with required terminal blocks, in each building, to be used for incoming and distributing cable terminations.

m. See public address/intercom/telephone and class-change signaling system design guide for coordination with clock system.

n. At existing school sites with an existing master clock system, new clocks shall be same make as existing master time control or clocks that are compatible with existing system.

o. Clocks shall be provided with hangers designed to ensure that they remain in place during earthquakes.

p. Provide block riser diagram of clock system, indicating all components and wiring.
q. When adding new clocks to an existing system confirm with clock manufacture if new clocks will work with existing clock system; then provide the appropriate design for a single comprehensive system.

r. Clock system at new sites shall be 2 wire reverse polarity, 12 hour and 59th minute correction impulse controlled.

D. COMPUTER AND NETWORKING SYSTEMS DESIGN

1. General
   
a. A complete Local Area Network and Computer System shall be provided for all new school projects, new building additions, and modernization projects.

b. Electrical power with surge protection and filtration must be provided for all computer equipment, as well as an owner furnished rack mounted uninterruptible power supply for data frames and servers.

c. Refer to Guide Construction Specifications, Section 25568 – Premise Wiring Systems, for additional more specific requirements. Section 25805 – LAN Systems contains information for Owner furnished equipment.

d. The Commissioned Architect/Engineer shall consult with the District prior to design of system to determine specific project-related requirements.

e. Sites with more than one school, such as a continuation high school co-located on a high school campus shall be equipped with one (1) MDF to serve both schools.

2. Local Area Network
   
a. The Local Area Network shall consist of the following:

   1. Backbone wiring shall provide interconnections between wiring closets, equipment rooms, and entrance facilities and shall consist of the transmission media, intermediate and main cross-connects, and mechanical terminations. The backbone wiring shall use the star topology where each wiring closet is wired to a main cross-connect. There shall be no more than 2 levels of cross-connects in the backbone wiring. The backbone wiring transmission media shall be a minimum of 12 fiber strands, 62.5/125 um multimode / 6 fiber strands single mode graded index optical fiber cable. Each switch in each IDF and LDF shall be provisioned with a dedicated uplink fiber pair connected to the MDF switch. When all switches have been provisioned, there shall be 50% spare (dark) fiber. As an example, if an IDF has five (24) port switches, the uplinks required will use 10 strands (5 pairs) of multi-mode fiber. Using a 12mm/6mm fiber would only leave 2 spare strands, in order to comply with the 50% spare requirement, the backbone mm fiber count must be increased to an 18mm/6sm cable. This allows 8 spare mm strands, which is in compliance with the 50% spare requirement. An 18/6 cable will meet the uplink requirements for a
maximum of 6 switches (12 strands) with 6 strands (50% spare) reserved for future expansion.

2. Horizontal wiring extends from the work area outlet to the wiring closet. The horizontal wiring includes the work area outlet, the physical termination for the cables, and the patch panels and/or data switches located in the wiring closet. The horizontal wiring is the star topology where each work area outlet is connected to a wiring closet. The horizontal distance from the termination in the wiring closet to the work area outlet must not be greater than 90 meters (295'). The horizontal wiring consists of category 5e, 100 ohm, 4-pair unshielded twisted pair cable; and a 4-strand multimode fiber cable to the teacher's workstation.

3. LAN equipment design shall incorporate no more than 20 outlets wired to a 24-port switch. This requirement shall be in addition to any growth factors for future wiring requirements as set forth in the District LAN specifications.

4. LAN Equipment Room, IDF Rooms, and Wiring Closets must be centrally located. Each closet must contain the terminations and devices for the horizontal wiring system. The closet must have sufficient space to accommodate all the components and servicing space. A typical wiring closet can have the following components:
   a. Equipment, 19" rack for mounting patch panels, and switches.
   b. Raceways for routing cables to work area outlets.
   c. Raceways/cable tray for routing backbone wiring.
   d. Rack-mounted UPS for active components in MDF/Server Racks in LAN Room and in all IDF and LDF racks. All UPS devices are to be located at the bottom of the rack space.
   e. Cabinets, Racks, Patch Panels and Wire Management equipment and cabling are Contractor Furnished Contractor installed.
   f. File servers, network switches, routers and UPS units are generally Owner furnished, Contractor installed.
   g. All MDF, IDF and LDF Racks shall have 50% physical space for future expansion. Provide rack elevation details showing all Owner and Contractor furnished components.
   h. All other signal headend equipment shall be located in the LAN Equipment Room.
   i. All other signal systems shall share the wiring closets with LAN IDF equipment.
   j. LAN Equipment Room and all IDF Rooms shall be air conditioned, 24 hours a day and 365 days a year. Coordinate with Mechanical Engineer.
   k. The following diagram shows the typical wiring design for data and voice cabling in a school or administrative building.
1. In Secondary Schools for all grade levels, General Classrooms, Science and Shop Classrooms shall have a minimum of six (6) student Category 5e drops, one (1) Category 5e drop for network printer, and one (1) four-strand fiber and one (1) category 5e drops at the teacher's location. All empty openings on each of the faceplates shall be effectively closed using factory made blank inserts. All classroom drops should terminate on two port faceplates. Student two position outlets containing two Category 5e drops shall be located per educational specification requirements. Printer outlet shall be located near teacher's desk.

m. In Elementary Schools for all grade levels, General Classrooms, Science and Shop Classrooms shall have a minimum of five (5) student Category 5e drops, one (1) Category 5e drop for network printers and one (1) four-strand fiber and one (1) category 5e drops at the teacher's location. All empty openings on each of the faceplates shall be effectively closed using factory made blank inserts. All classroom drops should terminate on two port faceplates. Student two position outlets containing two Category 5e drops shall be located per educational specification requirements. Printer outlet shall be located near teacher's desk. All drops shall be located on a single wall.

n. In Kindergarten classrooms they shall have a minimum of four (3) student Category 5e drops, one (1) Category 5e drop for network printers and one (1) four-strand fiber and one (1) category 5e drops at the teacher's location. All empty openings
on each of the faceplates shall be effectively closed using factory made blank inserts. All classroom drops should terminate on two port faceplates. Student two position outlets containing two Category 5e drops shall be located per educational specification requirements. Printer outlet shall be located near teacher’s desk. All drops shall be located on a single wall.

o. In Computer Laboratories, Technology Centers, Multi-Media Centers and Accounting Classrooms; A minimum of one (1), 6-strand fiber drop to the LDF in the Computer Laboratory and forty (40) Category 5e data drops distributed from the LDF. Category 5e drops shall be grouped with up to six Category 5e jacks per faceplate. Empty openings on faceplates shall be effectively closed using factory made blank inserts. The LDF may be installed in the closest signal room or collocated within an IDF.

p. In Administrative Units, for offices a minimum of one wall outlet with two category 5e outlets in a single 2-position faceplate shall be provided at each workstation. One of the two network connections will be labeled for Data. The remaining one connection will be labeled for Voice. Empty openings on faceplates shall be effectively closed using factory made blank inserts.

q. General workrooms shall receive a minimum of the following:
   1. Workroom/Project Rooms for Secondary Schools: Three (3) Cat 5e, one (1) printer.
   2. General Workroom for Secondary Schools: One (1) Cat 5e.
   3. Workrooms for Elementary Schools: One (1) Cat 5e.
   4. Workroom for Administration: One (1) 5e copy machine.
   5. Workroom for Performing Arts/Music Workroom: Two (2) Cat 5e.
   6. Workroom for Science Classrooms: One (1) Cat 5e.

r. Conference rooms will receive up to two (2) Category 5e drops; at two separate locations (faceplates) in the room. Drops will terminate in a single faceplate with two Category 5e drops. One drop shall be labeled “voice” and the other “data”.

s. In Library Reading Room, Circulation Center, Library Office and Conference Room, outlets at each workstation shall be provided. A minimum of one (1) 4-strand fiber drop to the Library LDF and a minimum of twelve (12) Category 5e data drops distributed from the LDF. Category 5e drops must be grouped with two Category 5e jacks (and two blank jacks) per faceplate. Drops must be distributed within the room according to the Project documents. Empty openings on faceplates shall be effectively closed using factory made blank inserts.
1. High Schools circulation desks shall receive four (4) data drops.

2. Middle Schools circulation desks shall receive three (3) data drops.

3. Elementary Schools and Primary Centers circulation desks shall receive two (2) data drops.

4. All Library offices shall receive two (2) drops.

5. All Library Workrooms shall receive two (2) drops.

6. All Primary Centers shall receive a minimum of six (6) student data drops in addition to the circulation drops.

7. All Secondary School sites shall receive a minimum of 12 and a maximum of 40 total library drops. The designer shall base the student drop counts above 12 on a 6:1 ratio as applied to the maximum occupant load capacity of the room. As an example, if a library has an occupant capacity of eighty, the drop count will be 13 (13.3333 rounded down).

8. Elementary School Library shall receive a minimum of one (1) 4-strand fiber drop to the Library LDF and a minimum of eight (8) student’s category 5e data drops distributed from the LDF (three (3) at circulation desk and five (5) in reading area), two (2) category 5e data drops at librarian’s circulation desk, and two (2) category 5e data drops at librarian’s workroom.

i. Student Nutritional Support Areas: A minimum of one (1), 4-strand fiber drop to the LDF and up to twenty (20) Category 5e data drops distributed from the LDF (12 drops for Elementary Schools, and 20 drops for Middle and High Schools). Category 5e drops must be grouped with two Category 5e jacks (and two blank jacks) per faceplate. Empty openings on faceplates shall be effectively closed using factory made blank inserts. Drops must be distributed within the room according to the District’s standard schematic details.

u. Student Nutritional Support Areas (Exterior Locations): Each location shall receive two (2) Category 5e drops in an environmentally sealed enclosure as described in section 1.02 B. 4 of this specification.

v. Multi-purpose rooms/Auditorium shall contain a total of: Eight (8) Category 5e data drops distributed from the closest LDF or IDF location. Category 5e drops must be grouped with two Category 5e jacks per faceplate. Empty openings on faceplates shall be effectively closed using factory made blank inserts. Drops must be distributed within the room according to the Project documents and consistent with the descriptions below.
1. In the stage area of a multipurpose room/auditorium, there shall be two (2) Category 5 drops and one (1), four-strand, multimode fiber optic drop located either at stage apron or the proscenium arch.

2. On the other three walls of the multipurpose room, two (2) Category 5 data drops shall be evenly distributed and installed.

w. Gymnasium shall receive two (2) category 5e data drops distributed from closest available LDF or IDF location. Category 5e drops must be grouped with two category 5e jacks per faceplate. Empty openings on faceplates shall be effectively closed using factory made blank inserts.

x. Project documents shall indicate all horizontal fiber and category 5e cabling requirements for non-instructional and office work areas, including book rooms and students stores.

y. Provide a cable tray system divided in three sections for all signal systems, except fire alarm, clock and building control systems.

z. Provide two (2) floor mounted outlets, Category 5e data drops. One for connection to projector and one from LDF, and a microphone at appropriately 15 feet from projection screen.

5. In the following Diagram, the sample network topology combines the design principles and considerations contained in the above section, showing the typical branch layout of both fiber optic and Category 5 data networking cabling:
Library, Cafeteria, Auditorium: LDF
fiber to LDF
plus minimum 12 cat5e (2 or 4 per faceplate)

Classrooms

6 classrooms per IDF workgroup switch

IDF

Classrooms

classrooms: teacher - 2 pr mm fiber plus 1 cat5e
students - 5 cat5e

Admin Offices:
4 cat5e per office (1 faceplate)

MDF

Minimum backbone cable between MDF and IDF/LDF:
12 strands mm fiber
6 strands cm fiber
Also install Cat5 riser / cross connect cable

Backbone cable trenched between buildings

classrooms: teacher - 2 pr mm fiber plus 1 cat5e
students - 5 cat5e

LDF

Classrooms with LDF:
Fiber, cat5e, and local switch terminate in wall mount cabinet.
Cat5e distribution from cabinet to single port jacks

Key:
Green = Category 5e cable
Red = Multimode Fiber Optic Cable
Yellow = Single mode Fiber Optic Cable
3. Power Requirements

a. Provide an electronic grade panelboard to supply power for all computers at each floor or wing. The panelboard can be either supplied from a general-purpose panelboard, which is fed from a K-4 rated transformer, or from a dedicated K-4 transformer.

1. A duplex receptacle shall be mounted in wall within 12 inches of each LAN Outlet. A double duplex receptacle shall serve two workstations where installed side by side. A 120-volt, 20-amp circuit shall be provided to serve up to maximum three workstations. Provide a dedicated 120-volt, 20 amp circuit and receptacle for each network or stand alone printer from electronic grade panelboard.

b. For each branch circuit serving computers, use a dedicated neutral.

c. All receptacles for computers shall be standard type, except blue in color.

d. In MDF and IDF rooms or areas, as well as the LDF locations, the number and type of electrical outlets will depend upon and must be designed to the specific size, type of equipment, and UPS equipment required. The following criteria are applicable to most cases: A minimum of one dedicated, dedicated, 20 ampere, 120 Volt circuit and a rack mounted receptacle outlet of the same rating is required for in each IDF and LDF cabinet for the rack mounted UPS system. Additionally, a dedicated 208 volt, 1 phase, 30A circuit terminated in a NEM L6-30P rack mounted receptacle is required in each MDF for the rack mounted UPS system.

4. Uninterruptible Power Supply (UPS)

a. The site MDF cabinet shall be provisioned with one 208 volt, 30 amps NEMA L6-30P receptacle to connect to owner furnished contractor supplied uninterruptible power supply.

E. TELEPHONE SYSTEM

1. General

a. The Architect-Engineer shall consult and coordinate with the telephone utility provider in requesting service, and shall include in the contract documents the drawings and specifications or other requirements provided by the utility. Requests must be made early in design, to allow sufficient time for obtaining the utility engineers' input. For assistance in this area, please contact Information Technology Divisions Telecommunications Branch.

b. System requirements are different for Elementary Schools and for Middle Schools / High Schools. Requirements also may be different for new school construction and existing schools.

c. PABX or PBX systems, depending upon the size of the project to be served, require either floor space or wall-mounting space. Some PBX
systems are contained within a system cabinet. Others may utilize a rack-mounted equipment configuration similar to data networking equipment. In planning a project, the access and egress to the cabinets or racks, and especially at the front, rear and sides of the main control cabinet, must be determined and planned to provide adequate space for operation and service. Consult the District Information Technology Divisions Telecommunications Branch for proper sizing of floor space requirements.

d. System shall interface with the PA / Intercom system. Manual control of program tone over PA system shall be locked out when Fire Alarm System is in “Alarm”. All manual and automatic program signals shall be deactivated during a fire-alarm condition.

e. Provide dedicated telephone line connections needed for elevators, and for fire alarm and intrusion alarm systems monitoring.

2. Elementary Schools

a. The following telephone lines are required for Elementary Schools (identical requirements for Early Education Centers provided the working areas exist) shall be as follows:

1. 1 PRI (Primary Rate Interface) with 40 DID’s.

2. 1 dedicated fax line.

3. 1 intrusion alarm line per alarm panel.

4. 2 fire alarm line per FACP (minimum or as needed to meet code requirements).

5. 1 line per elevator as needed.

6. 1 line for environmental control system as needed.

7. 1 T1 for data.

8. 1 phone with direct access to the outside at teacher’s lounge.

3. Middle and High Schools - New Construction:

a. System shall consist of a PBX telephone system and telephone lines with connections to other systems (i.e., intercom, public address and class/program change signaling system. Provide public address, intercom, PBX telephone, and class/program change signaling system.

b. In Middle and High Schools the line requirements are as follows:

1. Secondary sites with 1 - 30 administrative phones.
   a. One (1) PRI (Primary Rate Interface) with 100 DID’s
   b. One (1) dedicated fax line.
   c. One (1) dedicated intrusion alarm line per alarm panel.
d. Two (2) dedicated fire alarm lines per FACP (or as needed to meet code requirements).

e. One (1) dedicated line per elevator as needed.

f. One (1) dedicated line for environmental control system as needed.

g. One (1) payphone per campus under a sheltered student accessible area. A preferred location would be near the administration buildings or near the student’s quad (possibly adjacent to the lunch shelter/MPR).

h. Two (2) T1’s for data.

i. One (1) phone with direct access to the outside at teacher’s lounge.

2. Secondary sites with more than 30 administrative phones.

a. Two (2) PRI with 100 DIDDs.

b. One (1) dedicated fax line.

c. One (1) dedicated intrusion alarm line per alarm panel.

d. Two (2) dedicated fire alarm lines per FACP (minimum or as needed to meet code requirements).

e. One (1) dedicated line per elevator as needed.

f. One (1) payphone per campus under a sheltered student accessible area. A preferred location would be near the administration building, or near the student quad (possibly adjacent to the lunch shelter/MPR).

g. One (1) payphone per campus.

h. Two (2) T1 for data.

c. Consult the telephone company for specific entrance facility and pay phone requirements. Wire pay telephone outlets directly to main telephone backboard, by-passing PBX station.

4. Telephone Outlets

a. Telephone outlets shall be provided as follows:

1. One (1) attendant telephone console Type T1 in main office in Elementary Schools and two in Middle and High Schools’ main office, plus one in each small learning community (SLC) administrative office.

2. Multi-line telephones in Principal's, Vice Principal's, Assistant Principal's, Dean's Offices, at workstations in Attendance Office (high schools and middle schools only), SLC’s (Small Learning Communities), in Kitchen's office, (one fax, one telephone) and at each workstation in main office (except at workstations where attendant telephone consoles are located), Work Experience Coordinator and College Coordinator offices in high schools, Counselors Offices in Adult School and for each of following
offices in high schools and middles schools: Custodian, Librarian, Nurse, Doctor, Textbook Clerk, Girls’ P.E. Department, Boys P.E. Department, Industrial Arts Department, Grade Counselors, Counselors, and a two line telephone with two phone lines to library circulation desk.

3. Use wall mounted single line telephone where no desk is available such as teachers lounge rooms.

4. Single line desk PABX telephones shall be used only where specifically directed.

5. All telephone outlets, type IW and ID shall be connected to the PA/Intercommunication System. Identify Intercommunication Telephones from PABX telephones per LAUSD standard Symbol List and show them in appropriate location on Riser Diagrams. Descriptions above using the “Tx” descriptors refer to the LAUSD standard symbol definitions.

6. One wire connection (jack only) for each elevator.

7. One wire connection (jack only) for each fax machine in main administration area.

8. One wire connection for kitchen’s office fax.

9. Two wire connection (jack only) for fire alarm system.

10. One wire connection (jack only) T7 for intrusion alarm.

b. Single line Intercommunication Desk type telephones (ID) shall be used in classrooms and library reception desks. Use single line Intercommunication wall mounted telephones (IW) in Cafeteria, Auditorium, Gymnasium, Computer Rooms, Faculty Lounge, First Aid Room, Music/Choral Room, Locker rooms, etc. The classroom outlets are contractor-furnished and contractor-installed items and are specified under Guide Specification Section 25750. PBX and P.A. systems shall be interconnected to provide paging access capability from any designated intercommunication telephone. This is usually accomplished with paging adapters connected to or through the main P.A. console. A separate interconnection provides classroom phones (IW and ID) access to the PBX for emergency calls to the public switched telephone network (PSTN).

5. Wiring Requirements

1. Wiring requirements for T5 telephone outlets is Category 5e cable terminating in Category 5e jack as specified in Specification Section 25568. The homeruns shall be routed to the closest IDF’s dedicated voice patch panel for future Voice over IP network connections. From IDF a multi-pair telephone cable shall be used to connect all telephones to the PBX system in the administration building.
2. Wiring requirements for jack only telephone ports is one twisted pair #22 AWG, Category 3, cable terminating in RJ-11 jack and shall homerun to the main telephone backboard (thru telephone terminal cabinet of the building if applicable).

3. See Guide Construction Specifications Sections 25568 (wiring and infrastructure) and 25723 (Owner furnished PBX equipment and outlets) for equipment description and general requirements.

4. The following diagram, Voice Communications Topology, shows a typical wiring selection and design for a multiple building campus or multi-floor building.

6. PBX General Requirements
   a. A dedicated UPS providing at least 1 hour of emergency power for each system shall be furnished and installed by PBX equipment's vendor under separate contract (Owner Furnished, Owner installed under this contract).
b. Provide a dedicated, 30 Amp, 208 volt, 1 phase circuit with NEMA L6-30P outlet for connection to owner furnished UPS (which supplies power to the PABX equipment).

c. Allow 4 square feet of floor space adjacent to dedicated power outlet for the PBX UPS.

d. When designing for telephone systems take into account future requirements and make provisions for expansion in systems such as providing spare cables, sizing terminal boards with adequate spare terminals.

e. On sites with more than one school, such as a continuation high school co-located on a high school campus shall be equipped with a single PABX to serve all users on both sides.

f. The PBX system will be located either in the campus or building LAN room, or a separately designated room. Always provide main cross connect backboard or terminal cabinet in main building in LAN Equipment Room next to main telephone backboard (in new school campuses only). All wiring shall be routed via Cross-connect backboard or terminal cabinet through cable tray system.

g. Allow a separate 84 inch rack for the PABX and associated equipment in the LAN room.

h. Indicate on drawings the location of equipment and components, conduit and cable runs, and cable trays.

i. Cables shall be in raceways. Exposed cables will be allowed in cable tray system only.

j. All cable homeruns from outlets shall be routed to the closest IDF at each building. Provide separate patch panel in IDF dedicated to VOICE.

k. Cables homeruns to IDF may be run in same conduit or cable tray, which contain data cables routed to the same IDF. Voice and Data outlets are allowed to be installed on the same multi-position faceplates/boxes.

l. From IDF use a multi-pair telephone cable (riser rated or better) to route the telephone lines to PBX Cabinet (cross connect at both ends, in IDF room and LAN room). This temporary wiring shall be removed after Voice over IP system is implemented.

F. PUBLIC ADDRESS/INTERCOM/CLASS CHANGE SIGNALING SYSTEM

1. General:

a. Provide public address, intercom, and class/program change signaling systems.

b. Systems requirements are different for Elementary Schools and for Middle Schools / High Schools. Requirements also may be different for new school construction and existing schools. Verify specific requirements for each project.
c. There shall be a single public address/intercommunication system for each site. The Architect/Engineer shall select the appropriate system from one of the three specification compliant manufacturers. The design shall comply with the following criteria:

1. The proposed public address/intercommunication system shall not exceed manufacturer’s system capacity.

2. It is not acceptable to increase the manufacturer’s stated capacity by tying two or more systems together.

d. Provide an Autonomous Public Address System in Multi-Purpose Rooms, large Group Instruction Rooms and Auditoriums. System shall include a program from/to line to Central P.A. System and override capability from main PA system.

e. Provide an Autonomous Public Address System in Gymnasiums and athletic fields in Middle and High Schools. System shall include a program line from/to Central P.A. System and override capability from main PA system.

2. Main PA/Intercom System

a. Main PA System shall consist of public address, intercommunication and class/program change signaling equipment with capacity for speakers and telephones.

b. Provide intercom telephone service to each classroom, wired to the main Intercom/PA rack.

c. Provide an intercom system that allows multiple broadcasting opportunities: main office to classroom, classroom to classroom, office or classroom to outside, etc.

d. When designing PA systems, take into account future requirements and make provisions for expansion in systems such as providing spare cables, sizing terminal boards with adequate spare terminals, providing conduit stub-outs outside of buildings and size equipment such as P.A racks and PABX to accommodate future circuits as planned, or 20% minimum expansion.

e. See Guide Construction Specification, Section 25821: Public Address Systems and Section 25750: Intercommunications Systems, for equipment description and additional requirements. These Specifications shall be included in the Contract Specifications.

f. PA/Intercom Rack(s)

1. P.A. Rack(s) shall be located in the LAN Equipment Room, lining up with TV, MDF/Sever racks.

   a. Rack(s) shall be front and rear accessible for servicing. Main P.A. rack(s) shall consist of a free standing 19" rack(s) with following components:

   b. AM-FM tuner. Antenna for this tuner is mounted on roof of Administrative Building with conduit and antenna down leads installed to P.A. Rack.
c. Cassette tape player.
d. Intercom and program control panel.
e. Room selector panels with switch banks.
f. P.A. amplifier.
g. Emergency amplifier.
h. Microphones. One Microphone shall be installed in Main office wired to the PA Rack.
i. CD changer.

2. In medium and large campuses multiple PA racks are required to accommodate the numbers of speakers. Show the elevation of racks with all components shown. Prove adequate space to install multiple racks.

g. An additional function of P.A. speakers is to announce program/classroom change. System shall interface with master clock system and Fire Alarm System for class-change signaling utilizing P.A. speakers. The P.A. Rack equipment must include a tone generator, a separate amplifier and inputs from Program/Clock Controller. Manual activation of separate tones shall be provided for emergency call and general call.

h. System shall interface with Fire Alarm System to silence all speakers during a general fire alarm condition and activation of indicating devices. (See Standard Details 5.14 and 5.15.)

i. System shall interface with the site PBX to allow 911 access from the classrooms. (Refer to Standard Detail 5.8)

j. Wiring Requirements

1. For each P.A. speakers provide one twisted shielded pair #22 -#12 AWG, depending on the size of speaker and the length of the run.

2. For intercom telephones, one twisted unshielded pair #22.

3. For intercom telephones with co-located speaker, two twisted pair #22 one pair shielded and one pair unshielded.

4. For each microphone outlet, one twisted pair #22 AWG with overall shield.

5. For overriding autonomous P.A. system, one twisted pair #18 AWG.

6. For program to and from autonomous P.A. systems, one twisted pair #22 AWG.

7. For underground applications or under slabs at ground level use flooded type cables.

k. Intercommunication Phone Outlets
1. Provide intercommunication telephone outlets as follows. (See also the sub-section “Telephone PBX Systems.”)

2. Single line intercom desk telephones (ID) in Classrooms.

3. Single line intercom wall-mounted telephones (IW) in Cafeteria, Auditorium, Locker Rooms, Faculty Lounge, First Aid Room, Music/Choral Room, Teachers Work Rooms, etc.

4. Intercom telephone outlets, type ID (desk type where desk is available) and IW (wall-type) shall be connected to the PA/Intercommunication System thru PA Main terminal cabinet. The wires for speakers and intercom telephone serving a room shall be combined in a single cable with an overall jacket containing both shielded and unshielded twisted pairs.

5. Identify intercom telephones as separate from PABX telephones per LAUSD standard Symbol List and show them in appropriate locations on riser diagrams.

i. P.A. Speakers

1. Provide P.A. speakers in the following locations at minimum:
   a. Classrooms, offices, corridors, library, teachers’ workrooms, student store, plant manager’s office and all occupied rooms where no PBX telephone has been provided.
   b. Outdoors to cover all student assembly, athletic and activity areas. Size speakers appropriate to the area covered. Do not impact adjacent residential areas.
   c. Parking garages.
   d. All other rooms and areas as appropriate to specific projects.

m. Paging

1. PABX and Intercom/P.A. systems shall be interfaced to provide paging capability from any designated telephone. This is usually accomplished with paging adapters in the main Intercom/P.A. rack.

2. Provide a general paging zone for elementary schools and separate paging zones for middle and high schools as follows:
   a. General paging zone.
   b. Classrooms only.
   c. Gymnasium and athletic fields.
   d. Shops.
   e. Auditorium/Multi-Purpose Rooms.

n. General System Requirements

1. Provide at least 1 hour of emergency power for PA/Intercom system at full load by installing a dedicated UPS unit. Provide a dedicated 120-volt circuit from UPS to each P.A. rack.
2. In classrooms and offices, provide flush mounted baffles where new suspended ceilings are installed. Locate speaker at center of the room. Otherwise, provide surface mounted speaker baffles directly above the telephone handset at 8'-0".

3. In rooms without a teacher’s desk, telephone handsets shall be located in close proximity to Teacher’s work station, wall mounted at 4'-0". In classrooms telephones shall be desk mounted with telephone jack mounted at +15” above finished floor at wall behind the desk.

4. Provide speaker volume control in office areas only. For wall mounted speakers, volume control shall be installed within baffle with shaft extending out of baffle. Where speakers are ceiling-mounted, the volume controls shall be located on the wall in a convenient location.

5. Place both the PA/ Intercom wall display and one emergency PA microphone in main clerical core area.

6. When designing P.A. systems, take into account future requirements and make provisions for expansion in systems such as providing spare cables, sizing terminal boards with adequate spare terminals.

7. Main PA terminal cabinet shall be located on the wall in the same room where PA racks are located (LAN room in new campuses). All wiring shall be routed via main terminal cabinet through cable tray system.

8. Provide at least one terminal cabinet in each building. Locate terminal cabinet in building IDF room(s).

9. Design loudspeaker installation using proper types and numbers of speakers to provide adequate listening patterns in larger or special rooms and outdoor areas. Position outdoor speakers in a manner that minimizes the impact to residential neighbors of the site. Consider problems of feedback.

10. Fire Department requires self-supporting, non-guyed antenna masts. Ensure adequate structural support.

11. Locate antenna masts in least conspicuous locations as viewed from main school entrance.

12. Indicate mounting details on drawings of antenna, speaker baffles, special speaker mounting brackets, speaker clusters, etc.

13. Indicate on drawings a block-riser diagram of entire P.A. system, indicating components such as speakers and intercom telephones, cable trays, conduit and cable runs and underground facilities.
14. Indicate on drawings the location of equipment and components, conduit and cable runs, and cable trays.

15. Cables shall be in raceways. Exposed cables will be allowed in cable tray system only.

16. Provide grounding facilities for Public Address Systems consisting of 3/4" conduit and a #6 THW/N wire, or as required by code and specification to connect the Main Public Address terminal cabinet, and other terminal cabinets to the building grounding system. Where connection to existing building ground system is not practical, provide a separate ground rod to be used for grounding of the racks and antennas.

3. **Gymnasium Autonomous P.A./Sound System**

   a. Components include:

   1. Freestanding 19" rack with mixer pre-amplifiers, power amplifiers, cassette tape player, CD player, AM-FM radio, and graphic equalizer. Locate rack in Gymnasium Office.

   2. Terminal cabinet for termination of all inputs and outputs of the system.

   3. AM-FM antenna mounted on roof with downlead in conduit to radio innner and grounding.

   4. Loudspeakers in gymnasium court consisting of a cluster of minimum 4 horn loudspeakers mounted near ceiling in center of room in such a manner as to cover all 4 quadrants of room. Mount cluster in a steel enclosure firmly anchored to ceiling or roof structure.

   5. Two microphone outlets mounted flush with finished floor at center of side court. Next to microphone outlets, provide two 120V, 15 amp receptacles flush with finish floor.

   6. One microphone outlet in each of the Girls and Boys Coaches Offices.

   7. Assistive Listening System.

   b. Provide Program line to main P.A. rack in Administrative Unit to distribute local programs to main P.A. system.

   c. Provide Emergency Override line, including relays, to override local program from main P.A. console.

   d. Provide Program from main P.A. rack shall allow broadcast of main P.A. system programs and announcements in gymnasium areas.

   e. Provide dedicated 120-volt circuit for Autonomous PA Rack.
4. Multi-Purpose Room Autonomous P.A./Sound System
   a. Components include:
      1. Wall mounted amplifier in cabinet with a minimum of 8 input sources for tape, projector, and 5 microphones. Amplifier cabinet shall be flush or surface mounted and located back stage.
      2. Input/output switching panel mounted adjacent to or below amplifier cabinet.
      3. Three floor microphone outlets flush mounted near front of stage platform, equally spaced and wired to pre-amplifier mixer inputs.
      4. Microphone outlet flush mounted in front face of stage platform and wired to pre-amplifier mixer input.
      5. Microphone outlet flush mounted in floor at center of audience area and wired to pre-amplifier mixer input.
      6. Speakers mounted on either side of the stage platform and wired to amplifier outputs.
      7. Projector outlet flush mounted in floor at center of audience area and wired to pre-amplifier mixer input.
      8. Receptacle, 120V, 15 amps, flush mounted in floor at center of audience area.
   b. Provide Program line to main P.A. rack in Administrative Unit to distribute local programs to main P.A. system.
   c. Provide Emergency Override line, including relays, to override local program from main P.A. console.
   d. Provided Program from main P.A. rack shall allow broadcast of main P.A. system programs and announcements in multi-purpose rooms, gymnasium, auditoria, and other specialized areas with separate or autonomous PA systems.
   e. Provide dedicated 120-volt circuit for Autonomous PA wall mounted Rack.

5. Large Group Instruction Room Autonomous P.A./Sound System
   a. Large Group Instruction Rooms are rooms with capacity for 100 students or more, but without a stage.
   b. Components include:
      1. Wall mounted amplifier in cabinet with a minimum of 8 input sources for tape/CD, Audio from laptop computer, projector, and 4 microphones. Amplifier cabinet shall be flush or surface mounted in closest signal room.
2. Input/output switching panel mounted adjacent to or below amplifier cabinet.

3. Microphone outlet flush mounted on instruction wall at +48” A.F.F. and wired to pre-amplifier mixer input.

4. Microphone outlet flush mounted in floor at center of audience area and wired to pre-amplifier mixer input.

5. Provide two infrared wireless microphones.

6. Speakers mounted above instructional wall and wired to amplifier outputs.

7. Projector outlet flush mounted in floor at center of audience area and wired to pre-amplifier mixer input.

8. Receptacle, 120V, 15 amps, flush mounted in floor at center of audience area.


c. Provide Program line to main P.A. rack in Administrative Unit to distribute local programs to main P.A. system.

d. Provide Emergency Override line, including relays, to override local program from main P.A. console.

e. Provide Program from main P.A. rack shall allow broadcast of main P.A. system programs and announcements in multi-purpose room areas.

f. Provide dedicated 120-volt circuit for Autonomous PA wall mounted Rack.

6. Auditorium / Theater Autonomous P.A./Sound System

a. Components include:

1. A freestanding 19” rack backstage with mixer pre-amplifiers, power amplifiers, cassette tape player, AM-FM radio, graphic equalizer, and receivers for wireless microphones.

2. Terminal cabinet for termination of all inputs and outputs of system, except inputs of wireless microphones.

3. AM-FM antenna mounted on roof with downlead in conduit to radio tuner, and grounding.

4. Microphone outlets (three) mounted flush in stage platform, overhead, and in stage platform front. Each microphone outlet shall be wired to one input of pre-amplifier mixer. Wireless microphones and receivers shall be provided. Each wireless microphone receiver shall be wired to one pre-amplifier mixer input.
5. Projector outlet in projection room wired to pre-amplifier mixer input.

6. Speakers shall be provided to produce a uniform sound level throughout auditorium. A sound system analysis shall be done to properly locate sound columns.

7. A telephone intercom system shall be provided between projection rooms and backstage for stage cueing and lighting coordination. System shall include headsets, power supplies and input jacks.

8. Assistive Listening System.
   b. Provide Program line to main P.A. rack in Administrative Unit to distribute local programs to main P.A. system.
   c. Provide Emergency Override line, including relays, to override local program from main P.A. console.
   d. Provide Program from main P.A. rack shall allow broadcast of main P.A. system programs and announcements in auditorium building areas.
   e. Provide dedicated 120-volt circuit for Autonomous PA wall mounted Rack.
   f. In Performing Art Centers/Theaters (new facilities), a theater consultant hired by the architect shall determine the scope of sound system beyond the requirements defined here.

1. The electrical engineer shall coordinate with theater consultant and architect to provide power, cabling, racks, speaker clusters and raceways where needed.

7. Athletic Field Autonomous P.A./Sound System
   a. Components include:

1. Rack mounted amplifier in cabinet with a minimum of 8 input sources for tape, projector, and 5 microphones. Amplifier cabinet shall be flush or surface mounted, located in sound control booth.

2. Input/output switching panels mounted adjacent to or below amplifier cabinet.

3. Wall-mounted microphone outlet at coach’s office wired to amplifier inputs.

4. Microphone outlet mounted on an appropriate light pole or at concession room and wired to amplifier input.

5. Outdoor horn loudspeakers to cover all P.E. fields.

b. Provide Program line to main P.A. rack in Administrative Unit to distribute local programs to main P.A. system.

c. Provide Emergency Override line, including relays, to override local program from main P.A. console.
d. Provide Program from main P.A. rack shall allow broadcast of main P.A. system programs and announcements in auditorium building areas.

e. Provide dedicated 120-volt circuit for Autonomous PA wall mounted Rack.

f. Do not locate any equipment in the field or areas that would create a safety hazard.

G. SECURITY INTRUSION ALARM SYSTEM

1. General

   a. The District's preferred security intrusion alarm system consists of four basic elements: input, processing, output and receiving.

      1. The input element is a sensing device designed to monitor status of a protected area in a school, such as a motion detector or a door switch. These sensing devices, or intrusion detectors, are connected to a processing instrument, or control panel, via cable to form a closed loop.

      2. The control panel provides a small amount of current constantly flowing through loop. If current passes without interruption, there is no alarm. However, if one of the intrusion detectors is disrupted, opened, or the cable is cut, the control panel senses the absence of current in the loop.

      3. Upon sensing the absence of current, the control panel provides power necessary to activate an output device, or digital communicator, to provide an output device digital communicator, or alarm. Within seconds the digital communicator seizes telephone lines and begins dialing and sending programmed digital signals to a digital receiver located at the central station of the Los Angeles School Police Headquarters.

      4. Upon answering the call, the receiver electronically acknowledges the digital communicator and prepares to receive its message.

2. Sensing Devices

   a. Motion Detectors:

      1. Motion detectors shall be passive infrared.

      2. Provide motion detectors in all areas or rooms that are located along the perimeter of the first floor of a building.

      3. Provide motion detectors in rooms located above the first floor only if there is outside access or potential for entering directly by climbing trees, etc.

      4. Provide motion detectors in corridors and hallways on each floor of a building.
5. Provide motion detectors in computer rooms, LAN equipment rooms, IDF rooms, Multi-Purpose Building, Kitchen and Dining Rooms, Gymnasium and all other major spaces.

6. Install motion detectors on an outlet box on the ceiling to obtain maximum efficiency. Use wall-mounted detectors only where ceiling-mounted are impractical.

7. Locate the motion detector at a corner of a room, facing away from sunlight, heating elements, HVAC outlets and any turbulent air movements.

8. Provide remote control panel including a 12VDC power supply in each building for motion detectors.

b. Door Switches:

1. Door switches shall be of magnetic type.

2. Provide door switches for walk-in freezers or coolers in a kitchen.

3. Provide door switches for all exterior doors not covered by motion detectors on the interior, including restrooms with direct exterior access.

c. Alarm Detection:

1. Sump Pump: Provide connection and means of annunciation from high water alarm to intrusion detection system.

2. Sewage ejector Pump: Provide connection and means of annunciation from malfunction alarm device to intrusion detection system.

3. Alarm Zones

a. Each sensing device shall be identified with an alarm zone or alarm point, which shall be identified at the remote annunciator and at the control center. The zone or point identification shall be descriptive of the location of the sensing device, such as Administrative Building Room 120.

b. There shall be no more than two motion detectors per zone or no more than two points to identify the location. Areas where two detectors per zone may be required include multi-purpose buildings, gymnasiums, auditoriums, and two classroom relocatable buildings.

c. Zones or points shall be listed and indicated on site and building drawings, identifying each one by building, area and room number.

4. Zone By-Pass Keypads

a. Provide a strategically located zone by-pass keypad in places such as the interior wall of the Main Office, Kitchen/Cafeteria building, Student Store, Gymnasium Lobby, Multi-Purpose Building, Auditorium/Theater, Adult School Office, Computer/Multi-
media/Science laboratories, Music/Band Room, offices of academies in multi-academy learning centers, and Plant Manager's Office to deactivate the alarm when entering a building is necessary after the alarm system is armed.

1. A separate keypad will not be required, if any of the areas listed above is only accessible through another controlled area with a keypad.

2. Each main security panel can support a maximum of 8 keypads. If more key pads are required obtain authorization from District representative.

b. The by-pass keypad shall be a liquid crystal display.

c. Do not locate keypads in corridors or other areas easily subject to damage.

d. Consult with District representative to determine if other locations may be required.

5. Main Security Panel (MSP) and Annunciator

a. Main Security Panel and annunciator are also called headend equipment. They are used to annunciate alarm zones and to transmit alarm signals via telephone line to the central monitoring station located at the District Police Headquarters.

b. MSP consists of maximum of 16 zones, expandable to 128 zones by the use of zone expansion modules, each with motion and tamper inputs, dual phone line monitor and power supply housed in a lockable cabinet. Controller shall be located in a LAN equipment room (new facilities) or closet in Administration Unit (existing facilities).

c. In campuses where numbers of zones exceed 128, or in campuses where total combus wiring from the controller to a remote security panel or to any keypad connected, exceed 1000 feet, split the campus to be protected by two independent controllers. Both controllers shall be annunciated in the main office.

d. MSP shall be fed from a separate circuit of 120-volt power source. It will be stepped down through a 120/16-18 VAC, 40VA transformer.

e. Annunciator shall be located in clerk's office of the Administration Unit. Annunciator shall have full LED annunciation for all zones, tamper loop, and dialer output interface. Provide a keypad at each annunciator.


a. Provide a Remote Security panel at each building (except relocatable buildings where a group of relocatables may be controlled by one RSP), connected to the main security panel by combus wiring.

b. RSP consists of maximum of 16 zones, expandable to 128 zones by the use of zone expansion modules, each with motion and tamper inputs, and power supply housed in a lockable cabinet.
c. RSP shall be fed from a separate circuit of 120-volt power source. It will be stepped down through a 120/16-18 VAC, 40VA transformer
d. The RSPs shall be located in IDF rooms wherever possible.

7. Power Supply, Cables, Raceways and Cabinets
   a. Cables used for connection between MSP and annunciator in clerk's office, all homeruns from sensing devices to MSP/RSP and combus wiring between MSP and RSP as well as wiring to the keypads shall be 4 #22 for up to 1000 feet.
   b. Use flooded type cables for underground applications.
   c. Cables shall be installed in raceways. Concealed raceway shall be used for new building construction and exposed raceway shall be used for existing building installations. Exposed raceway in electrical rooms shall be conduit and exposed raceway in classrooms; offices and corridors shall be wiremold.
   d. Cable length, resistance and capacitance must be designed by the Architect to strictly conform to the manufacturer's design guide. Any deviation from the manufacturer's specifications for these types of systems can result in system malfunctions and/or high maintenance costs to the District.
   e. Existing underground raceways used for public address system or TV master antenna system may be used to run security intrusion alarm system cables if there are spaces available in those raceways. Any cables pulled out from an existing conduit shall be replaced with new.
   f. Power supplies consisting of receptacles, transformer/rectifier and batteries shall be installed in a lockable NEMA 1 enclosure or a lockable terminal cabinet.
   g. Terminal Cabinets and Junction Boxes:
      1. At least one terminal cabinet shall be provided in each building except relocatable buildings.
      2. At least one junction box (6"x 8") shall be provided in each relocatable building.

8. Existing Security Intrusion Alarm Systems
   a. At some District school sites existing intrusion alarm equipment may differ from the system described above.
   b. Existing system headend equipment may consist of an annunciator/switch panel, a relay panel and a dialer or transponders.
   c. If this situation is encountered, remove existing annunciator/switch panel, relay panel, dialer or transponder. Wire all existing zones directly to new controller. A new annunciator panel shall be installed in clerk's office.
9. Site Plan
   a. Instruct the contractor to provide a site plan for use by the District central monitoring stations. Site plan shall be as follows:
      1. Indicate location of buildings and zone numbers.
      2. Indicate school code number and zone chart.
      3. Indicate surrounding street names and direction.
      4. Site plan shall be drawn on 8 1/2" x 13" sheet.

H. CLOSED CIRCUIT TELEVISION (CCTV) AND AUDIO SURVEILLANCE SYSTEMS

1. General
   a. As part of the Los Angeles Unified School District's commitment to provide a safe working and learning environment, surveillance systems are to be used in approved, designated areas of schools and school grounds where there is no expectation of privacy as an additional and further means to continue to provide for that safe environment. Surveillance systems are defined as electronic devices for visual image (only) monitoring, recording and visual image data storage. (Parking garages are an exception and have audio monitoring and recording as well as video.)
   b. Surveillance systems ARE STRICTLY PROHIBITED WHERE A "REASONABLE EXPECTATION OF PRIVACY" EXISTS. This includes the following:
      1. No surveillance shall be installed in such spaces as restrooms, locker rooms, classrooms, private offices, and private workspaces.
      2. Cameras must be directed so that they do not look through windows or other openings into private areas.
      3. Cameras providing outside surveillance, such as parking lots or building perimeters must not be directed beyond school property.
   c. All real-time visual monitoring equipment (except point-of-entry monitors), including monitor screens, consoles, controllers and other appurtenant equipment, and data recording devices, must be located in a secure monitoring site, with restricted access by approved individuals only. Do not locate them in a common LAN Equipment Room.
      1. Secure monitoring sites may be located, secure from public viewing, in Principal's Office, Assistant Principal's Office, or a Police Office or special Security Room. For adult education or other after-hours use, the same provisions apply; systems must be able to be secured from unauthorized use.
   d. Provide CCTV surveillance systems as follows:
1. Parking Garage Systems: In all parking structures (Audio Surveillance are also required).

2. School Building and Site Systems: Only when directed in writing by the District’s authorized representative. (These systems shall be video only, with **NO AUDIO SURVEILLANCE OR RECORDING**.)

2. Parking Garage Surveillance System
   
a. Closed circuit television system shall consist of CCTV cameras, camera enclosures, monitors, coaxial switcher/controller system, digital video controller and recorders (DVR), and pan-and-tilt drives, cabling, power supplies and raceways. The video surveillance system shall be designed to be integrated with a School Building and Site System, either concurrently or in the future.

b. Audio surveillance equipment shall consist of controller, microphones, speaker/microphones, combiners, and call stations.

c. The basic system requirements are as follows:

1. One CCTV camera with pan and tilt spaced every 100 feet and within vandal-resistant enclosure in parking structures.

2. One fixed CCTV camera within vandal-resistant enclosure installed inside the parking structure entrance. Field of view shall include the vehicle access gate to the parking lot.

3. Surveillance microphones spaced every 60 feet, with a maximum of six microphones per zone.

4. Push to talk Emergency Speaker/microphone call stations every 50 feet in garage, one at elevator’s lobby and one at each pedestrian point of egress.

5. Sixteen CCTV cameras maximum per DVR.

6. One monitor for each group of sixteen cameras.

d. Locate monitors, Digital Video controller and recorders (DVR) and audio surveillance base stations system in a console/rack station either in the Police /Security Office (in secondary schools) or the Main Administrative office. Terminal cabinets for Parking Garage Systems may be located in the LAN Equipment Room.

3. School Building and Site Surveillance System (Required only at selected sites)
   
a. Provide CCTV surveillance system, cameras and other equipment to monitor any remote spaces where safety or security risks indicate a need. These include:

1. Main Office and Reception public spaces.

2. Attendance Office public space.
3. Corridors, lobbies, and other public circulation and access spaces.

4. Cafeteria

5. Lunch Shelter

6. Other interior and exterior locations determined during the design phase of the project.

b. Closed circuit television system shall consist of CCTV cameras, camera enclosures, monitors, digital video controller and recorders (DVR), and pan-and-tilt drives. Where Garage exists, the headend equipment shall be integrated with the Parking Garage Surveillance System to provide a single campus-wide system.

1. Provide pan-and-tilt or fixed CCTV camera to cover all corridors, stairwells, elevator lobbies, and other interior public areas.

2. Provide sixteen cameras maximum for each monitor and DVR, fewer if design and monitoring conditions warrant.

3. Cameras shall be located so that every camera is monitored by at least one other camera.

4. Cameras shall be located and secured so as to minimize vandalism, but there shall be no covert or concealed cameras.

c. No audio surveillance shall be provided for this system.


e. At all schools using CCTV buildings and site surveillance systems, appropriate signage must be posted to advise the public that the systems and camera are in operation.

1. Standard sign language and format has been adopted and is available on request.

2. Signs must be placed prominently at all points of entry to the school site, both pedestrian and vehicle. Where surveillance is provided in parking garages, place the sign at the entrance to the parking garage.

3. Location of signs shall be submitted at Design Development Phase for the District review. Signage with details must be shown in project construction documents.

I. GARAGE AND MAIN DOOR ENTRY SYSTEMS

1. Parking Structure Entry

a. Provide a stand-alone intercom call station to be mounted on card reader pedestal (provided under section 11150). The intercom unit shall be connected to PA/Intercom system. A switch at main reception office
(provided under Guide Specification Section 11150), next to PA administrative telephone shall be connected to garage entry controls and to allow remote operation of the gate.

b. See Guide Specification Section 11150 for description of Garage Entry system.

2. School Main Entrance Surveillance System (in selected sites only)
   a. Provide a CCTV camera in a vandal proof enclosure connected to a monitor in the main office. It shall be located directly inside the entrance door it protects. No recording shall be permitted for this system.
   b. Provide an intercom base station in the main office near the CCTV monitor, and a two-way talk/listen remote station outdoors near the entry door.
   c. Provide a pushbutton and wiring to activate door electric strike to permit entrance.
   d. See Guide Specification Section 25725 for description of components.

J. TELEVISION DISTRIBUTION SYSTEM

1. TV System Types
   a. Cable TV system (CATV) provided by local cable TV distributor.
   b. Off-air master antenna system (used when CATV is not available).
   c. Satellite TV system (used only for special situations).

2. Television Service
   a. CATV system by local cable TV provider is preferred. Where not available, use off-air master antenna system.
   b. The Architect shall consult and coordinate with the television cable service provider in requesting service, and shall include in the contract documents the drawings and specifications provided by the cable service. Requests must be made early in design, to allow sufficient time for obtaining the service-provider engineers’ input.

3. System Descriptions
   a. TV system and equipment consists of:
      1. Head End Equipment:
         a. Headend 19” rack with mixing networks, channel converters, processors, splitters, combiners, modulators, directional couplers, test taps, line amplifier, and video monitor.
         2. Line extender TV cabinets including amplifiers to be located in the IDF (Signal room) of remote buildings.
      b. School with CATV systems:
1. A cable drop from local cable TV distributor shall be terminated a cabinet per CATV utility company’s requirement. Provide a coax-11/U cable connection from CATV cabinet to headend Rack.

c. Schools with Off-air master antenna television system (used where Cable TV is not available):

1. UHF and VHF antennas mounted on roof of Administration Unit.
2. For antenna downleads, coax RG-6/U cable.

d. Schools with Satellite television system (used on sites specifically directed by the District):

1. Satellite antenna 3.7 meter in diameter mounted on roof of Administration Unit or on platform at ground level, with direct line of sight to all satellites.
2. Feed antennas, C and Ku bands low noise amplifiers/block down converters, motor drive actuator and sensor.
3. Satellite receiver shall be mounted in television distribution system rack.
4. Modulator at VHF Channel 12 frequency shall be installed in the TV headend Rack.

4. Distribution, Cabling And Power

a. Distribution:

1. Where available and numbers of TV outlets justify the cost, use single mode fibers of the data fiber optic backbone cabling. Install media converter in the first floor of remote building at IDF or TV terminal cabinet. A coax-RG11/U cable shall be used to connect media converter’s output to TV terminal cabinet located in the same room.
2. In small sites, or where less than ten TV outlets are served in the remote building, use coax-RG11/U or larger cable for distribution from TV Rack to remote TV terminal cabinets.
3. For building distribution from TV terminal cabinet to outlets, use coax-RG6/U cables.

b. Provide adequate number of line extender amplifiers in system so that signal level at any outlet shall be between +7dB and +10dB. Usually up to four TV outlets may be daisy chained to be served by a single RG-6U cable homerun to TV terminal cabinet.

c. Provide 120 volts, 20 amps, dedicated circuit to headend rack and line extender cabinets.
d. Cable runs shall be in raceways or cable trays.

e. Terminal outlets shall be mounted 18" above finished floor at TV monitor location, and shall be directional coupler design.

f. TV outlet shall be provided at VCR/ DVR location (media cabinet), Principal's Office, Library, and at teacher's workstation. A single TV drop from cable tray shall serve VCR/DVR and extend to the teacher's TV outlet.

g. Provide an S-Video connection from Teacher's Station to TV monitor and/or projector.

1. Use of Cat. 5e cable for S-Video connections will be acceptable for most sites. Provide alternate cables where higher resolution is required.

2. Provide S-Video outlets at ceiling (or TV monitor at wall) and at wall next to teacher's workstation.

h. Provide 120 volt, 15-amp receptacle at TV and projector outlet.

i. Antenna mast, cabinets and raceways shall be effectively grounded.

j. Submit system calculations indicating signal levels at components including terminal outlets. All block diagrams and construction details must be included in construction drawings.

5. Modernization Projects

a. For modernization projects, or where new buildings are added to existing school sites and an existing television distribution system is to be extended, following procedure shall be followed:

1. Obtain project record drawings of existing system.

2. Visit job site to compare project record drawings with actual field conditions and note any deviations from project record drawings.

3. Determine at what point existing TV system can be tapped and extended to new work location.

4. Usually line extender amplifiers need to be installed depending on attenuation values calculated. Signal level at any outlet shall be between +7dB and +10dB.

K. OVERHEAD DIGITAL PROJECTOR SYSTEM

1. In all classrooms and any instructional areas provide an overhead digital projector system as follows:

a. Provide a video projector approximately 15’ away from projector screen location.

b. At projector location provide an electronic grade surge type receptacle fed via a 20 Amp circuit.

c. Stub-up a 4” above ceiling conduit minimum from teacher's desk area.
d. Stub-up 4” above ceiling a 1 1/2” conduit from audio/visual cabinet.

e. Refer to Standard Technical Drawing SD-9.4B for additional requirements.

L. SOUND ENHANCEMENT SYSTEM

1. Application

a. In all classrooms provide a sound enhancement system that can be coordinated with the future installation of an overhead digital projector for video images from computer or TV signals. Provide a sound enhancement system in any other instructional areas as might be directed by the specific project requirements.

b. System provides for voice and other audio signal input for the audio component of any AV presentation equipment.

2. Description

a. Speakers: Minimum of four mounted in ceiling and located to provide uniform sound distribution throughout the room regardless of the arrangement of teacher and students. In existing facilities the use of wall mounted speakers may be considered, obtain approval from the Design Manager.

<table>
<thead>
<tr>
<th>Classroom Area:</th>
<th>Minimum Number of Speakers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 to 1200 sf.</td>
<td>4 ceiling speakers</td>
</tr>
<tr>
<td>1201 to 1500 sf.</td>
<td>6 ceiling speakers</td>
</tr>
<tr>
<td>1501 to 1800 sf.</td>
<td>8 ceiling speakers</td>
</tr>
<tr>
<td>+ 1800 sf.</td>
<td>Use a commercially available sound system analysis software package similar to TEF to determine quantity and location of speakers.</td>
</tr>
</tbody>
</table>

b. Receiver/amplifier located at front of classroom, in casework provided for other AV equipment and four to six feet above the floor. The system shall be interfaced with teacher's workstation and CD/DVD and TV/VCR equipment to amplify sound initiated by these components. Provide one mono input and at least two stereo inputs, with independent control of sound level from each input. In New Construction projects stub-up into ceiling space two appropriate size conduits (video and sound) from teachers work station and audio/visual cabinet locations for video signaling and sound enhancement cables. In existing facilities use appropriate sized surface mounted raceways.

c. Infrared sensors in receiver and in ceiling to receive signal from microphones. In existing facilities the use of wall mounted infrared receivers may be considered, obtain approval from Design Manager.
d. Microphones, collar-mounted and hand-held, for infrared transmission of speaker's voice to sensors.

e. See “Guide Specifications” for detailed description.

f. Show structural support details.

**M. SCHOOL RADIO COMMUNICATION SYSTEM**

1. **System Requirements**
   a. Each secondary school has a radio communication base station to support its hand-held portable radios. It is provided by the District, and is located in the open office of the Administration Unit – usually on top of file cabinets or on special shelving. It receives signals from a roof-mounted antenna.

   b. A one-inch inside diameter conduit for the coax antenna cable from the roof to the room is required as part of the building construction, terminating in a double gang deep device box with a single hole (one inch grommeted) stainless steel cover plate at the base-station location and in a weatherhead on the roof. Locate the box at 18 inches above finished floor in an accessible location. Conduit shall be provided with pull string.

   1. Conduit should extend 24 inches to 30 inches above the roof; it shall be braced at roof level and properly flashed to support the antenna.

   2. Conduit must have only sweep bends, no sharp turns.

   3. Conduits shall have no more than two 90 degree bends between pull boxes.

   c. Provide a 120V duplex U-ground dedicated power receptacle for the base station; locate outlet at no more than 12 inches from antenna device box.

**N. SIGNAL SYSTEMS RACEWAY AND TERMINAL CABINETS**

1. **Raceways and Routing**
   a. All signal systems' wiring and cabling, including fire alarm, clock, security intrusion alarm, telephone, public address, television, and computer networking shall be installed in raceways.

   b. Fire alarm and clock systems shall be installed in conduit. For all other signal systems, cable trays are preferred.

   c. For underground distribution to all buildings, signal systems shall be installed in conduit, sized for 40% fill (30% fill for new campus to accommodate future growth), with the following as a minimum standard:

   1. 4” C - Fiber Optic Data Backbone System with three innerducts – two 1 ½” and one 1”.
2. **3” C-** PA / Intercommunication/ Telephone systems. In large campuses, use 4” conduit or multiples conduit as needed.

3. **3” C-** Intrusion Alarm System/ CCTV system.

4. **3” C-** Cat. 5E data cables/ TV distribution (coaxial cables if applicable).

5. **2” C-** Fire Alarm System.

6. **2” C-** Clock System.

7. **3” C-** Spare.

8. **3” C** Minimum of two for telephone entrance service.

9. **2” C** Minimum of one for CATV entrance service.

d. For end drops to buildings not containing more than two classrooms, the conduit size shall be as follows as a minimum standard:

1. **3” C-** Fiber Optic Data System.

2. **2” C-** PA / Intercommunication/ Telephone systems

3. **2” C-** Intrusion Alarm System/ CCTV system.

4. **2” C-** Cat. 5E data cables/ TV distribution (coaxial cables if applicable).

5. **2” C-** Fire Alarm System.

6. **1” C-** Clock System.

7. **2” C-** Spare.

e. For inside building distribution, the sizes of conduits or cable trays shall be selected per 40% cable fill requirements for different systems. Provide separate conduits for fire alarm and clock systems.

2. **Terminal Cabinets and backboards**

a. The information indicated here are supplemental to requirements indicated elsewhere in the design guideline.

b. Terminal cabinets shall be provided for each signal system, in each building.

1. For public address system, a main PA terminal cabinet shall be provided, located near PA Rack and PABX equipment. If the Main PA terminal cross connects are located inside the dedicated LAN room, an open field (rather than a cabinet) cross-connect is acceptable. If the open field solution is selected, the backboard used must be separate and distinct from the main telephone backboard and cross connect field. All wiring between PABX and P.A. rack and stations shall be routed thru this terminal cabinet.
Cabinet or backboard must be sized in accordance with number of terminations required to be made plus 20% spare capacity. Other buildings shall each be provided with at least one P.A terminal cabinet sized in same manner as P.A main terminal cabinet. All cabinets shall include required terminal blocks for cable terminations.

2. For Telephone system, locate main telephone and PBX cross connect backboard shall be provided in LAN room, next to Main PA terminal cabinet. Provide at least one telephone terminal cabinet in the IDF room at first floor of each remote building to cross connect all multi-pair telephone cables originating from voice patch panels of all IDF’s in the building.

3. For security intrusion alarm system, one terminal cabinet shall be provided for main security panel each remote security panel. Cabinets shall include terminal strips, power supply and backup battery.

4. For fire alarm system, a main terminal cabinet shall be provided, located near control panel. All wiring between control panel and field devices shall be routed thru this terminal cabinet. Cabinet shall be sized in accordance with number of terminations required to be made plus 20% spare capacity. Each building shall be provided with at least one terminal cabinet sized in same manner as main terminal cabinet. All cabinets shall include required terminal strips for wire or cable terminations.

5. For clock/program system, a main terminal cabinet shall be provided, located near Clock/Program Controller. All wiring between control panel and field devices shall be routed thru this terminal cabinet. Each building shall be provided with at least one terminal cabinet. All cabinets shall include required terminal strips for wire terminations.

6. For TV system, at least one terminal cabinet shall be provided in each building. Cable terminations shall be made in cabinets, with approved components. Depending on distance and signal drop from headend equipment to remote terminal cabinets, remote terminal cabinets may include line extender amplifiers to compensate for signal drop (only where copper distribution is used).
3.9 PLANTING AND IRRIGATION

A. GENERAL REQUIREMENTS

B. PLANTING

C. SOILS

D. IRRIGATION

E. LIST OF APPROVED PLANT MATERIALS
3.9 PLANTING AND IRRIGATION

A. GENERAL REQUIREMENTS:

Landscapes are essential to the quality of life by providing areas for active and passive recreation and as an enhancement to the environment by cleaning air and water, preventing erosion, offering fire protection, and replacing ecosystem lost to development. Because schools represent important visual elements in the community, a well-conceived landscape design is essential – one that is economically maintainable and water efficient yet still provides a naturally beautiful campus that enhances its neighborhood. Adequate shading of outdoor teaching, gathering and play areas with year-round shade trees; durable plants that need little pruning or shaping; drought-tolerant landscaping providing ease of maintenance – all are important elements of the landscape development.

B. PLANTING

1. Examine existing trees on site, identify those that should be preserved, and incorporate them into site planning, with recommendations to the District that they be saved in place, relocated, and provide method of protection during construction.

2. See “Site Design” section for planning and design criteria on landscaping, planting and tree locations.

3. Trees shall be spaced to provide a maximum of five-feet of overlap of full canopies.

4. Use plant materials appropriate to the site and project, selected from District’s “Approved Plant List”.

5. Refer to the District’s “Guide Specifications” for additional requirements.

6. No tree box smaller than 24 inches is to be specified.

7. Trees provided by DWP shall be located in areas away from student activities and access to maximize their survival. These 15 gallon trees are provided as part of “Trees for a Green LA” program with a limit of 50 per school site.

C. SOILS

1. Examine physical properties of the existing soil at site and provide during the Design Development Phase a preliminary assessment of possible major soil problems, such as salinity and alkali conditions, and the need for soil amendments or imported topsoil in the early design stage.
2. If considered necessary, consult with the District regarding services of a soil specialist and laboratory testing during the design stage.

3. Provide for stockpiling of good existing topsoil to be used in planting areas, free of all debris and rock over ¾”.

4. Specify characteristics and source approval for topsoil to be imported, installation methods and blending if appropriate.

5. Specify subsoil ploughing and subsurface drainage to alleviate problems created by poor aeration, soil compaction or inadequate drainage.

6. Specify replacement of top 3 feet of soil where trees are planted in existing paved areas or other heavily compacted soils.

7. Indicate method of slope stabilization on banks 2:1 or steeper.

8. On plans indicate the area (in square feet) of each planting area.

D. IRRIGATION

1. Design Requirements:

   Shall be consistent with the California Code of Regulation, Title 23 Water, Division 2 Department of Water Resources, Chapter 2.7 State Model Water Efficient Landscape Ordinance, Section 490-495.

   a. The design documentation package shall include as detailed in the State Model Water Efficient Landscape Ordinance section 492(b&c), provide all formulas and calculations to support your estimates.

      Each landscape documentation package shall include a cover sheet, referred to as the Water Conservation Concept Statement. It serves as a check list to verify that the following elements of the landscaping documentation package have been completed:

      2. Estimated Applied Water use.
      3. Estimated Total Water Use.
      4. Landscape Design.
      5. Planting Design Plan shall include the square footage of the landscape area for each station, zone, controller and total square footage for all landscape area.
      6. Irrigation Watering Program Schedules. For controllers based on a Y2 month cycle.
      8. Landscape Irrigation Audit Schedule.
      10. Soil Analysis.

2. Design Efficiencies:

   All irrigation systems shall be provided with automatic controllers with electrically operated control valves and seasonal irrigation schedules, incorporating water conservation design and utilizing methods appropriate for specific terrains, soil
types, wind conditions, temperatures and other environmental factors in order to ensure a high degree of water efficiency.

a. Soil types and infiltration shall be considered when designing irrigation system.

b. All irrigation systems shall be designed to avoid runoff, low head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks roadways, or structures.

c. Proper irrigation schedules for each station, to include sequences of cycle and soak times shall be provided with your designs and plans.

d. Special attention shall be given to avoid runoff on slopes and to overspray in planting areas with a width less than ten feet and in median strips.

e. Select the proper equipment components and provide irrigation schedules for each station to meet or exceed the required irrigation efficiency of 0.625.

3. Design Plans:

a. Provide CAD site plans that shall include:

1. A Master site plan shall include showing the location of all irrigation zones for each controller with point of connections, backflow device, pressure regulators, isolation valves, mainlines, flow sensor/master valve & conduit, remote valves stations and quills.

2. A complete plan layout for each controller shall include showing the location of the point of connection to the main piping system, main and lateral lines, isolation valves, pressure regulator, master valve & conduit, flow sensor & cable, remote valves, rain sensor, controller and all sprinklers

3. Design Plans shall utilize and include District Design Guide Details.

4. Design Calculations:

a. Provide design hydraulic calculations worksheet per station to support the irrigation design plans using the following format:

1. Static Water Pressure- Hi and Low

2. Water meter- Size, friction loss @ required GPM

3. Backflow Device- Size, friction loss @ required GPM

4. Master Valve- Size, friction loss @ required GPM

5. Flow Sensor- Size, friction loss @ required GPM

6. Isolation Valves, Size, friction loss @ required GPM

7. Mainline piping, Size, developed length, friction loss at each sizes used @R/GPM

8. Lateral piping, Size, developed length, friction loss at each sizes @R/GPM

9. Remote Valves, Sizes, friction loss @ required GPM

10. Elevation Change
11. Total Pressure loss
12. Pressure required @ sprinkler head
13. Lowest Static Pressure (-10%)
14. Residual Water pressure

b. Provide design hydraulic calculations to support the design when incorporating a booster pump. Keep in mind, peak demands effecting water pressures are normally not during irrigation watering hours (10 pm to 6 AM)
c. Provide design calculations information to support incorporating a pressure regulator.
d. Water pressure over 80 psi shall be regulated per Zone to meet manufacturer’s suggested pressure-heads.

5. Design Materials and Components:

a. Call out design materials as specified in the LAUSD Guideline Specifications and LAUSD Design Guide Details to ensure quality of materials with uniformity in maintenance and procurement.
b. The following are some notable required materials that shall not be compromised:
   1. All valves including remote valves, isolation and shut-off valves shall be brass or bronze. Plastic valves are not acceptable.
   2. Drip Irrigation is not acceptable.
   3. Mainline and lateral PVC piping shall be a minimum schedule 40 PVC piping above ground is not acceptable.
   4. PVC male adapters are not acceptable, use schedule 80 PVC nipples when connecting to copper, brass, bronze or steel materials.

6. Water Supply, Meter and Backflow Device:

a. Provide a separate irrigation water meter and main of adequate size to satisfy maximum instantaneous demand and projected future demands.
b. For large sites, three or more watering acres, or any multiple of that in unit size, there may be separate points of connection on designated irrigation meters for each such unit.
c. Water piping from meter connection to backflow device shall be no smaller in diameter than backflow device served.
d. Provide Reduced-Pressure-Principle Backflow Prevention Devices upstream from irrigation system to prevent backflow.
e. Provide pressure regulator when necessary, never exceeding 100 psi.
f. Provide enclosure for backflow device and pressure regulators where necessary to reduce potential vandalism.

7. Piping Design:

b. Flow velocity: Five (5) feet per second maximum, based on industry-standard friction pressure loss values and complete hydraulic calculations.

c. Pipe size shall be sufficient to support a minimum of two control valves operating at the same time. (One opening, one closing)

d. Follow the manufacturer’s GPM demand and pressure requirements; make allowance for a 10% error margin with all GPM demand and sprinkler-head coverage values.

e. Size all valves (including remote control valves) no smaller than the piping served downstream, except that when piping is increased in size to reduce friction loss, remote valves may then be sized one pipe size smaller than the piping served.

f. Install shut off valves needed to isolate loop systems or major branch lines.

g. Do not use exposed PVC piping above ground.

8. Athletic Fields:

a. The placement and location of irrigation equipment such as Controllers, backflow devices, remote valve, isolation valves, quill valves and yard boxes for maintenance accessibility and student safety is a very important concern. The following are ideal locations for placement of the above irrigation equipment in order of number 1 is the most preferred location.

For Sports fields (Football, Baseball, Softball, Soccer field):

1. Install all equipment including the controller off the field of play in a fenced enclosure with valves such as remote valves, normally placed in a yard box, installed above the ground on a manifold system.

   Place the hose quill valves for football fields up against the perimeter cement curb to field. For other sport fields install next to wall, fence or outer perimeter of grass field, preferably next to pavement.

2. Install Controller and backflow device as near as possible to a wall or fence, away from the field of play. Place the remote valves in marked yard box with-in 12 inch of fence, wall, and or outer perimeter of grass field which is normally next to pavement. An Isolation valve in a marked yard box prior to the group of quills is ideal.

3. Install remote valves in a minimum group of three to easily locate the yard boxes in future. An Isolation valve in a marked yard box prior to the group of remote valves is ideal.

b. General Physical Education Field:

1. Install Controller and backflow device as near as possible to a wall or fence, away from the field of play. Place the remote valves in marked yard box with-in 12 inch of fence, wall, and or outer perimeter of grass field which is normally next to pavement.

2. Install remote valves in a minimum group of three to easily locate the yard boxes in future. An Isolation valve in a marked yard box prior to the group of remote valves is ideal.
9. Sleeves:
   a. Pressure piping installed under driveways, heavy traffic thresholds or sidewalks shall be sleeved.
   b. Sleeves shall be a minimum of 2 pipe sizes larger than the pipe it serves and include a tracer wire.
   c. Sleeves for long distances are not a good thing. Mainline piping must be center loaded to prevent movement due to expansion and contraction, which will cause the main line to break within the sleeve. Never exceed 60 feet of continues sleeve in any area.

10. Sprinklers:
   a. Provide 100% head-to-head triangulated coverage or other approved 100% configuration
   b. Locate sprinklers with pop-up spray 12 inches away from buildings, 4 inches away from paved areas or parking stalls, and where trees will not interfere with spray pattern.
   c. Reduce spacing in areas where winds during irrigation times may blow spray outside irrigation area.
   d. Locate sprinkler lines on banks parallel to contours.
   e. Sprinklers on fixed risers are not acceptable. All sprinkler heads shall be pop-up heads and installed with double swing-joints.
   f. Drip irrigation is not acceptable.
   g. All sprinkler spray heads shall have a built-in check valve to prevent drain down from the lowest head, including level irrigation systems.

11. Controllers shall be provided with the following:
   a. Locate controller close to a building, wall or fence and accessible for use. Install in vandal-resistant secured enclosure that prevents unauthorized access and control changes.
   b. Provide Rain Sensor-Locate in area accessible to rain and not easily vandalized. Do not in stall under roof overhang.
   c. Flow Sensor and Master Valve to provide mainline and lateral line protection
      1. Do not install manual control valves and quill valves on irrigation stations/zones using a flow monitoring system. Tie in before flow sensor.
   d. Provide a hand-held wireless remote control unit (one per site).
   e. Each controller shall be provided with three (3) extra stations for future connections.
12. Remote Valves serving Lawn and Planter Locations:

a. Remote valves serving planter areas shall be installed in marked yard box, located along the outer perimeter of planter it is serving as close to the sidewalk or pavement as possible in order to easily access and utilize during operation with getting wet by sprinklers during operation.

b. Remote valves serving turf areas shall be installed in marked yard box, located along the outer perimeter of grass area it is serving, as close as possible to the sidewalk or pavement in order to easily access and utilize during operation with getting wet by the sprinklers during operation.

1. When at all possible, install remote valves in a minimum group of three to easily locate the yard boxes in future. An Isolation valve in a marked yard box prior to the group of remote valves is ideal.
## EVERGREEN CANOPY SHADE TREE

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<thead>
<tr>
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<tbody>
<tr>
<td>ARBUTUS UNEDO</td>
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### Planting and Irrigation

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**JUNIPERUS CHINENSIS ‘TORULOSA’**
**PINUS THUNBERGIANA ‘MAJESTIC BEAUTY’**
**PRUNUS CAROLINIANA**
**PITTOSPORUM EUGENOIDES**
**PODOCARPUS GRACILIOR**
**PODOCARPUS HENKEII**
**UMBELULARIA CALIFORNICA**

**TECATE CYPRESS**
**ITALIAN CYPRESS**
**GREEN GEM INDIAN LAUREL**
**HOLLYWOOD JUNIPER**
**JAPANESE BLACK PINE**
**CAROLINA LAUREL CHERRY**
**TARATA**
**FERN PINE**
**YEW PINE**
**LONGLEAFED YELLOW WOOD**
**CALIFORNIA BAY LAUREL**

**EVERGREEN WEEPING FORM**

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### Planting and Irrigation

- **CEDRUS LIBANI** | Cedar of Lebanon
- **PINUS CANARIENSIS** | Canary Island Pine
- **PINUS ELDARICA** | Afghan Pine
- **PINUS HALEPENSIS** | Aleppo Pine
- **PINUS MONTEZUMAE** | Montezuma Pine

### Palms

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<tr>
<td>TRACHYCARPUS FORTUNELI</td>
<td>Windmill Palm</td>
</tr>
<tr>
<td>WASHINGTONIA FILIFERA</td>
<td>California Fan Palm</td>
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### Deciduous Canopy Shade Trees

<table>
<thead>
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<th>Botanical Name</th>
<th>Common Name</th>
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<tbody>
<tr>
<td>ACER SACCHARINUM</td>
<td>Silver Maple</td>
</tr>
<tr>
<td>ALBIZZIA JULIBRISIN</td>
<td>Silk Tree</td>
</tr>
<tr>
<td>FRAXINUS OXYCARPA ‘RAYWOOD’</td>
<td>Raywood Ash</td>
</tr>
<tr>
<td>GLEDITSIA TRIACANTHOS INERMIS</td>
<td>Honey Locust (Thornless)</td>
</tr>
<tr>
<td>KOELREUTERIA BIPINNATA</td>
<td>Chinese Flame Tree</td>
</tr>
<tr>
<td>KOELREUTERIA PANICULATA</td>
<td>Goldenrain Tree</td>
</tr>
<tr>
<td>MORUS ALBA</td>
<td>Fruitless Mulberry</td>
</tr>
<tr>
<td>PISTACIA CHINENSIS</td>
<td>Chinese Pistach</td>
</tr>
<tr>
<td>QUERCUS LOBATA</td>
<td>Valley Oak</td>
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### DECIDIOUS UPRIGHT

<table>
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<tr>
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<tbody>
<tr>
<td>GINKO BILOBA (MALE ONLY)</td>
<td>MAIDENHAIR TREE</td>
</tr>
<tr>
<td>LIQUIDAMBAR STYRACIFlua HYBRIDS</td>
<td>‘PALO ALTO’ SWEET GUM</td>
</tr>
<tr>
<td>PYRUS CALLERYANA ‘ARISTOCRAT’</td>
<td>ORNAMENTAL PEAR</td>
</tr>
<tr>
<td>PYRUS CALLERYANA ‘CHANTICLEER’</td>
<td>ORNAMENTAL PEAR</td>
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### DECIDIOUS FLOWERING TREE

<table>
<thead>
<tr>
<th>BOTANICAL NAME</th>
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<tbody>
<tr>
<td>BAUHINIA BLAKEANA</td>
<td>HONG KONG ORCHID TREE</td>
</tr>
<tr>
<td>BAUHINIA VARIEGATA (PURPUREA)</td>
<td>PURPLE ORCHID TREE</td>
</tr>
<tr>
<td>CALODENDRUM CAPENSE</td>
<td>CAPE CHESTNUT</td>
</tr>
<tr>
<td>CERCIS OCCIDENTALIS</td>
<td>WESTERN REDBUD</td>
</tr>
<tr>
<td>CHILOPSIS LINEARIS</td>
<td>DESSERT WILLOW</td>
</tr>
<tr>
<td>CHITALPA TASHKENENSIS</td>
<td>CHITALPA</td>
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<tr>
<td>CHIONANTHUS RETUSUS</td>
<td>CHINESE FRINGE TREE</td>
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<tr>
<td>FRAXINUS DIPETALA</td>
<td>FOOTHILL ASH</td>
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<tr>
<td>JACARANDA MIMOSIFOLIA</td>
<td>JACARANDA (LAWN ONLY)</td>
</tr>
<tr>
<td>LAGERSTROEMIA INDICA</td>
<td>CRAPE MYRTLE</td>
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<tr>
<td>LAGERSTROEMIA INDICA HYBRIDS</td>
<td>‘MUSKOGEES’ CRAPE MYRTLE</td>
</tr>
<tr>
<td>MAGNOLIA SOULANGIANA</td>
<td>SAUCER MAGNOLIA</td>
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<tr>
<td>MAGNOLIA STELLATA</td>
<td>STAR MAGNOLIA</td>
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<tr>
<td>PRUNUS CERASIFERA ‘ATROPURPUREA’</td>
<td>PURPLE LEAF PLUM</td>
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<td>PYRUS CALLERYANA</td>
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### HERBACIOUS PERENNIALS SHRUBS

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<th>BOTANICAL NAME</th>
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<tbody>
<tr>
<td>Acanthus mollis</td>
<td>Bears Breech (Shade Only)</td>
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<tr>
<td>Achillea millefolium &amp; hybrids</td>
<td>Common Yarrow</td>
</tr>
<tr>
<td>Agapanthus / Varieties</td>
<td>Lily of the Nile</td>
</tr>
<tr>
<td>Aloysia triphylla</td>
<td>Lemon Verbena</td>
</tr>
<tr>
<td>Anigozanthos flavidus</td>
<td>Kangaroo Paw</td>
</tr>
<tr>
<td>Artemisia californica</td>
<td>California Sagebrush</td>
</tr>
<tr>
<td>Aster chilensis ‘Point Saint George’</td>
<td>Point Saint George Aster</td>
</tr>
<tr>
<td>Bulbine frutescens</td>
<td>Stalked Bulbine</td>
</tr>
<tr>
<td>Clivia miniata</td>
<td>Kaffir Lily (Shade Only)</td>
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<tr>
<td>Convolvulus cneorum</td>
<td>Bush Morning Glory</td>
</tr>
<tr>
<td>Coreopsis auriculata 'Nana'</td>
<td>Dwarf Coreopsis</td>
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<tr>
<td>Coreopsis gigantea</td>
<td>Giant Coreopsis</td>
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<tr>
<td>Coreopsis lanceolata</td>
<td>Coreopsis</td>
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<tr>
<td>Coreopsis verticilata cvs.</td>
<td>Threadleaf Coreopsis</td>
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<tr>
<td>Dietes vegeta</td>
<td>Fornight Lily</td>
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<td>Encelia californica</td>
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<td>Epiobium canum spp. canum</td>
<td>California Fuchsia</td>
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<tr>
<td>Eremophila maculata</td>
<td>Spotted Emu Bush</td>
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<td>Erigeron (All)</td>
<td>Seaside Daisy</td>
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<tr>
<td>Eriophyllum confertiflorum</td>
<td>Golden Yarrow</td>
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<tr>
<td>Eschscholzia californica (Reseeds Itself)</td>
<td>California Poppy</td>
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<tr>
<td>Hemerocallis hybrids</td>
<td>Day Lily</td>
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<tr>
<td>Iris douglasiana</td>
<td>Douglas Iris</td>
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<tr>
<td>Justicia californica</td>
<td>Chuparosa</td>
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<td>BOTANICAL NAME</td>
<td>COMMON NAME</td>
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<tr>
<td>--------------------------------</td>
<td>----------------------</td>
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<tr>
<td>JUSTICIA SPICIGERA</td>
<td>MEXICAN HONEYSUCKLE</td>
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<tr>
<td>KNIPHOFIA UVARIA</td>
<td>RED HOT POKER</td>
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<tr>
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<td>LAVENDER</td>
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<td>LOBELIA LAXIFLORA</td>
<td>MEXICAN BUSH LOBELIA</td>
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<td>MIMULUS AURANTIACUS</td>
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<td>MONARDELLA VILLOSA</td>
<td>COYOTE MINT</td>
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<tr>
<td>PELARGONIUM / VARIETIES</td>
<td>GERANIUM</td>
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<tr>
<td>PENSTEMON WILD SPP.</td>
<td>PENSTEMON (WILD)</td>
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<tr>
<td>PHORMIUM SPP.</td>
<td>NEW ZEALAND FLAX</td>
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<tr>
<td>ROMNEYA COULTERI</td>
<td>MATILJA POPPY</td>
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<tr>
<td>ROSEMARINUS ‘PROSTRATUS’</td>
<td>TRAILING ROSEMARY</td>
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<tr>
<td>SISYRINCHIUM BELLUM</td>
<td>BLUE-EYED GRASS</td>
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<td>SPHAERALCEA AMBIGUA</td>
<td>DESERT MALLOW</td>
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<tr>
<td>STRELIZIA REGINAE</td>
<td>BIRD OF PARADISE</td>
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<td>TEUCRIUM FRUTICANS</td>
<td>BUSH GERMANDER</td>
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<td>TEUCRIUM MARUM</td>
<td>CAT THYME</td>
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<tr>
<td>THALICTRUM FENDLERI VAR. POLYCARPUM</td>
<td>MEADOW RUE</td>
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<tr>
<td>TRICHOSTEMA LANATUM</td>
<td>WOOLLY/MOUNTAIN BLUE CURLS</td>
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<tr>
<td>TULBAGHIA VIOLACEA ‘VARIGATA’</td>
<td>SOCIETY GARLIC</td>
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<tr>
<td>VERBASCUM PHOENICENSEUM</td>
<td>PURPLE MULLEIN</td>
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<td>VERBENA LILACINA</td>
<td>LILAC VERBENA</td>
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**SUN SHRUBS**

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<th>BOTANICAL NAME</th>
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<tr>
<td>ABUTILON PALERMI</td>
<td>INDIAN MALLOW</td>
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<td>CHAMISE</td>
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<td>ALYOGNE HUEGELII</td>
<td>BLUE HIBISCUS</td>
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<td>AZALEA SOUTHERN INDICA</td>
<td>SUN AZALEAS</td>
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<tr>
<td>BACCHARIS ‘CENTENNIAL’</td>
<td>CENTENNIAL BACCHARIS</td>
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- **BACCHARIS PILULARIS**
- **CAESALPINEA GILLIESII**
- **CALLIANDRA CALIFORNICA**
- **CALLIANDRA ERIOPHYLLA**
- **CEANOTHUS/VARIETIES WILD LILAC**
- **CERCOCARPUS BETULOIDES MOUNTAIN IRONWOOD**
- **CORDIA PARVIFOLIA LITTLE LEAF CORDIAL**
- **DALEA BICOLOR INDIGO BUSH**
- **ERIOGONUM FASCICULATURM BUCKWHEAT**
- **ESCALLONIA/VARIETIES GOLDEN SHRUB DAISY**
- **ESCALLONIA**
- **EURYOPS PECTINATUS ESCALLONIA**
- **FALLUGIA PARADOXA APACHE PLUME**
- **FORESTIERA NEOMEXICANA DESERT OLIVE**
- **GALVESIA SPECIOSA ISLAND BUSH SNAPDRAGON**
- **GREVILLEA NOELLI GREVILLA**
- **HEBE/VARIETIES HEBE**
- **ISOCOMA MENZIESII GOLDENBUSH**
- **JUNIPERUS/VARIETIES JUNIPER**
- **LANTANA/VARIETIES LANTANA**
- **LAVATERA ASSURGENTIFLORA TREE MALLOW**
- **LEPTOSPERMUM/VARIETIES LEPTOSPERMUM**
- **LEUCOPHYLLUM SPP. PURPLE SAGE, TEXAS RANGER ETC.**
- **LOROPETALUM CHINENSE FRINGE FLOWER**
- **MYRTUS/VARIETIES MYRTLE**
- **NANDINA DOMESTICUS/VARIETIES HEAVENLY BAMBOO**
- **OSMANTHUS FRAGRANS SWEET OLIVE**
- **PITTOSPORUM/VARIETIES PITTOSPORUM**
- **PLUMBAGO AURICULATA BLUE PLUMBAGO**
- **QUERCUS DURATA LEATHER OAK**
- **RHAPHIOLEPIS/VARIETIES INDIAN HAWTHORNE**
3.9 Planting and Irrigation

- RHUS OVATA - SUGAR BUSH
- ROSMARINUS/VARIETIES - ROSEMARY
- SALVIA APIANA - WHITE SAGE
- SALVIA CLEVELANDII & HYBRIDS - CLEVELAND/ALAN CHICKERING ETC.
- SALVIA LEUCANTHA - MEXICANA BUSH SAGE
- SALVIA LEUCOPHYLLA - PURPLE SAGE
- SALVIA MELLIFERA - BLACK/GREEN SAGE
- SALVIA ‘MRS. BEARD’ - MRS. BEARD SAGE
- SALVIA MUNZII - SAN MIGUEL MOUNTAIN SAGE
- SIMMONDSIA CHINENSIS - JOJOBA
- SALVIA “BEE’S BLISS” - BEE’S BLISS SAGE
- SYRINGA/VARIETIES - LILAC
- TRACHELOSPERMUM JASMINOIDES - STAR JASMINE
- VIBURNUM/VARIETIES - VIRBURNUM
- XYLOSMA CONGESTUM ‘COMPACTA’ - XYLOSMA

**SHADE SHRUBS**

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<th>BOTANICAL NAME</th>
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<tr>
<td>ACUBA JAPONICA</td>
<td>JAPANESE ACUBA</td>
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<td>AZALEA BELGIUM HYBRIDS</td>
<td>SHADE AZALEAS</td>
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<td>CARPENTERIA CALIFORNICA</td>
<td>BUSH ANEMONE</td>
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<td>CYRTOMIUM FALCATUM</td>
<td>HOLLY FERN</td>
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<td>DENDROMECON RIGIDA</td>
<td>BUSH POPPY</td>
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<td>JAPANESE ARALIA</td>
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<td>ISLAND BUSH</td>
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<td>RHUS TRILOBATA</td>
<td>SNAPDRAGON</td>
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<td>RIBES INDECORUM</td>
<td>GOLDEN CURRANT</td>
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<tr>
<td>RIBES MALVACEUM</td>
<td>WHITE FLOWERING CURRANT</td>
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### 3.9 Planting and Irrigation

#### HEDGE SHRUBS

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<tr>
<td>RIBES SANGUINEUM</td>
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<td>RIBES VIBURNIFOLIUM</td>
<td>EVERGREEN CURRANT</td>
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<td>RUELLIA CALIFORNICA</td>
<td>RAMA PARDA</td>
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<td>SALVIA MICROPHYLLA</td>
<td>CHERRY/GRAHAM SAGE</td>
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<thead>
<tr>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
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<tr>
<td>ARCTOSTAPHYLOS SPP. 'HOWARD MCMINN'</td>
<td>HOWARD MCMINN MANZANITA</td>
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<tr>
<td>BUXUS MICROPHYLLA JAPONICA</td>
<td>JAPANESE BOXWOOD</td>
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<tr>
<td>BUXUS SEMPERVIRENS</td>
<td>COMMON BOXWOOD</td>
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<tr>
<td>CHOISYA TERNATA</td>
<td>MEXICAN ORANGE BLOSSOM</td>
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<tr>
<td>COPROSMA REPENS</td>
<td>MIRROR PLANT</td>
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<td>COMAROSTAPHYLIS DIVERSIFOLIA</td>
<td>SUMMER HOLLY</td>
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<td>CORREA SPP.</td>
<td>AUSTRALIAN FUCHSIA</td>
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<td>DODENAEA VISCOSA 'PURPUREA'</td>
<td>PURPLE HOPSEED BUSH</td>
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<tr>
<td>ESCALLONIA 'FRADES'</td>
<td>ESCALLONIA</td>
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<tr>
<td>EUGINIA MYRTIFOLIA/VARIETIES</td>
<td>BRUSH CHERRY</td>
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<td>EURYOPS PECTINATUS</td>
<td>EURYOPS/SHRUB DAISY</td>
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<td>GREWIA CAFFRA</td>
<td>LAVENDER STARFLOWER</td>
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<td>HETEROMELES ARBUTIFOLIA</td>
<td>TOYON</td>
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<td>YAUPON</td>
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<td>LIGUSTRUM JAPONICUM</td>
<td>JAPANESE PRIVET</td>
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<td>LIGUSTRUM TEXANUM</td>
<td>WAXLEAF PRIVET</td>
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<td>MAHONIA NEVINII</td>
<td>NEVIN MAHONIA</td>
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<td>MALACOTHAMNUS FASCICULATUS</td>
<td>BUSH MALLOWS</td>
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<td>MALOSMA LAURINA (RHUS LAURINA)</td>
<td>LAUREL SUMAC</td>
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<td>MURRAYA PANICULATA</td>
<td>ORANGE JESSAMINE</td>
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<tr>
<td>MYRICA CALIFORNICA</td>
<td>PACIFIC WAX MYRTLE</td>
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<tr>
<td>MYRSINE AFRICANA</td>
<td>AFRICAN BOXWOOD</td>
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</table>
### Planting and Irrigation

- **MYRTUS / VARIETIES**  
  MYRTUS COMMUNIS 'COMPACTA'  
  PITTOSPORUM/VARIETIES  
  PHOTINIA FRASERI/VARIETIES  
- **PRUNUS I. ILICIFOLIA**  
  HOLLY LEAF CHERRY  
- **RHAMNUS CALIFORNICUS**  
  COFFEEBERRY  
- **RHUS INTEGRIFOLIA**  
  LEMONADE BERRY  
- **SENNA STURTII (CASSIA STURTII)**  
  STURT'S CASSIA/SENNA  
- **TECOMA STANS**  
  YELLOW BELLS  
- **TECUS/VARIETIES**  
  YEW  
- **WESTRINGIA FRUITICOSA (ROSMARINIFORMIS)**  
  COAST ROSEMARY  
- **XYLOCOCCUS BICOLOR**  
  MISSION MANZANITA

### Vines

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<th>Botanical Name</th>
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<tr>
<td>CISSUS VARIETIES</td>
<td>GRAPE IVY</td>
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<td>CLEMATIS LASIANtha</td>
<td>PIPESTEM CLEMATIS</td>
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<td>CLEMATIS LIGUSTICIFOLIA</td>
<td>WESTERN VIRGIN'S BOWER</td>
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<tr>
<td>CLYSTOSOMA CALLISTEGIOIDES</td>
<td>LAVENDER TRUMPET VINE</td>
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<tr>
<td>DISTICTIS BUCCINATORIA</td>
<td>BLOOD RED TRUMPET VINE</td>
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<tr>
<td>FICUS PUMILA</td>
<td>CREEPING FIG</td>
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<tr>
<td>HARDENBERGIA VIOLACEA</td>
<td>HAPPY WANDERER</td>
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<tr>
<td>HIBERTIA SCANDENS</td>
<td>GUINEA GOLD VINE</td>
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<td>JASMINUM VARIETIES</td>
<td>JASMINE</td>
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<tr>
<td>LONICERA HILDEBRANDIANA</td>
<td>BURMESE HONEYSUCKLE</td>
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<td>PANDOREA JASMINOIDES</td>
<td>BOWER VINE</td>
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<td>PARTHENCISSUS TRICUSPIDATA</td>
<td>BOSTON IVY</td>
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<td>PASSIFLORA ALATOCERAULEA</td>
<td>PASSION VINE</td>
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<td>POLYGONUM AUBERTII</td>
<td>SILVER LACE VINE</td>
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<tr>
<td>SOLANDRA MAXIMA</td>
<td>CUP OF GOLD VINE</td>
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<tr>
<td>Botanical Name</td>
<td>Common Name</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>---------------------------</td>
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<tr>
<td>Acacia Redolens</td>
<td>Prostrate Acacia</td>
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<tr>
<td>Achillea Clavenae</td>
<td>Silvery Yarrow</td>
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<tr>
<td>Achillea Tomentosa</td>
<td>Wooly Yarrow</td>
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<td>Arctotheca Calendula</td>
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<td>Arctostaphylos/Varieties</td>
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<td>Baccharis Pilularis 'Pigeon Point'</td>
<td>Coyote Brush</td>
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<td>Serbian Bell Flower</td>
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<tr>
<td>Ceanothus Griseus Horizontalis</td>
<td>Carmel Creeper</td>
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<td>Cerastium Tomentosum</td>
<td>Snow-in-Summer</td>
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<tr>
<td>Convolvulus Sabatius</td>
<td>Ground Morning Glory</td>
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<tr>
<td>Cylindrophyllum Speciosa</td>
<td>Red Spike Ice Plant</td>
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<tr>
<td>Dalea Gregghii</td>
<td>Trailing Indigo Bush</td>
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<td>Drosanthemum Hispidum</td>
<td>Lavender-Pink Ice Plant</td>
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<td>Dymondia Margararetae</td>
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<td>Wild Strawberry</td>
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<td>Hypericum Calycinum</td>
<td>St. John Wort</td>
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<td>Iva Hayesiana</td>
<td>Poverty Weed</td>
</tr>
<tr>
<td>Juniperus/Varieties</td>
<td>Juniper</td>
</tr>
<tr>
<td>Keckiella Antirrhinooides</td>
<td>Yellow Penstemon</td>
</tr>
</tbody>
</table>
• KECKIELLA CORDIFOLIA
  • SENECEO MANDRALISCAE
  • LAMPRANTHUS SPECTABILIS
  • LANTANA MONTEVIDENSIS
  • LIRIOPE/VARIETIES
  • LONICERA JAPONICA ‘HALLIANA’
  • MYOPORUM PARVIFOLIUM
  • OENOOTHERA STUBBEI
  • OSTEOSPERMUM FRUTICOSUS/VARIETIES
  • PACHYSANDRA TERMINALIS
  • PELARGONIUM PELTATUM
  • PLECOGSTACHYS SERPYLLIFOLIA
  • POTENTILLA Verna
  • ROSMARinus OFFICINALIS ‘PROSTRATUS’
  • SEDUM/VARIETIES
  • SENECEO MANDRALISCAE
  • TRACHELOSPERMUM JASMINOIDES
  • VERBENA LILIACINA ‘DE LA MINA’
  • VERONICA/VARIETIES
  • VINCA MINOR

  HEART-LEAVED PENSTEMMON
  KLEINIA
  ‘TRAILING ICE PLANT’
  LANTANA
  LILY TURF
  HALL’S HONEYSUCKLE
  MYORPUM
  BAJA EVENING PRIMROSE
  TRAILING AFRICAN DAISY
  JAPANESE SPURGE
  IVY GERANIUM
  STRAW FLOWER
  SPRING CINQUEFOIL
  ROSEMARY
  SEDUM
  KLEINIA
  STAR JASMINE
  LILJAC VERBENA
  SPEED WELL
  DWARF RUNNING MYRTLE

LAWNS AND TURF

BALLFIELDS

CYNONDON SPECIES:
  HYBRID BERMUDA
  GN-1
  TIFGREEN

GENERAL USE

FESTUCA ARUNDINACEA
  TALL FESCUE
### ORNAMENTAL GRASSES

<table>
<thead>
<tr>
<th>BOTANICAL NAME</th>
<th>COMMON NAME</th>
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</thead>
<tbody>
<tr>
<td>DESCHAMPSIA CAESPITOSA</td>
<td>TUFTED HAIRGRASS</td>
</tr>
<tr>
<td>LEYMUS CONDENSATUS ‘CANYON PRINCE’</td>
<td>CANYON PRINCE WILD RYE</td>
</tr>
<tr>
<td>FESTUCA OVINA ‘GLAUC’</td>
<td>BLUE FESCUE</td>
</tr>
<tr>
<td>FESTUCA RUBRA</td>
<td>RED FESCUE</td>
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<tr>
<td>MUHLENBERGIA RIGENS</td>
<td>DEER GRASS</td>
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<tr>
<td>NASSELLA CERNUA</td>
<td>NODDING NEEDLEGRASS</td>
</tr>
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<td>NASSELLA LEPIDA</td>
<td>FOOTHILL NEEDLEGRASS</td>
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<tr>
<td>NASSELLA PULCHRA</td>
<td>PURPLE NEEDLEGRASS</td>
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<td>OPHIOPOGON JAPONICUS</td>
<td>MONDO GRASS</td>
</tr>
<tr>
<td>PANICUM (NATIVE SPP.)</td>
<td>SWITCH GRASS</td>
</tr>
<tr>
<td>STIPA GIGANTEA</td>
<td>GIANT NEEDLE GRASS</td>
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### BIO-SWALES

<table>
<thead>
<tr>
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<th>COMMON NAME</th>
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<tbody>
<tr>
<td>TREES</td>
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<tr>
<td>ALNUS RHOMBIFOLIA</td>
<td>WHITE ALDER</td>
</tr>
<tr>
<td>POPULUS FREMONTII</td>
<td>WESTERN COTTONWOOD</td>
</tr>
<tr>
<td>SHRUBS</td>
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<td>ARTEMISIA DOUGLASIANA</td>
<td>MUGWORT</td>
</tr>
<tr>
<td>BACCHARIS DOUGLASII</td>
<td>MARSH BACCHARIS</td>
</tr>
<tr>
<td>BACCHARIS EMBRYI</td>
<td>EMORY BACCHARIS</td>
</tr>
<tr>
<td>BACCHARIS PILULARIS</td>
<td>COYOTE BRUSH</td>
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### PERRENIALS

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
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<tbody>
<tr>
<td>ACHILLEA MILLEFOILUM</td>
<td>COMMON YARROW</td>
</tr>
<tr>
<td>IRIS DOUGLASIANA</td>
<td>DOUGLAS IRIS</td>
</tr>
<tr>
<td>MIMULUS CARDINALIS</td>
<td>SCARLET MONKEY FLOWER</td>
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<tr>
<td>POTENTILLA EGEDII</td>
<td>MARSH CINQUEFOIL</td>
</tr>
<tr>
<td>SISYRINCHIUM BELLUM</td>
<td>BLUE-EYED GRASS</td>
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### GRASSES/SEDGES

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Common Name</th>
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<tbody>
<tr>
<td>CAREX GLOBOSA</td>
<td>GLOBE SEDGE</td>
</tr>
<tr>
<td>CAREX SUBFUSCA</td>
<td>RUSTY SEDGE</td>
</tr>
<tr>
<td>CAREX TUMULICOLA</td>
<td>BERKELEY SEDGE</td>
</tr>
<tr>
<td>JUNCUS PATENS</td>
<td>COMMON RUSH</td>
</tr>
</tbody>
</table>

- LOW WATER USAGE PLANT
- LOW WATER USAGE PLANT
Appendix “A”
Appendix “A”

A. 1 CHPS Score Card – New Facilities
A. 2 CHPS Score Card – Existing Facilities
A. 3 Submittal Requirements & Checklists
A. 4 Building Acoustical Requirements
A. 5 Checklist of Off-Site Work, Utilities & Easements
A. 6 Planning and Design Guidelines for Small Learning Communities (Separate Volume-Not Included)
A. 7 Estimating Guide (Separate Volume-Not Included)
Appendix A.1

CHPS Score Card – New Facilities
# Schematic

**CLASS**

**CREDIT NUMBER**

**CREDIT TITLE**

**SUMMARY**

**LAUSD RECOMMENDED POINTS**

**CLAIMED POINTS**

**CONFIRMED POINTS**

**PHASE REQUIRING DOCUMENTATION**

**DOCUMENTATION LOCATION**

**REVIEWER COMMENTS**

**ARCHITECT COMMENTS**

## TOTAL POINTS CLAIMED (MINIMUM 32 REQUIRED FOR CHPS DESIGNATION)

<p>| | | | | | |</p>
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### SUSTAINABLE SITES (3 prerequisites; 15 possible points)

**Site Selection**

<table>
<thead>
<tr>
<th>Class</th>
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<th>Credit Title</th>
<th>Summary</th>
<th>LAUSD Recommended Points</th>
<th>Claimed Points</th>
<th>Confirmed Points</th>
<th>Phase Requiring Documentation</th>
<th>Documentation Location</th>
<th>Reviewer Comments</th>
<th>Architect Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS1.0</td>
<td>Code Compliance</td>
<td>Comply with all siting &amp; EIR requirements of Title 5, CA Education Code 17213 &amp; CA Public Resources Code 21151.8</td>
<td>P</td>
<td>X</td>
<td>NA</td>
<td>LAUSD Siting Requirement</td>
<td></td>
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</tr>
<tr>
<td>SS1.1</td>
<td>Environmentally Sensitive Land</td>
<td>Do not develop on farmland, in flood zone, in endangered species habitat, near wetlands or on parkland</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Existing Site/ Demolition Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS1.2</td>
<td>Greenfields</td>
<td>Do not develop on greenfields</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Existing Site/ Demolition Plan</td>
<td></td>
<td></td>
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<tr>
<td>SS1.3</td>
<td>Central Location</td>
<td>Create centrally located sites within which 50% of students are located within minimum distances of the school</td>
<td>1</td>
<td>1</td>
<td>NA</td>
<td>LAUSD Standard</td>
<td></td>
<td></td>
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<tr>
<td>SS1.4</td>
<td>Joint Use of Facilities</td>
<td>Provide for joint use of facilities, including separate entrance &amp; bathrooms</td>
<td>1</td>
<td>1</td>
<td>Variable</td>
<td>Architectural Plans</td>
<td></td>
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<tr>
<td>SS1.5</td>
<td>Joint Use of Parks</td>
<td>Develop a joint use agreement for parks and open space</td>
<td>1</td>
<td>1</td>
<td>Variable</td>
<td>Joint Use Agreement</td>
<td></td>
<td></td>
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<tr>
<td>SS1.6</td>
<td>Reduced Footprint</td>
<td>Design reduced building footprint with minimum 1.2 FAR</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Site Plan/Elevations</td>
<td></td>
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</table>

**Transportation**

<table>
<thead>
<tr>
<th>Class</th>
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<th>Credit Title</th>
<th>Summary</th>
<th>LAUSD Recommended Points</th>
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<th>Phase Requiring Documentation</th>
<th>Documentation Location</th>
<th>Reviewer Comments</th>
<th>Architect Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS2.1</td>
<td>Public Transportation</td>
<td>Develop near public transit: within 1/4 mile of rail or 1/8 mile of bus stop</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Basis of Design/Site Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS2.2</td>
<td>Bicycles</td>
<td>Provide bike lanes &amp; secure bike storage for 5% elementary, 15% middle &amp; 10% high school occupants</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Site Plan, Landscaping Plan, Div 2 Specs</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SS2.3</td>
<td>Minimize Parking</td>
<td>Minimize parking &amp; provide preferred carpool parking for 5% of total carpool spaces</td>
<td>1</td>
<td>1</td>
<td>SD</td>
<td>Site Plan, Landscaping Plan, Div 2 Specs</td>
<td></td>
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Effective for all schools submitted to DSA on or after August 07, 2007
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<th>CLASS</th>
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<th>SUMMARY2</th>
<th>LAUSD RECOMMENDED POINTS</th>
<th>CLAIMED POINTS</th>
<th>CONFIRMED POINTS</th>
<th>PHASE REQUIRING DOCUMENTATION</th>
<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater Management</td>
<td>SS3.0</td>
<td>Construction Site Runoff Control</td>
<td>Control erosion &amp; sedimentation to reduce negative impacts on water &amp; air quality</td>
<td>P</td>
<td>X</td>
<td>100%/CD</td>
<td>Standard LAUSD Division 1 specs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS3.1</td>
<td>Limit Stormwater Runoff</td>
<td>Limit post-development stormwater runoff</td>
<td>1</td>
<td>DD</td>
<td>Pre &amp; Post Development Imperviousness Calculations</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SS3.2</td>
<td>Treat Stormwater Runoff</td>
<td>Provide post-development stormwater treatment</td>
<td>1</td>
<td>50%/CD</td>
<td>Site Plans &amp; Civil Drawings showing BMPs</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Outdoor Surfaces</td>
<td>SS4.1</td>
<td>Reduce Heat Islands - Landscaping Issues</td>
<td>Shade or lighten impervious areas, or reduce impervious paving</td>
<td>DD</td>
<td>Landscaping Plans, Architectural Plans, Div 2 Specs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SS4.2</td>
<td>Reduce Heat Islands-Cool Roofs</td>
<td>Install cool roof on 75% of roof surface or a green (vegetated) roof on 50%</td>
<td>1</td>
<td>50%/CD</td>
<td>Div 7 Specs, Roof Plans</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Outdoor Lighting</td>
<td>SS5.1</td>
<td>Light Pollution Reduction</td>
<td>Minimize outdoor illumination to minimize impacts on nocturnal environmental</td>
<td>1</td>
<td>50%/CD</td>
<td>Site Electrical Plan, Fixture Schedule, Cut Sheets</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Schools As Learning Tools</td>
<td>SS6.1</td>
<td>Educational Display</td>
<td>Provide a permanent educational display that describes school’s high performance features</td>
<td>P</td>
<td>TBD</td>
<td></td>
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<tr>
<td></td>
<td>SS6.2</td>
<td>Demonstration Site</td>
<td>Design demonstration features that showcase at least 3 high performance elements in the school</td>
<td>TBD</td>
<td></td>
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<tr>
<td>WATER (1 prerequisite; 5 possible points)</td>
<td>WE1.0</td>
<td>Create Water Use Budget</td>
<td>Develop a water budget for landscape and ornamental water</td>
<td>P</td>
<td>X</td>
<td>DD</td>
<td>Landscaping Plans, MAWA &amp; EAWU calcs</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>WE1.1</td>
<td>Reduce Potable Water for Landscaping</td>
<td>Reduce irrigation water (potable) consumption by 50% (1 point) or 100% (2 points)</td>
<td>50%/CD</td>
<td>Landscaping Plans, MAWA &amp; EAWU calcs</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Indoor Systems</td>
<td>WE2.1</td>
<td>Reduce Sewage Conveyance from Toilets and Urinals</td>
<td>Reduce potable water for sewage conveyance by 35% through water efficient toilets and urinals and/or reclaimed or recycled water</td>
<td>50%/CD</td>
<td>Plumbing Plans, Div 15 Specs, Design &amp; Baseline Water Use Calculations for Toilets &amp; Urinals</td>
<td></td>
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<tr>
<td></td>
<td>WE2.2</td>
<td>Reduce Potable Water Use</td>
<td>Decrease indoor potable water use by 20% (1 point) or 40% (2 points) after meeting Energy Policy Act</td>
<td>1</td>
<td>50%/CD</td>
<td>Plumbing Plans, Div 15 Specs, Design &amp; Baseline Water Use Calculations</td>
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<tr>
<td>ENERGY (2 prerequisites; 20 possible points; At least 2 points required)</td>
<td>EE1.0</td>
<td>Minimum Energy Performance</td>
<td>Exceed Title 24-2005 Energy Standards by 10%</td>
<td>P</td>
<td>X</td>
<td>100%/CD</td>
<td>Title 24 Analysis Performance Certificate of Compliance</td>
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2 Effective for all schools submitted to DSA on or after August 07, 2007
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<th>PHASE REQUIRING DOCUMENTATION</th>
<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
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</thead>
<tbody>
<tr>
<td>EE1.1</td>
<td>Superior Energy Performance</td>
<td>Exceed Title 24-2005 Energy Standards by 12-36% (1-13 points)</td>
<td>3</td>
<td>100% CD</td>
<td>Title 24 Analysis Performance Certificate of Compliance</td>
<td>Suggested points based on 16% better than 2005 Title-24. Could go significantly higher.</td>
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<tr>
<td>EE1.2</td>
<td>Natural Ventilation</td>
<td>Install interconnects to turn off HVAC in conditioned classrooms if operable windows or exterior doors opened</td>
<td></td>
<td>50% CD</td>
<td>Mechanical Plans showing HVAC controls</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>EE1.3</td>
<td>Energy Management Systems</td>
<td>Install energy management system to monitor energy use</td>
<td></td>
<td>50% CD</td>
<td>Mechanical Plans showing HVAC, hot water, plug loads, &amp; light controls</td>
<td>Only on campus with central plant</td>
<td></td>
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<tr>
<td>EE2.1</td>
<td>Renewable Energy</td>
<td>Provide 5 to 15% (1 to 3 points) of annual energy through on-site renewable energy systems</td>
<td></td>
<td>DD</td>
<td>Percent Renewable Contribution Calc</td>
<td></td>
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<tr>
<td>EE3.0</td>
<td>Fundamental Building Systems Testing and Training</td>
<td>Verify that Commissioning services meet Energy Design Resource's Commissioning Assistant database tool, and provide training and documentation</td>
<td>P X</td>
<td>NA</td>
<td>LAUSD Standard Specs</td>
<td></td>
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<tr>
<td>EE3.1</td>
<td>Enhanced Commissioning</td>
<td>Appoint commissioning authority; verify that Commissioning services meet Energy Design Resource's Commissioning Assistant database tool Standard or Comprehensive Commissioning process</td>
<td>2</td>
<td>DD</td>
<td>Commissioning Plan</td>
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**MATERIALS (2 prerequisites; 13 possible points)**

**Materials**

<table>
<thead>
<tr>
<th>ME1.0</th>
<th>Storage and Collection of Recyclables</th>
<th>Meet local ordinance requirements for recycling space &amp; have space dedicated to recycling</th>
<th>P</th>
<th>X</th>
<th>DD</th>
<th>Site Plan, Space Utilization Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME1.1</td>
<td>Storage and Collection of Organic Materials</td>
<td>Provide area dedicated to collection and storage of organic materials</td>
<td></td>
<td></td>
<td>DD</td>
<td>Site Plan, Space Utilization Plans</td>
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</tbody>
</table>

**Construction Waste Management**

<table>
<thead>
<tr>
<th>ME2.0</th>
<th>Construction Waste Management</th>
<th>Recycle, compost, and/or salvage at least 50% (by weight) of non-hazardous construction and demolition debris</th>
<th>P</th>
<th>X</th>
<th>NA</th>
<th>Standard LAUSD Division 1 specs</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME2.1</td>
<td>Construction Waste Management</td>
<td>Recycle, compost, and/or salvage at least 75% or 90% (by weight) of non-hazardous construction and demolition debris</td>
<td>1</td>
<td></td>
<td></td>
<td>Standard LAUSD Division 1 specs</td>
</tr>
</tbody>
</table>

**Building Reuse**

| ME3.1 | Reuse of Structure and Shell | Maintain 75% (1 point) or 95% (2 points) of existing building structure and shell systems | 50% CD | | Basis of Design, Building Reuse % Calc |
|-------|-------------------------------|-------------------------------------------------|-----|----|-----|----------------------------------|
| ME3.2 | Reuse of Interior Partitions | Use existing on-site non-shell elements in at least 50% of completed building | 50% CD | | Basis of Design, Non-Shell Reuse % Calc |

**Sustainable Materials**

| ME4.1 | Recycled Content | Specify and install at least 4 (1 point) or 8 (2 points) major or weighted average recycled content materials | 50% CD | | Identify materials on submittal scorecard and provide supporting specifications. |

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</thead>
<tbody>
<tr>
<td>ME4.2</td>
<td>Rapidly Renewable Materials</td>
<td>Use rapidly renewable materials for 2.5% of value of all products used in building</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; renewable materials % calc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4.3</td>
<td>Organically Grown Materials</td>
<td>Use USDA or IFOAM organically grown materials for at least 50% of rapidly renewable products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; organic renewable materials % calc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4.4</td>
<td>Certified Wood</td>
<td>Use minimum 50% of wood that is certified under Forest Stewardship Council guidelines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; certified wood materials % calc.</td>
<td></td>
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</tr>
<tr>
<td>ME4.5</td>
<td>Salvaged Materials</td>
<td>Specify off-site salvaged or refurbished materials for 5 or 10% of materials, or 25 or 50% of one major interior finish material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; salvage rate % calc.</td>
<td></td>
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</tr>
<tr>
<td>ME4.6</td>
<td>Environmentally Preferable Products (EPP)</td>
<td>Use up to 7 products certified as an Environmentally Preferable Product that is also low emitting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs referencing EPP certification program.</td>
<td></td>
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</tbody>
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**INDOOR ENVIRONMENTAL QUALITY (3 prerequisites, 20 possible points)**

<table>
<thead>
<tr>
<th>EQ1.1</th>
<th>Daylighting</th>
<th>Provide high quality daylighting in classrooms (using 1 of 3 modelling approaches), no direct sun and automatic light turn off or dimming</th>
<th>2</th>
<th>DD</th>
<th>Daylight modelling results</th>
<th>Recommend using SPOT daylight modelling tool available for free at <a href="http://www.archenergy.com/SPOT">http://www.archenergy.com/SPOT</a></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ1.2</td>
<td>Electric Lighting</td>
<td>Provide multi-scene indirect/direct lighting systems for all classrooms</td>
<td>1</td>
<td>50%CD</td>
<td>Lighting Controls Diagram for Typical Classrooms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Effective for all schools submitted to DSA on or after August 07, 2007
<table>
<thead>
<tr>
<th>CLASS</th>
<th>CREDIT NUMBER</th>
<th>CREDIT TITLE</th>
<th>SUMMARY</th>
<th>LAUSD RECOMMENDED POINTS</th>
<th>CLAIMED POINTS</th>
<th>PHASE REQUIRING DOCUMENTATION</th>
<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor Air Quality</td>
<td>EQ2.0</td>
<td>Minimum Requirements</td>
<td>Design HVAC to meet Title 24, ASHRAE 62.1-2004, install MERV 8 or greater filtration media, and meet ASHRAE 62.1-2004 ventilation requirements, and satisfy ASHRAE 62.1-2004 during construction and system startup. Meet building flushout and construction IAQ protection requirements.</td>
<td>P</td>
<td>X</td>
<td>NA</td>
<td>TBD</td>
<td>Mechanical Basis of Design</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EQ2.1</td>
<td>Increased Ventilation Effectiveness</td>
<td>Use thermal displacement ventilation in at least 90% of classrooms</td>
<td>DD</td>
<td></td>
<td>Architecture/Mechanical Plans, Div 12 specs</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>EQ2.2</td>
<td>Low-Emitting Materials Choose 1-8 building materials from CHPS Low-Emitting Materials Product List (1/2 point for each material)</td>
<td>2</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EQ2.3</td>
<td>Chemical and Pollutant Source Control</td>
<td>Provide permanent walk-off mats at all exterior entrances, isolate and separately vent all areas with cooking or chemical use, and install vented range hoods in cooking areas and chemical mixing areas of labs</td>
<td>1</td>
<td>DD</td>
<td>Architectural/Mechanical Plans, Div 12 specs</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>EQ2.4</td>
<td>Ducted Returns Install ducted HVAC returns</td>
<td>1</td>
<td>DD</td>
<td>Mechanical Plans</td>
<td></td>
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<tr>
<td></td>
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<td>EQ2.5</td>
<td>Filtration Use MERV 11 or greater rated filters</td>
<td>50% CD</td>
<td>HVAC Equipment Schedules, Div 15 spec</td>
<td></td>
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<tr>
<td>Acoustics</td>
<td>EQ3.0</td>
<td>Minimum Acoustical Performance Classrooms must have maximum unoccupied background noise levels of 45dBA, with 0.6 second maximum (unoccupied) reverberation times</td>
<td>P</td>
<td>X</td>
<td>NA</td>
<td>Testing and Balancing Report</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>EQ3.1</td>
<td>Improved Acoustical Performance Classrooms must have maximum unoccupied background noise levels of 40 dBA (1 point) or 35 dBA (3 points), with 0.6 second maximum reverberation times</td>
<td>50% CD with separate Acoustic Analysis</td>
<td>Testing and Balancing Report</td>
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<tr>
<td></td>
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<td></td>
<td>EQ4.1</td>
<td>Controllability of Systems Provide minimum one operable windows in each classroom (1 point), and/or provide separate temperature and ventilation controls (1 point) for each classroom</td>
<td>2</td>
<td>50% CD</td>
<td></td>
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<tr>
<td>CLASS</td>
<td>CREDIT NUMBER</td>
<td>CREDIT TITLE</td>
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<td>LAUSD RECOMMENDED POINTS</td>
<td>CLAIMED POINTS</td>
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<td>DOCUMENTATION LOCATION</td>
<td>REVIEWER COMMENTS</td>
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</tr>
<tr>
<td>PO1.1</td>
<td>CHPS Resolution</td>
<td>Pass Board-level resolution that mandates compliance with CHPS and CHPS best practices</td>
<td>1</td>
<td>NA</td>
<td></td>
<td></td>
<td>District Resolution passed 10/28/03</td>
<td></td>
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<tr>
<td>PO1.2</td>
<td>Environmental Education Resolution</td>
<td>Pass Board-level resolution stating commitment to integrate environment-based instructional strategies and establish implementation plan, and/or develop user's guide to incorporate high performance school site educational displays into school curriculum</td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td>PO1.3</td>
<td>Periodic Assessment of Environmental Conditions</td>
<td>Pass Board-level resolution committing to implementation of US EPA's Healthy Seat Program</td>
<td></td>
<td>NA</td>
<td></td>
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<tr>
<td>PO1.4</td>
<td>Equipment Performance</td>
<td>Pass Board-level resolution that requires Energy Star (1 point) or within 20% of Energy Star &quot;best available&quot; (2 points) equipment and appliances</td>
<td>1</td>
<td>NA</td>
<td></td>
<td>Per 2001 District Energy plan approved by Board</td>
<td></td>
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<tr>
<td>PO2.1</td>
<td>Buses</td>
<td>Provide busing service for students where municipal transit not available and biking or walking not practical</td>
<td>1</td>
<td>NA</td>
<td></td>
<td>Busing provided for all students who require it</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>PO2.2</td>
<td>Low Emission School Buses</td>
<td>Pass Board-level resolution that provides for alternative-fueling, and/or retrofitting with verified emission control strategy of at least 20% of buses</td>
<td></td>
<td>NA</td>
<td></td>
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<tr>
<td>PO3.1</td>
<td>Maintenance Plan</td>
<td>Create a school maintenance plan that includes an inventory of all equipment in the school &amp; their preventative maintenance needs</td>
<td>1</td>
<td>NA</td>
<td></td>
<td>All school maintenance needs are centrally logged via MAXIMO system</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>PO3.2</td>
<td>Green Power</td>
<td>Commit for a period of two years to purchasing renewable energy for equivalent of at least 50% of school's projected annual regulated electricity needs</td>
<td></td>
<td>NA</td>
<td></td>
<td></td>
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</tbody>
</table>
Appendix A.2

CHPS Score Card – Existing Facilities
## Schematic Design

### SUSTAINABLE SITES (3 prerequisites; 15 possible points)

<table>
<thead>
<tr>
<th>CLASS</th>
<th>CREDIT NUMBER</th>
<th>CREDIT TITLE</th>
<th>SUMMARY</th>
<th>POTENTIAL POINTS</th>
<th>CLAIMED POINTS</th>
<th>CONFIRMED POINTS</th>
<th>PHASE REQUIRING DOCUMENTATION</th>
<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Selection</td>
<td>SS1.0</td>
<td>Code Compliance</td>
<td>Comply with all siting &amp; EIR requirements of Title 5, CA Education Code 17213 &amp; CA Public Resources Code 21151.8</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>LAUSD Siting Requirement</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS1.1</td>
<td>Environmentally Sensitive Land</td>
<td>Do not develop on farmland, in flood zone, in endangered species habitat, near wetlands or on parkland</td>
<td>1</td>
<td>SD</td>
<td>Existing Site/ Demolition Plan</td>
<td>Typical for existing campuses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS1.2</td>
<td>Greenfields</td>
<td>Do not develop on greenfields</td>
<td>1</td>
<td>SD</td>
<td>Existing Site/ Demolition Plan</td>
<td>Typical for existing campuses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS1.3</td>
<td>Central Location</td>
<td>Create centrally located sites within which 50% of students are located within minimum distances of the school</td>
<td>1</td>
<td>NA</td>
<td>LAUSD Standard</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SS1.4</td>
<td>Joint Use of Facilities</td>
<td>Provide joint use of facilities, including separate entrance &amp; bathrooms</td>
<td>1</td>
<td>Variable</td>
<td>Architectural Plans</td>
<td></td>
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<tr>
<td></td>
<td>SS1.5</td>
<td>Joint Use of Parks</td>
<td>Provide joint use of parks and open space</td>
<td>1</td>
<td>Variable</td>
<td>Joint Use Agreement</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SS1.6</td>
<td>Reduced Footprint</td>
<td>Design reduced building footprint with minimum 1.2 FAR</td>
<td>1</td>
<td>SD</td>
<td>Site Plan/Elevations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>SS2.1</td>
<td>Public Transportation</td>
<td>Develop near public transit: within 1/4 mile of rail or 1/8 mile of bus stop</td>
<td>1</td>
<td>SD</td>
<td>Basis of Design/Site Plan</td>
<td>Typical for many existing campuses</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>SS2.2</td>
<td>Bicycles</td>
<td>Provide bike lanes &amp; secure bike storage for 5% elementary, 15% middle &amp; 10% high school occupants</td>
<td>1</td>
<td>50% CD</td>
<td>Site Plan, Landscaping Plan, Div 2 Specs</td>
<td>Consider on landscaping projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS2.3</td>
<td>Minimize Parking</td>
<td>Minimize parking &amp; provide preferred carpool parking</td>
<td>1</td>
<td>SD for parking size; 50% CD for carpool striping</td>
<td>Parking Plan, Site Details</td>
<td>Consider on parking projects</td>
<td></td>
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### TOTALS (Minimum required for school addition = 25 of 85 possible points)

<table>
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<tr>
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<th>CREDIT NUMBER</th>
<th>CREDIT TITLE</th>
<th>SUMMARY</th>
<th>POTENTIAL POINTS</th>
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<th>CONFIRMED POINTS</th>
<th>PHASE REQUIRING DOCUMENTATION</th>
<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>85</td>
<td>5</td>
<td>5</td>
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</table>

Los Angeles Unified School District - Existing Facilities CHPS 2006 Scorecard

January 22, 2006

School Name:  
Project No:  
LAUSD Design Manager:  
Architectural Firm:  
Architect of Project Record:  
Reviewer(s):  
Design Phase:  Schematic  
Doc Date:  
Review Date:  

GENERAL COMMENTS
<table>
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<tr>
<th>CLASS</th>
<th>CREDIT NUMBER</th>
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<th>DOCUMENTATION LOCATION</th>
<th>REVIEWER COMMENTS</th>
<th>ARCHITECT COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stormwater Management</td>
<td>SS3.0</td>
<td>Construction Site Runoff Control</td>
<td>Control erosion &amp; sedimentation to reduce negative impacts on water &amp; air quality</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>100%CD</td>
<td>Standard LAUSD Division 1 specs</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>SS3.1</td>
<td>Limit Stormwater Runoff</td>
<td>Limit post-development stormwater runoff</td>
<td>1</td>
<td></td>
<td>DD</td>
<td>Pre &amp; Post Development Imperviousness Calculations</td>
<td>Consider on landscaping projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SS3.2</td>
<td>Treat Stormwater Runoff</td>
<td>Provide post-development stormwater treatment control best management practices</td>
<td>1</td>
<td></td>
<td>50%CD</td>
<td>Site Plans &amp; Civil Drawings showing BMPs</td>
<td>Consider on landscaping projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor Surfaces</td>
<td>SS4.1</td>
<td>Reduce Heat Islands - Landscaping Issues</td>
<td>Shade or lighten impervious areas, or reduce impervious paving</td>
<td>1</td>
<td></td>
<td>DD</td>
<td>Landscaping Plans, Architectural Plans, Div 2 Specs</td>
<td>Recommended for elementary schools</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SS4.2</td>
<td>Reduce Heat Islands-Cool Roofs</td>
<td>Install cool roof on 75% of roof surface or a green (vegetated) roof on 50%</td>
<td>1</td>
<td></td>
<td>50%CD</td>
<td>Div 7 Specs, Roof Plans</td>
<td>Consider for reroofing projects</td>
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<tr>
<td>Outdoor Lighting</td>
<td>SS5.1</td>
<td>Light Pollution Reduction</td>
<td>Minimize outdoor illumination to minimize impacts on nocturnal environmental</td>
<td>1</td>
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<td>50%CD</td>
<td>Site Electrical Plan, Fixture Schedule, Cut Sheets</td>
<td>Consider on landscaping projects</td>
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<tr>
<td>Schools As Learning Tools</td>
<td>SS6.1</td>
<td>Educational Display</td>
<td>Provide a permanent educational display that describes school’s high performance features</td>
<td>R</td>
<td></td>
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<td>TBD</td>
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<td></td>
<td>SS6.2</td>
<td>Demonstration Site</td>
<td>Design demonstration features that showcase at least 3 high performance elements in the school.</td>
<td>1</td>
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<td>TBD</td>
<td>TBD</td>
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<tr>
<td>WATER (1 prerequisite; 5 possible points)</td>
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<tr>
<td></td>
<td>WE1.0</td>
<td>Create Water Use Budget</td>
<td>Develop a water budget for landscape and ornamental water</td>
<td>R</td>
<td></td>
<td>DD</td>
<td>Landscaping Plans, MAWA &amp; EAWU calcs</td>
<td>Consider on landscaping projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>WE1.1</td>
<td>Reduce Potable Water for Landscaping</td>
<td>Use climate tolerant plants, high efficiency irrigation, captured rainwater or reclaimed water to reduce irrigation water consumption by 50 or 100%</td>
<td>1-2</td>
<td></td>
<td>50%CD</td>
<td>Landscaping Plans, MAWA &amp; EAWU calcs</td>
<td>Consider on landscaping projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indoor Systems</td>
<td>WE2.1</td>
<td>Reduce Sewage Conveyance from Toilets and Urinals</td>
<td>Reduce potable water for sewage conveyance by 35% through water efficient toilets and urinals and/or reclaimed or recycled water</td>
<td>1</td>
<td></td>
<td>50%CD</td>
<td>Plumbing Plans, Div 15 Specs, Design &amp; Baseline Water Use Calculations for Toilets &amp; Urinals</td>
<td>Consider on bathroom projects</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>WE2.2</td>
<td>Reduce Potable Water Use</td>
<td>Decrease indoor potable water use by 20 or 40% after meeting Energy Policy Act</td>
<td>1-2</td>
<td></td>
<td>50%CD</td>
<td>Plumbing Plans, Div 15 Specs, Design &amp; Baseline Water Use Calculations</td>
<td>Consider on bathroom projects</td>
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<td></td>
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<tr>
<td>ENERGY (2 prerequisites; 20 possible points)</td>
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<tr>
<td></td>
<td>EE1.0</td>
<td>Minimum Energy Performance</td>
<td>Exceed Title 24-2005 by 10%</td>
<td>R</td>
<td></td>
<td></td>
<td>100%CD</td>
<td>Title 24 Analysis Performance Certificate of Compliance</td>
<td>Consider on new or replacement HVAC projects or major changes to building envelopes</td>
<td></td>
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</table>

Schematic Design

Core Facilities CHPS Version 2 Scorecard
<table>
<thead>
<tr>
<th>CLASS</th>
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<th>CREDIT TITLE</th>
<th>SUMMARY 2</th>
<th>POTENTIAL POINTS</th>
<th>CLAIMED POINTS</th>
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<th>DOCUMENTATION LOCATION</th>
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<th>ARCHITECT COMMENTS</th>
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<tbody>
<tr>
<td>EE1.1</td>
<td>Superior Energy Performance</td>
<td>Exceed Title 24-2005 by 12-36%</td>
<td>1-13</td>
<td>100% CD</td>
<td>see EE1.0</td>
<td>see EE1.0</td>
<td>Mechanical Plans showing HVAC controls</td>
<td>Consider on projects where all building windows &amp; doors are replaced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE1.2</td>
<td>Natural Ventilation</td>
<td>Install interconnects to turn off HVAC in conditioned classrooms if operable windows or exterior doors opened</td>
<td>1</td>
<td>50% CD</td>
<td>Mechanical Plans showing HVAC controls</td>
<td>Consider on projects where all building windows &amp; doors are replaced</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE1.3</td>
<td>Energy Management Systems</td>
<td>Install energy management system to monitor energy use</td>
<td>1</td>
<td>50% CD</td>
<td>Mechanical Plans showing HVAC, hot water, plug loads, &amp; light controls</td>
<td>Consider on new HVAC projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE2.1</td>
<td>Renewable Energy</td>
<td>Provide 5 to 15% of annual energy through on-site renewable energy systems</td>
<td>1-3</td>
<td>DD</td>
<td>Percent Renewable Contribution Calc</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>EE3.0</td>
<td>Fundamental Building Systems Testing and Training</td>
<td>Verify that Commissioning services meet EDR's CX Assistant database tool Abbreviated Commissioning process, and provide training and documentation</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>LAUSD Standard Division 1 Specs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EE3.1</td>
<td>Enhanced Commissioning</td>
<td>Appoint commissioning authority; verify that Commissioning services meet EDR's Cx Assistant database tool Standard or Comprehensive Commissioning process</td>
<td>1-2</td>
<td>DD</td>
<td>Commissioning Agent (CA) selection &amp; Commissioning Plan</td>
<td></td>
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</table>

**MATERIALS (2 prerequisites; 13 possible points)**

<table>
<thead>
<tr>
<th>Materials</th>
<th>ME1.0</th>
<th>Storage and Collection of Recyclables</th>
<th>Meet local ordinance requirements for recycling space &amp; have space dedicated to recycling</th>
<th>R</th>
<th>X</th>
<th>X</th>
<th>DD</th>
<th>Site Plan, Space Utilization Plans</th>
<th>Consider on interior renovation projects and/or projects altering existing trash enclosures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ME1.1</td>
<td>Storage and Collection of Organic Materials</td>
<td>Provide area dedicated to collection and storage of organic materials</td>
<td>1</td>
<td>DD</td>
<td>Site Plan, Space Utilization Plans</td>
<td>Consider on kitchen/dining projects</td>
<td></td>
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</tr>
<tr>
<td>Construction Waste Management</td>
<td>ME2.0</td>
<td>Construction Waste Management</td>
<td>Recycle, compost, and/or salvage at least 50% (by weight) of non-hazardous construction and demolition debris</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>Standard LAUSD Division 1 specs</td>
<td>District requirement is 75% recycling</td>
</tr>
<tr>
<td></td>
<td>ME2.1</td>
<td>Construction Waste Management</td>
<td>Recycle, compost, and/or salvage at least 75% or 90% (by weight) of non-hazardous construction and demolition debris</td>
<td>1-2</td>
<td>1</td>
<td>I</td>
<td>see ME2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building Reuse</td>
<td>ME3.1</td>
<td>Reuse of Structure and Shell</td>
<td>Maintain 75 or 95% of existing building structure and shell systems for 3 points</td>
<td>1-2</td>
<td>50% CD</td>
<td>Basis of Design, Building Reuse % Calc</td>
<td>Consider on all projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ME3.2</td>
<td>Reuse of Interior Partitions</td>
<td>Use existing on-site non-shell elements in at least 50% of completed building</td>
<td>1</td>
<td>50% CD</td>
<td>Basis of Design, Non-Shell Reuse % Calc</td>
<td>Consider on all projects</td>
<td></td>
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<tr>
<td>Sustainable Materials</td>
<td>ME4.1</td>
<td>Recycled Content</td>
<td>Specify and install at least 4 or 8 major or weighted average recycled content materials</td>
<td>1-2</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard and provide supporting specifications.</td>
<td>Consider in projects using concrete, steel, MDF, ACT, gyp</td>
<td></td>
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<tr>
<td>CLASS</td>
<td>CREDIT NUMBER¹</td>
<td>CREDIT TITLE</td>
<td>SUMMARY²</td>
<td>POTENTIAL POINTS</td>
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<tr>
<td>ME 4.2</td>
<td>Rapidly Renewable Materials</td>
<td>Use rapidly renewable materials for 2.5% of value of all products used in building</td>
<td>1</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; renewable materials % calc.</td>
<td>Consider in projects requiring interior finish materials and agrifiber</td>
<td></td>
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<tr>
<td>ME 4.3</td>
<td>Organically Grown Materials</td>
<td>Use USDA or IFOAM organically grown materials for at least 50% of rapidly renewable products</td>
<td>1</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; organic renewable materials % calc.</td>
<td></td>
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<tr>
<td>ME 4.4</td>
<td>Certified Wood</td>
<td>Use minimum 50% of wood that is certified under Forest Stewardship Council guidelines</td>
<td>1</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; certified wood materials % calc.</td>
<td>Consider in projects requiring Div 6 specifications</td>
<td></td>
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<tr>
<td>ME 4.5</td>
<td>Salvaged Materials</td>
<td>Specify off-site salvaged or refurbished materials for 5 or 10% of materials, or 25 or 50% of one major interior finish material</td>
<td>1-2</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs &amp; salvage rate % calc.</td>
<td></td>
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<tr>
<td>ME 4.6</td>
<td>Environmentally Preferable Products (EPP)</td>
<td>Use up to 7 products certified as an Environmentally Preferable Product that is also low emitting</td>
<td>1/2-7</td>
<td>50% CD</td>
<td>Identify materials on submittal scorecard, provide supporting specs referencing EPP certification program.</td>
<td>Consider in projects requiring products covered by EPP categories (see <a href="http://www.eppbuildingproducts.org/productcategories.html">www.eppbuildingproducts.org/productcategories.html</a>)</td>
<td></td>
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INDOOR ENVIRONMENTAL QUALITY (3 prerequisites, 20 possible points)

| EQ 1.1 | Daylighting | Provide high quality daylighting in classrooms using 1 of 3 measuring approaches, no direct sun and automatic light turn off or dimming | 1-4 | DD | Daylight Factor Analysis | Consider for projects specifying new window and skylight locations, or major alterations to envelope and roof penetrations. |
| EQ 1.2 | Electric Lighting | Provide multi-scene indirect/direct lighting systems for all classrooms other than those excepted | 1 | 50%CD | Lighting Controls Diagram for Typical Classrooms | Consider for all classroom lighting projects |

¹PREREQUISITE: Architect must verify
²Licensed Architect must verify
<table>
<thead>
<tr>
<th>CLASS</th>
<th>CREDIT NUMBER</th>
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<th>ARCHITECT COMMENTS</th>
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<tr>
<td>Indoor Air Quality</td>
<td>EQ2.0</td>
<td>Minimum Requirements</td>
<td>Design HVAC to meet Title 24, ASHRAE 62.1-2004, install MERV 8 or greater filtration media, and meet ASHRAE 62.1-2004 ventilation requirements, and satisfy ASHRAE 62.1-2004 during construction and system startup. Meet building flushout and IAQ protection requirements.</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>Included in Title 24 compliance</td>
<td>Consider for all projects</td>
<td></td>
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<tr>
<td></td>
<td>EQ2.1</td>
<td>Increased Ventilation Effectiveness</td>
<td>Use thermal displacement ventilation in at least 90% of classrooms</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td>DD</td>
<td>Mechanical Basis of Design</td>
<td>Consider for new building designs</td>
</tr>
<tr>
<td></td>
<td>EQ2.2</td>
<td>Low-Emitting Materials</td>
<td>Choose 1-8 building materials from CHPS Low-Emitting Materials Product List</td>
<td>1/2</td>
<td>4</td>
<td>50% CD</td>
<td></td>
<td></td>
<td>Identify materials on submittal scorecard, provide supporting specs.</td>
<td>Consider for all projects involving new building insulation, adhesives, sealants, gyp, ACT, wall panels, wood flooring, composite wood boards, resilient flooring, carpet, wall coverings, paint</td>
</tr>
<tr>
<td></td>
<td>EQ2.3</td>
<td>Chemical and Pollutant Source Control</td>
<td>Provide permanent walk off mats at all exterior entrances, isolate and separately vent all areas with cooking or chemical use, and install vented range hoods in cooking areas and chemical mixing areas</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>DD</td>
<td>Architectural/ Mechanical Plans, Div 12 specs</td>
<td>Consider for all projects involving new school entries, kitchens, science labs, and custodial areas</td>
</tr>
<tr>
<td></td>
<td>EQ2.4</td>
<td>Ducted Returns</td>
<td>Install ducted HVAC returns</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>DD</td>
<td>Mechanical Plans</td>
<td>Consider for new HVAC projects</td>
</tr>
<tr>
<td></td>
<td>EQ2.5</td>
<td>Filtration</td>
<td>Use MERV 11 or greater rated filters</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>50% CD</td>
<td>HVAC Equipment Schedules, Div 15 spec</td>
<td>Consider for new HVAC projects</td>
</tr>
<tr>
<td>Acoustics</td>
<td>EQ3.0</td>
<td>Minimum Acoustical Performance</td>
<td>Classrooms must have maximum unoccupied background noise levels of 45dBA, with 0.6 second maximum (unoccupied) reverberation times</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>Testing and Balancing Reports</td>
<td>See Mechanical QA/QC Form for any comments.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EQ3.1</td>
<td>Improved Acoustical Performance</td>
<td>Classrooms must have maximum unoccupied background noise levels of 40 or 35 dBA, with 0.6 second maximum (unoccupied) reverberation times</td>
<td>1 or 3</td>
<td></td>
<td></td>
<td>50% CD with separate Acoustic Analysis</td>
<td>Testing and Balancing Reports</td>
<td></td>
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<tr>
<td>Thermal Comfort</td>
<td>EQ4.0</td>
<td>ASHRAE 55 Code Compliance</td>
<td>Comply with ASHRAE 55-2004 Thermal Comfort Conditions for Human Occupancy</td>
<td>R</td>
<td>X</td>
<td>X</td>
<td>NA</td>
<td>NA</td>
<td>Included in Title 24 compliance</td>
<td></td>
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<tr>
<td></td>
<td>EQ34.1</td>
<td>Controllability of Systems</td>
<td>Provide minimum one operable windows in each classroom, and/or provide separate temperature and ventilation controls for each classroom</td>
<td>1-2</td>
<td></td>
<td></td>
<td>50% CD</td>
<td>Window Schedule &amp; Details, Mechanical Plans, Lighting Plans</td>
<td>Consider for projects with new classroom windows, HVAC systems, or lighting systems</td>
<td></td>
</tr>
<tr>
<td>CLASS</td>
<td>CREDIT NUMBER</td>
<td>CREDIT TITLE</td>
<td>SUMMARY</td>
<td>POTENTIAL POINTS</td>
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<td>PHASE REQUIRING DOCUMENTATION</td>
<td>DOCUMENTATION LOCATION</td>
<td>REVIEWER COMMENTS</td>
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<tr>
<td><strong>PO1.1 CHPS Resolution</strong></td>
<td>District Level Credits</td>
<td>Pass Board-level resolution that mandates compliance with CHPS and CHPS best practices</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>NA</td>
<td>District Resolution passed 10/28/03</td>
<td></td>
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<tr>
<td>PO1.2 Environmental Education Resolution</td>
<td></td>
<td>Pass Board-level resolution stating commitment to integrate environment-based instructional strategies and establish implementation plan, and/or develop user's guide to incorporate high performance school site educational displays into school curriculum</td>
<td>1-2</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td></td>
<td></td>
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<tr>
<td>PO1.3 Periodic Assessment of Environmental Conditions</td>
<td></td>
<td>Pass Board-level resolution committing to implementation of US EPA's Healthy Seat Program</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td></td>
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<tr>
<td>PO1.4 Equipment Performance</td>
<td></td>
<td>Pass Board-level resolution that requires Energy Star or within 20% of Energy Star &quot;best available&quot; equipment and appliances</td>
<td>1-2</td>
<td>1</td>
<td>1</td>
<td>50% CD</td>
<td>Per 2001 District Energy plan approved by Board</td>
<td></td>
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<tr>
<td><strong>PO2.1 Buses</strong></td>
<td>Transportation</td>
<td>Provide busing service for students where municipal transit not available and biking or walking not practical</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>NA</td>
<td>Busing provided for all students who require it</td>
<td></td>
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<tr>
<td>PO2.2 Low Emission School Buses</td>
<td></td>
<td>Pass Board-level resolution that provides for alternative-fueling, and/or retrofitting with verified emission control strategy of at least 20% of buses</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td></td>
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<tr>
<td><strong>PO3.1 Maintenance Plan</strong></td>
<td>Project Level Credits</td>
<td>Create a school maintenance plan that includes an inventory of all equipment in the school &amp; their preventative maintenance needs</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>NA</td>
<td>All school maintenance needs are centrally logged via MAXIMO system</td>
<td></td>
<td></td>
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<tr>
<td>PO3.2 Green Power</td>
<td></td>
<td>Commit for a period of two years to purchasing renewable energy for equivalent of at least 50% of school's projected annual regulated electricity needs</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>Point Not Available</td>
<td></td>
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Appendix A.3

Submittal Requirements & Checklist
Submittal Requirements & Checklists

- **SCHEMATIC DESIGN**
- **DESIGN DEVELOPMENT**
- **CONSTRUCTION DOCUMENT – 50%**
- **CONSTRUCTION DOCUMENT – 100% – DSA SUBMITTAL**
- **CIVIL DESIGN CHECKLIST – 100% SUBMITTAL**
- **ELECTRICAL DESIGN CHECKLIST – 100% SUBMITTAL**
- **MECHANICAL DESIGN CHECKLIST – 100% SUBMITTAL**
- **DSA SUBMITTAL – LOCAL FIRE AUTHORITY APPROVAL CHECKLIST**
- **DSA SUBMITTAL – STRUCTURAL REQUIREMENTS CHECKLIST**
SUBMITTAL REQUIREMENTS
Los Angeles Unified School District Facilities Services Division

Schematic Design

**DRAWINGS:**

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<th>Scale (Min)</th>
<th>Information Included</th>
<th>Location Reference</th>
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<tbody>
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<td>% Compd. % ft.</td>
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**General**
At a preliminary Schematics review meeting, present the District with three or more design solutions, for selection of one to be refined. Provide site analysis diagrams showing key site influences: Solar, winds, views, traffic, neighborhood context, topographical features. Mount illustrations (*) on 30"x40" boards.
The deliverables include the following:

- **Title Sheet**
  - Project name & address, project directory w/ all consultants
  - LAUSD ID and Logo (on all drawings)

- **Vicinity and Location Map**
  - Neighborhood land uses and characteristics, parking, setbacks on adjacent and frontage properties
  - Streets, crossings, signals, gen'l traffic & pedestrian densities

- **Color Photos**
  - Surrounding properties and improvements
  - Proposed site, incl. existing bldgs. and surroundings

- **Site Plan**
  - Buildings, playground areas, future buildings
  - Scope and Limits of Work, Off-Site Improvements
  - Relevant topographical features, grading concepts
  - Driveways, streets, parking, walks, future street widening
  - Existing landscape features, planting concepts

- "Check List of Offsite Work, Utilities & Easements"

**Civil Engineering**

- **Site Survey**
  - 100%
  - Boundary & Topography. Note "FOR REFERENCE ONLY."

- **Basis of Design**
  - Description of systems, criteria, surface drainage & retention, water availability & conservation, other sustainability issues, sub-surface investigation recommendations, City requirem'ts
  - Symbols List, coordinated with LAUSD Civil Standards

**Landscape**

- **Basis of Design**
  - Description of design approach & criteria, plant selections, irrigation, soil preparation requirements

**Architecture**

- **Floor Plans**
  - Schem. 1/8
  - Room names, doors and windows, special finishes
  - Cabinets, furniture & equipment to show function, capacity
  - Stairs, ramps, elevators, major structural elements
  - Equipment rooms (mech'l, power, data), major shafts & chases

- **Roof Plans**
  - Schem. 1/8
  - Slopes, covered walks, material changes

- **Exterior Elevations**
  - Schem. 1/8
  - Wall features and materials, important features

- **Building Sections**
  - Schem. 1/8
  - Relevant sections to show important bldg. configurations or structural conditions

- **Basis of Design**
  - Design approach and philosophy, general description of
## Schematic Design

### DRAWINGS:

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<tbody>
<tr>
<td>Reference</td>
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### Structural Engineering

**Floor and Roof Plans**
- **Basis of Design**: Schem. 
- **Description**: Diagrammatic layout of structural elements, if necessary

| **Building & Materials, Important Design Factors, Community Issues, Sustainability Measures** |

### HVAC

**Basis of Design**: Prelim.
- **Description**: Description of systems, criteria, special energy and sustainability issues, envelope criteria, possible phasing

### Plumbing & Fire Protection

**Basis of Design**: Prelim.
- **Description**: Description of systems and criteria, fixture types, general loads, water availability, on- and off-site drainage provisions

### Electrical

**Basis of Design**: Prelim.
- **Description**:
  - Of all electric power related systems, including emergency power, computer power, equipment types, etc.
  - Of all signal systems, incl. Fire alarm, intrusion alarm, CCTV/Audio Surveillance Systems, PA/Intercom, Autonomous PA/Sound System (Gym, Auditorium, Athletic fields, multi-purpose rooms and large instruction rooms), TV Distribution (copper or Fiber Optic), clock system, Classroom Sound Enhancement System.
  - Of lighting system in typical areas, indicating fixture types and lighting controls.
  - Indicate measures and strategies to achieve maximum CHPS scores.
  - Typical Classroom Plan (Lighting, Power & Data Outlets).
  - Other special conditions, if necessary (8.5 x11 or 11x17 bound with Basis of Design).

### Food Service

**Basis of Design**: Prelim.
- **Basis of Design, Criteria, Descriptive Material**

### Graphics & Signage

**Basis of Design**: Prelim.
- **Basis of Design, Criteria, Descriptive Material** of other design disciplines as may be needed by the size and complexity of the project.

### Theater Consultant

**Basis of Design**: Prelim.
- **Basis of Design, Criteria, Descriptive Material**

### Kitchen Consultant

**Basis of Design**: Prelim.
- **Basis of Design, Criteria, Descriptive Material**

### Other:

- **SP2A Building Area Diagrams and Area Calculations**
- **Cost Estimate**
- **CHPS Scorecard**
- **Savings by Design Incentive Program**

- **Show compliance with Building Program**
- **O.O.M. for each alternate. Final estimate in District format**
- **Show compliance with Building Program**
- **Record of application submittal**
# SUBMITTAL REQUIREMENTS

Los Angeles Unified School District Facilities Services Division

## Design Development

### DRAWINGS:

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<th>Information Included</th>
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</table>

| General          | 80%           |       |                      |                    |
| Title Sheet, Vicinity and Location Map | Project name & address, project directory w/ all consultants | | LAUSD ID and Logo (on all drawings) | |
| Draw Index       | 95%           |       |                      |                    |
| General Notes    | 65%           |       |                      |                    |
| Code Analysis    | 80%           |       |                      |                    |

| Site Plan        | 50% 1/20      |       |                      |                    |
| Constructions, names, overhangs, nbr.of stories, gross area | | | Driveways, service roads, parking & layouts, walks | |
|                  |               |       |                      |                    |
| Construction Phasing Plan | 25% | Flag pole, planters, site walls, fencing, railings, signage, parking, playground equipment, stairs and ramps, bollards, trash enclosure | | For multi-phase projects: Limits of Work, barriers, access |

| Site Details     | 20%           |       |                      |                    |
| Architectural Presentation Drawings | Vicinity Plan and Photos (as for Schematic Design Submittal) | | Site and Floor Plans, Elevations, Sections (in color) | |
|                  |               |       |                      |                    |
| "Check List of Offsite Work, Utilities & Easements" | | | Perspective Rendering (in color) | (Above mounted on 30" x 40" boards) |
| CHPS Scorecards  | 100%          |       |                      |                    |
|                  |               |       | Detailed Account of CHPS Points achieved in School Design. | |

## Civil Engineering

| Topographic Survey | 100% | Note "FOR REFERENCE ONLY" |
|                   |      | Building locations (dimensions or coordinates), Work Limits |
| Site Plan         | 50% 1/20 | Floor Plan Elevations, Key Dimensions, Grids |
|                  |       | Existing and Finish Contours (0.5' intervals typ.), spot elevations, ADA-compliant slopes |
|                  |       | Property lines, streets, setbacks, easements, walls & fences |
|                  |       | Site walls and top-of-wall elevations |
|                  |       | Utilities, UG tanks, fencing, walks, drives, planting, other features, onsite and adjacent (existing and new) |
|                  |       | Construction phasing provisions, for multi-phase projects |

April 2007
<table>
<thead>
<tr>
<th>OTHER DOCUMENTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition Plan</td>
</tr>
<tr>
<td>Street and Parking Plan</td>
</tr>
<tr>
<td>Grading and Drainage Plan</td>
</tr>
<tr>
<td>Site Utilities Plan (Water &amp; Drainage)</td>
</tr>
<tr>
<td>Off-site Civil Work Plans</td>
</tr>
<tr>
<td>Drainage Plans/ Profiles</td>
</tr>
<tr>
<td>Site Details</td>
</tr>
<tr>
<td>Log of soil borings</td>
</tr>
<tr>
<td>Storm Water Calc'ns</td>
</tr>
<tr>
<td>Basis of Design</td>
</tr>
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</table>

### Landscaping

<table>
<thead>
<tr>
<th>Landscaping</th>
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<tbody>
<tr>
<td>Site Plan</td>
</tr>
<tr>
<td>(on Civil Engineering Background)</td>
</tr>
<tr>
<td>Plant Schedules</td>
</tr>
<tr>
<td>Details</td>
</tr>
<tr>
<td>Irrigation Plans</td>
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<td>IrrigationDetails</td>
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### Architecture

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<tbody>
<tr>
<td>Floor Plans</td>
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<tr>
<td>Room Names, Numbers, References</td>
</tr>
<tr>
<td>Floor finishes, floor drains</td>
</tr>
<tr>
<td>Door &amp; Window locations, sizes</td>
</tr>
<tr>
<td>Partition locations, finishes, types, fire-ratings</td>
</tr>
<tr>
<td>ADA compliance provisions, references</td>
</tr>
<tr>
<td>Cabinets, furniture &amp; equipment layout (incl. N.I.C. items)</td>
</tr>
<tr>
<td>Enlarged Floor Plans</td>
</tr>
<tr>
<td>Roof Plans</td>
</tr>
<tr>
<td>Elevations of top of steel, sheathing, parapet walls</td>
</tr>
<tr>
<td>Parapets, screens, walkways, items visible on roof</td>
</tr>
<tr>
<td>Reflected Ceiling Plans</td>
</tr>
<tr>
<td>Fire ratings of ceilings and walls</td>
</tr>
<tr>
<td>Soffits, special items</td>
</tr>
</tbody>
</table>

April 2007
<table>
<thead>
<tr>
<th>Interior Elevations</th>
<th>10% 1/8</th>
<th>Major room elevations, mat'l's &amp; features (MP, Gym, typ.CR)</th>
<th>Wall features and materials, all important features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Room Names, Numbers, Elevation &amp; Detail References</td>
<td>Door and Frame Materials</td>
</tr>
<tr>
<td>Door Schedules and Types</td>
<td>10% 1/8</td>
<td>Numbers, Locations, Detail References</td>
<td>Men's, Women's, etc.</td>
</tr>
<tr>
<td>Window and Louver Schedules and Types</td>
<td>25% 1/2</td>
<td>Numbers, Locations, Detail References</td>
<td>Sash and Frame Materials</td>
</tr>
<tr>
<td>Vertical Circulation Plans, Sections, Details</td>
<td>35% 1/4</td>
<td>Stairs, Elevators, etc. with struct. grid, dimensions</td>
<td>Major materials and equipment, typical details</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equipment room layouts, pits, holding tanks, etc.</td>
<td>Wayfinding, fire ratings, etc.</td>
</tr>
<tr>
<td>Basis of Design</td>
<td>100%</td>
<td>Design approach and philosophy, general description of</td>
<td>Building and material issues, community issues, sustainability measures</td>
</tr>
</tbody>
</table>

- **Exterior Elevations**: 35% 1/8  
  - Structural grid, floor elevations, key dimensions  
  - Wall features and materials, all important features  
  - Doors, windows, louvers  
- **Building Sections**: 35% 1/8  
  - Sections sufficient to show all major building configurations  
  - Structural grid, floor elevations, dimensions, Rm. Names, Nbrs.  
  - Major materials, structural elements  
- **Exterior Envelope Sections**: 75% 1/2  
  - Key wall sections w/ struct. grid, dimensions, address acoustical requirements per Acoustical Design Guidelines  
- **Exterior Envelope Details**: 20% 1 1/2  
  - Key details, incl. roofing, drains, skylights, waterproofing  
- **Interior Elevations**: 10% 1/8  
  - Major room elevations, mat'l's & features (MP, Gym, typ.CR)  
  - Cabinets, Furniture & Equipment (incl. N.I.C.)  
- **Interior Finish Schedules**: 20%  
  - Room Names, Numbers, Elevation & Detail References  
  - Ceiling and soffit heights  
  - Preliminary materials and paint finishes  
- **Door Schedules and Types**: 10%  
  - Numbers, Locations, Detail References  
  - Door and Frame Materials  
- **Window and Louver Schedules and Types**: 25%  
  - Numbers, Locations, Detail References  
  - Sash and Frame Materials  
- **Door, Window and Louver Details**: 25%  
  - All details incl. Thresholds, hardware references, fire ratings, panic hardware, smoke seals  
- **Vertical Circulation Plans, Sections, Details**: 35% 1/4  
  - Stairs, Elevators, etc. with struct. grid, dimensions  
  - Major materials and equipment, typical details  
  - Equipment room layouts, pits, holding tanks, etc.  
- **Interior and Miscellaneous Details**: 25%  
  - Wall types and details, with fire-ratings, address acoustical requirements per Acoustical Design Guidelines  
  - Ceiling, soffit, suspended fixtures w/ structural anchoring  
  - Floor/ ceiling/ wall/ roof assemblies w/ fire ratings, UL fire-assembly numbers  
  - Cabinet and equipment, w/ structural anchoring  

- **Foundation Plans**: 20% 1/8  
  - Structural grid, finish floor elevations, dimensions, references  
  - Bottom-of-footing elev'ns, pipe trenches adj. to footings  
  - Slab penetrations & depressions, dimensioned  
- **Floor and Roof Plans**: 35%  
  - Framing and floor construction, penetrations, openings  
  - Shear walls and other lateral force resisting elements  
- **Sections**: 35% 1/8  
  - Foundation and member sizes
### Design Development

#### Drawings:

<table>
<thead>
<tr>
<th>Information Included</th>
<th>Location Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Sections &amp; Elevations</td>
<td>35%</td>
</tr>
<tr>
<td>Secondary framing &amp; supports for finishes</td>
<td>20%</td>
</tr>
<tr>
<td>Retaining wall elevations, sections</td>
<td>20%</td>
</tr>
<tr>
<td>Details</td>
<td>20%</td>
</tr>
</tbody>
</table>

- **Basis of Design**
  - Description of systems, bearing conditions, load criteria, foundation-engineering report reference
- **Preliminary Calculations**
  - Including calculations and details for: 1) Elements of non-structural components, equipment anchorage and attachment to the structure; 2) Stairs, handrails, and landings.

#### HVAC

- **HVAC Floor and Roof Plans**
  - (On Architectural Backgrounds)
  - 35% 1/8
  - Duct & diffuser grille layout (double-line) with CFM's, smoke detectors, combination smoke/fire dampers with State Fire Marshal approval numbers
  - Existing mechanical systems & components
  - Equipment locations and rooms
- **HVAC Piping Plans**
  - 35%
  - Piping & valve layouts and sizes
- **Air-flow Diagrams**
  - 35%
  - Flow and riser diagrams for each air system, incl. controls, outside air and exhaust, CFM, velocities, pressures
- **HVAC Piping System Diagrams**
  - 35%
  - Schematic and riser diagrams for each piping system, incl. pipe sizes, controls, instrumentation, valves, etc.
- **Enlarged Floor Plans**
  - 25%
  - Equipment layouts, piping, ducts, coordination of major duct & pipe space, and a typical classroom layout
- **Equipment Schedules**
  - 25%
  - All equipment -- types, sizes, capacities, weights
- **Control System Diagrams**
  - 25%
- **Details**
  - 20%
- **Equipment Mounting Details**
  - 10%
  - Mounting details for all HVAC components, incl. pads, curbs, seismic restraints, vibration isolators

#### Basis of Design

- **Final load estimates**
  - 100%
- **Calculations per CBC Energy Efficiency Std's**
  - 50%
  - Critical findings affecting glazing, lighting, other bldg elements

#### Plumbing

- **Site Plan**
  - (On Civil Engineering Background)
  - 50%
  - Mechanical Utilities (gas, steam, heating water), coordinate w/ site utilities
- **Floor and Roof Plans**
  - (On Arch'l Backgrounds)
  - 35% 1/8
  - Piping, fixtures, floor drains, equipment and rooms
  - Existing utilities, equipment and P.O.C's, demo. requirements
  - Major pipe space coordination, incl. roof-drain locations
- **Enlarged Floor Plans**
  - 25%
  - Equipment layouts, piping, supply air & exhaust, major pipe space coordination
- **Equipment Schedules**
  - 25%
  - All equipment -- types, sizes, capacities, weights

---

*April 2007 Page 4 of 6*
# Design Development

## Drawings

<table>
<thead>
<tr>
<th>Information Included</th>
<th>Location Reference</th>
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</thead>
<tbody>
<tr>
<td>Schematic and riser diagrams for each piping system, incl. pipe sizes, controls, valves, etc.</td>
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</tr>
<tr>
<td>Mounting details for all components, incl. pads, curbs, seismic restraints, vibration isolators</td>
<td></td>
</tr>
<tr>
<td>Description of systems, criteria, restroom controls, water conservation, utilities connections requirements</td>
<td></td>
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</tbody>
</table>

## Fire Protection

<table>
<thead>
<tr>
<th>Information Included</th>
<th>Location Reference</th>
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</thead>
<tbody>
<tr>
<td>Mains, risers, P.O.C.’s</td>
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<tr>
<td>Sprinkler head layouts</td>
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<tr>
<td>(On smaller projects, may be shown with Plumbing)</td>
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<tr>
<td>Hydraulic calculations</td>
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## Electrical

<table>
<thead>
<tr>
<th>Information Included</th>
<th>Location Reference</th>
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</thead>
<tbody>
<tr>
<td>Service equipment locations (power, phone, TV, MPOE)</td>
<td></td>
</tr>
<tr>
<td>Conduit duct bank routing and underground pull boxes for power and signal systems</td>
<td></td>
</tr>
<tr>
<td>Exterior lighting (Pole mount and wall mount), Indicate fixture types.</td>
<td></td>
</tr>
<tr>
<td>Exterior Signal devices (Fire Alarm horns, PA speakers, CCTV cameras, etc.)</td>
<td></td>
</tr>
<tr>
<td>Indicate all lighting fixture locations and types. Show panels. Show switches and lighting control components in all rooms.</td>
<td></td>
</tr>
<tr>
<td>Indicate all receptacles locations and types. Show panels.</td>
<td></td>
</tr>
<tr>
<td>Indicate all signal system devices. Show Cable tray layouts and conduit sleeves locations. Show Terminal cabinets, racks and data frames.</td>
<td></td>
</tr>
<tr>
<td>Indicate all initiating &amp; alarm devices, control panels, annunciator and terminal cabinets.</td>
<td></td>
</tr>
<tr>
<td>Equipment rooms layouts showing panels, transformers, inverters, cable trays, LAN racks &amp; signal equipment, terminal cabinets, working &amp; access space</td>
<td></td>
</tr>
<tr>
<td>Show fixture description, manufacturers cat.#, lamp type, ballast type, numbers of lamps and ballasts, input wattage and mounting type.</td>
<td></td>
</tr>
<tr>
<td>Show panel schedules.</td>
<td></td>
</tr>
<tr>
<td>Show contol diagrams and energy forms</td>
<td></td>
</tr>
<tr>
<td>Show headend equipment and terminal cabinets/racks in satellite buildings. Show interconnections.</td>
<td></td>
</tr>
<tr>
<td>Show Main Fire Alarm Control Panel and Satellite control panels or expanders.. Show interconnections.</td>
<td></td>
</tr>
<tr>
<td>Equipment &amp; feeder sizes (new and existing to be used)</td>
<td></td>
</tr>
<tr>
<td>Main switchboards, panels, breakers, MCC’s, etc.</td>
<td></td>
</tr>
<tr>
<td>Load calculations based on allotments indicated in Design Guide per square foot basis to size main service and power distribution panels and for submission to Utility Company.</td>
<td></td>
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</tbody>
</table>
### Design Development

#### Drawings:

<table>
<thead>
<tr>
<th>Other Documents</th>
<th>Scale (Min)</th>
<th>Information Included</th>
<th>Location Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% Compl</td>
<td>Information Included</td>
<td></td>
</tr>
</tbody>
</table>

- Details: 35%
  - Indicate Grounding system.
  - Utility company details if available.
  - ADA-complying heights of all racks and devices
- Equipment Mounting Details: 35%
  - Mounting details for all fixtures, shelving & equipment, incl. seismic restrain-Not required for this submittal.
- Basis of Design: 95%
  - Update and indicate changes to original Basis of Design submitted in schematic phase.
- Lighting Calculations: 65%
  - Provide point-by-point calcs. incl. graphic display for all typical rooms and areas for both normal and emergency modes demonstrating compliance with Design Guide, IES standards, SCE Classroom Lighting Design manuals and applicable codes.

#### Other:

- Fire Alarm System Calculations: 65%
- Title 24 Compliance: 50%
  - Critical findings affecting glazing, lighting, HVAC, other bldg elements and use of day lighting.
  - LTG forms showing compliance with Title 24 and CHPS guidelines and standards.
  - Coordinate with Mechanical Engineer and Architect to optimize energy use and achieve higher CHPS scores.
- Food Service: 25%
  - Plans, Elevations, Sections, Details, Descriptive Data
  - of other design disciplines as may be needed
  - by the size and complexity of the project.
- Graphics & Signage: 25%
- Theater Consultant: 25%

#### Specifications

- List of District Guide Specification and special sections required for project, with Table of Contents
- Catalog cut sheets of architectural and engineering products, organized in CSI format, esp. those not in District standards
- Updated, showing compliance with Building Program
- Detailed CSI Cost Estimate in compliance with Districts estimating guide.
- Site Development Cost Estimate in compliance with Districts estimating guide
- Detailed account of CHPS Points achieved in School Design
- Record of design documents sent to Savings by Design

---

April 2007
## SUBMITTAL REQUIREMENTS

Los Angeles Unified School District Facilities Services Division

### Construction Documents -- 50 %

<table>
<thead>
<tr>
<th>Drawings</th>
<th>Other Documents</th>
<th>% Compl</th>
<th>Scale (Min)</th>
<th>Information Included</th>
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<tr>
<td><strong>General</strong></td>
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<tr>
<td>Title Sheet, Vicinity and Location Map</td>
<td>80%</td>
<td></td>
<td>ft.</td>
<td>Project name &amp; address, project directory w/ all consultants</td>
</tr>
<tr>
<td>Drawing Index</td>
<td>95%</td>
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<td>List of DSA Deferred Approvals</td>
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<tr>
<td>General Notes</td>
<td>80%</td>
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<td></td>
<td>Legend, Abbreviations, Symbols (LAUSD Approved)</td>
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<tr>
<td>Code Analysis</td>
<td>90%</td>
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<td>Constr'n Type, Occupancies, Areas, Separations, Exit Width.</td>
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<tr>
<td>Site Plan</td>
<td>75% 1/20</td>
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<td></td>
<td>Buildings, w/ names, overhangs, nbr.of stories, gross area</td>
</tr>
<tr>
<td>Construction Phasing Plan</td>
<td>50%</td>
<td></td>
<td></td>
<td>For multi-phase projects: Limits of Work, barriers, access</td>
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<tr>
<td>Site Details</td>
<td>35%</td>
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<td>Flag pole, planters, site walls, fencing, railings, signage, parking, playground equipment, stairs and ramps, bollards, trash enclosure</td>
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<td>&quot;Check List of Offsite Work, Utilities &amp; Easements&quot;</td>
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<tr>
<td>CHPS Scorecard</td>
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<td>Detailed account of CHPS Points achieved in School Design</td>
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<tr>
<td><strong>Civil Engineering</strong></td>
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<tr>
<td>Topographic Survey</td>
<td>100%</td>
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<td></td>
<td>Note &quot;FOR REFERENCE ONLY&quot;</td>
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<tr>
<td>Site Plan</td>
<td>75% 1/20</td>
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<td></td>
<td>Building locations (dimensions or coordinates), Work Limits</td>
</tr>
<tr>
<td>Demolition Plan</td>
<td>75%</td>
<td></td>
<td></td>
<td>Buildings, paving, utilities, old foundations - offsite and onsite. Limits of Work, specific demolition notes, legend, coordinate symbols with LAUSD Standards</td>
</tr>
<tr>
<td>Street and Parking Plan</td>
<td>65% 1/20</td>
<td></td>
<td></td>
<td>Pavement dimensions, Fire Department access, references</td>
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<tr>
<td>Construction Documents -- 50 %</td>
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</tr>
<tr>
<td>Grading and Drainage Plan</td>
<td>65%</td>
<td>1/20</td>
<td>□ Existing &amp; New Design grades, final grading, flow lines, CB's, culverts, downspouts, references legend &amp; symbols per LAUSD Standards. Identify paving types &amp; landscape areas</td>
<td></td>
</tr>
<tr>
<td>Site Utilities Plan (Water &amp; Drainage)</td>
<td>65%</td>
<td>1/20</td>
<td>□ Piping, manholes, valves, CB's, drinking fountains, hose bibs, combination SS/SD drain valves, PIV's</td>
<td></td>
</tr>
<tr>
<td>Off-site Civil Work Plans</td>
<td>65%</td>
<td>□ Off-site work (drains, walks, drives, streets, hydrants, utilities tie-ins, street-vacations, street trees, power poles, etc.) per public agency requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drainage Plans/ Profiles</td>
<td>65%</td>
<td>1/10</td>
<td>□</td>
<td></td>
</tr>
<tr>
<td>Site Details</td>
<td>35%</td>
<td>□ Curbs, gutters, drainage structures, valves, boxes, utilities connections, . . .</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log of soil borings</td>
<td>100%</td>
<td>□</td>
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<tr>
<td><strong>Calculations</strong></td>
<td>100%</td>
<td>□</td>
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<tr>
<td><strong>Basis of Design</strong></td>
<td>-</td>
<td>□ Updated</td>
<td></td>
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</table>

### Landscaping

- **Site Plan** (on Civil Engineering Background) 75% 1/20
  - □ Planting areas with plant references
  - □ Location of existing trees (to remain) in area of work and proposed relocation if necessary
- **Plant Schedules** 65%
  - □ Names, sizes, detail references
- **Details** 35%
  - □ Planting, site furniture, special features
- **Irrigation Plans** 50%
  - □ Piping, sprinkler & controller locations, references
  - □ Water POC, meter & backflow preventor locations
- **Irrigation Details** 35%
  - □ Valves, control schedules
  - □ Updated

### Architecture

- **Floor Plans** 75% 1/8
  - □ Structural grid, finish floor elevations, final dimensions
  - □ Room Names, Numbers
  - □ Door & Window Numbers, Wall Numbers, references
  - □ Partition types, fire-ratings, ADA compliance, references
  - □ ADA compliance, references
  - □ Cabinets, furniture & equipment layout, detail references (incl. N.I.C. items)
  - □ Floor depressions, penetrations, housekeeping pads, FD's & slopes, detail references
- **Enlarged Floor Plans** 50% 1/4
  - □ Educational spaces, library, admin. area, restrooms, kitchens, mech'l equip. rooms, special areas. All FFE incl. N.I.C. items shown.
- **Roof Plans** 75% 1/8
  - □ Structural grid, slopes, drains, scuppers, penetrations
  - □ Elevations of top of steel, sheathing, parapet walls
  - □ Equipment, ducts, pipes, curbs and pads, pipes & ducts
  - □ Parapets, screens, walkways, all items visible on roof with dimensions and detail references

**April 2007 Page 2 of 8**
<table>
<thead>
<tr>
<th>Information Included</th>
<th>Exterior Elevations</th>
<th>Interior Elevations</th>
<th>Building Sections</th>
<th>Exterior Envelope Sections</th>
<th>Exterior Envelope Details</th>
<th>Door Schedules and Types</th>
<th>Window and Louver Schedules and Types</th>
<th>Door, Window and Louver Details</th>
<th>Vertical Circulation Plans, Sections, Details</th>
<th>Interior and Miscellaneous Details</th>
</tr>
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<tbody>
<tr>
<td>Lighting, grilles, access panels, sprinklers, penetrations</td>
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<tr>
<td>Fire ratings of ceilings and walls</td>
<td>☐</td>
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<tr>
<td>Soffits, special items, dimensioned &amp; references</td>
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**Basis of Design**

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<td>HVAC Piping Plans, Flr./Roof</td>
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## Construction Documents -- 50 %

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<td>Site Plan</td>
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<td>✓ Mechanical Utilities (gas, steam, heating water), coordinate w/ site utilities</td>
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<td>(on Civil Engineering Background)</td>
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<td>✓ Piping, fixtures, floor drains, equipment and rooms</td>
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<td>Floor and Roof Plans</td>
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<td>✓ Existing utilities, equipment and P.O.C’s, demo. requirements</td>
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<td>(on Arch’l Backgrounds)</td>
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<td>✓ Major pipe space coordination, incl. roof-drain locations</td>
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<td>Enlarged Floor Plans</td>
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<td>✓ Equipment layouts, piping, supply air &amp; exhaust, major pipe space coordination</td>
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<td>Equipment Schedules</td>
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<td>✓ All equipment -- types, sizes, capacities, weights</td>
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<td>Fixture Schedules</td>
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<td>✓ Schematic and riser diagrams for each piping system, incl. pipe sizes, controls, valves etc</td>
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<td>Piping System Diagrams</td>
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<td>✓ Mounting details for all components, incl. pads, curbs, seismic restraints, vibration isolators</td>
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<td>✓ Sprinkler head layouts</td>
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<td>✓ (On smaller projects, may be shown with Plumbing)</td>
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<td>Site Plan</td>
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<td>✓ Service equipment locations (power, phone, TV)</td>
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<td>(on Civil Engineering Background)</td>
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<td>✓ Show vault/pad details, primary and secondary conduit routing</td>
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<td>✓ Conduit duct bank routing and underground pull boxes for power and signal systems. Show sizes.</td>
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<td>✓ Exterior lighting (Pole mount and wall mount), Indicate fixture types. Assign panel circuit homeruns</td>
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<td>✓ Exterior Signal devices (Fire Alarm horns, PA speakers, CCTV cameras, etc.)</td>
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<td>Lighting Floor Plans/RCPs</td>
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<td>✓ Indicate all lighting fixture locations and types. Show panels. Show switches and lighting control components in all rooms. Assign panel circuit homeruns</td>
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<td>Power Floor Plans</td>
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<td>✓ Indicate all receptacles locations and types. Show panels. Assign panel circuit homeruns</td>
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<td>Signal Floor Plans</td>
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<td>✓ Indicate all signal system devices. Show Cable tray layouts and conduit sleeves locations. Show Terminal cabinets, racks and data frames. Show conduit interconnections.</td>
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<td>Fire Alarm Floor Plans</td>
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<td>Indicate all initiating &amp; alarm devices, control panels, annunciator and terminal cabinets. Indicate candela ratings</td>
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<td>Enlarged Floor Plans</td>
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<td>Provide equipment rooms layouts showing panels, transformers, inverters, cable trays, LAN racks &amp; signal equipment, terminal cabinets, working &amp; access space. Size equipment and provide dimensioned layouts and weight information. Coordinate with Structural Engineer for seismic details. Calculate heat loads and coordinate with Mechanical for sizing HVAC equipment. Provide cable tray layout in LAN Room and signal rooms.</td>
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<td>Light Fixture Schedule</td>
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<td>Show fixture description, manufacturers cat.#, lamp type, ballast type, numbers of lamps and ballasts, input wattage and mounting type.</td>
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<td>Panel Schedules</td>
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<td>Provide Panel schedules showing load details and calculations.</td>
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<td>Lighting Control Diagrams</td>
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<td>Provide lighting control diagram showing all components and interconnections.</td>
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<tr>
<td>Signal Block and Riser Diagrams</td>
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<td>Show Headend equipment and terminal cabinets/racks in satellite buildings. Show interconnections. Show all components. Show all interconnections indicating conduit and cabling information.</td>
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<tr>
<td>Fire Alarm Block and Riser Diagrams</td>
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<td>Show Main Fire Alarm Control Panel and Satellite control panels or expanders. Show all components. Show all interconnections indicating conduit and cabling information.</td>
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<td>Single-line Diagram</td>
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<td>Equipment &amp; feeder sizes (new and existing to be used)</td>
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<td>Main switchboards, panels, breakers, MCC's, etc.</td>
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<td>Load calculations based on actual connected loads Resize main service and power distribution panels based on actual loads. Include spare capacities required by Design Guide.</td>
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<td>Indicate Grounding system for main service and satellite buildings.</td>
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<td>[ ] Short-circuit ratings of all panelboards calculated based on available fault current from utility company</td>
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<td>[ ] Provide Utility company contact information.</td>
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<td>[ ] Typical ADA-complying heights of all racks and devices</td>
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<td>[ ] Applicable LAUSD standard details</td>
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<td>Details</td>
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<td></td>
<td>[ ] Mounting details for all fixtures, shelving &amp; equipment, incl. seismic restrain. Coordinate with structural</td>
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<tr>
<td>Equipment Mounting Details</td>
<td>50%</td>
<td></td>
<td>[ ] Update and indicate changes to original Basis of Design submitted in schematic phase.</td>
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<tr>
<td>Basis of Design</td>
<td>95%</td>
<td></td>
<td>[ ] Update Point-by-point calcs. incl. graphic display typical rooms and areas for both normal and emergency modes demonstrating compliance with Design Guide, IES standards, SCE Classroom Lighting Design manuals and applicable codes.</td>
<td></td>
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<tr>
<td>Lighting Calculations</td>
<td>95%</td>
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<tr>
<td>Fire Alarm System Calcs.</td>
<td>50%</td>
<td></td>
<td>[ ] Battery and voltage-drop calculations.</td>
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<tr>
<td>Title 24 Compliance</td>
<td>100%</td>
<td></td>
<td>[ ] Update-Critical findings affecting glazing, lighting, HVAC, other bldg elements and use of day lighting.</td>
<td></td>
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<td></td>
<td>[ ] Update-LTG forms showing compliance with Title 24 and CHPS guidelines and standards.</td>
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<tr>
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<td></td>
<td>[ ] Update-Coordinate with Mechanical Engineer and Architect to optimize energy use and achieve higher CHPS scores.</td>
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<td>[ ] Incorporate comments received from &quot;Saving by Design&quot; Review</td>
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<tr>
<td>Food Service</td>
<td>50%</td>
<td></td>
<td>[ ] Plans, Elevations, Sections, Details, Descriptive Data of other design disciplines as may be needed by the size and complexity of the project.</td>
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<tr>
<td>Graphics &amp; Signage</td>
<td>50%</td>
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<tr>
<td>Theater Consultant</td>
<td>50%</td>
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</table>
Specifications

- Set of District Guide Specifications with Table of Contents and Technical Sections required for the project, red-marked (or edited in MS Word while tracking changes and highlighting) to reflect the specific work of the project, plus additional sections to recognize unique materials or assemblies. Specify two or more manufacturers for each product.

OTHER:

- SP2A Building Area Diagrams
  - Updated

- Product Information
  - Catalog cut sheets not submitted with DD package

- Record Reports
  - All utility company, public agency and fire dept contacts

- Cost Estimate
  - Detailed CSI Cost Estimate in compliance with Districts Estimating Guide

- CHPS Scorecard
  - Detailed account of CHPS Points achieved in School Design

- Savings By Design
  - Savings by Design Energy Analysis Recommendation Letter & Architect's Response

- Incentive Program
  - Site Development Cost Estimate in compliance with Districts Estimating Guide

- D.D. Review Comments
  - All comments & dwgs., with responses to each comment
# SUBMITTAL REQUIREMENTS

Los Angeles Unified School District Facilities Services Division

## Construction Documents -- 100 % C.D. - DSA Submittal

### DRAWINGS:

<table>
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<th>OTHER DOCUMENTS:</th>
<th>% Comp</th>
<th>Scale (Min)</th>
<th>Information Included</th>
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<td>1/20</td>
<td></td>
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</tbody>
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### General

- **Title Sheet, Vicinity and Location Map**
  - 100%
  - □ Project name & address, project directory w/ all consultants
  - □ LAUSD ID and Logo (on all drawings)
  - □ List of DSA Deferred Approvals

- **Drawing Index**
  - 100%
  - □ List all drawings for final set.

- **General Notes**
  - 100%
  - □ Legend, Abbreviations, Symbols (LAUSD Approved)
  - □ Constr'n Type, Occupancies, Areas, Separat'ns, Exit Wdth.
  - □ ADA path of travel and accessibility criteria
  - □ Exit signs, fire extinguishers
  - □ Applicable Codes

- **Site Plan**
  - 100% 1/20
  - □ Buildings, w/ names, overhangs, nbr.of stories, gross area
  - □ Driveways, service roads, parking & layouts, walks
  - □ Hardscape, planting areas, site furniture, drinking fountains
  - □ Playground layouts, paving types, detail references
  - □ ADA accessibility signage, ramps, railings, HC parking
  - □ Fire Dept. access, hydrants & F.D. Approval block
  - □ DSA Application Nbr. for existing buildings

- **Construction Phasing Plan**
  - 100%
  - □ For multi-phase projects: Limits of Work, barriers, access

- **Site Details**
  - 100%
  - □ Flag pole, planters, site walls, fencing, railings, signage, parking, playground equipment, stairs and ramps, bollards, trash enclosure

### Civil Engineering

- **Topographic Survey**
  - □ Note "FOR REFERENCE ONLY"

- **Site Plan**
  - 100% 1/20
  - □ Building locations (dimensions or coordinates), Work Limits
  - □ Floor Plan Elevations, Key Dimensions, Grids
  - □ Existing and Finish Contours (0.5' intervals typ.), spot elevations, ADA-compliant slopes
  - □ Property lines, streets, setbacks, easements, walls & fences
  - □ Site walls and top-of-wall and bottom-of-footing elevations
  - □ Utilities, UG tanks, fencing, walks, drives, planting, other features, onsite and adjacent (existine and new)
  - □ Construction phasing provisions, for multi-phase projects

- **Demolition Plan**
  - 100%
  - □ Buildings, paving, utilities, old foundations - offsite and onsite
  - □ Limits of Work, specific demolition notes

- **Street and Parking Plan**
  - 100% 1/20
  - □ Pavement dimensions, Fire Department access, references

- **Grading and Drainage Plan**
  - 100% 1/20
  - □ Final grading, flow lines, CB's, culverts, downspouts, references
## Construction Documents -- 100 % C.D. - DSA Submittal

### Drawings:

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<th>Scale (Min)</th>
<th>Information Included</th>
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<td>Site Utilities Plan (Water &amp; Drainage)</td>
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<td>Piping, manholes, valves, CB's, drinking fountains, hose bibbs, combination SS/SD drain valves, PIV's</td>
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<tr>
<td>Off-site Civil Work Plans</td>
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<td>Off-site work (drains, walks, drives, streets, hydrants, utilities tie-ins, street-vacations, street trees, power poles, etc.) per public agency requirements</td>
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<td>Drainage Plans/ Profiles</td>
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<tr>
<td>Site Details</td>
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<td>Curbs, gutters, drainage structures, valves, boxes, utilities connections, . . .</td>
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<td>Log of soil borings</td>
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### Landscaping

**Site Plan (on Civil Engineering Background)**

| Plant Schedules                          | 100%   |             | Names, sizes, detail references                           |
| Details                                  | 100%   |             | Planting, site furniture, special features                |
| Irrigation Plans                         | 100%   |             | Piping, sprinkler & controller locations, references      |
| Irrigation Details                       | 100%   |             | Valves, control schedules                                 |

### Architecture

**Floor Plans**

100% 1/8  
- Structural grid, finish floor elevations, final dimensions
- Room Names, Numbers
- Door & Window Numbers, Wall Numbers, references
- Partition types, fire-ratings, ADA compliance, references
- ADA compliance, references
- Cabinets, furniture & equipment layout, detail references (incl. N.I.C. items)
- Floor depressions, penetrations, housekeeping pads, FD's & slopes, detail references

**Enlarged Floor Plans**

100% 1/4  
- Educational spaces, library, admin. area, restrooms, kitchens, mech'l equip. rooms, special areas. All FFE incl. N.I.C. items.

**Roof Plans**

100% 1/8  
- Structural grid, slopes, drains, scuppers, penetrations
- Elevations of top of steel, sheathing, parapet walls
- Equipment, ducts, pipes, curbs and pads, pipes & ducts
- Parapets, screens, walkways, all items visible on roof with dimensions and detail references

**Reflected Ceiling Plans**

100% 1/8  
- Lights, grilles, access panels, sprinklers, penetrations
- Fire ratings of ceilings and walls
- Soffits, special items, dimensioned & referenced

**Exterior Elevations**

100% 1/8  
- Structural grid, floor elevations, dimensions
- All wall features and materials, w/ dimensions & references, incl. expansion joints, screeds, copings and sills

**April 2007 Page 2 of 9**
<table>
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<th>Information Included</th>
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<td>Doors, windows, louvers, w/ dimensions and references</td>
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<td>Sections sufficient to show all major building configurations</td>
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<td>Struct'l grid, floor elevations, dimensions, Room Names, Nbrs.</td>
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<td>Key details, incl. roofing, drains, skylights, waterproofing</td>
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<td>All details incl. Thresholds, hardware references, fire ratings, panic hardware, smoke seals</td>
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<td>Stairs, Elevators, etc. with structl.grid, dimensions</td>
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<td>Major materials and equipment, typical details</td>
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<td>Equipment room layouts, pits,holding tanks,etc.</td>
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<td>Vertical Circulation Plans, Sections, Details</td>
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<td>Wall types and details, with fire-ratings</td>
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<td>Ceiling, soffit, suspended fixtures w/ structural anchoring</td>
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<td>Floor/ ceiling/ wall/ roof assemblies w/ fire ratings, UL fire-assembly numbers</td>
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<td>Cabinet and equipment, w/ structural anchoring</td>
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<td>Bottom-of-footing elevations, pipe trenches adj. to footings</td>
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<td>Slab penetrations &amp; depressions, dimensioned</td>
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<td>Framing and floor construction, penetrations, openings</td>
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<td>Shear walls and other lateral force resisting elements</td>
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<td>Foundation and member sizes</td>
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<td>Wall Sections &amp; Elevations</td>
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<td>Secondary framing &amp; supports for finishes</td>
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<td>Retaining wall elev'ns,sections</td>
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## Construction Documents -- 100 % C.D. - DSA Submittal

### Drawings:

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<td>Description of systems, bearing conditions, load criteria, foundation-engineering report reference</td>
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<tr>
<td>Final Calculations</td>
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<td>Including calculations and details for: 1) Elements of non-structural components, equipment anchorage and attachment of the structure; 2) Stairs, handrails, and landings.</td>
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### HVAC

- **Floor and Roof Plans**
  - 100% 1/8
  - Duct & diffuser/ grille layout (double-line) with CFM's, smoke detectors, combination smoke/ fire dampers with State Fire Marshal approval numbers
  - Existing mechanical systems & components
  - Equipment locations and rooms

- **HVAC Piping Plans, Flr./Roof**
  - 100%
  - Piping & valve layouts and sizes

- **Air-flow Diagrams**
  - 100%
  - Flow and riser diagrams for each air system, incl. controls, outside air and exhaust, CFM, velocities, pressures

- **HVAC Piping System Diag'ms**
  - 100%
  - Schematic and riser diagrams for each piping system, incl. pipe sizes, controls, instrumentation, valves, etc.

- **Enlarged Floor Plans**
  - 100%
  - Equipment layouts, piping, ducts, major duct & pipe space coordination

- **Equipment Schedules**
  - 100%
  - All equipment -- types, sizes, capacities, weights

- **Control System Diagrams**
  - 100%

- **Details**
  - 100%

- **Equipment Mounting Details**
  - 100%
  - Mounting details for all HVAC components, incl.pads, curbs, seismic restraints, vibration isolators

- **Basis of Design**
  - -

- **Final load estimates**
  - 100%

- **Final calculations**
  - 100%
  - Title 24 Energy Standards Compliance Forms: Performance Method with analysis of each building.

### Plumbing

- **Site Plan**
  - 100%
  - (on Civil Engineering Background)
  - Mechanical Utilities (gas, steam, heating water), coordinate w/ site utilities

- **Floor and Roof Plans**
  - 100% 1/8
  - (on Arch'l Backgrounds)
  - Piping, fixtures, floor drains, equipment and rooms
  - Existing utilities, equipment and P.O.C's, demo. requirements
  - Major pipe space coordination, incl. roof-drain locations

- **Enlarged Floor Plans**
  - 100%
  - Equipment layouts, piping, supply air & exhaust, major pipe space coordination

- **Equipment Schedules**
  - 100%
  - All equipment -- types, sizes, capacities, weights

- **Piping System Diagrams**
  - 100%
  - Schematic and riser diagrams for each piping system, incl. pipe sizes, controls, valves, etc.

- **Details**
  - 100%
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<th>Scale (Min)</th>
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<td>Mounting details for all components, incl. pads, curbs, seismic restraints, vibration isolators</td>
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<td>Final calculations</td>
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<td>Fire Protection</td>
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<tr>
<td>Floor Plans (on Archl Backgrounds)</td>
<td>100% 1/8</td>
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<td>Mains, risers, P.O.C.'s</td>
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<td></td>
<td>Sprinkler head layouts</td>
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<td>(On smaller projects, may be shown with Plumbing)</td>
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<tr>
<td>Electrical</td>
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<tr>
<td>Site Plan (on Civil Engineering Background)</td>
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<td></td>
<td>Service equipment locations (power, phone, TV)</td>
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<td>Show vault/pad details, primary and secondary conduit routing</td>
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<td>Show utility companies point of connections</td>
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<td>Conduit duct bank routing and underground pull boxes for power and signal systems. Show sizes.</td>
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<td>Show underground conduits fill ratios.</td>
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<td>Coordinate with Civil to avoid conflict with Sewer, Gas and water lines and access manholes.</td>
</tr>
<tr>
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<td></td>
<td>Exterior lighting (Pole mount and wall mount), Indicate fixture types. Indicate homeruns and conduit routing to panelboard. Show circuit numbers and wiring.</td>
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<tr>
<td></td>
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<td>Exterior Signal devices (Fire Alarm horns, PA speakers, CCTV cameras, etc.) Indicate Device types. Indicate homeruns and conduit routing to signal terminal cabinet. Show wiring infor.</td>
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<tr>
<td>Lighting Floor Plans/RCPs</td>
<td>100% 1/8</td>
<td></td>
<td>Indicate all lighting fixture locations and types. Show panels. Show circuit numbers, J. boxes, switching and wiring for all areas. Indicate rooms ID's. Show all wiring and conduit interconnections. Provide exit signs (high and low mount) and all exit door. Provide directional exit signs.</td>
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<tr>
<td>Power Floor Plans</td>
<td>100% 1/8</td>
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<td>Indicate all receptacles locations and types. Show panels. Show circuit numbers, J. boxes and wiring for all areas. Indicate rooms ID's. Show all wiring and conduit interconnections.</td>
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<td>Scale 1/ft.</td>
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<tr>
<td>Signal Floor Plans</td>
<td>100%</td>
<td>1/8</td>
<td>Indicate all signal system devices. Show Cable tray layouts. Show terminal cabinets, J. boxes, equipment and wiring for all areas. Indicate rooms ID's. Show all wiring and conduit interconnections.</td>
</tr>
<tr>
<td>Fire Alarm Floor Plans</td>
<td>100%</td>
<td>1/8</td>
<td>Indicate all initiating &amp; alarm devices, control panels, annunciator and terminal cabinets. Indicate candela ratings. Show J. boxes, devices ID's, circuit ID's and wiring for all areas. Indicate rooms ID's. Show all wiring and conduit interconnections.</td>
</tr>
<tr>
<td>Enlarged Floor Plans</td>
<td>100%</td>
<td>1/4</td>
<td>Provide equipment rooms layouts showing panels, transformers, inverters, LAN racks &amp; signal equipment, terminal cabinets, working &amp; access space.</td>
</tr>
<tr>
<td>Equipment room layouts</td>
<td></td>
<td></td>
<td>Update equipment sizes and provide dimensioned layouts and weight information. Coordinate with Structural Engineer for seismic details.</td>
</tr>
<tr>
<td>Light Fixture Schedule</td>
<td>100%</td>
<td></td>
<td>Update fixture description, manufactures cat.#, lamp type, ballast type, numbers of lamps and ballasts, input wattage and mounting type. Coordinate with book specification.</td>
</tr>
<tr>
<td>Panel Schedules</td>
<td>100%</td>
<td></td>
<td>Update Panel schedules showing load details and calculations.</td>
</tr>
<tr>
<td>Lighting Control Diagrams</td>
<td>100%</td>
<td></td>
<td>Update lighting control diagram showing all components and interconnections. Show Room ID's where components are located.</td>
</tr>
<tr>
<td>Signal Block and Riser Diagrams</td>
<td>100%</td>
<td></td>
<td>Show Headend equipment and terminal cabinets/racks in satellite buildings. Show interconnections. Show all components. Show all interconnections indicating conduit and cabling information. Show Room ID's where components are located. Provide separate Riser Diagram for each signal system. Data and telephone (PBX) shall be combined.</td>
</tr>
</tbody>
</table>
### Construction Documents -- 100 % C.D. - DSA Submittal

<table>
<thead>
<tr>
<th>OTHER DOCUMENTS:</th>
<th>% Complete</th>
<th>Information Included</th>
</tr>
</thead>
</table>
| Fire Alarm Block and Riser Diagrams | 100% | Show Main Fire Alarm Control Panel and Satellite control panels or expanders.  
Show all components. Show all interconnections indicating conduit and cabling information. Show Room ID's where components are located. |

| | | |
| Single-line Diagram | 100% | Update equipment & feeder sizes (new and existing to be used)  
Update information for Main switchboards, panels, breakers, MCC's, etc. Provide physical spaces for future expansion.  
Update load calculations based on actual connected loads  
Resize main service and power distribution panels based on actual loads. Include spare capacities required by Design Guide.  
Update information for grounding system for main service and satellite buildings.  
Update Voltage drops and length for all feeders.  
Update short-circuit ratings of all panelboards calculated based on available fault current from utility company  
Update Utility company contact information. |

| | | |
| Details | 100% | Provide complete Utility company standard details  
Provide ADA-complying heights of all typical racks and devices  
Provide complete relevant LAUSD standard details. |

| | | |
| Equipment Mounting Details | 100% | Provide mounting details for all fixtures, racks, panels & equipment, incl. seismic restrain. Coordinate with structural |

| Basis of Design | 100% | Update and indicate changes to original Basis of Design submitted in previous submittal phase. |

| Lighting Calculations | 100% | Update Point-by-point calcs. incl. graphic display-Update typical rooms and areas for both normal and emergency modes demonstrating compliance with Design Guide, IES standards, SCE Classroom Lighting Design manuals and applicable codes. |

| Fire Alarm Sys. calc. | 100% | Update Battery and voltage-drop calculations- |

| Title 24 Compliance | 100% | Update-Critical findings affecting glazing, lighting, HVAC, other bldg elements and use of day lighting.  
Update-LTG forms showing compliance with Title 24 and CHPS guidelines and standards. |
### Construction Documents -- 100 % C.D. - DSA Submittal

#### DRAWINGS:

<table>
<thead>
<tr>
<th>OTHER DOCUMENTS</th>
<th>100%</th>
<th>Comp Scale (Min)</th>
<th>Information Included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comp</td>
<td></td>
<td>1/ft.</td>
<td></td>
</tr>
</tbody>
</table>

- Update-Coordinate with Mechanical Engineer and Architect to optimize energy use and achieve higher CHPS scores.
- Incorporate comments received from "Saving by Design" Review
- Complete CHPS score board.

#### Food Service Graphics & Signage

- 100% Plans, Elevations, Sections, Details of other design disciplines as may be needed by the size and complexity of the project.

#### Theater Consultant Kitchen Consultant

- 100% Specifications

- 100% Cover indicating District, project name & address, architect's name & address, license number, professional seal and signature
- Clearly described scope of work in Division 1, Section 01010
- 6 sets incl. Gen'l Cond'ns (7 if project has a kitchen)

#### Other Documents:

- **DSA Application Form**
  - 3 Sets. Completed and signed by the Architect of Record
  - Scope of work clearly described, identifying all new buildings and uses
  - Coordinate required fees with DSA and LAUSD Project Managers

- **SP3A Building Area Diagrams**
  - 2 Sets.

- **Check Lists for DSA Submittal:**
  - 2 Sets each.
  - All documents checked to address "Checklists"
  - "Testing and Inspection" List
  - 1 set of Construction Documents and Title 24 electronic data input

- **Calculations:**
  - 2 Sets each.
  - Final Calculations (see "Structural Requirements Checklist")
  - Final Energy Calculations & Compliance Forms (Title 24)
  - Final Energy Calculations & Compliance Forms (Title 24) (Coordinate and bind with Mechanical Engineering Calcs)

- **Reports and Approvals:**
  - 1 Set each.
  - Approval block signed by Fire Dept. representative, and showing fire mains, valves, hydrants, connections, access drives

- **Product Information:**
  - 2 Sets each.
  - Equipment catalog data indicating dimensions, weights, corner weight distribution and center of gravity locations
  - Catalog Data on vibration isolators and seismic restraints
## Construction Documents -- 100% C.D. - DSA Submittal

### DRAWINGS:

<table>
<thead>
<tr>
<th>OTHER DOCUMENTS:</th>
<th>Comp (Min)</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

- Struct'l calculations on vibration isolators, seismic restraints and equipment anchorage
  - (Submit all above with plans in a binder with proper reference to the plans.)

- **Plumbing**
  - Cut sheets of all Plumbing Fixtures for Accessibility Review

- **Electrical**
  - Fire Alarm System Manual containing:
    - Cut sheets and CSFM Listing sheets of all fire-alarm devices, with index
    - F.A. System Devices Symbol List
    - Cut sheets for Assistive-Listening System of Autonomous PA/Sound Systems for Auditorium, Gymnasium, and Multi-Purpose Room

- **Cost Estimate**
  - 6 Sets.

- **CHPS Scorecard**
  - Detailed account of CHPS Points achieved in School Design

- **Savings by Design**
  - Savings by Design Contract

- **Incentive Program**

- **D.D. Review Comments**
  - All comments and drawings with responses to each comment
**Items required for submittal:**

<table>
<thead>
<tr>
<th>A. Demolition Plan:</th>
<th>Check Items Complete.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Show removal of all concrete or masonry walls, fences, curbs, gutters, trees, asphaltic concrete pavement, planting, debris, pipes and all structures required to be removed.</td>
<td></td>
</tr>
<tr>
<td>2. Coordinate plumbing, electrical, architectural and mechanical drawings and specifications with the civil engineering drawings to ensure that there are no conflicts or interferences.</td>
<td></td>
</tr>
<tr>
<td>3. Cover removals in the specifications.</td>
<td></td>
</tr>
<tr>
<td>4. Show all pertinent information which will aid contractor in making removals.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B. Paving Plan:</th>
<th>Check Items Complete.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thickness and types of all paving and base course. Use thickness directed by the district.</td>
<td></td>
</tr>
<tr>
<td>2. Paving limits.</td>
<td></td>
</tr>
<tr>
<td>3. Concrete landings at all exterior doorways of buildings, not opening onto concrete areas, for installation of door stops.</td>
<td></td>
</tr>
<tr>
<td>4. Contraction and expansion joints and pattern for score lines in concrete areas and dimension for same. In walks on adobe soils omit expansion joints. Use continuous mild steel reinforcement instead. (No wire mesh)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. Grading Plan:</th>
<th>Check Items Complete.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. New and existing contours in and adjacent to work area.</td>
<td></td>
</tr>
<tr>
<td>2. Benchmark. (Location and elevation)</td>
<td></td>
</tr>
<tr>
<td>3. Paving and grading limits.</td>
<td></td>
</tr>
<tr>
<td>4. Exterior door locations.</td>
<td></td>
</tr>
<tr>
<td>5. Finish elevations in paved areas to 0.01’.</td>
<td></td>
</tr>
</tbody>
</table>
6. Ridges, flow lines, grade changes and top and bottom of banks, indicate spot elevations at changes in directions of above items.

7. Existing and finish contours at 0.5’ intervals except on high banks, where 5’-0”, contours may be used.

8. Finish contours as straight lines. Free hand or curved lines are not acceptable.

9. Wall elevations at top, ends, at slope changes and at abrupt changes in elevations.

10. Downspouts and drinking fountain locations and label.

11. Date of topographical survey.

12. Spot elevations and arrows indicating direction of slope are not acceptable on working drawings.

13. Existing manholes, yard boxes, vaults, and other surface structures which may require adjustments to fit new finish grade.

14. Depth and location of existing underground utility lines if information is available.

15. Floor drains in lunch area and indicate top of grate elevation.

16. Submit final quantity estimates of earthwork volumes.

D. Storm Drain Plan:

1. Complete storm drain system with type of pipes, sizes slopes, invert elevations, catch basin top and invert elevations and downspout lines.

2. Locations, details, and construction detail for manholes, junction chambers, transition structures, collars, easements, connections to existing storm drain lines, outlet structures, and other storm drain structures.

3. Storm drain system on grading plan, provided plan is not unduly cluttered.

4. Profiles of storm drain pipes, and for drain pipes 12” or larger, when conflicts with other utilities are possible.

E. Miscellaneous

1. Miscellaneous details on separate sheet or on any civil engineering drawings where space is available.

2. Details of catch basin, curbs, walls, cleanouts, headers, storm drain structures, headwalls, encasements, mow strips, gutters, and other pertinent details.

3. Plan and profile of retaining walls, concrete block fences and respective footings. Coordinate retaining wall and footing elevations with structural engineer. Structural details of such structures to be indicated on structural drawings. Plan and profile may be indicated on architectural or structural drawings provided that dimensions and elevations required for staking are indicated.

F. Special Earthwork Plan:

1. Limits of areas where special earthwork is required such as removal of loose fills, trash or dump areas, or loose earth in basements, swimming pools tanks, etc.

2. This information is usually determined from soil reports and information supplied by the District.

3. Limits of special earthwork described above are denoted by term “bottom of excavated plane” and is abbreviated to “B.E.P.” B.E.P. elevations, locations and dimensions should be indicated on grading plan if it can be clearly indicated. Data shall originate from the structural engineer in coordination with the soil engineer. The B.E.P. and specifications for special earthwork will be reviewed by the District structural engineer.

4. A special paragraph shall be included for specifications for over excavation.
**G. Staking Plan:**

2. Controls for major improvements such as wall, banks, athletic fields, etc., shall be adequately tied downed by dimensions and coordinates.
3. If above data is indicated on other than civil engineering drawings, it shall be checked by the civil engineer.

**H. Logs Of Soil Boring:**

1. Show logs of soil borings and indicate locations on plan. Datum of boring samples must be coordinated with datum of grading plan.
2. Logs of soil borings may be reproduced from the soils reports onto standard size vellum as part of set of drawings. Location of soil borings may likewise be reproduced on same sheet.

**I. Off-Site Drawings:**

1. Prepare drawing in accordance with the requirements of the agencies having jurisdiction.
2. See attachment to this chapter, “checklist of offsite work, utilities & easements”. This checklist must be completed and submitted to the design and construction branch with the 100% construction documents.
**Los Angeles Unified School District**

**ELECTRICAL DESIGN CHECKLIST**  
New School Facilities  
100% Submittal

<table>
<thead>
<tr>
<th>Items required for submittal</th>
<th>Check Items Complete</th>
</tr>
</thead>
</table>

**School:** ____________________________________________  
**Architect:** ____________________________________________  
**Project name:** ___________________________________________  
**Engineer:** ________________________________________________

*This form shall be completed and submitted with the submittal package. The submittal will be deemed incomplete without the completed form.

**Items required for submittal:**

**A. Single Line Diagram:**

1. Voltage, amperage, phase and wires shown.  
2. Available fault current shown at each equipment bus.  
3. Circuit breaker frame and trip size.  
4. Switch rating, fuse size and type of fuse.  
5. Conduit, wire size, length and voltage drop of each feeder.  
6. Load summary of main distribution switchboard showing 30% future growth spare capacity above connected load. Provide the space in main switchboard for future growth.  
7. Obtain written approval from the electric utility company for new electrical services planned for the facility.  
8. Ground fault protection on main for 480/277 volt, 3 phase, 4 wire, 1000 amps or higher main switchboards.  
9. Ground fault protection on each feeder of 480/277 volts 3 phase, 4 wire rated at 800 amps or more.  
10. Location of existing utility facilities such as power poles to be removed where applicable.  
11. Identify electronic grade panel boards intended for computer system power. If these panels are serviced via a step down transformer, then transformer must be K-Rated.  
12. Step down transformer are k-rated.

**B. Site Plan:**

1. Location of electric utility equipment, concrete pad, vault, power pole, underground conduits, and main switchboard, in compliance with serving utility company requirements, industry standards, and applicable codes.  
2. Telephone facilities, as per approved requirements.  
3. Cable TV facilities, as per approved requirements.  
4. Location of existing underground utilities (if applicable), where trenching is required.
5. Underground feeders and branch circuits.
6. Terminal cabinets and underground conduit runs for P.A., fire alarm, TV, CCTV, clock, intrusion detection, and computer systems.
7. Location of other outdoor equipment such as transformers, motor control centers, light standards, etc.
8. Building names or numbers, scale, north arrow and streets.
9. Minimum underground conduit size shall be two inch for power system, two inch for clock system, four inch for fiber optic backbone interduct system, and three inch for all other signal systems, except for end runs to buildings containing maximum two classrooms which are not used as a distribution point to other small buildings.
10. Provide spare underground conduits for power, and signal systems, minimum one 3 inch for power and three inch for signal system, except for end runs to buildings described in item 9.
11. Provide properly sized pull boxes, or manholes and show their locations.
12. Names and telephone numbers of utility service planners.

### C. Power Requirements

1. Front elevation of main distribution switchboard.
2. Distribution panel schedules including load calculations for each building.
3. Grounding schematic diagram and details.
4. Feeders and branch circuits clearly shown on plans.
5. Provide conduits, starters and relays shown on mechanical control diagrams as items by Division 16. Coordinate with the mechanical engineer.
6. Equipment ratings are the same as those shown on mechanical and plumbing drawings.
7. Fused disconnects at motorized equipment.
8. Ground fault circuit protection for receptacles located in toilets and outdoor.
9. Provide outdoor receptacles (W.P., GFCI) on new buildings. A switch shall be provided in janitor room to switch all exterior outlets.
10. Separate branch circuits for the supply of lights, fans, and other outlets in or on each elevator car.
11. Feeders and branch circuits sized for the intended load and not less than 125% of continuous loads.
12. Provide main circuit breaker in the distribution panelboard or main panelboard of each building to satisfy code requirements for main service disconnect at each building. Provide main circuit breaker for the main panelboard serving each floor of the building. Subpanels located in the same electrical rooms need not to have main circuit breaker.
13. Properly sized grounding electrode conductors.
14. Properly sized equipment grounding conductors for equipment and raceway systems.
15. Outdoor and underground raceways shall carry a properly sized equipment grounding conductor.
16. Provide adequate ventilations in electrical equipment rooms. Coordinate with mechanical engineer for the heat dissipation data of equipment such as transformers.
17. Locate data equipment, computer networking racks and all electronic equipment in air conditioned rooms. The air conditioning shall be available 24 hours. Coordinate with mechanical engineer.
18. Indicate circuit designations near outlets and identify all homeruns.
19. Provide required working space, adequate illumination and access to work space for electrical and signal equipment.
20. A single receptacle installed on an individual branch circuit shall have an ampere rating of not less than that of the branch circuit.
21. A building or other structure shall be supplied by only one set of service drop or service lateral conductors; except where electronic grade panel is installed.
a second feeder may provide power for computers.

22. Provide weatherproof, GFCI receptacles within 25 feet of all rooftop mounted equipment.

23. Provide primary and secondary protection for each transformer.

24. Panelboards supplying power to motor loads shall be fully rated for available fault current at the panelboard’s bus; series rating is not acceptable per U.L. standards.

25. Provide panel schedules for power showing bus size, feeder size, main circuit breaker/lug size, top/bottom fed, bus bracing, and short circuit rating of circuit breakers.

26. For electronic grade panels provide double sized neutrals, filter and surge suppression modules per specification.

D. Lighting Requirements:

1. Lighting fixture mounting details.
2. Provide emergency lighting in corridor, multi-purpose rooms, auditoriums, gymnasiums, cafeteria, classrooms of larger than 1000 square feet and all other areas required by code. A separate central battery/inverter system shall be sized for each building to provide emergency power for lighting.
3. Provide illuminated exit signs at each exit. Exit signs shall be powered from normal and emergency sources.
4. Show lighting fixture schedule.
5. Use lighting fixtures that are specified in District’s standard specification.
6. Lights in classrooms, offices and work rooms shall be controlled by motion sensors with separate light level controller (or built in light sensors) and switches as required by title 24. Separate switches shall be provided for daylight areas. Rooms of more than 100 square feet shall have double switching.
7. Lighting branch circuits shall be sized for 125% of continuous load.
8. Show number of conductors, conductor size, and conduit size for each lighting branch circuit.
9. Show lighting panelboard schedules showing bus size, feeder size, main circuit breaker/lug size, top/bottom fed, bus bracing, and short circuit rating of circuit breakers.
10. Submit lighting calculations and energy compliance forms as required by the California Energy Commission, Title 24.

E. Signal Requirements For Public Address, Telephone Fire Alarm, Television, CCTV, Security Intrusion Alarm, Clock And Computer Systems:

1. Install all signal system headend equipment in LAN room. Do not locate electrical equipment and panels in LAN room with the exception of the electronic grade panel feeding equipment in the LAN room.
2. All components, equipment, terminal cabinets, instruments, conduit, wiring and cables must be shown in plans.
3. District standard specifications must be edited to comply with the specific job requirements.
4. Do not combine fire alarm wiring with any other signal wiring.
5. Show riser diagrams of each signal system.
6. Provide main terminal cabinet in administration building and at least one terminal cabinet at each building for each signal system, except for computer networking system, where IDF are installed at each building.
7. Provide two hour uninterruptible power supply for PABX, and PA/Intercom systems.
8. Security intrusion alarm and fire alarm systems shall contain integral emergency power supplies per specification.
9. Computer networking system shall have rack mounted UPS system.
10. Clearly identify all cables (or wires) used for each signal system.
11. Clearly identify all signal system components.
12. Provide zone schedules for security systems on drawings and specifications.
13. Use ¾” conduit as the minimum size for each signal system.
14. Fire alarm system components include:
   a. Control panel.
   b. Annunciator panel.
   c. Bells (part of sprinkler system)
   d. Horns, strobes, combination horns/strobes.
   e. Pull stations.
   f. Smoke detectors.
   g. Duct smoke detectors.
   h. Heat detectors.
   i. Flow switches.
   j. Tamper switches.
   k. Conduit, wiring and terminal cabinets.
   l. Interconnection to Public Address system for interlocking the manual and automatic bell or tone.
   m. Ventilation systems where required for the purpose of fan shutdown.
   n. Damper control or smoke management system.
   o. Water based fire sprinkler system.
   p. Chemical fire extinguisher systems.
   q. Autonomous PA System(s).
   r. List of all interactive components
   s. Connections to PA system, program controller for class change signal.
   t. Fire alarm shall report water flow to central station only.
15. Fire alarm system and all initiating devices shall be addressable.
16. Fire alarm system shall not be interconnected to any of the following systems:
   a. Sump warning systems
   b. Carbon monoxide detection systems.
   c. Methane gas detection systems.
   d. Elevator car alarm bell circuit.
   e. Any other unrelated system.
17. Fire alarm drawings shall include complete submittal information required for DSA approval including battery calculation for all control and transponder/expander panels and voltage drop calculation for branch circuits as required by specification.
18. The design of the fire alarm system shall be based on a radial system with a main control panel in the administration buildings, and network nodes or slave panels in other buildings, as specified in section 16715
19. Security alarm systems components include:
   a. Control panel
   b. Annunciator panel
   c. Motion sensors
   d. Door switches
   e. Terminal cabinets
   f. Cable tray, conduit and cables
20. Public address intercommunication and telephone systems components include:
   a. P.A. console
   b. PABX
   c. Emergency power supply
   d. Telephone instruments
   e. Speakers.
   f. Terminal cabinets.
   g. Cable tray, conduit and cables.
21. Television system components include:
   a. Head and equipment installed in rack.
   b. Terminal outlets.
   c. Terminal cabinets.
d. Line extension amplifiers.
e. Cable tray, conduit and cables.

22. Clock system components include:
   a. Clock controller.
   b. Boosters.
   c. Clocks.
   d. Terminal cabinets.
   e. Conduit and wires.
   f. Program controller for class change signals.
   g. Interactive components with fire alarm and P.A. systems.

23. Computer system components include:
   a. Server rack, MDF, IDF, and LDF, and CLDF racks with related switching
      equipment and patch panels.
   b. Cable tray, conduit and cables.
   c. Wall and floor boxes.
   d. Fiber optic backbone system shall be used to connect IDF’s, LDF’s, and
      CLDF’s to MDF located in LAN room.
   e. Cat 5e cables shall be used for horizontal wiring not to exceed 90 meters.

24. Conductors and cables for fire alarm, and clock systems shall be enclosed in
    separate conduit systems.

25. Conductors and cables for security intrusion alarm, television, public address,
    telephone, and computer systems shall be placed in a three section wire mesh cable
    tray system with dividers where possible, placed in separate conduit sleeves in
    accessible areas, and in separate underground conduits in duct banks.

F. General Requirements:

1. Symbol list.
2. General notes.
3. Each project must include a site plan.
4. Provide the following details:
   a. Lighting fixture mounting.
   b. Floodlight standard and footing.
   c. Roof receptacle.
   d. Transformer pad and manhole.
   e. Precast concrete pull boxes for power and signal systems.
   f. Ground rod and precast concrete box.
   g. Underground conduit stub-up.
   h. Conduit roof penetration.
   i. Disconnect switch mounting.
   j. Electrical equipment room.
   k. Switchboard pad.
   l. P.A. handset and speaker mounting.
   m. P.A. rack elevation and mounting details.
   n. TV elevation and mounting rack details.
   o. MDF, IDF, LDF, and CLDF rack details.
   p. Motion sensor mounting.
   q. Fire alarm system devices point to point connection details, fire alarm
      control panels, annunciator panel, and remote power supply mounting
      details.
   r. Security alarm system control panel, and devices mounting details.
   s. Television system equipment mounting details.
   t. CCTV equipment system mounting details.
   u. Front elevation of P.A. system console.

5. Switchboards, transformers, and motor control Centers shall be installed on 4
   inch concrete pads. Main switchboard’s concrete pad shall extend 40 inches in
   front of switchboard.
6. Provide wiring or schematic diagrams for:
   a. All motor controls and motor control centers, or refer to applicable mechanical drawings in coordination with mechanical engineer.
   b. Lighting controls.

7. All plans shall indicate the drawing scale, north arrow, the name of the project, school or location name, and address.

8. The signature and registration number of a State of California registered electrical engineer is required on all the electrical plans. The engineer signing the plans shall be a principal or a project manager/director in charge of the electrical design.
### MECHANICAL DESIGN CHECKLIST
#### NEW SCHOOL FACILITIES
#### 100% SUBMITTAL

<table>
<thead>
<tr>
<th>ITEMS REQUIRED FOR SUBMITTAL</th>
<th>CHECK ITEMS COMPLETE</th>
</tr>
</thead>
</table>

#### DRAWING GENERAL CHECK LIST

**FOR ALL DRAWINGS**

1. Drawing Title
2. Scale
3. Sheet Title
4. Project Title
5. Sheet Number
6. Company Sticker
7. Registration Seal

#### PLANS

**A. General**

1. North Arrow.
2. Key Plan. (where applicable)
3. Match Line. (where applicable)
4. Column line numbers.
5. Room names and numbers.
6. Floor elevations indicated at least on first floor and basement floor plans.
7. General notes and reference to them on each drawing.
8. Legend of symbols and abbreviations.
9. Detail references.
10. Equipment anchorage details and / or reference to the structural drawings. Structural drawings shall address anchorage of all equipment.
11. Coordinated with structural drawings. Mechanical drawings shall address space coordination with structural members.
12. Coordinated with Electrical Drawings. All mechanical and plumbing equipment that requires power must be addressed on the electrical drawings. All transformers and other heat dissipating equipment must be addressed on the mechanical drawings.
13. Coordinated with Architectural elevations, furniture plans etc. so that thermostats and registers are not behind doors or on chalkboards etc.
14. Spell check all drawings with room for proper service.
15. Indicate service clearances on drawings.

**B. Floor Plans**

1. All air inlets and outlets must be identified for service, type, throw pattern and capacity by both symbols and notes.
2. All ducts must have sizes indicated.
3. No ducts will straddle walls.
4. No ducts will cross a wall at a slant unless absolutely unavoidable.
5. No ducts will cross a fire-rated wall at a slant.
7. All equipment must be identified as follows:
   a. Equipment that is specified in a schedule must be identified by the symbol indicated in the schedule.
   b. Equipment described in the legend must be identified by the symbol indicated in the legend.
   c. Equipment that is neither in the schedules or the legend must be fully identified and described in detail.
8. Preferably no equipment except plain ducts are to be located above non-lift up type ceilings.
9. No unrelated ductwork across electrical rooms or computer rooms if possible.
10. No thermostats on exterior walls.
11. Abbreviations indicated in legend.
12. Indicate access panels and doors.
13. No air inlet / outlet openings close to fans, air handlers or air conditioning units. Provide some ductwork in between for sound attenuation.
14. Whether sufficient space is available to accommodate ductwork and equipment with room for proper service.
15. Indicate service clearances on the drawings.

**C. Floor Plans (Piping)**

1. No pipes across electrical rooms and computer rooms.
2. No valves above non-lift up ceilings if possible.
3. No straddling of walls with pipes.
4. No crossing walls at a slant.
5. No unnecessary penetration of demising walls.
6. Zone valves provided for each floor or logical zone.
7. Expansion loops and anchors for straight runs longer than 50'-0".
8. Seismic joints and anchors at seismic separations.
9. Leak containment troughs for pipes that have to pass through electrical rooms.
10. All pipes and equipment identified.
11. All pipe sizes indicated.
12. Indicate access panels / doors.
13. Reference notes between plans and risers
14. Reference notes between plans and plot (site) plan.
15. Invert elevations of house sewers leaving the building.
16. In general, piping should be run to clear steel and concrete beams. Where absolutely necessary, piping may be run through beams. Where it is necessary to clip beam flanges or run piping through the web of steel beams or through concrete beams, permission from the structural engineer must be obtained and confirmed; and all such special conditions should be clearly noted on the drawings.
17. Note piping rising within a story as "rise." Note that rising to the story above as "UP." Piping dropping within a story should be noted as "drop." That dropping to the story below should be noted as "Dn." Piping at the ceiling should be noted as "at ceiling" when exposed and as "in ceiling" when concealed. Piping under the floor, other than obvious fixture drain lines, should be noted as "under floor," "at ceiling below," or "in ceiling below," as required.
18. Verify wall thickness where 3” or larger pipes risers are located inside walls.
19. Verify column structural construction before locating risers inside column sheathing.
20. Verify all utilities including domestic water, fire service, sewer, storm drain and gas are addressed on the plumbing and civil site plans as applicable.

PLUMBING (DOMESTIC HOT AND COLD WATER SYSTEMS)

P1. Indicate the job address on each page of the plan.
P2. Plans shall not be smaller than 1/8 inch per foot scale.
P3. Provide ¼” scale blow-ups of toilets, kitchens and laboratories except for single closet toilets.
P4. Show all pipe sizes on the plan.
P5. Provide riser diagrams for hot & cold water systems, waste & vent systems, storm drainage systems and fuel gas systems.
P6. Provide site water piping plans. If provided on civil drawings co-ordinate and indicate proper reference.
P7. Indicate size and location of water meter. If provided on civil drawings co-ordinate and indicate proper reference.
P8. Install a shut-off valve in the domestic water supply to each building in a vault outside the building as specified.
P9. The riser diagram shall indicate all the fixtures served, the pipe size and the fixture unit count on each leg of pipe, pressure regulators, back flow prevention devices, and water meter if applicable.
P10. Show all new and all existing devices located between the city water service and the building plumbing system that cause pressure losses or gains in the system. Devices shall include but not be limited to pumps, water softeners, and sub meters. If site water distribution is indicated on civil drawings, make proper references but water pressure loss calculations must be provided on plans.
P11. State make(s), model(s), and size(s), of the above items and indicate if they are new or existing.
P12. Provide manufacturer's specification sheets for such devices indicating the pressure loss
through the device(s) from 0 flow to the rated flow.

P13. Indicate on the plans, all fixture unit loads in addition to the loads of the new fixtures including but not limited to, existing fixtures, irrigation load, make up water for cooling towers and boilers, demand for future use, and any other uses.

P14. Show the future water demand where applicable.

P15. Indicate maximum and minimum water supply pressure on the plans.

P16. Provide hydraulic calculations for sizing the cold and hot water systems on plans. Also refer to P-10.

P17. The minimum water pressure supplied to the most remote fixture shall be not less than the requirements of that fixture and not less than 15 PSI, whichever is higher.

P18. Indicate pressure-regulating valves on the plans where maximum water pressure is more than 80 psi.

P19. Verify whether a reduced pressure backflow device at the meter by the local water purveyor and provide if required comply with LADWP Rule 16-D.

P20. Show size of water meter on the riser diagram.

P21. Provide a temperature & pressure relief valve on the water heater. The valve shall discharge to an approved location. Pressure relief valves for water heaters installed inside a building shall discharge to a floor sink or service sink.

P22. Provide an approved thermal expansion tank at the water heater.

P23. Indicate make, model and size of the thermal expansion tank.

WASTE & VENT SYSTEMS

W1. Show the slope of the horizontal drainage piping.

W2. Show size and location of the sewer main in the street. If provided on civil drawings co-ordinate and indicate proper reference.

W3. Provide suds relief for laundry washers where applicable.

W4. The aggregate cross sectional area of the vents shall not be less than that of the largest required building sewer.

W5. Obtain a Bureau of Sanitation permit or clearance for Industrial Waste. (Fat, oils, grease & corrosive laboratory waste)

W6. Show details for the island venting.

W7. Install a clean out every 100 feet or a manhole every 300 feet in the building sewer (site sewer) in straight runs and for each aggregate horizontal change in direction exceeding 135°.

W8. Provide yoke vents where required.

W9. Provide lot subdivision. The building sewer shall not cross lot lines.

W10. All wet vented fixtures shall be within the same story.

W11. Combination waste and vent system is only allowed where structural conditions preclude the installation of a conventional system.

W12. Provide a separate vent for each waste branch line exceeding 15’ in length.

W13. The minimum area of any vent installed in a combination waste and vent system shall be at least 1/2 the cross sectional area of the drainpipe served.

W14. Each drainpipe and each trap, in a combination waste and vent system, shall be 2 pipe sizes
larger than the sizes required by UPC.

W15. No vertical waste pipes, toilets or urinals are allowed a combination waste and vent system.

W16. Relief vents shall be provided every 100' along the main.

W17. Show on plans type & use of each fixture served by the combination waste and vent system.

W18. Provide a vent downstream of the furthest fixture served by the combination waste and vent system.

W19. The discharge line from the ejector shall be provided with an accessible check valve and gate valve. The gate valve shall be located on the discharge side of the check valve. Gate valve and check valve shall be located outside the pit.

W20. Provide detail of sewage ejector on plans with valves, fittings and sump complete with elevations of inlet pipe; pump on/off and high water alarm levels.

W21. Provide dual pumps each capable of handling the load independently.

W22. Provide airtight cover for the sump.

W23. Sump(s) shall be provided with a vent pipe that extends through the roof.

W24. Show load discharging into the sump on plans.

W25. Indicate pump schedule complete with make, model, flow rate, head, horsepower and electrical characteristics of pump on plan.

W26. State length of pipe & elevation difference between the bottom of the sump and the gravity line.

W27. Sumps receiving waste from water closets shall have minimum 3-inch discharge.

W28. Allow two fixtures units for each gallon per minus discharging from the sewage ejector.

**NATURAL GAS SYSTEMS**

G1. Indicate on the plans the total developed length of the system from the meter or regulator to the most remote gas outlet.

G2. Provide a separate gas shutoff valve for each logical part of the system to allow independent service of connected equipment and devices.

G3. Indicate on the plans the hourly volume (CFH) of gas required at each outlet.

G4. Provide an approved type seismic gas shutoff valve.

G5. Show on plan size, make and model of seismic gas shut off valve.

G6. The seismic shut off shall be installed rigidly to the exterior of the building or structure containing the fuel gas piping.

G7. No gas pipes shall be installed under a new building.

G8. Provide a letter from the gas company stating that they will deliver the desired pressure and volume of gas at 100% submittal.

G9. Show on plans size, make, model, orifice size, spring number, pressure at the inlet of the pressure regulator, and setting of pressure regulator.

G10. An approved gas valve shall be installed immediately preceding each regulator.

G11. Pressure regulator shall be vented to the outside of the building.

G12. Provide engineering calculations used in sizing the piping system on plans.
RAIN WATER SYSTEMS

R1. Indicate on riser diagram the area (ft²) covered by each drain.
R2. Indicate on the plan the slope of horizontal piping.
R3. Indicate overflow drain. Otherwise, note the reasons for not having them such as scuppers on plans.
R4. Roof drain and over flow drains shall be piped independently to the outside of the building.
R5. The discharge line from the sump shall be provided with an accessible backwater valve.
R6. Backwater valve shall be located outside the pit.
R7. Sump(s) shall be made of concrete, metal or other approved materials. Fiberglass sumps shall be approved by the Los Angeles city Mechanical Testing Laboratory.
R8. Provide dual sump pumps.
R9. Minimum size of pump shall be 15 gpm.
R10. Provide an airtight cover. (94.1101.5.3)
R11. The sump pit shall be at least 15 inches in diameter and 18 inches in depth.
R12. The discharge line from the sump shall be at least 1 1/2 inch diameter.
R13. Where the pump discharge line connects to a horizontal drain line, such connection shall be made from the top through a wye branch fitting.
R14. The lowest inlet to the sump shall have a minimum clearance of 2 inches above the high water level.
R15. Sump(s) shall be provided with a vent pipe, which shall extend a minimum of six feet above the solid sump cover.
R16. Show load discharging into the sump.
R17. Indicate pump schedule complete with make, model, flow rate, head, horsepower and electrical characteristics of pump on plan.
R18. Provide detail of sump pump on plans with valves, fittings and sump complete with elevations of inlet pipe; pump on/off and high water alarm levels.
R19. State length of pipe & elevation difference between the bottom of the sump and the gravity line.

SUBSURFACE DRAINS

S1. Show subsurface drainage on the floor plans.
S2. State piping material.
S3. Non-perforated piping shall be made of metal as in sanitary drainage systems.
S4. Provide a statement from a civil engineer showing the required flow.
S5. Either terminate the subsurface drains to the city storm drain, or provide a soil report showing that there is no continuously flowing springs or ground water.

AIR CONDITIONING

A1. Show job address on plans.
A2. Plans shall be clearly legible, and at a scale no smaller than 1/8 inch per foot.
| A3. | Show equipment schedule on the plans. |
| A4. | Show the room names and room numbers of each area. |
| A5. | Show all fire rated walls and ceilings on plans. |
| A6. | Indicate if rated corridors are tunnel type or full height. |
| A7. | Provide a primary and a secondary condensate drains and secondary drains pans for cooling coils installed above the ceiling or in furred spaces. The drain from the secondary drain pan shall terminate in a visible location. |
| A8. | Duct shall be constructed in accordance with chapter 6 of the Uniform Mechanical Code. |
| A9. | Provide duct type smoke detectors in the supply air duct: in every air conditioning system in excess of 2,000 cfm. Multiple units serving the same room, or having common return air plenum or a common outside air duct are considered to be one system for the determination of the cfm. If the area smoke detection system is of the complete area coverage type, the area detectors may be used for shutdown. |
| A10. | Show all fire rated walls and ceilings on planes. |
| A11. | Listed fire dampers and smoke dampers are required to be installed at all duct penetrations through area separation and occupancy separation walls. Indicate smoke detectors that will operate these dampers on plans. |
| A12. | Listed fire dampers and smoke dampers are required to be installed at all duct penetrations through fire rated shafts. |
| A13. | Listed fire dampers are required to be installed at all due penetrations through fire rated ceilings. |
| A14. | Provide a copy of the manufacturer catalogs for the mechanical equipment used. |
| A15. | Provide combination smoke/fire dampers to isolate ducts serving rated corridors. |
| A17. | Provide a permanent roof access. |

**TITLE 24**

| A18. | Provide outside air per current Title 24 requirements. |
| A19. | Make-up air shall be electrically interlocked with their associated exhaust systems. |
| A20. | Back draft dampers shall be provided in outdoors air supply and exhaust systems. |
| A21. | Provide economizer in every cooling unit exceeding 2,500 cfm. (3 Tons capacity for roof top units.) |
| A22. | Show thermostats for each unit or zone control device. |
| A23. | Provide complete Title 24 Compliance Documentation with the Performance Compliance Approach. |

**VENTILATION SYSTEMS**

**GENERAL**

| V1. | Exhaust ducts under positive pressure and venting systems shall not extend into or pass through ducts or plenums. |
| V2. | Show location & sizes of all ventilation ducts & openings. |
| V3. | Environmental exhausts duct shall terminate outside the building and shall be equipped... |
with a back draft damper.

**V4.** Exhaust outlets shall be 10 feet from property line; 3 feet from exterior roof/wall; 10 feet from opening into the building; 10 feet above grade.

**V5.** Make-up air shall be provided for all rooms with exhaust.

### TOILET ROOMS

**V6.** Toilet rooms shall have 10 air changes per hour.

**V7.** Provide a duct type smoke detector in the toilet exhaust system exceeding 2,000 cubic feet per minute.

**V8.** Provide combination fire smoke dampers where the toilet exhaust ducts penetrate a fire rated shaft. (If the area smoke detection system is of the complete area coverage type, the area detectors may be used for shutdown.)

**V9.** Provide combination fire smoke dampers at every penetration of area separation and occupancy separation wall.

### CORRIDOR VENTILATION

**V10.** Rooms adjacent to the corridor shall not draw air from the corridor or transfer air to the corridor except for small quantities as exfiltration into a negative pressure toilet with make up air supply.

### GARAGE VENTILATION

**V11.** Provide calculations on plans showing that the exhaust system is capable of uniformly exhausting 1.5 cfm per square foot of gross floor area.

**V12.** Provide make up air.

**V13.** Show the termination of the garage exhaust. Exhaust outlet shall terminate not less than 10 feet from property line, 3 feet from exterior wall or roof, 10 feet from openings into the building, 10 feet above adjoining grade.

**V14.** Do not connect any other ventilation system to the garage ventilation system.

### KITCHEN HOODS

**H1.** Provide kitchen lay out plans showing location of hoods ducts, shafts, make-up air, operable windows and their area, and the volume of the kitchen.

**H2.** Provide roof plans showing the location of the kitchen exhaust blower, property line and any openings into the building.

**H3.** Provide make-up air.

**H4.** Provide elevations showing finished floor, cooking equipment, grease exhaust hood, distance between cooking equipment and grease filters, overhang, finished ceiling, flushing, fire rated shaft, clearance between duel and shaft, cleanouts, slope of horizontal ducts, roof, blower, diverter, distance of outlet termination above roof.

**H5.** Each exhaust outlet within a hood shall serve not more than a 12-foot section of hood unless the hood is U.L. listed to exceed.

**H6.** Duct system shall have a slope not less than 1/4 inch per linear foot toward the hood or toward an approved grease reservoir. When horizontal ducts exceed 75 feet in length, the slope shall not be less than 1 inch per linear foot. The bottom of duct elevations shall be
indicated on plans to verify clearance from structural members, etc.

| H7. | Duct enclosures from the point of ceiling, wall or floor penetration shall be at least one hour, except it shall be two-hour fire resistive construction in Type I & II buildings. |
| H8. | The duct enclosure shall be sealed around the duct at the point of penetration. |
| H9. | A clearance of at least 3 inches and not more than 12 inches shall be maintained between duct and enclosure. |
| H10. | Air velocity within the duct system shall be not less than 1,500 feet per minute and shall not exceed 2,500 ft/min. |
| H11. | Exposed grease duct/hood systems serving a Type I hood shall have a clearance from unprotected combustible construction of at least 18 inches. Clearance may be reduced to not less than 3 inches when the combustible construction is protected with material required for one-hour fire-resistive construction. |
| H12. | Hoods less than 12 inches from the ceiling or wall shall be flashed solidly with materials as specified in CMC Sec.508.2. |
| H13. | Exhaust outlets serving grease duct systems shall terminate above the roof surface, 10 feet from property line, 10 feet from air intake openings and 10 feet above adjoining grade. Base of fan shall be 2 feet above roof surface. |
| H14. | A grease gutter shall drain to a receptacle accessible for cleaning. |
| H15. | Type I Hoods for use over solid-fuel cooking equipment shall be provided with separate exhaust systems. |
| H16. | Indicate on plans what provisions have been made for fire protection in the hood and in the duct. |
| H17. | The fire-extinguishing system shall be interconnected to the fuel or current supply so that the fuel or current is automatically shut off to all equipment under the hood when the system is actuated. Show controls on plans. |
| H18. | The exhaust and make-up air systems shall be connected by electrical interlock switch. Show controls on plans. |
| H19. | Provide grease duct cleanouts per code. |

**FUME HOOD EXHAUST**

| H20. | Motors for fans used to convey flammable vapors or dusts shall be located outside the duct or shall be protected with approved shields and dust-proofing. |
| H21. | Motors and fans shall be accessible for servicing and maintenance. |
| H22. | Parts of fans in contact with explosive or flammable vapors, fumes or dusts shall be of nonferrous or non-sparking materials or their casing shall be lined or constructed of such material. |
| H23. | Both the fan and the casing shall be of non-sparking materials. When fans are required to be spark resistant, their bearings shall not be within the air stream, and all parts of the fan shall be grounded. |
| H24. | The termination point for fume hood exhaust shall not be less than the following: |
|     | 1. 30 feet from property line |
|     | 2. 10 feet from openings into the building |
|     | 3. 6 feet from exterior walls or roofs |
|     | 4. 30 feet from combustible walls or openings into a building which are in the direction of the exhaust discharge |
5. 10 feet above adjoining grade.

**REFRIGERATION MACHINERY ROOM (Chiller Rooms)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>M1.</td>
<td>A 3 feet wide &amp; 6 feet 8 inches high clearance shall be provided around at least two sides of all moving machinery.</td>
</tr>
<tr>
<td>M2.</td>
<td>Door(s) shall swing in the direction of exit.</td>
</tr>
<tr>
<td>M3.</td>
<td>Provide 2 separate exits.</td>
</tr>
<tr>
<td>M4.</td>
<td>Provide calculation showing that the capacity of the exhaust system complies with section.</td>
</tr>
<tr>
<td>M5.</td>
<td>A switch of the break-glass type, controlling the emergency purge ventilation system, shall be provided adjacent to and outside of the exit door.</td>
</tr>
<tr>
<td>M6.</td>
<td>Switch controlling fans providing ventilation shall be in glass-covered enclosures and shall be located adjacent to and outside of the exit door.</td>
</tr>
<tr>
<td>M7.</td>
<td>Show make-up air inlets and exhaust outlets on plan.</td>
</tr>
<tr>
<td>M8.</td>
<td>Make-up air shall be from outside of the building and shall be equipped with a back draft damper.</td>
</tr>
<tr>
<td>M9.</td>
<td>Exhaust shall be discharged at least 20 feet from property line. Show that on plans.</td>
</tr>
<tr>
<td>M10.</td>
<td>Only equipment essential to the operation of refrigeration system shall be allowed in the machinery room.</td>
</tr>
<tr>
<td>M11.</td>
<td>State type of refrigerant.</td>
</tr>
<tr>
<td>M12.</td>
<td>Show location of refrigerant-vapors detectors.</td>
</tr>
</tbody>
</table>

**FIRE PUMP & GENERATOR ROOM**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>M13.</td>
<td>Show engine exhaust pipe.</td>
</tr>
<tr>
<td>M14.</td>
<td>Show clearances for the engine exhaust pipe. It shall be a minimum of 18 inches from combustible construction and 2 inches from non-combustible construction.</td>
</tr>
<tr>
<td>M15.</td>
<td>Show termination of engine exhaust pipe.</td>
</tr>
<tr>
<td>M16.</td>
<td>The engine exhaust pipe shall extend above the roof surface, and shall be legated not less than 12 inches from any openings into the building, 2 feet from an adjoin building and 7 feet above grade when located adjacent a public walkway.</td>
</tr>
<tr>
<td>M17.</td>
<td>Enclose the engine exhaust pipe in a fire rated shaft.</td>
</tr>
<tr>
<td>M18.</td>
<td>Show combustion air.</td>
</tr>
<tr>
<td>M19.</td>
<td>Dampers are not allowed in combustion-air ducts.</td>
</tr>
<tr>
<td>M20.</td>
<td>Show room ventilation.</td>
</tr>
<tr>
<td>M21.</td>
<td>The room ventilation shall be added to the combust air.</td>
</tr>
<tr>
<td>M22.</td>
<td>Show room ventilation exhaust.</td>
</tr>
<tr>
<td>M23.</td>
<td>Show point of termination outside of the building of the room ventilation.</td>
</tr>
<tr>
<td>M24.</td>
<td>Combustion air shall not be drawn from the garage.</td>
</tr>
</tbody>
</table>
SUBMITTAL REQUIREMENTS
Los Angeles Unified School District Facilities Services Division

DSA Submittal -- Local Fire Authority Approval Checklist

DSA reviews fire sprinkler installations for compliance with NFPA Standards in accordance with CBC Section 904.1.2. In addition, requirements pertaining to fire flow and mains, hydrant spacing, types of control valves, and the location of valves and connections vary with jurisdiction and specific sites within each jurisdiction. Requirements of the local fire authority must be met, and documentation of local fire authority approval must be submitted to DSA prior to DSA approval.

The following is a Check List of items critical to DSA review and approval of a fire sprinkler system.

☐ 1. Fire department connection is visible, accessible and installed on the address side of the building.

☐ 2. Fire department connection is located at the public street as close to the curb face as possible. The distance from the fire department connection to the curb face does not exceed 25’.

☐ 3. Fire department connection is located with 150’ of a public fire hydrant.

☐ 4. Fire department connection is located at least 25’ from the building, or, if not feasible, a minimum two hour fire-resistive wall is provided.

☐ 5. Each fire sprinkler system has a mini post indicator valve located at the public water valves connection.

☐ 6. Each fire sprinkler riser has an exterior control valve located above grade.

☐ 7. Requirements of the local water purveyor have been included for cross-connection backflow-control devices (detector-checks).

☐ 8. Local fire jurisdiction requirements pertaining to fire flow, hydrant spacing, and

For a current Project Submittal checklist required by DSA check their website as follows;

www.dsa.dgs.ca.gov

Click on: Project Submittal and Plan Review Process
Appendix A.4

Building Acoustical Requirements
**BUILDING ACOUSTICAL REQUIREMENTS**

### Allowable Maximum Background Sound Level (BSL) from HVAC Noise

<table>
<thead>
<tr>
<th>Function</th>
<th>dBA</th>
<th>Suggested Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classrooms</td>
<td>45 Max. 40 Target</td>
<td>See HVAC Design Criteria</td>
</tr>
<tr>
<td>Conference Rooms</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Library Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cafeteria</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Gymnasium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locker Rooms</td>
<td></td>
<td>Duct routing and location or air transfer openings shall not significantly compromise the sound isolation of the envelope of the space.</td>
</tr>
<tr>
<td>Multi-Purpose Room</td>
<td>40 Max. 35 preferred</td>
<td></td>
</tr>
</tbody>
</table>

### Allowable Maximum Background Sound Level (BSL) from Traffic Noise or Playground Noise

<table>
<thead>
<tr>
<th>Function</th>
<th>DBA</th>
<th>Suggested Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>45 Max. 40 Target</td>
<td>Wall construction to provide STC based on actual exterior sound levels. Glazing: ¼&quot; monolithic typical. ¼ &quot;3/8&quot; laminated if needed. DO NOT use thermal insulating dual glazing. Weather-stripped solid core or hollow metal door with drop threshold, or provide vestibules with two doors.</td>
</tr>
<tr>
<td>Conference Library Office</td>
<td>45</td>
<td>Same as above.</td>
</tr>
<tr>
<td>Cafeteria</td>
<td>Gymnasium</td>
<td>Corridor</td>
</tr>
<tr>
<td>-----------</td>
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</table>

<table>
<thead>
<tr>
<th>Multi-Purpose Room</th>
<th>40 Max. 35 Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Doors from the Stage and Multi-Purposes Room should lead into corridors and other circulation areas, NOT directly into adjoining classrooms or other occupied spaces.</td>
</tr>
<tr>
<td></td>
<td>As far as is practical, attempt to site the space away from noise sources such as railways, freeways, industrial noise sources etc.</td>
</tr>
<tr>
<td></td>
<td>Reasonable measures should be incorporated to limit transient noise intrusion into the space, e.g. acoustical seals should be provided at all doors to the Multi-Purpose Room and Stage.</td>
</tr>
</tbody>
</table>

NOTE: Background noise shall be defined and measured as specified in ANSI Standard 2.60

<table>
<thead>
<tr>
<th>Allowable Maximum Reverberation Time (RT 60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Classroom (all) Conference Library</td>
</tr>
<tr>
<td>Conference Library Office &gt;15,000 cu.ft.</td>
</tr>
<tr>
<td>Cafeteria Gymnasium Corridor Locker Rooms</td>
</tr>
<tr>
<td>Multi-Purpose Room</td>
</tr>
</tbody>
</table>
### Allowable Minimum Sound Transmission Class (STC) Values for Partitions Separating a Classroom or Library from:

<table>
<thead>
<tr>
<th>Function</th>
<th>STC</th>
<th>Suggested Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>45</td>
<td>One layer of 5/8&quot; thick drywall on each side of a single steel stud 24&quot; on center or 2x4 wood staggered studs at 16&quot; on center partition with full width insulation, penetrations not desirable. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>Conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staircase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor Playground or lunch Shelter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech Clinic</td>
<td>50</td>
<td>One layer of 5/8&quot; thick drywall on one side of a single steel stud 24&quot; on center or 2’x4’ wood staggered studs at 16&quot; on center partition and 2-layers of 5/8” thick drywall on the other side with full width insulation, penetrations not desirable. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>Health Care Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music Room</td>
<td>60</td>
<td>Two layers of 5/8” thick drywall on one side of a double steel stud partition 24” on center or 2’x4’ wood staggered studs at 16” on center and 3-layers of 5/8” thick drywall on the other side with full width double insulation. Stud lines are separated by a one inch airspace. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>Mech. Equipment Rm</td>
<td></td>
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<tr>
<td>Gymnasium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cafeteria</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M/P Room</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Allowable Minimum STC Values for Floor / Ceiling Assemblies Separating Classrooms or Libraries from:

<table>
<thead>
<tr>
<th>Function</th>
<th>STC</th>
<th>Suggested Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>45</td>
<td>Nominal 6” thick lightweight concrete on steel fluted deck or plywood sub floor with suspended acoustical tile ceiling a minimum 30” below the deck. or 5/8” drywall suspended ceiling; All penetrations properly sealed.</td>
</tr>
<tr>
<td>Conference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Library</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Office</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corridor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staircase</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outdoor Playground or lunch Shelter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech Clinic</td>
<td>50</td>
<td>Same as above</td>
</tr>
<tr>
<td>Health Care Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>STC</td>
<td>Suggested Construction</td>
</tr>
<tr>
<td>----------</td>
<td>-----</td>
<td>------------------------</td>
</tr>
<tr>
<td>From Office or Conference Room to Office or Conference Room</td>
<td>35</td>
<td>1-layer of 5/8” thick drywall on each side of a single steel stud 24” on center or 2”x4” wood staggered stud at 16” on center partition Weather-stripped solid-core wood door with drop-threshold. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>From Office or Conference Room to Corridor or Staircase or Shower Room</td>
<td>45</td>
<td>1-layer of 5/8” thick drywall on each side of a single steel stud 24” on center or 2”x4” wood staggered stud at 16” on center partition Insulate the cavity. Weather-stripped solid-core wood door. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>From Office Conference Room Music Room to Outdoor Playground</td>
<td>50</td>
<td>1-layer of 5/8” thick drywall on one side of a single steel stud 24” on center or 2”x4” wood staggered stud at 16” on center partition and 2-layers of 5/8” thick drywall on the other side Insulate the cavity. All joints and penetrations properly sealed. Steel sound-rated door STC-49.</td>
</tr>
<tr>
<td>From Corridor or Staircase or Shower Room to Corridor Staircase Shower Room</td>
<td></td>
<td>No requirements.</td>
</tr>
</tbody>
</table>
### Appendix A.2 – Acoustical Requirements

| From Music Room to Mech. Equipment Rm Gymnasium Cafeteria M/P Room Office Conference Room | 60 | 2-layers of 5/8” thick drywall on one side of double steel stud 24” on center or 2”x4” wood staggered stud at 16” on center partition and 3-layers of 5/8” thick drywall on the other side. 
Insulate the cavity. 
All joints and penetrations properly sealed. 
Steel sound-rated door. STC-49. |
|--------------------------------|------|--------------------------------------------------------------------------------------------------|
| From Office Conference Room to Mech. Equipment Rm or Gymnasium or Cafeteria | 60 | 2-layers of 5/8” thick drywall on one side of double steel stud 24” on center or 2”x4” wood staggered stud at 16” on center partition and 2-layers of 5/8” thick drywall on the other side. 
Insulate the cavity. 
All joints and penetrations properly sealed. 
Steel sound-rated door. STC-49. |
| From Music Room To Music room | 62 | 2-layers of 5/8” thick drywall on one side of double steel partition 24” on center or 2”x4” wood staggered stud at 16” on center and 3-layers of 5/8” on the other side. 
Insulate the cavity. 
All joints and penetrations properly sealed. 
Steel sound rated door. STC-49. |

#### Allowable Minimum STC Values for Floor / Ceiling Assemblies

**Separating Other Alike and Dislike Function**

<table>
<thead>
<tr>
<th>Function</th>
<th>STC</th>
<th>Suggested construction</th>
</tr>
</thead>
</table>
| From Office or Conference Room to Office or Conference Room | 35 | Nominal 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended acoustical tile ceiling a minimum 30” below the deck. 
All joints and penetrations properly sealed. |
| From Office or Conference Room to Corridor or Staircase or Shower Room | 45 | Nominal 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended acoustical tile ceiling a minimum 30” below the deck. 
All joints and penetrations properly sealed. |
<table>
<thead>
<tr>
<th>From Office or Conference Room or Music room to Outdoor Playground</th>
<th>Provide extra wall STC to meet 45 DBA background noise level; (See “Traffic noise” requirement above. All joints and penetrations properly sealed.</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Corridor or Staircase or Shower Room to Corridor or Staircase or Shower Room</td>
<td>Provided extra STC to meet 45DBA background noise level; See “Traffic noise” requirement above. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>From Music Room to Mechanical Equipment Room or Gymnasium or Cafeteria</td>
<td>60 Nominal 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended 5/8” thick drywall ceiling a minimum 30” below the deck. Insulate the cavity. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>From Office or Conference Room to Mech. Equipment Rm Gymnasium Or Cafeteria</td>
<td>60 Nominal 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended 5/8” thick drywall ceiling a minimum 30” below the deck. Insulate the cavity. All joints and penetrations properly sealed.</td>
</tr>
<tr>
<td>From Music Room To Music Room</td>
<td>62 Nominal 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended 5/8” thick drywall ceiling a minimum 30” below the deck. Insulate the cavity. All Joints and penetrations properly sealed.</td>
</tr>
</tbody>
</table>

**Allowable Maximum Impact & Isolation Class (IIC) levels for Floor/Ceiling assemblies Above Classrooms**

<table>
<thead>
<tr>
<th>Function</th>
<th>IIC</th>
<th>Suggested Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom</td>
<td>50</td>
<td>Vinyl tile over 6” thick lightweight concrete on a steel fluted deck or plywood sub floor with a suspended acoustical tile a minimum 30” below the deck. Alternative: Equivalent IIC using carpeting.</td>
</tr>
</tbody>
</table>
| Gymnasium  
| Music Room  
| Dance Studio | 50+ | Vinyl tile over 6" thick lightweight concrete on a steel fluted deck or plywood sub floor with a 5/8" thick suspended drywall ceiling a minimum 30 below the deck. Insulate the cavity. |

**GENERAL NOTES:**

Provide acoustical consultant recommendations for all auditoria and for special cases such as unusual exterior ambient noise.
Appendix A.5

Checklist of Off-Site Work, Utilities & Easements
<table>
<thead>
<tr>
<th>Item</th>
<th>Agency Consulted</th>
<th>Needed Y/N</th>
<th>Coordinated Y</th>
<th>N</th>
<th>N/A</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Dedications &amp; Alley Vacations</td>
<td>City-Dept. of Transportation</td>
<td></td>
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<tr>
<td>Widening</td>
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<tr>
<td>Cul-de-sac</td>
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<tr>
<td>Corner Cuts</td>
<td>&quot;</td>
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<tr>
<td>Bus Turn-outs</td>
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<td>Transit shelter est.</td>
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<tr>
<td>Street Improvements</td>
<td>City – Dept. of Transportation</td>
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<tr>
<td>Widening (Check all streets abutting school)</td>
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<tr>
<td>Cul-de-sac</td>
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<td>Bus Turn Out</td>
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<td>Bus Pad</td>
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<tr>
<td>Sidewalk</td>
<td>City – Dept. of Transportation</td>
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<tr>
<td>Repair</td>
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<td>Replacement</td>
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<td>Pave Parkway</td>
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<tr>
<td>Street Trees</td>
<td>City Planning/Zoning</td>
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<tr>
<td>Street Lighting</td>
<td>City Planning/Zoning</td>
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<tr>
<td>Handicapped Ramps (4 sides of each corner)</td>
<td>City Planning/Zoning</td>
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<tr>
<td>Building Setbacks</td>
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<tr>
<td>Front</td>
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<td>Side</td>
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<td>Rear</td>
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<td>Building to Building</td>
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<td>Fire Hydrants</td>
<td>Fire Dept</td>
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</table>
### CHECKLIST OF OFF-SITE WORK, UTILITIES & EASEMENTS

(Provide details on a separate sheet)

<table>
<thead>
<tr>
<th>Utilities</th>
<th>Agency Consulted</th>
<th>Needed Y/N</th>
<th>Coordinated Y N N/A</th>
<th>Date</th>
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<tbody>
<tr>
<td>Electrical</td>
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<tr>
<td>Overhead Power Pole</td>
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<tr>
<td>Underground Manhole</td>
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<tr>
<td>Transformer</td>
<td></td>
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<tr>
<td>Guy Wires &amp; Poles</td>
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<tr>
<td>Telephone</td>
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<tr>
<td>Overhead Poles</td>
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<tr>
<td>Underground Manhole</td>
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<tr>
<td>Cable TV</td>
<td></td>
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<tr>
<td>Overhead Power Poles</td>
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<tr>
<td>Water</td>
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<tr>
<td>Gas</td>
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<td>Storm Drain</td>
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<td>Sanitary Drain</td>
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<tr>
<td>Fuel Line</td>
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</tr>
</tbody>
</table>

Sidewalks: Provide repairs and improvements as needed for safe access, including improvements for new driveway, etc.

Street Trees: Minimum of 1 tree per 25 linear feet of frontage recommended. Verify requirement and types of trees acceptable by the City Street tree Division

Street Lighting: No Mandatory requirement except as may be required for street dedications and alley vacations. Contract City Street Lighting Division

Driveway location: Transportation Department would prefer access driveway to a site garage at a minimum of 150 feet from curb. Verify requirements.

Building Setbacks: Identify zoning requirement for building setbacks in addition to Fire Department and code requirements.

Fire Truck Access: Verify with the Fire Department where access should be located. Ensure proper paving thickness is identified on the drawings.

Fire Hydrant: Contact the Fire Department and determine if new fire hydrants are required and coordinate locations if new hydrants are required.

“A” Permit: Identify if “A” permit is required. Identify scope of work if the “A” permit is required.

“B” Permit: Identify if “B” permit is required. Identify scope of work if the “B” permit is required.
Appendix A.6

Planning and Design Guidelines for Small Learning Communities
(Separate Volume – Not Included)
Appendix A.7

Estimating Guide
(Separate Volume – Not Included)