



Adaptive Re-Use: An Option for California's Schools



FEASIBILITY GUIDELINES FOR SELECTION OF EXISTING NON-CONFORMING FACILITIES FOR REHABILITATION TO PUBLIC SCHOOLS AND CALIFORNIA COMMUNITY COLLEGES

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Introduction

Purpose:

The purpose of this document is to provide guidance to school districts, charter school entities and design professionals in the selection of an existing non-conforming building to be rehabilitated into public school use. These guidelines identify conditions of existing building and site construction, which if evaluated for adequacy to support the new use and occupancy demands, will provide the district with information necessary to make an informed selection of a facility for rehabilitation to public school use. These guidelines have been developed solely to assist school districts and charter school entities in facility and site selection, and do not imply compliance with Title 24 requirements for design, plan and construction review.

Applicability:

The regulations of Title 24, C.C.R. apply to any existing non-conforming building for purchase or lease by a district for use as a public school building or by a charter school entity for use as a charter school building when required to comply with the Field Act.

The regulations of Title 24, C.C.R., shall also be applicable to California Community College Districts desiring DSA approval of the plans/specifications and certification of construction for rehabilitation of any existing non-conforming building for purchase or lease for use as a California Community College school building.

What is Rehabilitation?

Rehabilitation is the evaluation and retrofit of an existing non-conforming building or site to bring the building or site, and its operating systems, into conformance with all health and safety standards of the currently effective regulations. Rehabilitation applies to the existing structural, fire and life safety, accessibility, mechanical, plumbing, electrical and energy building systems intended for continued use.

Regulations for Rehabilitation:

Existing non-conforming facilities being rehabilitated into public schools are defined in the regulations as new school buildings and sites to meet the performance objectives of the Field Act for protection of life and property. The regulations for rehabilitation provide methodologies that allow for existing non-conforming construction of the building and site to comply or be retrofitted to comply with the requirements of Title 24, C.C.R. Compliance with the requirements for rehabilitation in Title 24, C.C.R. will result in certification of construction for the completed project.

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Owners of qualified historical buildings may request use of the currently effective regulation of the State Historical Building Code, and the implementing regulations of the California Historical Building Code (CHBC), when strict compliance with Title 24, C.C.R. will adversely affect the historic fabric of the building. Considerations for rehabilitation of a qualified historic building are contained in the DSA “*Procedures For Rehabilitation Of Existing Non-Conforming Buildings For Public School Use*”.

Assessment of Candidate Buildings for Selection:

It is the responsibility of the owner and their project team to initially assess any non-conforming site and facility being considered for rehabilitation to public school use. Initial facility and site assessment should be performed by California licensed design professionals, architects and engineers, knowledgeable in rehabilitation of existing structures and familiar with the design and construction of California public schools or community colleges. These guidelines should serve as a minimum assessment tool and do not preclude the use of other assessment methods by the design professionals or district personnel.

Building and Site Selection:

The benefits realized by the districts in rehabilitating an existing facility depend upon the complexity and condition of the building and/or site selected. Rehabilitation of a well designed, constructed and maintained building may result in significant cost and time savings to the district. Likewise, rehabilitation of buildings with deficient design systems and construction, and/or deterioration of materials may result in higher construction costs and take longer to design, plan review and construct than a new facility of comparable size, use and occupancy. Site concerns, including but not limited to water, utilities, accessibility, environmental impact, public safety, and security may require upgrades that exceed the cost of the building retrofit.

Consultation with DSA:

DSA will be available for consultation with districts regarding selection of existing facilities for rehabilitation upon request. The district may contact the regional office having jurisdiction over the proposed site. DSA will not make recommendations to the district regarding purchase or lease of a facility, nor imply that the facility complies with all provisions of the current edition of Title 24, C.C.R. The decision to purchase or lease a facility shall reside with the owner/district.

DSA Review of Rehabilitation Projects:

Upon purchase or lease of an existing facility for rehabilitation to a public school, the owner and their project team shall submit to DSA an Evaluation and Design Criteria Report for review and approval. Approval of the Report establishes the design criteria and testing program prior the project design that is to be utilized by the project team during the design, by the DSA reviewers during plan review, and by the DSA field engineers during construction. Upon approval of the Report and completion of the design, the project shall be submitted to DSA for plan review and approval as for a new construction project. Contact the DSA regional office for the procedures to submit a project for rehabilitation.

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DSA will provide plan review and construction inspection for buildings or portions of buildings being rehabilitated to public school and community college use. DSA will also provide plan review and construction inspection for modification/alteration/addition to buildings or portions of buildings having been rehabilitated to house a public school. The local jurisdiction should be consulted for local plan review and construction inspection requirements for projects in which school and non-school facilities are housed within the same building. Dual plan review and construction inspection may be required.

Definitions:

Non-Conforming Building:

A non-conforming building is a structure that has not been certified by DSA as a school building.

Rehabilitated Space:

Rehabilitated space is defined as the area of the building that is undergoing a change in use to a public school building. Where only a portion of a building is undergoing change to a public school building, the rehabilitated space:

- Shall be separated vertically from the adjacent non-school portion by code-compliant rated wall assemblies, including area/occupancy separation walls, and by seismic separation joints where required by structural regulations.
- Shall be separated horizontally from the adjacent non-school floors, immediately above or below, by code-compliant rated floor assemblies; and, the entire building shall be equipped with an approved automatic fire sprinkler system, while the portion of the building occupied by the school, shall be equipped with an approved automatic fire alarm and detection system.
- Shall include any area(s) required for egress/exiting from the public school that is located outside the public school area.

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School districts seeking state funds to acquire commercial, public or residential buildings for conversion to school use under the provisions of Assembly Bill 16 will need to include the California Department of Education (CDE) School Facilities Planning Division (SFPD) very early in the process. The SFPD's involvement is crucial, because not only will school districts be acquiring a new facility, they will also be acquiring the land the building is on.

There are three major components of a new school facility that require approval by the SFPD:

1. Site Selection
2. Educational Specifications
3. Building Plans

SITE SELECTION:

As a school district contemplates available buildings for acquisition and seismic retrofitting, they should also be very much aware of the building's site and the surrounding neighborhood. In 2000, CDE published the *School Site Selection and Approval Guide*. This free booklet, available at <http://www.cde.ca.gov/ls/fa/sf/publication.asp>, outlines the site approval process.

Because school districts will be acquiring a site with an existing building already on it, some steps may need to occur before they would in a typical site acquisition process. For example, playfield layout may be considered very early in the process, based on the location of the existing building(s). Also, vehicular and pedestrian traffic patterns could be determined based on the location of the building(s) on the site. A preliminary drawing of the programmed spaces in the proposed building may also be necessary.

It is important to note that one or more characteristics of a site may make it unusable, while the building on the site being considered is an excellent candidate for seismic retrofitting. Contacting the school district's field representative at the SFPD and utilizing the SFPD Form 4.0 for evaluation will help avoid costly errors.

Other factors, such as the California Environmental Quality Act (CEQA), the Department of Toxic Substances Control's review (DTSC) and incompatible zoning may play a significant role in determining whether a site is useable for school purposes. Asbestos, lead-based paint and PCB's are hazardous materials that may require mitigation. It is never too early to consider these aspects of the site approval process.

EDUCATIONAL SPECIFICATIONS:

The SFPD reviews Educational Specifications as required by Title 5 regulations. The development of thorough Educational Specifications is a crucial step in determining if a particular commercial building is appropriate for conversion to school use. In many cases, the size of the building(s) may coincide with the school district's program for a school, but other aspects of the building may be difficult to mediate. For example, if a

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school district finds a commercial building that meets the criteria for square footage for a high school, but does not have a tall enough ceiling to accommodate a gymnasium, another option may need to be pursued. Also, the layout of walls and columns may prevent an acceptable arrangement or size of classrooms. Trying to configure the school's program around an existing building can be costly, both financially and programmatically. Comprehensive Educational Specifications will help avoid this mistake.

In 1997, the Department of Education published *Educational Specifications – Linking Design of School Facilities to Educational Program*. This publication is a helpful tool for school districts planning new facilities. It can be purchased at

<http://www.cde.ca.gov/facilities/field/publications.htm>. As with other steps in planning a new school facility, early involvement by the school district's SFPD Field Representative will be very beneficial.

BUILDING PLANS:

One of the primary functions performed by the SFPD is the review of proposed plans for educational appropriateness and certain student safety issues. As previously indicated, the purchase of a commercial building for conversion to school use condenses the typical process of site acquisition and development. Because of this compressed time frame, it is highly recommended that preliminary drawings are submitted to the SFPD for review to determine if a prospective building and its site will, among other things:

1. Provide for a safe arrival/departure of students with separation of pedestrians, buses and cars.
2. Allow for adequate supervision of students and protection from intruders.
3. Be located in a neighborhood with compatible zoning and comply with Section 14010 of Title 5, California Code of Regulations.
4. Comply with CEQA and DTSC requirements.
5. Support the curriculum and facility requirements defined in the school's educational specifications.

CONCLUSION:

Acquisition of buildings for seismic retrofitting and conversion to school use requires thorough, advanced planning. Contacting the SFPD Field Representative early in the process will help avoid costly errors, including the purchase of a commercial building and its site, which may be unsuitable for housing students.



EVALUATING STRUCTURAL AND GEOHAZARD FACTORS

The structural regulations contained in Division VI-R, Part 2, Title 24, C.C.R., currently effective edition, provide methodologies for evaluation, analysis, material testing, condition assessment and construction inspection of any existing non-conforming building for rehabilitation to school use. School districts are advised to retain a California licensed structural and geotechnical engineer to conduct an initial structural and geohazard evaluation of the existing site and building systems for conformance with the health and safety provisions of the current regulations.

The following guidelines indicate structural and geohazard issues that should be considered when assessing a building for rehabilitation that may have significant impact on the extent, cost and time of design and construction. In general, buildings recently constructed with structural framing accessible for investigation, such as exposed wood and steel, make the most successful candidates for rehabilitation. Buildings in which the structural components are concealed, such as masonry and concrete, may require significant destructive and/or non-destructive investigation to establish credible verification of the existing construction to make a meaningful assessment.

Where items have been identified with the symbol “HI” (high impact), DSA suggests that potential impact on the time and cost of design and construction necessary to rehabilitate the structure will be high. The district is advised to consider alternative facilities prior to purchasing or leasing a facility with such identified issues.

GENERAL SITE AND BUILDING CONSIDERATIONS

1. Buildings in which plans and specifications of the original construction and any subsequent additions or alterations, approved by the local jurisdiction for construction, are not available. If existing or “as built” drawings are not available, DSA will require “as built” drawings that shall be prepared based on extensive investigation. (HI)
2. Although not required by current Title 24 requirements, DSA recommends, wherever possible, that for proposed school facilities adjacent to a non-school building, the proposed school building be located away from an adjacent non-school structure a minimum distance equal to the height of the adjacent structure. If such clearance does not exist, the school district should consider the type of construction and the condition of the adjacent building, including its exterior elements, for potential collapse or falling hazards onto the proposed school building and/or site. DSA does not review, nor does it have jurisdictional authority to review, existing non-school buildings adjacent to public school rehabilitation projects. Such considerations should include, but are not limited to, adjacent structures: (HI)
 - a. In which the structural integrity of the adjacent building cannot be determined;
 - b. In which the construction is of unreinforced masonry (URM);

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- c. In which the lateral force resisting system consists of unrehabilitated non-ductile concrete moment frames, with or without infill walls;
 - d. In which exterior elements, such as masonry veneer or ornamental appendages, may become potential falling hazards onto the school building and/or occupants during seismic ground shaking or high winds;
3. General condition of building and framing elements. Buildings should be investigated for excessive cracking and deflection of materials; water damage including dryrot and rusting; insect damage; mold; decomposition of concrete. Mitigation may require repair or replacement of materials and site improvements to eliminate cause of damage. (HI)
 4. For buildings in which only a portion of the building is being rehabilitated to public school use, the entire structure will be reviewed unless seismically separated vertically within the same horizontal floor plane. For multi-story structures, the entire structure will be reviewed.

STRUCTURAL SITE CONSIDERATIONS:

1. A geohazard evaluation will be required for all new school sites resulting from the rehabilitation of existing non-conforming buildings into school buildings. The proposed site may be subject to potential geological hazards as regulated in the *California Code of Regulations, Title 5*, as follows: (HI)
 - a. Section 14010(f), specifies that new school sites may not contain an active earthquake fault or fault trace. DSA recommends districts consider sites located at least 10 km from a known active fault.
 - b. Section 14010(i), requires that new school sites not be subject to moderate-to-high liquefaction or landslides.
 - c. Section 14010(g), requires that new school sites are not to be within an area of flood or dam inundation unless the cost of mitigating the impact is reasonable. Mitigation shall be under the direction of the CDE.

If existing geotechnical site information is not available, the district is advised to consult a licensed California geotechnical engineer. A geotechnical report and a geohazard report shall be prepared and submitted during project plan review as required per Section 4-317(e), Part 1, Title 24, C.C.R.

2. Site retaining walls experiencing cracking and deflection, material deterioration and/or rotation of the foundation may require strengthening or replacement. Justification of the existing retaining wall, including calculations and drawings, shall be required during project plan review.

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FOUNDATION CONSIDERATIONS:

1. Buildings, other than relocatable buildings, constructed on unreinforced concrete or non-concrete foundations. Foundation systems must be capable of resisting combined gravity and lateral loads which may require new reinforced foundations or reinforcing of existing foundations to resist tensile stresses. (HI)
2. Buildings constructed on pile foundations in which the piles lack the strength and deformation capacity to resist lateral forces induced by seismic ground motion. (HI)
3. Buildings having undergone foundation settlement may cause damage to framing elements resulting in reduction of capacity. Indicators of potential damage include substantial cracking or spalling of the concrete foundations and wall finishes, mis-alignment of floors, walls, doors and windows, and heaving of adjacent soil or walkways. Settlement may require stabilizing of the soil, dewatering systems to control soil saturation, and damaged framing may require replacement or repair. (HI)
4. Building retaining walls supporting gravity loads and/or resisting lateral forces that are experiencing cracking, deflection, rotation, and/or deterioration may require strengthening or replacement. (HI)

STRUCTURAL SYSTEMS:

GENERAL SYSTEM CONSIDERATIONS:

1. Buildings in which the lateral force resisting system and load path is unidentifiable. DSA will require complete “as built” drawings that shall be prepared based on extensive investigation, and the rehabilitation design may require a complete new lateral resisting system including foundations. (HI)
2. Buildings greater than two stories in height that possess one or more of the following irregularities: stiffness – soft story, weight (mass), vertical geometric, discontinuity in capacity – weak story, and torsional – when diaphragms are not flexible. Mitigation may require additional lateral force resisting elements and foundations to eliminate the irregularity. (HI)
3. Buildings in which the lateral force resisting system is provided by cantilever columns; although uncommon, this system has been used in large warehouse type structures. A complete new lateral force resisting system may be required. (HI)

WOOD BUILDING CONSIDERATIONS:

1. In general, wood framed buildings designed, approved and constructed under 1976 UBC or later version have the best potential to meet the performance

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objectives of the current CBC with minimal retrofit, unless as discussed otherwise.

2. Buildings utilizing materials other than structural panel sheathing or diagonal lumber sheathing for shear walls and/or floor and roof diaphragms will require retrofit to either structural panel sheathing or diagonal lumber sheathing. Gypsum board, plaster and particleboard sheathing or siding will not be allowed to provide shear resistance. (HI)
3. Buildings constructed utilizing light metal plate connected truss framing will require either complete truss analysis or load test of the trusses. Trusses may require strengthening. (HI)

STEEL BUILDING CONSIDERATIONS:

1. In general, structural steel moment resisting and braced frame buildings designed, approved and constructed under 1997 UBC or later version have the best potential to meet the performance objectives of the current CBC with minimal retrofit, unless as discussed otherwise.
2. Light gauge steel braced frame and structural panel sheathing shear wall designed, approved and constructed under 1997 UBC or later version have the best potential to meet the performance objectives of the current CBC with minimal required retrofit.
3. Welded steel moment frame buildings designed and constructed prior to 1997 UBC, in which the welded beam-column connections have not been retrofitted in accordance with FEMA 351, FEMA 356 nor evaluated and repaired in accordance with FEMA 352. All welded connections will require evaluation and may require retrofit. (HI)
4. Pre-fabricated steel frame buildings (a.k.a. “Butler Building”). Connections of the gravity and lateral load resisting system framing members require evaluation for eccentric configuration and may require substantial retrofit. (HI)

CONCRETE BUILDING CONSIDERATIONS:

1. In general, concrete buildings designed, approved and constructed under 1985 UBC or later version have the best potential to meet the performance objectives of the current CBC with minimal retrofit, unless as discussed otherwise.
2. Concrete frame buildings consisting of non-ductile concrete frame construction, with or without infill. Such buildings potentially lack the reinforcing steel and concrete strength to withstand cyclical seismic forces which may lead to the loss of structural integrity of the concrete. Retrofit may

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require strengthening and confinement of concrete framing or an alternative lateral force resisting system. (HI)

3. Prestressed-precast concrete structures in which the framing members and floor/roof slabs are not integrally cast together. Such buildings may lack interconnection detailing that will resist both upward and lateral seismic ground motion. Retrofit may require extensive interconnection of precast elements. (HI)
4. Concrete tilt-up structures (HI):
 - a. The heavy mass of the wall systems induce large demands on the floor and roof diaphragms, particularly flexible diaphragms, during seismic events. Strengthening of floor-to-wall connections and/or diaphragm framing may be required.
 - b. Wall configurations with large window openings that resist in-plane shear forces may perform as wall-piers or wall-frames. Strengthening of the existing wall-pier/frame elements or the addition of shear wall elements may be required.
 - c. Wall-to-foundation connection or wall-to-wall interconnection may require strengthening to resist shear and overturning forces induced by seismic ground motion.

MASONRY BUILDING CONSIDERATIONS:

1. In general, masonry bearing wall, shear wall and wall frame buildings designed, approved and constructed under 1994 UBC or later version have the best potential to meet the performance objectives of the current CBC with minimal retrofit, unless as discussed otherwise.
2. Unreinforced masonry (URM) buildings. URM buildings lack the capacity to resist tensile stresses induced by seismic forces which may lead to a loss of structural integrity and stability of the masonry. The regulations prohibit URM to support vertical loads or to resist lateral forces. An alternative vertical and lateral force resisting system, including lateral stability for the walls, will be required. (HI)
3. Partially reinforced concrete masonry buildings. Partially reinforced non-bearing non-shear walls may be used for fences and interior partitions. Retrofit for use as bearing or shear walls may require filling of all non-grouted cells or alternative framing/strengthening methods. (HI)

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NON-STRUCTURAL SYSTEM CONSIDERATIONS:

1. Suspended ceiling systems, light fixtures, non-bearing wall partitions and ornamental appendages shall require gravity support and lateral bracing to comply with current CBC or approved alternate method.
2. Exterior wall systems, including but not limited to, precast concrete and masonry veneer shall require support and anchorages to comply with current CBC requirements. Potential falling hazards shall require mitigation.
3. Mechanical and electrical equipment and devices shall require gravity support and lateral anchorage/bracing to comply with current CBC or approved alternate method.



EVALUATING FIRE AND LIFE SAFETY FACTORS

School districts are advised to retain a California licensed architect, mechanical and electrical engineer team or a fire prevention specialist to conduct an initial evaluation of the existing site and building fire/life safety systems for conformance with the health and safety provisions of the current regulations, Title 24, C.C.R.

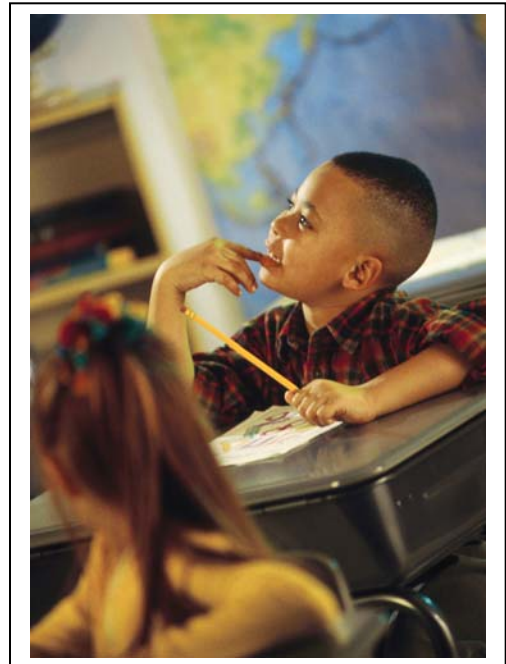
The following guidelines indicate fire and life safety issues that should be considered when assessing a building for rehabilitation that may have significant impact on the extent, cost and time of design and construction. In general, buildings recently constructed with systems and components accessible for investigation make the most successful candidates for rehabilitation. Buildings in which the systems and components are concealed may require some destructive investigation to establish credible verification of the existing construction to make a meaningful assessment.

GENERAL SITE AND BUILDING CONSIDERATIONS:

1. In accordance with Section 4-307, Part 1, Title 24, California Code of Regulations, an existing non-conforming building rehabilitated for use as a school building is considered, for the purpose of the application of Title 24, to be a new school building. Furthermore, a site, which is currently not an existing school site, on which one or more existing non-conforming buildings are rehabilitated for use as school building(s) is considered to be a new school site for the purpose of application of Title 24.
2. For buildings and sites in which plans and specifications of the original construction and any subsequent additions or alterations, approved by the local jurisdiction for construction are not available, DSA will require “as built” drawings that shall be prepared based on investigation.
3. General condition of the site and building fire safety systems, equipment and devices intended for reuse should be investigated and analyzed for the ability to perform their function in accordance with Title 24 requirements. Remediation may require repair or replacement of systems, equipment and devices, and may require changes to the configuration of the building or site.

SPECIAL PROVISIONS for Facilities for Daycare, Kindergarten, First-Grade or Second-Grade:

School districts evaluating the rehabilitation of existing, non-conforming buildings for use as primary or elementary schools, should pay close attention to the special provisions of CBC 305.2.3 summarized below.



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Rooms used for daycare purposes, kindergarten, first- or second-grade pupils shall not be located above or below the first story.

Exceptions:

1. Basements or stories having floor levels located within 4 feet, measured vertically, from adjacent ground level at the level of exit discharge, provided the basement or story has exterior exit doors at that level.
2. In buildings equipped with an automatic sprinkler system throughout, rooms used for kindergarten, first- and second-grade children or for day-care purposes may be located on the second story, provided there are at least two exterior exit doors for the exclusive use of such occupants.

FIRE PROTECTION CONSIDERATIONS:

1. Sites and buildings, if rehabilitated for school use with State School Facility Program funds, shall be subject to the Green Oaks Family Academy Elementary School Fire Protection Act, under Section 17074.50 of the Education Code. This means that existing non-conforming buildings rehabilitated for school use with state funds, must be equipped with automatic fire sprinklers and automatic fire alarm and detection systems throughout.
2. With regard to installation of automatic fire sprinklers in existing non-conforming building(s) not already equipped with them, school districts must evaluate:
 - a. The adequacy of water supply for fire sprinklers. Refer to Division III, Fire Protection, State Appendix III-AA, Fire-Flow Requirements for Buildings and State Appendix III-BB.
 - b. Fire hydrant locations and distribution to support fire fighting operations in buildings being considered for conversion to school use. Refer to Fire Hydrant Locations and Distribution within the California Fire Code (Part 9, Title 24).

FIRE DEPARTMENT ACCESS AND EGRESS CONSIDERATIONS:

Existing, non-conforming buildings or sites rehabilitated for school use require vehicle access from all-weather hard-surfaced (suitable for use by fire apparatus) right-of-way not less than 20 feet in width. Such right-of-way shall be unobstructed and maintained only as access to the public street. Gate entrances to school grounds shall also be provided for entrance by fire apparatus, ambulances and police vehicles. Gate openings shall be of sufficient width to accommodate the emergency vehicles used by the fire protection and law enforcement agencies serving the school. Refer to Sections 3.05 and 3.16, Title 19.

LOCATION ON PROPERTY CONSIDERATIONS:

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Existing non-conforming buildings and/or portions within to be rehabilitated for school use shall front directly on a public street or an exit discharge not less than 20 feet in width. The exit discharge to the public street shall be a minimum 20-foot-wide right-of-way, unobstructed and maintained only as access to the public street. At least one required exit shall be located on the public street or on the exit discharge. (CBC Section 305.3)

School grounds may be fenced, and gates therein may be equipped with locks, provided that safe dispersal areas based on 3 square feet per occupant are located between the school and the fence. Such required safe dispersal areas shall not be located less than 50 feet from school buildings. (CBC 1007.3.11)

CONSTRUCTION, HEIGHT AND ALLOWABLE AREA CONSIDERATIONS:

Existing, non-conforming buildings being considered for conversion to school use, should be limited to single-story if possible, as school buildings two or more stories in height are required to be a minimum of one-hour fire-resistive construction. The allowable area of a school building is 9,100 square feet for Type V-N construction, which is the most common building construction type. The area or size of a school building may be increased if it is adequately separated by yards, if travel distance to exits is reduced, or if the building is provided with automatic fire sprinklers throughout. (CBC 305.2)

EXITING PROVISIONS:

In evaluating an existing building for rehabilitation as a public school, all of the exiting provisions for educational occupancies within the current code shall be applied, especially those dealing with one-hour corridors, number and width of exits, and travel distance to exits. However, this list is not all inclusive.

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School districts are advised to retain an accessibility specialist or a California licensed design professional experienced with the design and construction of public schools to conduct an initial accessibility evaluation of the existing site and building(s) for conformance with the new construction requirements of the current regulations, Title 24, California Code of Regulations (Title 24) and Title II of the Americans with Disabilities Act of 1990.

The following guidelines indicate accessibility issues that should be considered when assessing a site and/or building(s) for rehabilitation that may have significant impact on the extent, cost and time of design and construction. In general, buildings recently constructed on relatively flat sites and for the use of state or local government services, make the most successful candidates for rehabilitation. It may be hard or even impossible to provide compliant and meaningful access on hilly sites, in historical buildings, or in multi-story buildings with no or outdated elevators.

GENERAL SITE AND BUILDING CONSIDERATIONS:

1. In accordance with Section 4-307, Part 1, Title 24, California Code of Regulations, an existing non-conforming building rehabilitated for use as a school building is considered, for the purpose of the application of Title 24, to be a new school building. Furthermore, a site, which is currently not an existing school site, on which one or more existing non-conforming buildings are rehabilitated for use as school building(s) is considered to be a new school site for the purpose of application of Title 24.
2. For buildings and sites in which accurate plans and specifications of the original construction and any subsequent additions or alterations, approved by the local jurisdiction for construction are not available, DSA will require “as built” drawings that must be prepared based on a comprehensive access compliance survey, indicating all relevant dimensions.
3. A district shall not, in determining the site, make selections that have the effect of excluding individuals with disabilities from, denying them the benefits of, or otherwise subjecting them to discrimination.
4. The access compliance regulations contained in Divisions I, II, and III of Chapter 11B, of Part 2 of Title 24, currently effective edition, set forth minimum requirements for accessibility that shall be met. With very few exceptions the subsequent standards shall be met:
 - All interior and exterior paths of travel shall be accessible.
 - All building entrances and ground floor exists shall be accessible.
 - All stories, floors, and levels shall be accessible.
 - All exterior use areas and all portions of all buildings shall be accessible.

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- All exterior use areas, portions of buildings, and accessible elements shall be connected to an accessible path of travel.
5. Sites where students may walk to and from school shall be located in areas where the surrounding public rights-of-way provides proper accessibility and safety.

Sites where students may use public transportation to and from school shall be located in areas where the path of travel from these public transportation stops to a site entry point provides proper accessibility and safety.

A. EXTERIOR SITE ACCESSIBILITY CONSIDERATIONS

1. The location, nature, and topography of the proposed site shall allow full and meaningful accessibility to and of all buildings, structures, walks, sidewalks, ramps, curbs, curb ramps, parking facilities, stairs, planting areas, pools, promenades, exterior gathering or assembly areas and raised or depressed paved areas, and related facilities as regulated in the Title 24, and the Americans with Disabilities Act of 1990 (ADA).
2. All paths of travel shall be accessible and coincide, to the maximum extent feasible, with the route for the general public as required by Title 24 and the ADA.

If an inaccessible element is provided adjacent to an accessible element along a particular path of travel, (e.g., stairs adjacent to a ramp), than the accessible element should be provided with the same amenities. Consider:

- Approximately the same distance and level change.
- Protection from the elements (e.g., roofed structures or wind barriers).
- Illumination and way finding elements.
- Materials and finish.
- Security and safety.

Exterior paths of travel shall be free of any abrupt level changes exceeding ½-inch beveled at 1:2 max. slope or vertical level changes not exceeding ¼-inch; shall be at least 48 inches wide; shall have a surface that is slip resistant, stable, firm, and smooth; shall have a cross slope not to exceed 2%; and shall slope in the direction of travel less than 5% unless the path complies with the requirements for a ramp.

Sites that require extensive ramping to comply with the path of travel requirements may not receive DSA approval if it is apparent that individuals who use manual wheelchairs cannot travel the height difference easily and conveniently. Also note that exterior platform (wheelchair) lifts are usually not accepted in new school construction projects.

EVALUATING ACCESSIBILITY FACTORS

3. Where provided, there shall be accessible paths of travel, to and from, and between each of the following items:
 - Public transportation stops serving the site.
 - Public streets and sidewalks serving the site.
 - All site entry points.
 - All accessible parking spaces serving the site.
 - All accessible passenger loading zones serving the site.
 - All exterior activity areas.
 - All building entrances and ground floor exists.
4. Where provided, the following items shall be accessible:
 - Public transportation stops serving the site.
 - Public streets and sidewalks serving the site.
 - All site entry points.
 - All accessible parking spaces serving the site.
 - All accessible passenger loading zones serving the site.
 - All exterior activity areas.
5. Where provided, exterior activity areas shall be accessible, including but not limited to:
 - Educational areas and public accommodations.
 - Play areas and equipment.
 - Assembly and gathering and performance areas.
 - Athletic fields and courts.
 - Swimming pools and decks.
 - Gardening, agricultural park, and recreational areas.

B. BUILDING ACCESSIBILITY CONSIDERATIONS

1. All entrances and ground floor exits shall be accessible. Consider:
 - Overall distance and level change leading to/from the building. It is recommended that the distance from on-site accessible parking spaces and passenger drop-off zones to the nearest building entrance should not exceed 200 ft.
 - Landings on either side of the door shall be level (2% max).

EVALUATING ACCESSIBILITY FACTORS

- Level change between interior and exterior level landing cannot exceed ½ inch in height.
 - Door hardware, maneuvering clearances, entrance and exit signage shall be fully compliant.
 - Vestibules shall be adequately sized to prevent individuals with wheelchairs from being trapped.
2. All levels shall be accessible including:
- All floor levels including split levels.
 - Platforms, podiums, stages, orchestra pits, and sunken or raised areas.
 - Mezzanines and balconies.
 - Roofs, if used as common-use or public area such as gardens, play grounds, observation or vista point.
- Elevator pits, elevator penthouses, mechanical rooms, piping or equipment catwalks are exempted from this requirement.
3. In buildings which exceed 10,000 square feet on any floor, accessible means of vertical access (elevators, ramps, lifts) shall be provided within 200 feet of each stairs and each escalator.

This requirement does not apply to stairs used solely for emergency egress.

4. All interior routes shall be accessible. Consider:
- All interior paths of travel shall be accessible and coincide, to the maximum extend feasible, with the route for the general public.
 - An accessible path of travel shall connect all entrances, ground floor exists, and spaces with one another.
 - All floor surfaces shall be stable, firm, and slip-resistant.
 - When elevators are provided, all elevators shall be accessible.
 - All ramps shall be accessible, at least 48 inches wide, and have handrails on both sides that extent 12 inches horizontally beyond the top and bottom of the ramp in the direction of the ramp run. Extensions which are turned any amount from the direction of the ramp run are not acceptable.
 - All stairs shall be accessible, have uniform riser height and tread widths, and have handrails on both sides that extent 12 inches beyond the top and the tread width plus 12 inches at the bottom of the stairs in the direction of the stair run. Extensions which are turned any amount from the direction of the stair run are not acceptable.

EVALUATING ACCESSIBILITY FACTORS

- Stairways adjacent to an area of rescue assistance shall have a minimum clear width of 48 inches between handrails.
 - Clear maneuvering clearances at all doors shall be provided (e.g. hinge-side approaches to pull side of swinging doors shall have maneuvering space that extends 36 inches minimum beyond the latch side of the door).
 - Clear maneuvering clearances for turning, passing, and operating at all accessible elements shall be provided (e.g. a wall-mounted accessible public telephone shall not protrude into the required width of the path of travel, and allow a parallel approach from both sides as well as front approach).
 - A U-turn around an obstruction less than 48 inches wide requires a passage width of 42 inches minimum and a U-turn base of 48 inches minimum width.
5. All portions of buildings, spaces and rooms shall be accessible, including:
- All waiting areas, offices, meeting, and conference rooms.
 - All classrooms, laboratories, preparation rooms, darkrooms, and special purpose rooms.
 - All occupational shops, greenhouses, and gardens.
 - All auditoria, cafeterias, and multipurpose rooms, including participation areas, such as, platforms, stages, orchestra pits, and green rooms.
 - All stadiums, grandstands, bleachers, athletic pavilions, gymnasiums, swimming pools, and other sport-related facilities.
 - All ticket booth, press boxes, projector and control rooms.
 - All libraries and resource centers.
 - All dressing, locker, nurse's, examination, and treatment rooms.
 - All bathing and toilet facilities.
 - All corridors, hallways, vestibules, lobbies, and staircases.
 - All filing, storage, and photocopy rooms.
 - All employee areas, lounges, and break rooms.

Kitchen and food preparation areas need only comply with the door and aisle width requirements.

Specific workstations need only comply with the door and aisle width requirements.

C. OTHER ACCESSIBILITY CONSIDERATIONS

1. When required exits are provided on any floor other than on the ground floor(s) and the building does not have a supervised automatic sprinkler system, an area for evacuation assistance, adjoining an accessible path of travel, shall be provided.

EVALUATING ACCESSIBILITY FACTORS

2. All emergency alarm initiation devices (pull-stations) shall be located 48 inches above the finished floor and its operation shall not require tight grasping, pinching or twisting of the wrist. The device shall be so located that to allow a parallel approach from both sides as well as front approach.
3. If emergency warning systems are provided at the facility, then they shall include both audible alarms and visual alarms. Visual alarm notification devices shall be integrated into the alarm system and shall be provided in all general and common-use areas, including:
 - Toilet and bathing facilities.
 - Classrooms and locker rooms.
 - Gymnasiums, auditoriums, stages, and multipurpose rooms.
 - Occupational shops.
 - Corridors, hallways, lobbies, and enclosed staircases.
 - Libraries, cafeterias, meeting and conference rooms.
 - Filing and photocopy rooms, employee break rooms.
 - Dressing, examination, and treatment rooms, and similar spaces that are not used solely as employee work areas.
 - Any other area for common use.
4. In every toilet room there shall be at least one accessible water closet and where provided at least one accessible urinal. At least one of each type of dispenser, disposal, or accessory provided shall be accessible. All lavatories shall be accessible. In addition, in large toilet rooms where more than six stalls are provided, at least one stall serving semi-ambulant persons shall be provided.
5. Platform (wheelchair) lifts may only be used under the following conditions:
 - To provide an accessible route to a performing area in an assembly occupancy.
 - To comply with the wheelchair viewing position line-of-sight and dispersion requirements.
 - To provide access to incidental occupiable spaces and rooms which are not open to the general public and which house no more than five persons, including but not limited to equipment control rooms and projection booths.
 - To provide access where existing site constraints or other constraints make use of a ramp or an elevator infeasible.

Note that in new construction projects lifts that require a 90-degree turn (as opposed to a straight through lift) may not receive DSA approval if it is apparent that individuals who use wheelchairs cannot use the lift easily and conveniently.

EVALUATING ACCESSIBILITY FACTORS

6. When drinking fountains are provided on a floor, there shall be at least one that is accessible to persons using wheelchairs and one that is accessible to persons who have difficulty bending or stooping. All drinking fountains shall be completely located within alcoves.
7. When signs identify permanent rooms and spaces of a building or site, they shall be accessible.
8. Where fixed or built-in seating, benches, tables, or counters are provided for the public, and in general employee areas, 5 percent, but never less than one, shall be accessible.
9. All doors shall be accessible and shall provide a clear, unobstructed opening width of 32 inches. Where a pair of doors is used, at least one of the doors shall provide a clear, unobstructed opening width of 32 inches.

The following level and clear maneuvering clearances shall be provided at all doors that can be approached from the front:

- At the pull side of a door there shall be a maneuvering space that extends 24 inches minimum at exterior doors (18 inches minimum at interior doors) beyond the latch side of the door and 60 inches minimum perpendicular to the doorway.
- At the push side of a door, equipped with closer and latch, there shall be a maneuvering space that extends 12 inches minimum beyond the latch side of the door and 48 inches minimum perpendicular to the doorway.
- At the push side of a door, not equipped with latch and closer, there shall be a maneuvering space that is the same width as door opening and extends 48 inches minimum perpendicular to the doorway.

The following level and clear maneuvering clearances shall be provided at all doors that can be approached from the hinge side:

- At the pull side of a door there shall be a maneuvering space that extends 36 inches minimum beyond the latch side of the door if 60 inches minimum is provided perpendicular to the doorway.
- At the push side of a door, not equipped with latch and closer, there shall be a maneuvering space of 54 inches minimum, parallel to the doorway and 44 inches minimum, perpendicular to the doorway.
- At the push side of a door, equipped with latch and closer, there shall be a maneuvering space of 54 inches minimum, parallel to the doorway, 48 inches minimum perpendicular to the doorway.

The following level and clear maneuvering clearances shall be provided at all doors that can be approached from the latch side:

EVALUATING ACCESSIBILITY FACTORS

- At the pull side of a door, there shall be a maneuvering space that extends 24 inches minimum beyond the latch side of the door and 60 inches minimum perpendicular to the doorway.
- At the push side of a door, with closers, there shall be a maneuvering space that extends 24 inches minimum parallel to the doorway beyond the latch side of the door and 48 inches minimum perpendicular to the doorway.
- At the push side of a door, not equipped with closers, there shall be a maneuvering space that extends 24 inches minimum parallel to the doorway beyond the latch side of the door and 44 inches minimum perpendicular to the doorway.

Doors in alcoves may only comply with the clearances for front approach.

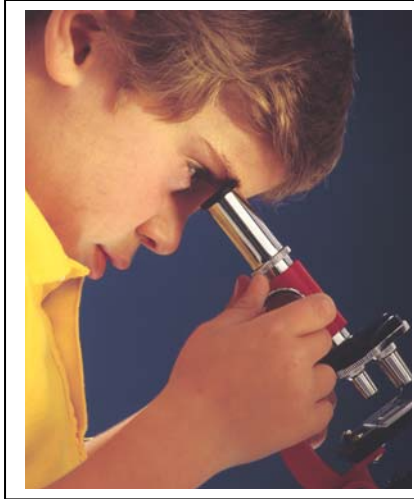
At recessed doors, where the plane of the doorway is offset 8 inches or more from any obstruction within 18 inches measured laterally on the latch side, the door shall be provided with maneuvering clearance for front approach.

10. All gates, intended for pedestrian use, shall meet all applicable specifications for doors.

For more information and guidance on access compliance requirements, visit the following web site of the Division of the State Architect - Office of Universal Design: http://www.documents.dgs.ca.gov/dsa/pubs/official_comments.pdf



EVALUATING MECHANICAL AND PLUMBING FACTORS



For rehabilitation of any existing building or portion of a building for public school use, regardless of whether the rehabilitation constitutes a change in use, school districts are advised to conduct an evaluation of the existing mechanical and plumbing systems, equipment and components for compliance with Title 24 provisions, currently effective edition, when such systems may be considered for reuse. (Note: Title 24 provisions are applicable to existing non-conforming buildings being used or having been previously used for educational purposes.) DSA recommends that such an evaluation be performed by a California licensed mechanical engineer experienced in the design and construction of public schools.

The following guidelines identify mechanical and plumbing issues that should be considered when assessing a building's suitability for rehabilitation which may have significant impact on the extent, cost and time of design and construction. The systems, equipment and components should be evaluated for their configuration, condition, capacity, performance, efficiency and flexibility to service the rehabilitated space. These systems should include, but not be limited to, the space conditioning systems, water heating systems, combustion equipment, cooling/heat rejection equipment, water supply, sewer, and fuel systems. Evaluation of inaccessible systems may necessitate removal of existing finishes or framing materials for access. Owners are further advised to evaluate the systems for their long-range operating cost and maintainability.

GENERAL REQUIREMENTS FOR REHABILITATION OF EXISTING MECHANICAL AND PLUMBING SYSTEMS, EQUIPMENT AND COMPONENTS:

1. All newly constructed or retrofitted mechanical/plumbing elements, components and systems in the rehabilitated space shall comply with Title 24, CCR, currently effective edition, including anchorage/bracing for structural forces and displacements.
2. Existing mechanical/plumbing systems and components of the rehabilitated space intended for continued use shall be evaluated for compliance with Title 24, CCR, currently effective edition. All existing mechanical/plumbing systems and components not in compliance with the code shall be retrofitted to comply with Title 24, C.C.R., with the following exceptions:
 - a. Continued use of existing mechanical equipment that meets all current code requirements other than energy provisions, will be acceptable provided equipment meets minimum efficiency standards per 1995 Title 24, C.C.R.; or,
 - b. If the existing building, systems and equipment, including all modifications for rehabilitation meet current energy performance standards per Title 24, C.C.R., no

EVALUATING MECHANICAL AND PLUMBING FACTORS

individual equipment upgrades will be required provided that the individual equipment meets all current code requirements other than energy provisions.

3. For rehabilitated buildings served by a remote central plant not located on the school site, and in which the central plant is not owned by the school district, the central plant may be considered as a utility and the existing elements, components and systems at the plant will not require retrofit to compliance with current Title 24 requirements provided the existing elements, systems and components have sufficient capacity to serve the school use. All newly constructed or retrofitted mechanical/plumbing elements, components and systems required to support the school facility at the central plant shall comply with Title 24, CCR, currently effective edition.
4. New or existing HVAC/plumbing systems and equipment sharing service to both the school and non-school facilities within the building shall comply or be retrofitted to comply with Title 24, C.C.R., currently effective edition, in accordance with Items 1 and 2 above. Components of systems crossing building separation joints shall be capable of accommodating the combined displacements of the respective portions during a seismic event.
5. The presence of toxic or hazardous materials/substances in existing systems, equipment or components (asbestos, lead, etc.) shall be disclosed/identified and remediated in accordance with the currently effective federal, state and local regulatory requirements.

MECHANICAL SYSTEM CONSIDERATIONS:

The general requirements above should provide the basis for evaluation of the existing mechanical systems, equipment and components of a building to be rehabilitated for the following issues, but not limited to:

Hazardous and Combustible Materials:

1. Plenum return combustibles: Systems and equipment must be suitable for plenum construction, such as plenum-rated cabling. Smoke from burning/hot wires or other burning combustible materials can be carried throughout the building by the HVAC system. Mitigation may require the installation of new return air ductwork, rated plenum construction or replacement of non-plenum rated components such as plenum-rated cabling.
2. Opening protection: Older buildings should be evaluated for means of protection at penetrations of all rated wall, floor, roof and ceiling assemblies; such as fire/smoke dampers in duct penetrations of rated walls. Existing means of protection may vary depending upon model code in effect at time of original construction and may need upgrading to current code. Additionally, the rehabilitation may result in existing non-rated construction being converted into rated construction. Any rated wall penetration (existing or remodeled) shall be

EVALUATING MECHANICAL AND PLUMBING FACTORS

protected with a fire-smoke damper per California Building Code CBC 302.5, 305.8.

3. Asbestos/hazmat removal: Existing equipment, duct lining and materials concealing mechanical components may contain toxic or hazardous substances which will require removal prior to retrofitting work per currently effective regulatory requirements, including but not limited to, asbestos duct insulation, removal of lead based paints or asbestos based wall and framing materials.

Water Heating Systems, Combustion, Cooling Refrigeration and Heat Rejection Equipment:

4. New Occupancy System Demands: Evaluation of the existing building systems and equipment should be based on the minimum cooling and heating demands for the proposed new occupancy requirements. The owner is advised to identify the use needs prior to calculation of the demand and evaluation of the existing systems.
5. Chillers and boilers in same room: Open flame from boilers can react with Freon in chillers to produce hazardous fumes. Per current Title 24, C.C.R., boilers require a separate one-hour rated room, or when interior space is not available, a boiler may be replaced or relocated outdoors.

Space Conditioning and Climate Control:

6. Outside air: The existing air handling system should be evaluated for outside air quantities suitable for the new occupancy use based on the minimum rate of outside air per occupancy as listed in current Title 24 C.C.R. Change in occupancy may result in an increase in occupancy density, requiring an increase in outdoor ventilation air to limit carbon dioxide levels from increasing into a potential health risk. (Example: Office areas are typically designed for 10 people per 1000 square feet, while the typical classroom has 50 students per 1000 square feet.) Rebalancing of existing HVAC equipment may achieve adequate outdoor air quantities, however if not, new or additional HVAC equipment may be required.
7. Pre-test and balance of HVAC system (including outside air quantities): To determine if the existing HVAC system has adequate capacity to provide required ventilation air, system pressurization (CFM), and conditioned air, a pre-test and balance of the system, conducted by a Test and Balance Agency, is recommended to identify deficiencies in the system, new or upgrade equipment requirements, and/or whether rebalancing will satisfy system requirements.
8. Indoor air quality: The building should be evaluated for potential indoor air quality hazards, which include, but are not limited to:
 - Current and proposed minimum ventilation rates per Title 24, C.C.R. requirements. Ventilation is required for all areas housing equipment which

EVALUATING MECHANICAL AND PLUMBING FACTORS

produce hazardous fumes, such as copy machines, break rooms, janitor closets, etc. New or upgraded ventilation systems may be required.

- Filtered air supply and contaminant control – All air supply to building shall be filtered for control of contaminants, and may require installation of new or upgraded filters and/or devices.
 - Building's outdoor air intakes shall be located away from plumbing vents, building exhaust, traffic areas where fumes from vehicles can be pulled into the building. Replacement or relocation may be required.
 - Molds and leaking water above the ceiling, around doors and windows. Repair of leaks and replacement of damaged building components, including ceiling tiles, will be required. HVAC equipment condensate drain pans are subject to water build-up and mold growth, and shall have sloped drain pans to prevent water accumulation. Equipment and/or drain pans may require replacement.
9. High-rise building stairwell requirements: Stairwell pressurization and smoke removal in high-rise buildings shall comply with the requirements of Title 24, C.C.R., currently effective edition. High rise exit stairwells shall be pressurized by supplying outdoor air directly into stairwell to prohibit smoke leakage into the stairwell during a fire. Addition of ventilation and pressurization systems may be required.
10. Atrium requirements: Similar to high-rise requirements, pressurization and ventilation systems are required to prevent the collection of smoke and to exhaust smoke in case of fire. Existing smoke removal systems may require upgrading to meet current code provisions.

Energy Efficiency:

11. Minimum SEER (COP) for HVAC equipment: Equipment and systems, in relatively new and good condition, shall be evaluated and upgraded as necessary to meet the provisions of Items 1, 1a and 1b of the General Requirements noted above.
12. Opinion of efficiency for whole building by qualified energy auditor: Evaluation of the building as a whole will assist in determining compliance with General Requirements 1, 1a and 1b noted above. Some buildings inherently waste energy, and the building's operating costs are excessively high. Owners are recommended to evaluate the existing building systems as a whole for energy efficiency and to consider upgrade or replacement of the following components to improve the efficiency to current standards:
- HVAC equipment efficiency.
 - Duct, piping, wall and roof insulation.

EVALUATING MECHANICAL AND PLUMBING FACTORS

- Air economizers and controls (when the outdoor temperature is favorable, the outdoor air can alone be used to condition the building, saving compressor energy).
- Glazing type: dual pane and tinted glazing preferred to single pane clear glazing.
- Conditioned air leakage.

PLUMBING SYSTEM CONSIDERATIONS:

The general requirements above should provide the basis for evaluation of the existing plumbing systems, equipment and components of the building and site identified, but not limited to, below:

Water and Sewer Systems:

1. Water supply: The water supply to the site and/or facility should be evaluated to provide the expected capacity appropriate for the use of the building. This will require preliminary calculation of the demand. Remediation may require cooperation with the utility provider and the local jurisdiction for the planning, scheduling, financing and construction, or it may require retrofit of existing site supply lines and equipment.
2. Pipe materials: Pipe materials for water distribution being considered for continued use shall be evaluated for compliance with Sections 604 and 811, C. P. C., currently effective edition, and expected capacity of the new use. The use of ABS and PVC piping shall be acceptable as follows:
 - a. For sanitary drainage systems (e.g. toilet and lavatory drainage), the use of ABS or PVC (Sch. 40 DWV) is limited to relocatable school buildings.
 - b. For storm drainage systems (e.g. roof drainage), the use of ABS or PVC (Sch. 40 DWV) is allowed without exception.
 - c. For vent systems (venting of sanitary drainage systems) the use of ABS or PVC (Sch. 40 DWV) is allowed without exception.
 - d. Section 811.2.1 allows the use of ABS or PVC for acid waste drainage systems in school laboratories (i.e.: science/photography lab).
3. Plumbing fixtures: Where existing plumbing fixtures are being considered for continued use of the rehabilitated space, additional fixtures, replacement or fixtures retrofitted for accessibility requirements should be evaluated and should be included in the demand for water supply and sewer capacity. Use of low water consuming fixtures shall be considered.
4. Sewer capacity: The sewer capacity to service the site and/or facility should be evaluated to provide the expected capacity appropriate for the use of the building. This will require preliminary calculation of the demand. Remediation may require cooperation with the local jurisdiction for the planning, scheduling, financing and construction, or it may require retrofit of existing site sewer lines and equipment.

EVALUATING MECHANICAL AND PLUMBING FACTORS

5. Roof drainage: Roof drainage will be required to comply with current model code requirements. Existing facilities may require replacement of existing drainage systems to provide adequate roof slope and overflow drains. The addition of materials to achieve adequate slope may trigger the need to strengthen the structural framing.
6. Fire sprinklers: Based on fire safety regulations of Title 24, C.C.R., currently effective edition, fire sprinkler systems may be required. Water supply and site hook-up requirements should be evaluated in conjunction with the building/site water supply.

Fuel Systems:

7. Fuel supply: The fuel supply to the site and/or facility should be evaluated to provide the expected capacity appropriate for the use of the building. This will require preliminary calculation of the expected fuel consumption demand. Remediation may require cooperation with the utility provider and the local jurisdiction for the planning, scheduling, financing and construction, or it may require retrofit of existing site supply lines and equipment.
8. Gas piping: Gas piping shall be adequate to meet the maximum demand without undue loss of pressure between the point of supply (meter) and the appliance.
9. Earthquake Actuated Shut-off Valve: Gas piping system shall be evaluated to determine if an automatic shut-off valve is present within the existing fuel gas piping system. DSA/SS requires this valve for school building construction in the event of a seismic disturbance and, given a change in use/occupancy, this valve may not be part of the existing fuel gas piping system.

Hazardous Materials:

10. Asbestos/lead hazmat removal: Existing equipment, plumbing and piping and materials concealing plumbing components may contain toxic or hazardous substances which will require removal prior to retrofitting work per DTSC and Department of Health Services (DHS) regulations, including but not limited to, lead pipe, lead solder, asbestos insulated pipes, removal of lead based paints or asbestos based materials to gain access to systems.
11. Drinking water: All drinking water samples should be analyzed in accordance with DHS requirements by a laboratory that is certified by the DHS. In 1986, lead solder was banned from use in drinking water plumbing systems. Therefore, buildings that were constructed prior to 1986 and which were plumbed with copper pipe, must receive the water sampling. All tap samples for lead must be collected in accordance with DHS requirements and should be first draw samples (i.e., the first water to flow out of the tap). Piping shall be replaced if the lead content in water is at unacceptable level as defined by DHS.

EVALUATING ELECTRICAL FACTORS

For rehabilitation of any existing building or portion of a building for public school use, regardless of whether the rehabilitation constitutes a change in use, school districts are advised to conduct an evaluation of the existing electrical systems, equipment and devices for compliance with Title 24 provisions, currently effective edition, when such systems may be considered for continued use. (Note: Title 24 provisions are applicable to existing non-conforming buildings being used or having been previously used for educational purposes.) DSA recommends that such an evaluation be performed by a California licensed electrical engineer experienced in the design and construction of public schools.

The following guidelines identify electrical issues that should be considered when assessing a building's suitability for rehabilitation which may have significant impact on the extent, cost and time of design and construction. The systems, equipment and components should be evaluated for their configuration, condition and capacity to service the rehabilitated space. Owners are further advised to evaluate the equipment and components for their long-range operating cost and serviceability.

GENERAL REQUIREMENTS FOR REHABILITATION OF EXISTING ELECTRICAL SYSTEMS, EQUIPMENT AND DEVICES

1. All newly constructed electrical systems and equipment in the rehabilitated space shall comply with Title 24, C.C.R., currently effective edition. Electrical equipment and components shall be anchored/braced per structural requirements of Title 24.
2. Existing electrical systems and equipment within the rehabilitated space intended for continued use shall be evaluated for the proposed capacity requirements and for compliance with Title 24, C.C.R., currently effective edition. Existing systems and equipment may be deemed to comply with Title 24 requirements when supported by appropriate testing. All existing electrical systems and equipment not meeting the proposed capacity/performance requirements or not in compliance with the currently effective code shall be retrofitted to comply with Title 24, C.C.R.
3. For a rehabilitated school building served by a remote electrical facility not located within the rehabilitated building, any new or existing electrical systems and equipment servicing the facility shall comply with the provisions of Items 1 and 2 above.
4. For buildings in which only a portion of the building is being rehabilitated into a public school, any new or existing electrical systems and equipment located in the same building sharing service to both the school and non-school facilities shall comply with the provisions of Items 1 and 2 above. Components of systems crossing building separation joints shall be capable of accommodating displacements between the building portions that may occur during a seismic event.
5. The presence of toxic or hazardous materials/substances in existing electrical systems and equipment (asbestos, PCB, etc.) shall be identified/disclosed and remediated in accordance with currently effective federal, state and local regulatory requirements.

EVALUATING ELECTRICAL FACTORS

6. Electrical equipment and devices for new or continued use in the rehabilitated space shall be listed, labeled or certified for its use by a Nationally Recognized Testing Laboratory (NRTL) as recognized by the U. S. Department of Labor, Occupational Safety and Health Administration.

ELECTRICAL SYSTEMS, EQUIPMENT AND DEVICE CONSIDERATIONS

The general requirements above provide the basis for evaluation of the existing electrical systems, equipment and devices of the building and site. Considerations should include, but not be limited to:

Condition Assessment of Existing Electrical Distribution Systems/Equipment and Fire Alarm Systems Proposed for Continued Use:

The existing electrical distribution systems and equipment shall include, but not be limited to: switchboards/switchgear, panelboards, motor control centers, transformers, feeders, and associated equipment. The existing fire alarm systems shall include the fire alarm system and devices, the fire alarm panel and notification devices. Evaluation of inaccessible systems may necessitate removal of existing finishes or framing materials for observation.

1. The existing electrical distribution system/equipment and fire alarm/detectable warning systems should be evaluated for compliance with Title 24, C.C.R., and any deficiencies related to the following considerations should be identified:
 - a. Physical Configuration and Condition:
 - i. The physical system/equipment/wiring should be evaluated for any deficiencies or missing components that may need to be retrofitted or added to comply with current model code. Evaluation should include safety provisions, including but not limited to; electrical grounding systems, panel enclosures, feeder protection devices.
 - ii. Existing equipment and devices should be listed, labeled or certified by a Nationally Recognized Testing Laboratory (NRTL). Equipment not so identified may require replacement unless it can be tested in place by a NRTL.
 - iii. The physical space and configuration of the existing equipment should be identified to determine if space exists to add any devices necessary for the new school use. (Example: Space in distribution panels for additional breakers.)
 - iv. Archaic systems, equipment or components should be identified for replacement, including, but not limited to:
 - a) Fused distribution panels,
 - b) Deteriorating wiring.
 - v. Adequate clearance from around existing equipment for serviceability. Equipment may require relocation.

EVALUATING ELECTRICAL FACTORS

- b. Age and Serviceability: The age of the equipment/devices may determine whether the equipment/devices are serviceable and still supported by the original manufacturer. Original equipment may be obsolete and replacement parts may be unavailable. Equipment that is unserviceable or unable to be retrofitted to meet current code should be replaced.
- c. Operating Condition:
 - i. Equipment and wiring should be maintained in conformance with the applicable code provisions at the time of construction. Any missing parts should be identified and replaced.
 - ii. Equipment and its enclosure should have no damage or open holes exposing live parts. Any damage, including water damage and rust, shall be identified and replaced.

Determine Capacity of Existing Electrical Systems and Equipment:

- 2. Existing electrical systems and equipment that have been determined appropriate for continued use in accordance with Item 1, should be evaluated for the capacity to service the proposed school use. Existing systems and equipment may be deemed to comply with Title 24 requirements when qualified/quantified by the following tests and/or calculations:
 - a. Utility: Ability of the existing service utility to provide adequate power for the new usage. If inadequate, the district may be required to replace transformers as directed by the service utility.
 - b. Panels: Load calculations or load testing may determine whether the existing electrical “panel” equipment will support the proposed new school use. It is possible that a building panel may comply with the current model electrical code, but may not have the capacity to power a new classroom (i.e., a computer lab).
“Panel”, as used herein, is defined as any panelboard, switchboard, motor control center, distribution panelboard, etc. Transfer switches and transformers are not defined as panels.
Load requirements of the existing panel system may be determined by either:
 - i. Calculation of the connected load in accordance with CEC, Article 220, or
 - ii. Continuous Ammeter Recording Load Test (7 day), which reflects the maximum loading of the equipment over a minimum 7 day period. The maximum value recorded over this period shall be multiplied by 125% to establish the maximum demand.
 - c. Breakers: Main and feeder breakers being proposed for continued use shall be tested by an approved electrical testing laboratory to verify that the breaker mechanisms function in compliance with original manufactures specifications.

EVALUATING ELECTRICAL FACTORS

- d. Feeders: The condition of the insulation of the existing feeders must be determined. Feeders that have been in service for more than 15 years should be tested to insure that the cable insulation is within tolerance. High Potential test on older cable must be preformed or the cables must be replaced. If aluminum cables are encountered the terminations must be checked to insure they were made per factory specifications, re-termination may be required.
- e. Equipment and Devices: Available Fault Current at each panel should be determined. The Interrupting Capacity (AIC) rating of existing equipment should be checked to insure that it is adequately rated. New equipment will be rated for the available fault current.

Determine Projected Load/Demand to Establish Adequacy of Existing Systems, Equipment and Devices:

- 3. The projected loads of the electrical system and equipment for the new school use, including adjustments for any new HVAC or fire alarm demands on the system, should be determined and compared with the capacity of the existing electrical systems and equipment per Item 2 above. If the existing electrical system will not support the proposed use, then either new equipment or retrofit/replacement of the existing equipment may be required.
 - a. A schematic single-line diagram should be prepared with the major equipment labeled to identify equipment capacity and demand on the system, and should include the following:
 - i. Voltage.
 - ii. Phase.
 - iii. Ampacity.
 - iv. Utility demand information, if available.
 - v. Breaker and fuse sizes.
 - vi. Cable size and insulation.
 - vii. Load calculated for the school use in accordance with the current CEC.
 - b. The projected loads should be calculated for the school use in accordance with the current CEC.

Fire Safety Systems:

- 4. Determine if the building is equipped with a complete automatic fire alarm system. Refer to Fire Life Safety Guidelines for requirements. Fire alarm systems, equipment and devices that are non-compliant may require retrofit or replacement of electrical components to comply with Title 24, C.C.R. requirements.

ADAPTIVE RE-USE: AN OPTION FOR CALIFORNIA'S SCHOOLS

For more information on doing an Adaptive Re-Use project
see DSA Publication # DSA REH 002
"Procedural Guidelines for Adaptive Re-Use Projects"
which will be available on the web
www.dsa.dgs.ca.gov/Publications