



**BUILDING CODE MANUAL
COUNTY OF LOS ANGELES
DEPARTMENT OF PUBLIC WORKS
BUILDING AND SAFETY DIVISION
Based on the 2011 LACBC**

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Page 1 of 16**

**SOUND INSULATION OF NOISE SENSITIVE STRUCTURES
NEAR LOS ANGELES INTERNATIONAL AIRPORT**

Purpose and Scope

The purpose of these regulations is to safeguard property, health and public welfare by establishing uniform minimum sound insulation standards and requirements to protect persons within designated noise sensitive buildings from excessive exterior noise through regulation of the design, construction and modification of such buildings in the vicinity of Los Angeles International Airport (LAX). These regulations are based upon an agreement between the City of Los Angeles Department of Airports, neighboring Cities adjacent to LAX and the County of Los Angeles effective since 1999.

These regulations establish specific procedures to implement the exterior-to-interior sound transmission standards and requirements that are set forth in the California Noise Insulation Standards for hotels, motels, dormitories, residential care facilities, apartment houses, and other dwellings, and to implement the sound insulation standards and requirements that are set forth in the California Airport Noise Standards and made applicable to all Group R occupancy structures, **including detached single-family dwellings**, and to noise-sensitive non-residential structures, defined as private schools, and convalescent homes, churches, synagogues, temples, and other places of worship. The intent of these regulations is to ensure that, after acoustic insulation, the interior Community Noise Equivalent Level (CNEL) attributable to exterior sources shall not exceed 45 dB in any habitable room within a residential building or in any noise-sensitive area within noise-sensitive nonresidential structures.

Definitions. The following special definition shall apply to these regulations:

LOS ANGELES INTERNATIONAL AIRPORT (LAX) AIRCRAFT NOISE IMPACT AREA (ANIA) MAP is a map showing property line representations of the 65 dB CNEL, 70 dB CNEL, and 75 dB CNEL noise contour boundaries generated for the fourth quarter of 1992, but including data from the entire calendar year 1992 (4Q92), in compliance with Title 21, Subchapter 6 of the California Code of Regulations. The 65 dB CNEL, 70 dB CNEL, and 75 dB CNEL noise contour lines on the map have been changed to follow the outer property line of each parcel of land traversed by the noise contour lines in order to clearly define which parcels are subject to which noise insulation building requirements set forth in these regulations.

Scope of Regulations.

Relation to other codes and ordinances. These regulations are intended to supplement the provisions of the Los Angeles County Building Code, a portion of the Los Angeles

County Code. In the case of conflict between these regulations and any other applicable code or ordinance, the more restrictive requirements shall govern. These regulations are not intended to abridge any safety or health requirements under any other applicable code or ordinance.

Geographic area of applicability - LAX ANIA MAP. The provisions of these regulations shall apply to all new or altered residential buildings or noise-sensitive non-residential buildings, as defined herein, that are located on parcels of land that fall wholly or partially within the annual 65 dB CNEL noise contour line shown on the fourth quarter 1992 CNEL noise contour map developed by the City of Los Angeles World Airports for LAX and adopted with and made part of these regulations by this reference. The boundaries of the 65 dB CNEL, 70 dB CNEL, and 75 dB CNEL noise contours shown on the 4Q92 noise contour map are formed by the outermost property lines of the parcels traversed by these contour lines rather than by the noise contour lines themselves. This map shall be known, and referred to herein, as the Los Angeles International Airport Aircraft Noise Impact Area map or boundary, or the LAX ANIA map and boundary, or the LAX Exterior Sound Transmission Control Regulation Map.

When, in implementing these regulations, it is determined that aircraft noise is not the only significant source, noise levels from all sources, including those referenced in Section 1207, shall be added to determine the composite site noise level. The preferred noise metric for implementing this regulation shall be the CNEL.

The Los Angeles World Airports shall be responsible for reviewing and approving any proposed changes to these regulations as being consistent with applicable State requirements pertaining to airport noise, shall make all findings required pursuant thereto, and shall prepare any CNEL contour maps required of the County of Los Angeles under these regulations or under Section 1207.

Applicability to New and Altered Residential Structures.

These regulations establish pro forma, prescriptive building standards and requirements that are to be applied to all habitable rooms or areas within all newly constructed or reconstructed residential structures and to all additions or alterations to existing residential structures within the LAX ANIA boundaries as more specifically set forth below.

- 1. New residential structures.** For newly constructed residential structures, these regulations provides two separate sets of prescriptive building standards and requirements for application to the new structures that are located within the noise zone formed by the area between the 75 dB CNEL and the 70 dB CNEL boundaries, and to the new structures that are located within the noise zone formed by the 70 dB CNEL and the 65 dB CNEL boundaries shown on the LAX ANIA.
- 2. New residential structures in the greater than 75 dB CNEL noise zone.** Specific prescriptive building standards and requirements are not provided for new residential structures in the 75 dB CNEL and above noise zone shown on the LAX ANIA map. If, however, a building permit for such new construction is requested, the prescriptive standards applicable to altered existing residential structures within the 75 dB CNEL and above noise zone shall apply. In such cases, an acoustic

measurement report shall be submitted and required to certify compliance with the maximum 45 dB interior CNEL noise standard in all habitable rooms after construction and prior to issuance of an occupancy permit.

3. **Alteration to existing residential structures.** These regulations set forth prescriptive building standards and requirements for the alteration or expansion of all existing residential structures in the same manner as for new structures, except that three separate sets of prescriptive standards and requirements are provided for the three noise zones formed by the area within the 75 dB CNEL boundary, the area between the 75 dB CNEL and the 70 dB CNEL boundaries, and the area between the 70 dB CNEL and the 65 dB CNEL boundaries shown on the LAX ANIA map.
 - a. **Alteration to existing residential structures in the less than 75 dB CNEL noise zone.** Additions or alterations of floor area may be made to existing residential buildings in the area between the 75 dB CNEL boundary and the 65 dB CNEL boundary without making the entire building comply with all requirements of this regulation for new construction, unless the cost of the addition or alteration improvements is 75 percent or more of the replacement value of the structure, in which case, the entire building shall be made to comply. All additions of separable habitable rooms, and all separable habitable rooms or areas that result from an expansion of the building, including both the newly expanded area and the pre-existing room or area, shall be made to fully comply with the performance and prescriptive building standard and requirements set forth in these regulations.
 - b. **Alterations to existing residential structures in the greater than 75 dB CNEL noise zone.** No addition or alteration of habitable space may be made to existing residential buildings in the greater than 75 dB CNEL noise zone unless the entire building is made to comply with these regulations. In such cases, an acoustic measurement report shall be submitted and required to certify compliance with the maximum 45 dB interior CNEL noise standard in all habitable rooms after construction and prior to issuance of an occupancy permit.

Applicability to New and Altered Noise-sensitive Non-residential Structures.

This regulation does not establish specific prescriptive design and construction standards for application to noise-sensitive non-residential structures, but does require compliance with the performance standard that all such structures, defined in the California Airport Noise Standards and set forth herein, that are proposed to be constructed or altered within the LAX ANIA boundary, shall be designed, constructed or altered to provide an interior CNEL due to aircraft noise of 45 dB or less in all new or altered noise-sensitive areas within the building. Where the cost of improvements to existing noise-sensitive non-residential structures is 75 percent or more of the replacement value of the structure, all noise-sensitive areas within the building shall be made to comply; and, where noise-sensitive areas are to be added or expanded within such structures that are located with the 75 dB CNEL and above noise zone, all noise-sensitive areas within the entire structure shall be made to comply.

Compliance with Regulation: Noise Reports, Validation Testing and Certifications.

In order to validate compliance with the provisions of these regulations, all applicants for building permits to construct or alter structures that are subject to these regulations will be required to provide a noise report containing post-construction, pre-occupancy acoustic measurements, and such other information as the Superintendent of Building may require, that validate that the interior noise levels attributable to exterior sources do not exceed 45 dB CNEL in any habitable room of residential structures or within any noise-sensitive area of non-residential structures. The required report shall be prepared and signed by a person experienced in the field of acoustic testing and engineering and shall certify fulfillment of the requirements of these regulations and state that the new construction has achieved the 45 dB CNEL interior standard and, in the case of alterations to existing structures, also state that the construction has avoided nullifying any prior, pre-construction achievement of the standard in any newly constructed or altered habitable room or noise-sensitive area.

In addition to the post-construction noise validation report, applicants for building permits to construct or alter noise-sensitive non-residential structures are required to submit a pre-construction acoustic analysis report, prepared by a person experienced in the field of acoustic testing and engineering, identifying all noise-sensitive rooms or areas within the structure, or such other information as the Superintendent of Building may require, and certifying that the planned construction or alteration will achieve, and will avoid nullifying prior achievement of the 45 dB CNEL interior standard in all affected noise-sensitive areas of the newly constructed or altered structure. Prior to obtaining an occupancy permit and after construction, the applicant's acoustical engineer shall submit an amended pre-construction report incorporating post-construction noise measurement data and the engineer's certification evidencing that the 45 dB CNEL interior standard and all requirements have been met.

Occupation of any new or modified habitable room that is shown in a required post-construction acoustic measurement report to fail to achieve the required CNEL noise level shall be precluded until such time as acoustic alteration of that room achieves at least the 45 dB CNEL standard.

BUILDING REQUIREMENTS FOR NEW RESIDENTIAL CONSTRUCTION OR EXISTING RESIDENTIAL BUILDINGS IN THE NOISE ZONE BETWEEN 60 dB CNEL AND LESS THAN 65 dB CNEL

All new Group R buildings in this noise zone shall be constructed with sound insulation or other means to achieve an interior CNEL level in all rooms of no more than 45 dB. Remodeled or altered structures where the total cost of improvements is 75 percent or more of the total assessed value of the structure must also meet this standard in the entire structure.

A person experienced in the field of acoustical testing and engineering shall certify in writing that the proposed new construction will comply with Los Angeles County Code, Title 26, and this BCM prior to the issuance of a building permit. Acoustic measurements shall be conducted by a person experienced in the field of acoustic testing and engineering to verify that the 45 dB CNEL Standards is not exceeded for all new and modified rooms.

BUILDING REQUIREMENTS FOR NEW RESIDENTIAL CONSTRUCTION IN THE NOISE ZONE BETWEEN 65 dB CNEL AND LESS THAN 70 dB CNEL.

1. Exterior Walls.

- a. New walls that form the exterior portion of rooms shall be constructed as follows:
 1. Studs shall be at least 4 inches in nominal depth.
 2. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this Code. Wood or metal siding shall be installed over 1/2-inch solid sheathing.
 3. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by Item No. 5 below.
 4. Wall insulation shall be at least R-13 glass fiber or mineral wool or equal and shall be installed continuously throughout the stud space.
 5. Interior wall finish shall be at least 5/8-inch thick gypsum wallboard or plaster.

2. Exterior Windows.

- a. **Openable Windows.** All openable Windows in the exterior walls of rooms shall have a laboratory Sound Transmission Class (STC) rating of at least 35 dB and shall have air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- b. **Fixed Windows.** All fixed windows in the exterior walls of habitable rooms shall be at least 1/4-inch thick and shall be set in non-hardening glazing materials.
- c. The total area of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

3. Exterior Doors.

- a. Exterior hinged doors to rooms that are exposed to aircraft noise shall be a door and edge seal assembly that has a laboratory STC rating of at least 35 dB.
- b. Sliding glass doors shall have glass that has a laboratory STC rating of at least 35 dB.
- c. Access doors from a garage to a room within a dwelling shall have a laboratory STC rating of at least 30 dB.

4. Roof/Ceiling Construction.

- a. Roof rafters shall be covered on their top surface with 1/2-inch solid sheathing and any roof covering allowed by Title 26, the Building Code.
- b. An accessible attic space shall be provided above rooms on the uppermost level of Group R buildings.
- c. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joists.
- d. Attic ventilation shall be:
 1. Gable vents or vents that penetrate the roof surface that are fitted with transfer ducts at least 6 feet in length that are insulating flexible ducting or

metal ducts containing internal 1-inch thick coated fiberglass sound absorbing duct liner. Each duct shall have a lined 90-degree bend in the duct so that there is no direct line-of-sight from the exterior through the duct into the attic, or

2. Noise control louver vents, or
 3. Eave vents that are located under the eave overhang.
- e. Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick.
- f. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line and shall be glazed with at least 3/16-inch plastic, tempered or laminated glass. The weather-side skylight shall be any type that is permitted by Title 26, the Building Code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

5. Floors.

The floor of the lowest habitable rooms shall be concrete slab on grade or wood-framed floors.

6. Ventilation.

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of Title 26, the Building Code, in each room without opening any windows, door or other opening to the exterior. Unless otherwise prohibited, all concealed duct work shall be insulated flexible glass fiber ducting that is at least 10 feet long between any two points of connection.
- b. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

7. Fireplaces.

Each fireplace constructed of masonry units shall be fitted with a damper at the top of the chimney that is operated from the firebox and shall have glass doors across the front of the firebox.

8. Wall and Ceiling Openings.

Openings in the shell of the residence that degrade its ability to achieve an interior CNEL rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB CNEL or less standard in the room to which they provide access.

BUILDING REQUIREMENTS FOR NEW RESIDENTIAL CONSTRUCTION IN THE NOISE ZONE BETWEEN 70 dB CNEL AND LESS THAN 75 dB CNEL NOISE ZONE.**1. Exterior Walls.**

- a. New walls that form the exterior portion of habitable rooms shall be constructed as follows:
 - 1. Studs shall be at least 4 inches in nominal depth.
 - 2. Exterior finish shall be stucco, minimum 7/8-inch thickness, brick veneer, masonry, or any siding material allowed by this Code. Wood or metal siding shall be installed over 1/2-inch solid sheathing.
 - 3. Masonry walls with a surface weight of less than 40 pounds per square foot will require an interior supporting studwall that is finished as required by Item No. 5 below.
 - 4. Wall insulation shall be at least R-13 glass fiber, mineral wool or equal and shall be installed continuously throughout the stud space.
 - 5. Interior wall finish shall be at least 5/8-inch thick gypsum wallboard or plaster.

2. Exterior Windows.

- a. **Openable Windows.** All openable windows in the exterior walls of habitable rooms shall have a laboratory STC rating of at least 40 dB and shall have an air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- b. **Fixed Windows.** All fixed windows in the exterior walls of rooms shall:
 - 1. Have a laboratory STC rating of at least 40 dB, or
 - 2. Shall be 5/8-inch laminated glass with a laboratory STC rating of at least 40 dB and shall be set in non-hardening glazing materials, or
 - 3. Shall be glass block at least 3-1/2 inches thick.
- c. The total areas of glazing in rooms used for sleeping shall not exceed 20 percent of the floor area.

3. Exterior Doors.

- a. Exterior hinged doors to rooms that are exposed to aircraft noise shall be a door and edge seal assembly that has a laboratory STC rating of at least 40 dB.
- b. Sliding glass doors shall have a laboratory STC rating of at least 40 dB.
- c. Access doors from a garage to a room within a noise sensitive structure shall have a laboratory STC rating of at least 30 dB.

4. Roof/Ceiling Construction.

- a. Roof rafters shall be covered on their top surface with 1/2-inch solid sheathing and any roof covering allowed by Title 26, the Building Code.
- b. Attic insulation shall be batt or blown-in glass fiber or mineral wool with a minimum R-30 rating applied between the ceiling joists.
- c. Attic ventilation shall be:
 - 1. Gable vents or vents that penetrate the roof surface that are fitted with transfer ducts at least 6 feet in length that are insulating flexible ducting or metal ducts containing internal 1-inch thick coated fiberglass sound

absorbing duct liner. Each duct shall have a lined 90-degree bend in the duct so that there is no direct line-of-sight from the exterior through the duct into the attic, or

2. Noise control louver vents, or
 3. Eave vents that are located under the eave overhang.
- d. Ceilings shall be finished with gypsum board or plaster that is at least 5/8-inch thick. Ceiling materials shall be mounted on resilient channels.
- e. Skylights shall penetrate the ceiling by means of a completely enclosed light well that extends from the roof opening to the ceiling opening. A secondary openable glazing panel shall be mounted at the ceiling line or at a point that provides at least a 4-inch space between the skylight glazing and the secondary glazing and shall be glazed with at least 3/16-inch plastic or laminated glass. The weather-side skylight shall be any type that is permitted by Title 26, the Building Code. The total size of skylights shall be no more than 20 percent of the roof area of the room.

5. Floors.

The floor of the lowest habitable rooms shall be concrete slab on grade or wood framed. Wood framed floors for rooms will be allowed when they are directly above a habitable room, a basement, garage, workshop, utility room or other non-habitable rooms or areas that are completely enclosed with wall materials allowed by Title 26, the Building Code.

6. Ventilation.

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of Title 26, the Building Code, in each room without opening any window, door or other opening to the exterior. Unless otherwise prohibited, all concealed duct work shall be insulated flexible glass fiber ducting that is at least 10 feet long between any two points of connection.
- b. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.

7. Fireplaces.

Each fireplace constructed of masonry units shall be fitted with a damper at the top of the chimney that is operated from the firebox and shall have glass doors across the front of the firebox.

8. Wall and Ceiling openings.

Openings in the shell of the residence which degrade its ability to achieve an interior CNEL rating of 45 dB or less when all doors and windows are closed are prohibited unless access panels, pet doors, mail delivery drops, air conditioning, or other openings are designed to maintain the 45 dB CNEL (or less) standard in the room to which they provide access.

BUILDING REQUIREMENTS FOR EXISTING RESIDENTIAL BUILDING IN THE NOISE ZONE BETWEEN 65 dB CNEL AND LESS THAN 70 dB CNEL.

1. Exterior Walls.

Exterior walls in this noise zone do not require modification.

2. Exterior Windows.

- a. Openable wood frame windows in rooms exposed to aircraft noise shall be replaced with new openable windows that have a minimum laboratory STC rating of at least 35 dB if the existing window has:
 1. Missing or insecure glazing putty or other glazing materials, or
 2. Broken or cracked glass, or
 3. Operating sash that is not securely supported in its frame or does not close tightly against the frame.
- b. Openable wood frame windows that do not require replacement by Item a. above and that are exposed to aircraft noise shall be fitted with a secondary window that has a laboratory STC rating of at least 25 dB. The secondary window may be mounted at the exterior or interior of the existing window and shall be completely trimmed and caulked in place.
- c. Openable metal frame windows in rooms exposed to aircraft noise shall be replaced with new openable windows that have a minimum laboratory STC rating of at least 35 dB if the existing windows have:
 1. Jalousie louver glass sash, or
 2. Missing or insecure glazing putty or other glazing materials, or
 3. Broken or cracked glass, or
 4. Operating sash that is not securely supported in its frame or does not close tightly against the frame.
- d. Openable metal frame windows in rooms exposed to aircraft noise that do not require replacement by Item c. above shall be fitted with a secondary window that has a laboratory STC rating of at least 25 dB with a space of at least 2 inches between the glass surfaces of the two windows. The secondary window may be mounted at the exterior or interior of the existing window and shall be completely trimmed and caulked in place.
- e. Fixed windows in rooms exposed to aircraft noise shall be glazed with ¼-inch glass unless they are part of an acoustic window assembly.

3. Exterior Doors.

Exterior doors in rooms that are exposed to aircraft noise shall be modified as follows:

1. Hollow core or lightweight doors and doors with glazed openings shall be replaced with doors that have a minimum laboratory STC rating of at least 35 dB.
2. Solid core or heavy panel doors shall be fitted with a drop seal at the sill and vinyl bulb seals at the jambs and head.

4. Roofs.

- a. Accessible attics shall be insulated to achieve a minimum R-30 insulation value.
- b. Attic vents shall be modified as follows:

1. Gable vents or vents that penetrate the roof surface shall be provided with noise control louver vents that meet the noise reduction levels shown in Table 1207A or transfer ducts that are at least 6 feet in length. The ducts shall be of flexible insulated ducting with a 90-degree bend so that there is no direct line-of-sight from the exterior through the duct into the attic.
2. Eave vents do not require modification.
- c. Roofs with a slope of 2:12 or less and open beam ceilings shall be modified as indicated below only if bearing walls are adequate to support the additional load stresses:
 1. Existing roof covering shall be removed to expose sheathing.
 2. Two-by-six rafters at 24-inches on center shall be installed directly above the existing roof construction and supported by existing bearing walls, shall be insulated with R-19 fiberglass batts, and shall be covered with ½-inch plywood sheathing.
 3. New roofing shall be installed on the new construction that can be adequately supported by the new framing and existing bearing walls.

5. Floors.

Floors in this noise zone do not require modification.

6. Ventilation.

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of Title 26, the Building Code, in each room without opening any window, door or other opening to the exterior. All concealed duct work shall be insulated flexible glass fiber ducting that is at least 10 feet long between any two points of connection. Exposed duct work may be sheet metal with 1-inch fiberglass duct liner and shall have a bend in the duct to avoid direct line-of-sight through the duct.
- b. Kitchen cooktop vent hoods shall be replaced with non-ducted recirculating vent hoods with no ducted connection to the exterior.

7. Fireplaces.

Each fireplace constructed of a masonry unit shall be fitted with a damper at the top of the chimney that is operated from the firebox and shall have glass doors across the front of the firebox.

8. Wall and Ceiling Openings.

Openings in the shell of a residence that degrade its ability to achieve an interior CNEL rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air-conditioning, or other openings must be designed to maintain the 45 dB CNEL or less standard in the room to which they provide access.

BUILDING REQUIREMENTS FOR EXISTING RESIDENTIAL BUILDINGS IN THE NOISE ZONE BETWEEN 70 dB CNEL AND LESS THAN 75 dB CNEL.

1. Exterior Walls.

- a. Exterior walls of rooms that are exposed to aircraft noise shall be modified as follows:
 1. Wood frame walls with exterior wood siding or other lightweight exterior finish shall be provided with a secondary interior stud wall that is supported at the ceiling and the floor and is separated from the surface of the interior wall by at least ½-inch. The exposed surface of the secondary wall shall be finished with 5/8-inch gypsum wallboard or plaster.
 2. Wood frame walls with an exterior finish of stucco, brick veneer or other similar materials and with an interior finish that is less than ½-inch thick shall be provided with an additional interior layer of 5/8-inch gypsum wallboard.
 3. Wood frame walls with an exterior finish of stucco, brick veneer or other similar heavy materials and with interior finish that is at least ½-inch thick do not require modification.
 4. Walls that are constructed principally of load bearing masonry do not require modifications.

2. Exterior Windows.

- a. Openable windows in rooms shall be replaced with an openable window that has a laboratory STC rating of at least 40 dB and shall have an air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- b. Fixed windows in rooms shall be modified by one of the following methods:
 1. Replace the existing window with a window that has a laboratory STC rating of at least 40 dB, or
 2. Replace the existing window with 5/8-inch laminated glass that has a laboratory STC rating of 40 dB, or
 3. Add secondary removable glazing at the interior or exterior of the existing window. The secondary glazing shall be at least ¼-inch float glass or laminated glass. The space between the two panes of glass shall be at least 2 inches.
- c. The joint between the wall opening and the new windows required in this BCM shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.
- d. Fixed glass shall be set in non-hardening glazing materials.

3. Exterior Doors.

- a. Exterior hinged doors to rooms that are exposed to aircraft noise shall be replaced with a door and seals that have a laboratory STC rating of at least 40 dB. A new rabbeted frame shall be provided for each new door to replace the existing frame.
- b. Access doors from a garage to a room within a dwelling shall be replaced with a door and seals that have laboratory STC rating of at least 30 dB.

- c. Sliding glass doors to rooms that are exposed to aircraft noise shall be fitted with a secondary sliding glass door installed on the exterior of the existing door and trimmed on all exposed sides with wood trim that is at least 2-inches thick (nominal).
- d. The joint between the wall opening and the new doorframe required in Item No. 3 a, b or c above shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.

4. Roofs.

- a. Accessible attics shall be insulated to achieve a minimum R-30 insulation value.
- b. Attic vents shall be modified as follows:
 - 1. Gable vents or cents that penetrate the roof surface shall be provided with noise control louver cents that meet the noise reduction levels shown in Table 1207A or transfer ducts that are at least 6 feet in length. The ducts shall be of flexible insulated ducting with a 90-degree bend so that there is no direct line-of-sight from the exterior through the duct into the attic.
 - 2. Eave vents do not require modification.
- c. Roofs with a slope of 2:12 or less and open beam ceiling shall be modified as indicated below only if bearing walls are adequate to support the additional load stresses:
 - 1. Existing roof covering shall be removed to exposed sheathing.
 - 2. Two-by-six rafters at 24-inches on center shall be installed directly above the existing roof construction and supported by existing bearing walls, shall be insulated with R-19 fiberglass batts, and shall be covered with ½-inch plywood sheathing.
 - 3. New roofing shall be installed on the new construction that can be adequately supported by the new framing and existing bearing walls.

5. Floors.

- a. Vent openings to underfloor areas of wood framed floors shall be provided with acoustic vent baffles that meet noise reduction levels shown in Table 1207A. Vent baffles shall be fitted with ¼-inch mesh screen.
- b. Underfloor access doors shall be non-vented plywood or other weatherproof material.

6. Ventilation.

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of Title 26, the Building Code, in each room without opening any window, door or other opening to the exterior. All concealed duct work shall be insulated flexible glass fiber ducting that is at least 10 feet long between any two points of connection. Exposed duct work may be sheet metal with 1-inch fiberglass duct liner and shall have a bend in the duct to avoid direct line-of-sight through the duct.
- b. Kitchen cooktop vent hoods shall be replaced with non-ducted recirculating vent hoods with no ducted connection to the exterior.

7. Fireplaces.

Each fireplace constructed of masonry units shall be fitted with a damper at the top of the chimney that is operated from the firebox and shall have glass doors across the front of the firebox.

8. Wall and Ceiling Openings.

Openings in the shell of the residence that degrade its ability to achieve an interior CNEL rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB CNEL or less standard in the room to which they provide access.

BUILDING REQUIREMENTS FOR EXISTING RESIDENTIAL BUILDINGS IN THE NOISE ZONE BETWEEN 75 dB CNEL AND 80 dB CNEL

1. Exterior Walls.

- a. Exterior walls of rooms that are exposed to aircraft noise shall be modified as follows:
 1. Wood frame walls with exterior wood siding or other lightweight exterior finish shall be provided with a secondary interior stud wall that is supported at the ceiling and the floor and is separated from the surface of the interior wall by at least ½-inch. The exposed surface of the secondary wall shall be finished with 5/8-inch gypsum wallboard or plaster.
 2. Wood frame walls with an exterior finish of stucco, brick veneer or other similar materials and with an interior finish that is less than ½ -inch thick shall be provided with an additional interior layer of 5/8-inch gypsum wallboard.
 3. Wood frame walls with an exterior finish of stucco, brick veneer or other similar heavy materials and with interior finish that is at least ½-inch thick do not require modification.
 4. Walls that are constructed principally of load bearing masonry do not require modifications.

2. Exterior Windows.

- a. Openable windows in rooms that have stucco or masonry exterior walls surfaces shall be replaced with an openable window that has a laboratory STC rating of at least 40 dB.
- b. Openable windows in rooms that have wood siding or lightweight exterior cladding shall be replaced with an openable window that has a laboratory STC rating of at least 44 dB. All windows shall have an air infiltration rate of no more than 0.5 cubic feet per minute when tested according to ASTM E-283.
- c. Fixed windows in rooms shall be modified by one of the following methods:
 1. Replace the existing window with a window that has a laboratory STC rating of at least 44 dB, or
 2. Add secondary removable glazing at the interior or exterior of the existing window. The secondary glazing shall be at least ¼-inch float glass or

laminated glass. The space between the two panes of glass shall be at least 2 inches. The joint between the wall opening and the new windows shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.

3. Exterior Doors.

- a. Exterior hinged doors to rooms that are exposed to aircraft noise shall be replaced with a door and seals that have a laboratory STC rating of at least 40 dB. A new rabbeted frame shall be provided for each new door to replace the existing frame.
- b. Access doors from a garage to a room within a dwelling shall be replaced with a door and seals that have a laboratory STC rating of at least 30 dB.
- c. Sliding glass doors in rooms that are exposed to aircraft noise shall be fitted with a secondary sliding glass door installed on the exterior of the existing door and trimmed on all exposed sides with wood trim that is at least 2 inches thick (nominal).
- d. The joint between the wall opening and the new door frame required in Item No. 3 a, b or c above shall be continuously filled with glass fiber insulation and the exterior cover trim shall be continuously caulked to seal the joint.

4. Roofs.

- a. Accessible attics shall be insulated to achieve a minimum R-30 insulation value.
- b. Attic vents shall be modified as follows:
 1. Gable vents or vents that penetrate the roof surface shall be provided with noise control louver vents that meet the noise reduction levels shown in Table 1207A or transfer ducts that are at least 6 feet in length. The ducts shall be of flexible insulated ducting with a 90 degree bend so that there is no direct line-of-sight from the exterior through the duct into the attic.
 2. Eave vents do not require modification.
- c. Roofs with a slope of 2:12 or less and open beam ceiling shall be modified only if bearing walls are adequate to support the additional load stresses:
 1. Existing roof covering shall be removed to expose sheathing.
 2. Two-by-six rafters at 24-inches on center shall be installed directly above the existing roof construction and supported by existing bearing walls, shall be insulated with R-30 fiberglass batts, and shall be covered with ½-inch plywood sheathing.
 3. New roofing shall be installed on the new construction that can be adequately supported by the new framing and existing bearing walls.

5. Floors.

- a. Vent openings to underfloor areas of wood framed floors shall be provided with acoustic vent baffles that meet noise reduction levels shown in Table 1207A. Vent baffles shall be fitted with ¼-inch mesh screen.
- b. Underfloor access doors shall be non-vented plywood or other weatherproof material.

6. Ventilation.

- a. A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of Title 26, the Building Code, in each room without opening any window, door or other opening to the exterior. All concealed duct work shall be insulated flexible glass fiber ducting that is at least 10 feet long between any two points of connection. Exposed duct work may be sheet metal with 1-inch fiberglass duct liner and shall have a bend in the duct to avoid direct line-of-sight through the duct.
- b. Kitchen cooktop vent hoods shall be replaced with non-ducted recirculating vent hoods with no ducted connection to the exterior.

7. Fireplaces.

Each fireplace constructed of masonry units shall be fitted with a damper at the top of the chimney that is operated from the firebox and shall have glass doors across the form of the firebox.

8. Wall and Ceiling Openings.

- a. Openings in the shell of the residence that degrade its ability to achieve an interior CNEL rating of 45 dB or less when all doors and windows are closed are prohibited. Any access panels, pet doors, mail delivery drops, air conditioning, or other openings must be designed to maintain the 45 dB CNEL or less standard in the room to which they provide access.

**TABLE 1207A
Octave Band Sound Transmission**

Center Frequency, HZ	Loss
125	4
250	5
500	6
1,000	9
2,000	10
4,000	12

Supersedes BCM 1208 Article 4 dated 08-19-99

WRITTEN BY: STEVE IKKANDA
Civil Engineer

REVIEWED BY: JUAN MADRIGAL
Senior Civil Engineer

RECOMMENDED BY:

APPROVED BY:



HASSAN ALAMEDDINE
Chief Engineer



RAJ PATEL
Superintendent of Building