



Typical Sound Insulation Costs

Sound insulation costs vary widely depending upon such factors as:

- Outdoor DNL zone,
- Selected indoor noise goal,
- Construction of the residence,
- Region of the country,
- Availability of contractors familiar with sound insulation construction, and
- Number of residences sound insulated at one time.

On average the cost to sound insulate an existing house to achieve 25 to 35 dB of attenuation can vary between \$15,000 and \$45,000.

Interior Noise Reduction Goals

Navy guidelines indicate that residential development is not compatible with locations impacted by noise levels above 65 dB DNL. The Navy also provides guidance that if local governments approve residential development in those areas, then as a minimum they should also require that new buildings reduce outdoor noise levels by at least 25 dB between the 65 and 70 dB DNL contours, and by at least 30 dB between the 70 and 75 dB DNL contours.

To get a copy of the full *Sound Insulation Guidelines for Residences Exposed to Aircraft Operations publication* or to obtain a free computer program to estimate the scope and cost to sound insulate a room in your house, contact the Naval Facilities Engineering Command (NAVFAC) regional office nearest you:

NAVFAC Headquarters, Washington DC

Contact: Alan Zusman

E-mail: Alan.Zusman@navy.mil

Telephone: (202) 685-9181

NAVFAC Atlantic, Norfolk, VA

Contact: Fred Pierson

E-mail: Fred.Pierson@navy.mil

Telephone: (757) 322-4935

NAVFAC Southwest Division, San Diego, CA

Contact: Robert Henderson

E-mail: Robert.K.Henderson@navy.mil

Telephone (619) 532-1622

NAVFAC Southern Division, Charleston, SC

Contact: Richard Jolly

E-mail: Richard.Jolly@navy.mil

Telephone: (843) 820-5889

Sound Insulation Guidelines for Residences Exposed to Aircraft Operations

April 2005



Prepared for:
NAVAL FACILITIES
ENGINEERING COMMAND



Prepared by:
Wyle Acoustics Group
Wyle Laboratories, Inc.





Aircraft noise interferes with typical activities in homes such as watching television, talking on the telephone, and sleeping. Reducing the level of aircraft noise inside an existing home or planning a new home for improved noise reduction is referred to as sound insulation. This document provides an overview of sound insulation concepts and step-by-step guidelines for sound insulating a home. This guide was developed for homeowners, municipal planning departments and design professionals interested in sound insulating residences.

Sound Insulation Basics

Noise enters a house through all exterior elements, including walls, roofs, doors, windows, range exhaust ducts, chimneys, etc. Each of these paths must be addressed if significant noise reduction is desired.

Typical sound insulation modifications include:

Windows - the single most important modification is to use acoustical windows, or add acoustical storm windows over existing windows.

Doors - Acoustical doors or acoustical storm doors should be used. These products are heavier than typical doors and have a special type of weatherstripping.

Walls and Ceilings - For houses with lightweight walls and ceilings it is often necessary to add layers of gypsum board or other materials

to walls and ceilings in order to meet the acoustical design goals.

Skylights - For skylights the recommended modifications are to add secondary interior glass panels, to replace the units with special acoustical skylights, or to remove the skylights.

Fireplaces - The recommended modifications for fireplaces are to either provide a special acoustical chimney-top damper, or to provide tight-fitting glass doors over the fireplace.

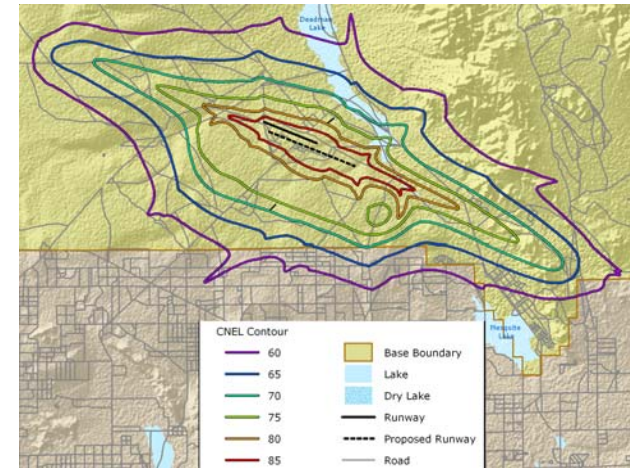
Air Conditioners - Through-window or through-wall air conditioners should be removed to achieve the noise reduction goal.

Exhaust Fans - Kitchen range hood or in-wall fans that duct to the exterior are a significant noise leak. In general, replacing them with ductless models is the best course of action.

Ventilation - When a house is sound insulated it is necessary to close windows to achieve the benefits of the modifications. To replace the cooling and ventilating effects of open windows air conditioning and/or ventilation systems should be provided.

Noise Contours Explained

The Department of the Navy and other federal agencies express noise levels around air installations using Day-Night Average Sound Level (DNL) contours. DNL represents the average noise exposure of all aircraft events that occur at the air installation and is calculated based



upon the type of aircraft operated, the number of operations, the runways used, the aircraft flight tracks, the time of day that the operations occur, and operational conditions such as the use of afterburners. In addition, a 10 dB penalty is added to the DNL calculation between 10 p.m. and 7 a.m. to account for the added intrusiveness of sounds that occur during normal sleeping hours, both because of increased sensitivity to noise during those hours and because ambient sound levels at night are typically lower than during the day. The DNL can be determined from an Air Installation Compatible Use Zone (AICUZ) study if one was completed for the air installation near your house.

For air installations in California, the Community Noise Equivalent Level (CNEL) is used in lieu of the DNL in the AICUZ study. CNEL is very similar to DNL except that it includes an additional 5 dB penalty for noise that occurs in the evening from 7 p.m. to 10 p.m.

