



## New sound insulation maps developed to aid noise reduction

**Major roads, railways, airports and industrial areas** can be a major source of noise nuisance for local communities. To help city planners and architects determine the most appropriate sound insulation design for the exterior of buildings, Turkish researchers have developed a new method that transforms noise maps into insulation maps.

In the EU, environmental noise from major roads, railways, airports and other sources, such as outdoor industrial sites and machinery, must be monitored as a requirement of the EU's Environmental Noise Directive<sup>1</sup>. Member States are obliged to draw up maps for specific sources of noise, such as motorways, in addition to strategic noise maps that identify overall exposure from all sources of environmental noise. These maps are used as the basis for action plans to reduce high levels of noise and preserve quieter areas.

In addition to planning and regulation options, action plans can include various sound installation designs to minimise noise in a building. This study developed a method to convert strategic noise maps into different categories of insulation for building facades (exteriors), to help architects, building contractors and planners determine appropriate sound insulation designs.

Based on a three-step process, the sound insulation performance of the exterior of a building can be shown on a sound insulation map. In the first step, strategic noise maps are developed based on noise sources, the physical environment and the location where populations live. On the strategic noise map, contour lines linking equal noise levels are drawn and overlaid on a plan of the physical environment. Buildings in areas of excessive noise and noise-sensitive buildings, such as hospitals, can be identified along with the number of people exposed to the noise. The strategic noise maps are used to determine noise levels at the facades of buildings.

In the second step, using the information from the strategic noise maps, sound insulation for the exterior of the buildings can be designed. In addition to the type and sound characteristics of the noise, criteria for sound insulation include the material construction of the building facade, people's annoyance response and indoor noise levels. Adjustments are made for noise reflection from the facades and for low-frequency noise. In a similar manner to noise maps, insulation maps have contour lines linking equal performances of insulation.

In the third step, alternative designs, legal requirements, such as restrictions and building codes, and costs are considered before implementing sound insulation measures. To illustrate how the method is used, insulation criteria were determined for the exteriors of two buildings, a school and a hotel, located under different noise conditions in Istanbul. Insulation maps for both buildings were drawn up by using strategic noise maps. The insulation maps were used to guide the choice of insulation, and the extent and location of insulation on the exteriors of the buildings.

The researchers argue that insulation maps, used together with strategic noise maps, are particularly useful for assessing implications of land use change, in addition to planning new residential developments and drawing up building codes.

1. See: <http://ec.europa.eu/environment/noise/directive.htm>

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