THE NOISE FRAMEWORK LAW AND ITS RELATIONSHIP WITH OTHER LAND-USE PLANNING TOOLS

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Framework law n.447/95

The Italian law has been based on planning and organization of the territory as basic element to manage the environmental acoustic pollution and to reduce during the time the noise levels in the living ambient protecting the public.

Therefore the law 447/95 represents an other territorial planning tools in addition to many other in force in Italy as duty for each municipality.

As a consequence it is necessary to integrate all the planning tools that they must be coordinated.

Territorial planning tools

Each municipality has to adopt a **REGULATORY PLAN** as main instrument to organize the land use; often **OPERATING RULES** are associated to this tool to complete the reference instrument for the territory.

The **TRAFFIC PLAN** is a tool to organize the urban traffic and the viability and it's a duty only for major cities.

AIR QUALITY PLAN and **ENERGY PLAN** are other two planning tools useful to know the criticalities and to individuate the main causes and to program specific solutions

Why tools integration? (1)

The environmental noise is strongly depending on living uses of people, particularly:

- utilizations of private car or public transport for movement in urban areas;
- positioning of work places or recreative places;
- hours for free time and for work time;

but also on the characteristics of the cities, as:

- weight of tourism;
- significance of environment or landscape;
- commercial or industrial weight.

Why tools integration? (2)

It is possible to find out that:

- the regulatory plan and its operating rules organize the city watching the development of residential areas or handicrafts areas, or the localisation of industrial plants: relevant conditions for noise climate;

- the traffic plan defines the guidelines to optimise traffic flows inside the municipality, specifically in urban area, on the basis of organization of the city and of needs of mobility;

- air quality and energy plans suggest actions to contain the air pollution that it's strongly correlated to noise pollution together depending principally by urban traffic.

Relationship between acoustic law and Regulatory Plan (1)

The law 447/95 establishes the classification of the territory in six areas (acoustic zones) based on the characteristics of the territory itself: industrial, residential, commercial, recreational or for medical use (see figure 1).

A similar classification, but for other aims, is used for the preparation of the regulatory plan (see figure 2).

With these premises it is possible to acoustically classify the territory on the basis of the addresses of the regulatory plan (see figure 3).

Any change on one of these tools implicates a relative variation of the other one.

Relationship between acoustic law and Regulatory Plan (2)

For example:

- areas for exclusively or principally industrial use in the regulatory plan are classified in VI or V zones in acoustic plan;
- areas for scholastic or medical use in the regulatory plan are classified in I acoustic zone;
- parking areas are classified in III or IV acoustic zones;
- areas for exclusively or principally residential use are classified in II or III zones;
- great public parks in the regulatory plan are classified in I acoustic zone;

Figure 1 - Acoustic zoning on the basis of statistical parameter

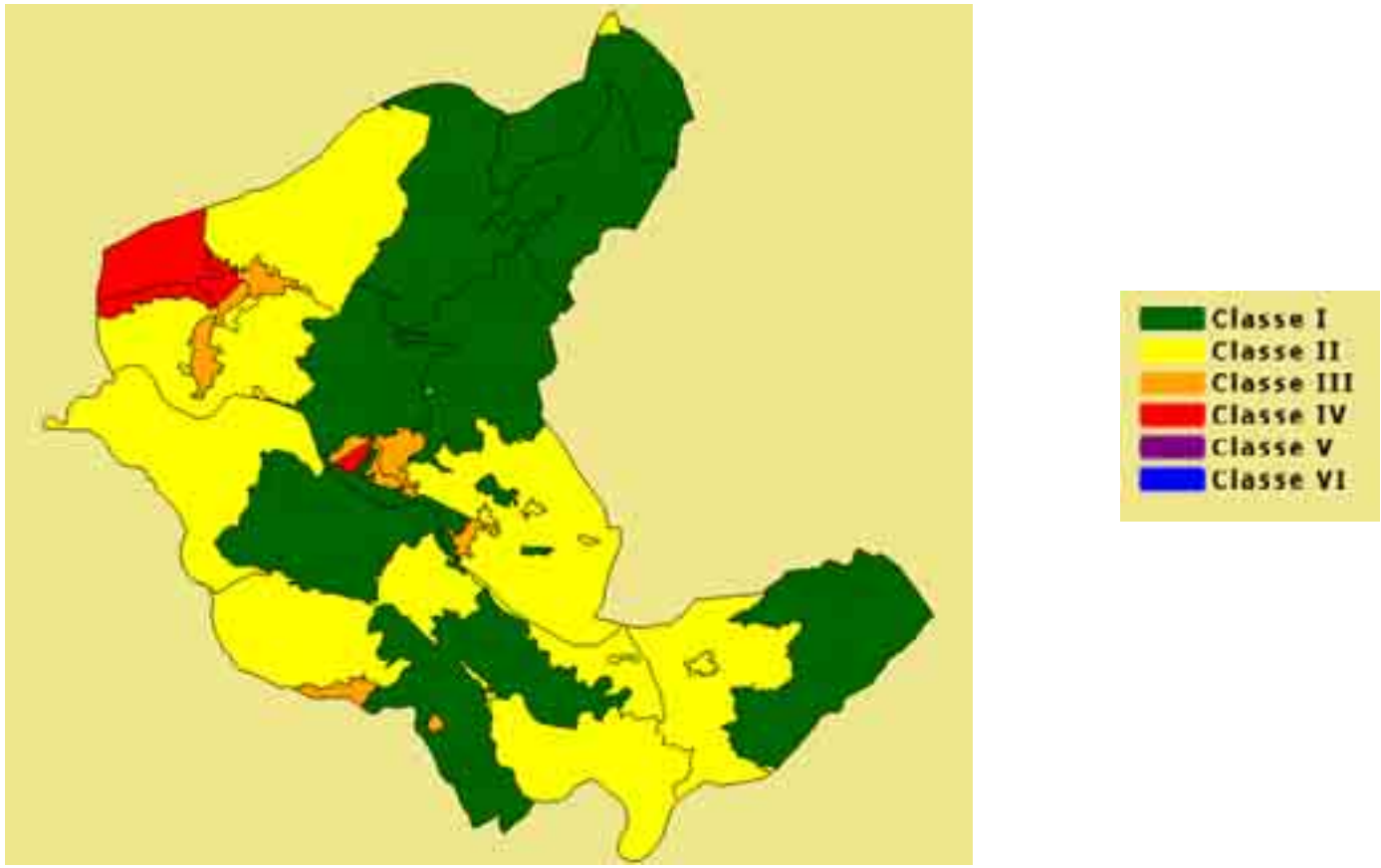
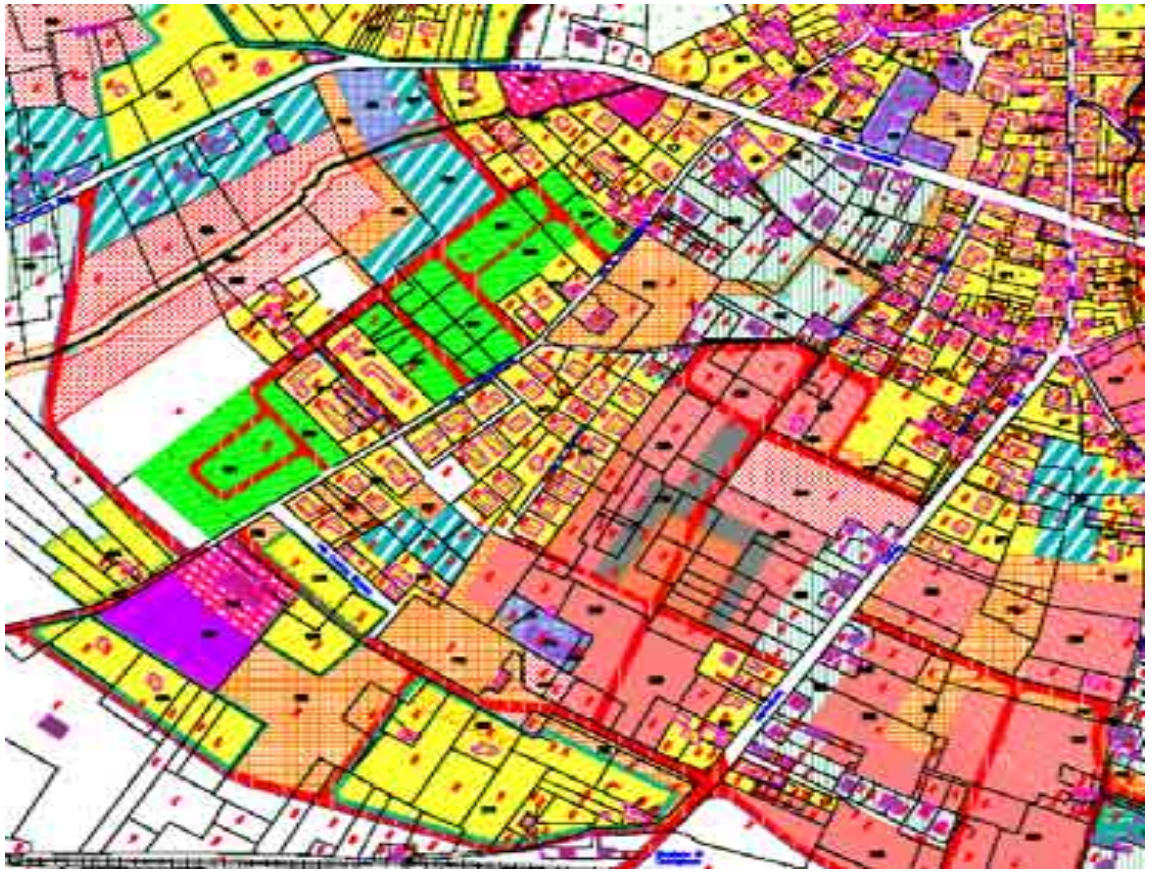


Figure 2 – Example of Regulatory Plan

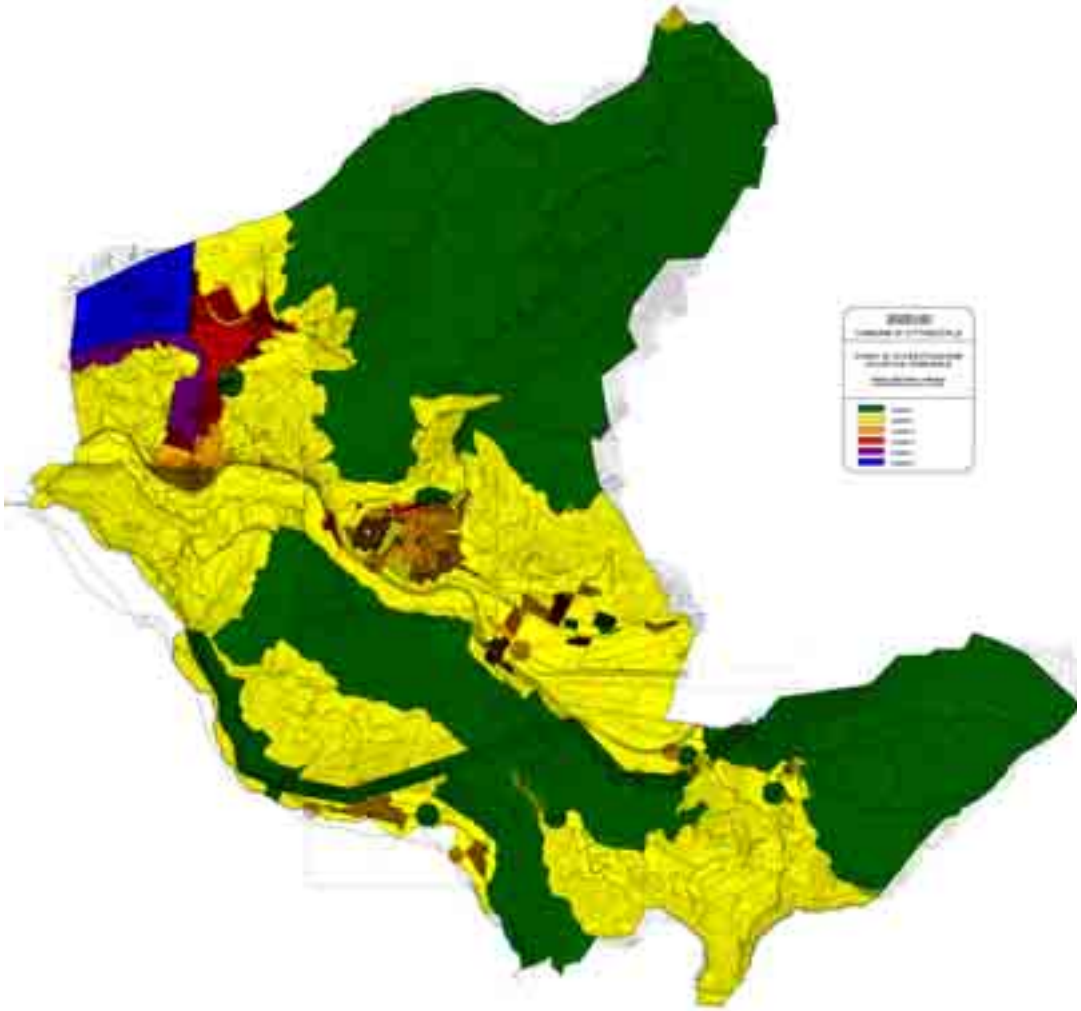


Example of Regulatory Plan – Description of areas (1)

Example of Regulatory Plan – Description of areas (2)

Example of Regulatory Plan – Description of areas (3)

Figure 3 – Ultimate Acoustic zoning on the basis of the Regulatory Plan



Relationship between acoustic law and Traffic Plan (1)

One of the principles to characterize an acoustic zone is the traffic density in terms of number of vehicles per hour:

- only local traffic – less than 50 vehicles per hour (zone II),
- only local and crossing traffic – between 50 and 500 vehicles per hour (zone III),
- presence of main roads – more than 500 vehicles per hour (zone IV).

Relationship between acoustic law and Traffic Plan (2)

The traffic plan generally defines strategy to reduce the number of vehicles in specific roads inside residential areas preferring external roads or to reduce vehicles speed (low speed limit areas – 30 km/h) or to limit road traffic in specific times of the day.
Other actions in the Traffic Plan could be:
- changes in the percentage of heavy/light vehicles on specific roads;
- round about to replace lights in proximity of cross road.

Any of these solutions has relevant influence on the acoustic climate and it can contribute to address to a specific acoustic zone.

Actions on Traffic Plan (1)

Changes in the percentage of heavy/light vehicles on specific roads have the following results

Reduction of	50%	- 3 dB
"	75%	- 6 dB
"	90%	- 10 dB

from the theoretical point of view.

Really it's depending on the speed of the vehicles and on the type of road; for example:

- if the road has a vehicular flow of 2000 vehic/h, a reduction of 300 vehicles can determine a gain of 0.7 dB;

- the same reduction of vehicles in a road with 400 vehicles per hour can give a gain of 10 dB in terms of sound levels

Actions on Traffic Plan (2)

In addition, modifications of the traffic composition can influence the noise climate.

For example, the percentage of heavy vehicles in a road with speed limits equal to 50 km/h and a flow of 2000 vehic/h contributes to the acoustic climate:

80% light + 20% heavy	70.9 dB
90% light + 10% heavy	68.6 dB
95% light + 5% heavy	66.8 db
100% light	63.7 dB

Actions on Traffic Plan (3)

The realization of areas where speed limits are reduced (i.e. zone 30) contributes to contain the noise peaks and to reduce the levels of noise peaks because the frequent changes of speed and the acceleration are eliminated.

As a consequence, reduction of 5-6 dB(A) of peak levels and 3-4 dB (A) of equivalent level (LAeq) can be obtained.

In addition, this solution contribute to favour the coexistence between cars and pedestrians.

In Europe the organization of the vehicles circulation is one of the main instrument for urban territory requalification.

But solutions aimed to eliminate transit traffic, to reduce speed of local traffic must be accompanied by actions regarding improvements of road infrastructures and pedestrian ways, so determining an effective and general improvement of the environment.

Actions on Traffic Plan (4)

Concentrating the traffic in main road permits to reduce and better redistribute the traffic in other less important road.

This solution

- permits the reduction of all harmful emissions close the building;
- it's more easy protect the building by the adoption of acoustic barriers;
- increasing the vehicular traffic in an already full road determines a restricted variation of the noise emissions produced by the circulation (double traffic = +3dB);

Relationship between acoustic law and other Planning tools

Planning tools also represent instruments to foresee the development and the growing of the municipality in terms of new urbanisations, new infrastructures and other, evaluating the changes of the territory.

It must be take into account also for the changes in the acoustic field with the aim to control degrading areas, to protect area with peculiar needs, to reclaim other areas.

So different instruments with different action field have the same objective: manage the territory from political, social and economic point of view.

Compatibility between planning tools

From the compatibility between the tools the needs of reclamation could be found out as political choice:

-To prefer the addresses of the Regulatory Plan, favouring the chances of the urbanization, or

- to prefer the acoustic evidences acting on the territory and also re-addressing the urban development.

In the second case, changement in the Regulatory Plan or Traffic Plan are necessary determining a prevalence of environmental policy on urban policy.

Innovative solutions (1)

The better solution is a care planning and management of the urban territory by an appropriate localisation of noisy activities and residential areas.

Innovative solutions could be:

-the design of areas with a care distribution of buildings or spaces at different use (see following figures 4 and 5);

-new addresses in building constructions (figures 6 and 7).

Innovative solutions (2)

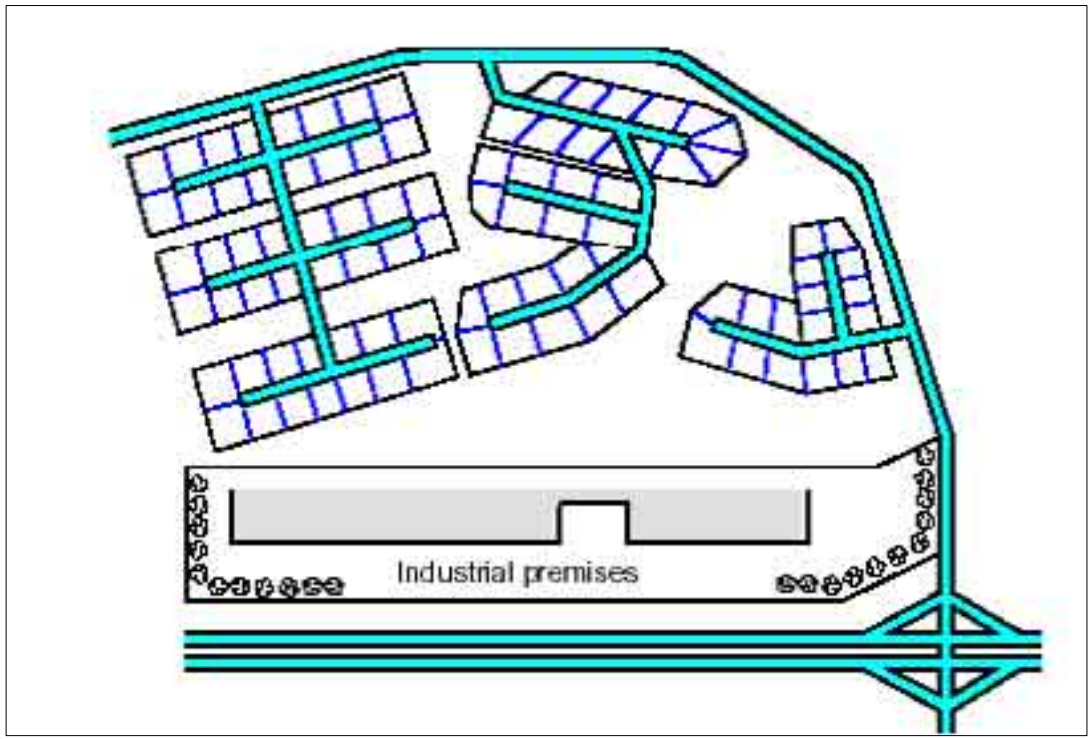


Fig 4 – industrial premises as buffer building between a main road and a residential areas

Innovative solutions (3)

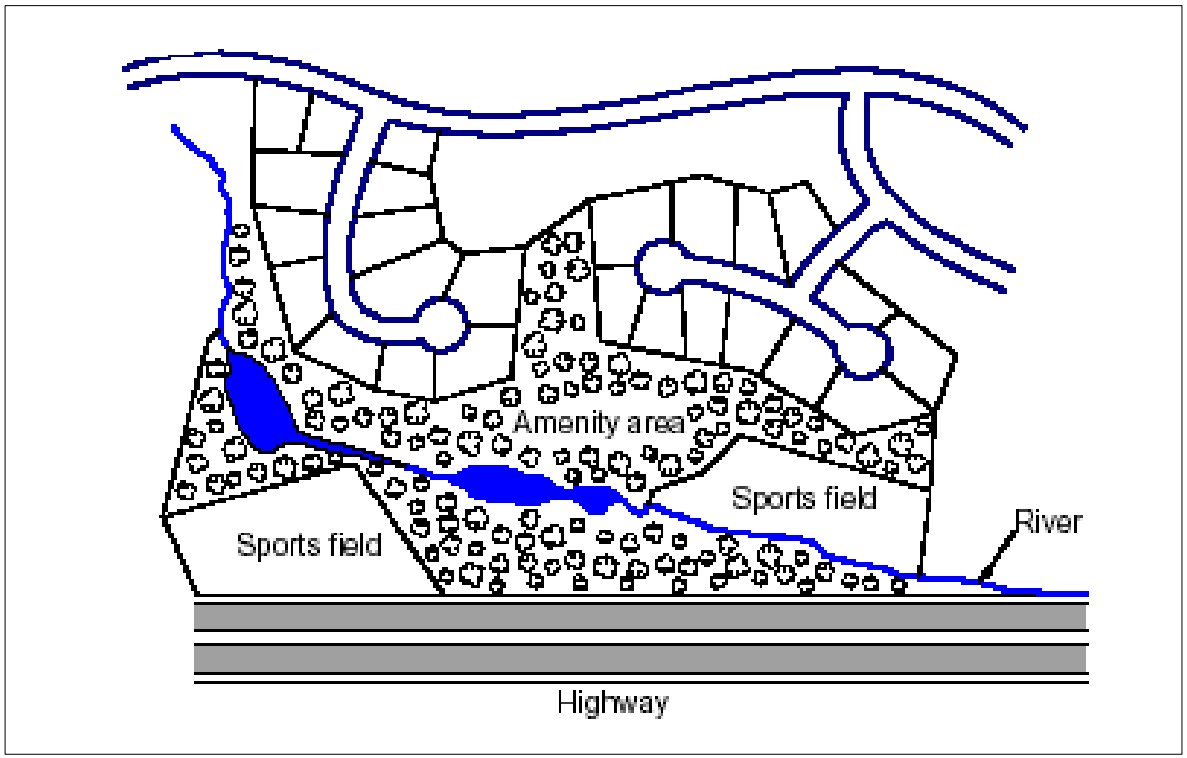


Fig 5 – sports activities and amenity areas as buffer zone between a highway and a residential areas

Innovative solutions (4)

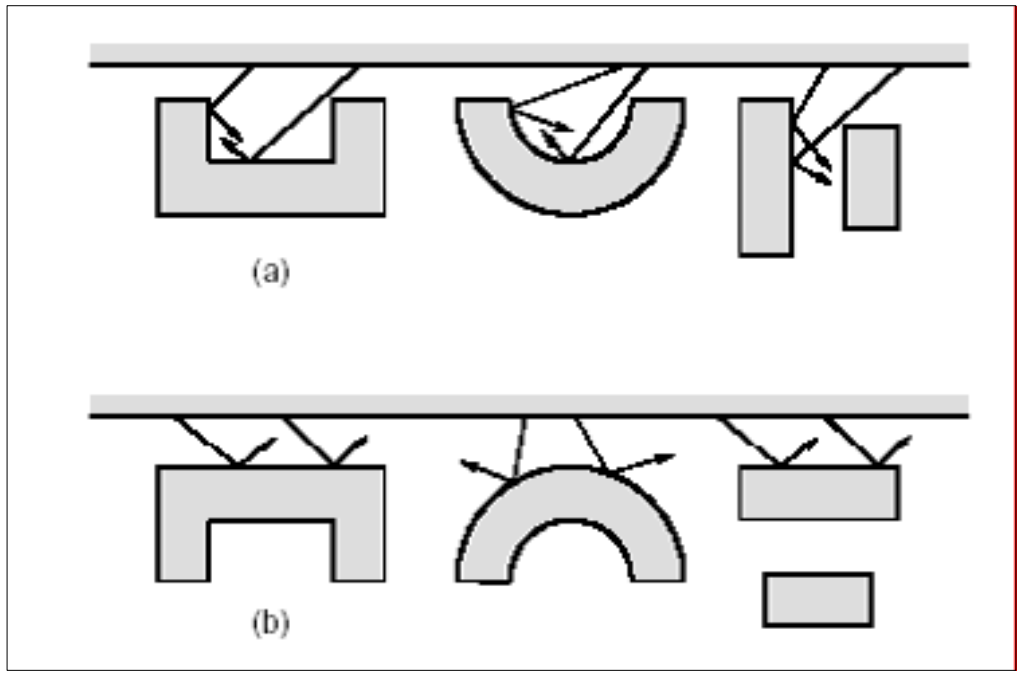


Fig 6 – construction of buildings close a road: a (to avoid), b (to prefer),

Innovative solutions (5)

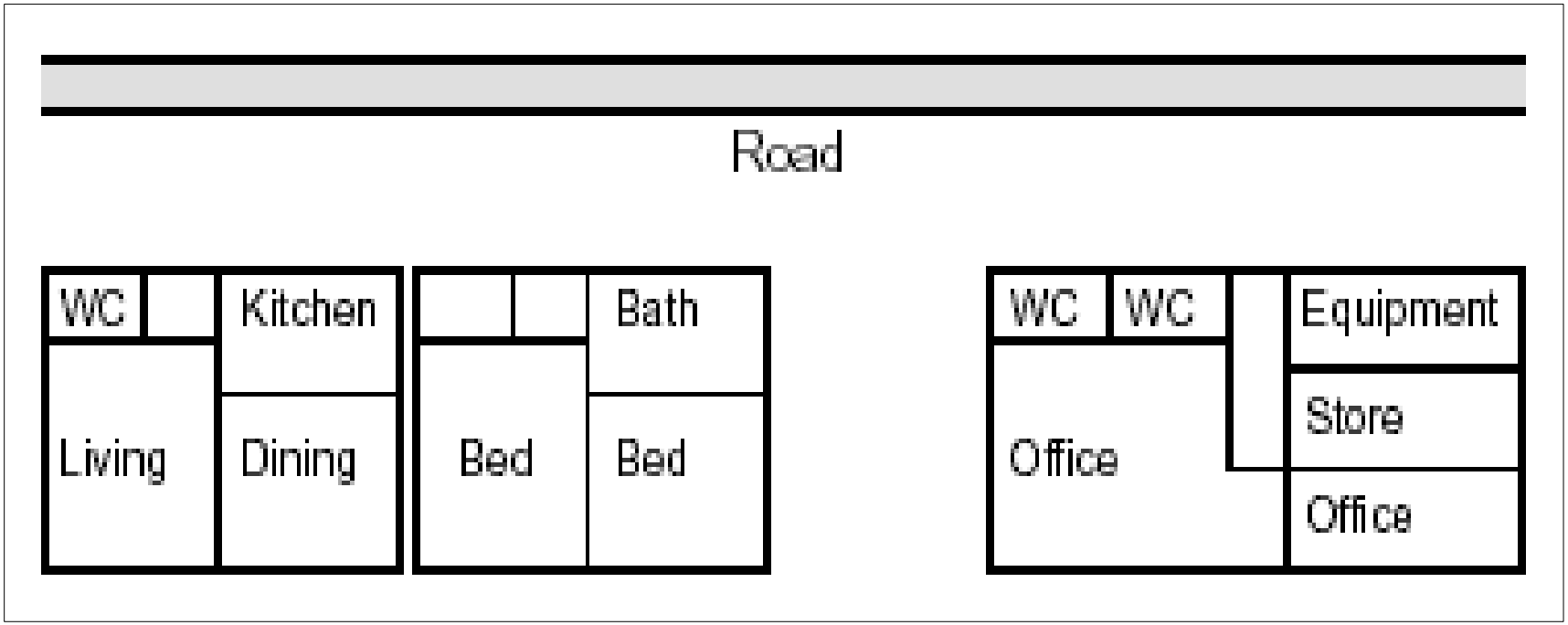


Fig 7 – Example of correct distribution of the rooms inside an apartment with respect to the road side for reducing noise levels in the rooms dedicated to the rest