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NOISE BARRIERS: FIRST INTRODUCTION ON ITALIAN HIGHWAYS

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Acoustic pollution forms part of the problem of the Assessment of Environmental Impact, which has now assumed considerable importance in road planning and has much influence on the selection projects.

In relation to the new legal proposal on noise levels which is at present being discussed, we are carrying out acoustic studies of critical points on stretches under construction or in operation of the Motorways' network and consequent executive projects which are to be carried out to allow a good attenuation.

Antinoise barriers in Italy are briefly described in this memo, keeping in mind that not only this type of intervention has been used, but also vegetal screen and phono-absorbent paving.

The first example of an integrated system of noise reduction is that of the phychiatric hospital protection against the noise of the new Milan-Naples highway near Rome.

After an appropriate acoustic study with previsional models we proceeded with the antinoise barrier project.

The intervention extends for 750 m. in length as protection for the hospital and 5.50 m. in height, and it is constituted by the overlap of a concrete barrier type New Jersey up to 1.50 m. in height and proper phono-absorbent panels of 4 m. in height in addition to a slanting projecting part of about 10° and of 0.50 m. in length.

The intervention is repeated both on the external edge of the viaduct and on the internal side:
the latter results biabsorbent so as to intercept sound waves produced by the more distant carriageways.

"Windows" of 18 m. have also been inserted every 140 m. approx. of transparent panels for perceptive aims and to allow a better visibility for the infrastructure users.

Significant is another intervention planned for the A10 Highway near Genova, where the infrastructure is placed in cutting at a variable quote from 2 to 6 m. from the site level, with walls of vertical supports and carriageways reduced to only 2 lanes of traffic and with buildings located at 2-6 m. from the edge of the wall.

It's to be underlined that there are buildings on both sides of the infrastructure and therefore geometrically we can represent the site as a "U", putting in evidence one of the heavier situation from a point of view of propagation of sound waves because of high reverberations originating from the non-absorbent walls (concrete walls infront of the buildings). (Fig. 1)

Experimental measures, taken on the external face of the various floors of the buildings, suggest a drastic intervention for attenuation is needed.

Several Hypothesis have been carried out which start from the insertion linked to a biabsorbent vertical barrier at the centre of the carriageway and to a wall plate applied to the head of the wall. This leads to the creation of an artificial tunnel, phono-insulating and phono-absorbent, constituted by a broken line with a vertical structural steel.

For structural, aesthetic and economic reasons, for the elimination of gas discharge, we have selected an intermediate solution. This solution foresees the central element to be "biabsorbent" with slanting projections connected to the wall plate, this also with overhanging parts, so to intercept a good percentage of the sound waves.

As already stated, the execution of solid foundation is fundamental: if one intervene during the phase of the project or in the already existing situation with ample space, the problem can be easily approached;but when the foundation interacts with the already existing structures, with no much space available, it is necessary to

tare the intervention, keeping in mind the structural characteristics of the whole system.

Another interesting example is that of an all-in aggregate type of barrier like the one denominated biowall: it consists of a series of concrete elements which are appropriately placed in a longitudinal direction and joined to two vertical plates and placed on the edge of the road, even if in embankment or in top of a cutting.

Such elements are conformed in such a way that a congruous volume of ground can be contained, into which vegetal essences are inserted. With the intention of maintaining a steady rate of umidity on the inside of such "pockets", materials which hold water have been inserted allowing a slow evaporation.

Therefore during the project and construction of artificial barriers, all parameters must be considered and valued. Not only the acoustic ones, but also those linked to safety, maintenance and aesthetic aspect for this insertion in the surrounding environment.

The structural dimension must guarantee the shape of the whole wall both to environment agents(first of all wind and snow, etc.) and to specific weight and whatever impacts.

Even resistance to fire, facility of cleaning for aesthetic and phonic factors, are all elements to be considered in relation to the duration.

Our experience in performing executive prohects puts in evidence the importance of all these elements together with the morphological and structural situations of the surroundings.

BIBLIOGRAPHY

1) G. Camomilla, S. Canale, F. Ventura
Control of noise traffic - XX National Meeting AIPCR
Cagliari, may 1986

2) G. Camomilla, M. Malgarini
Noise - New problem of Highway Direction
Autostrade Magazin n° 3/87

3) S. Canale, F. Ventura
Traffic noise and highway project
Autostrade Magazin n° 2/86

4) Cetur and IRT-Cerne
Automatic calculation program of sound levels due to vehicular traffic - NOISE June 1980

5) Paving Centre of Grenoble (France)
The utility of acoustic studies on urban pavings

6) Z. Maekawa
Noise reduction by screens - Applied Acoustic, 1968

7) L. Cohn, W. Bowlby
Atheoretically based method to estimate highway noise level with emphasis on parallel barrier insertion loss determination. J. Acoust. Soc. of Japan 5, 1, 1984

8) G. Camomilla, S. Canale, F. Ventura, S. Gervasio
Noise control on Italian Highways - Rome University December 1987

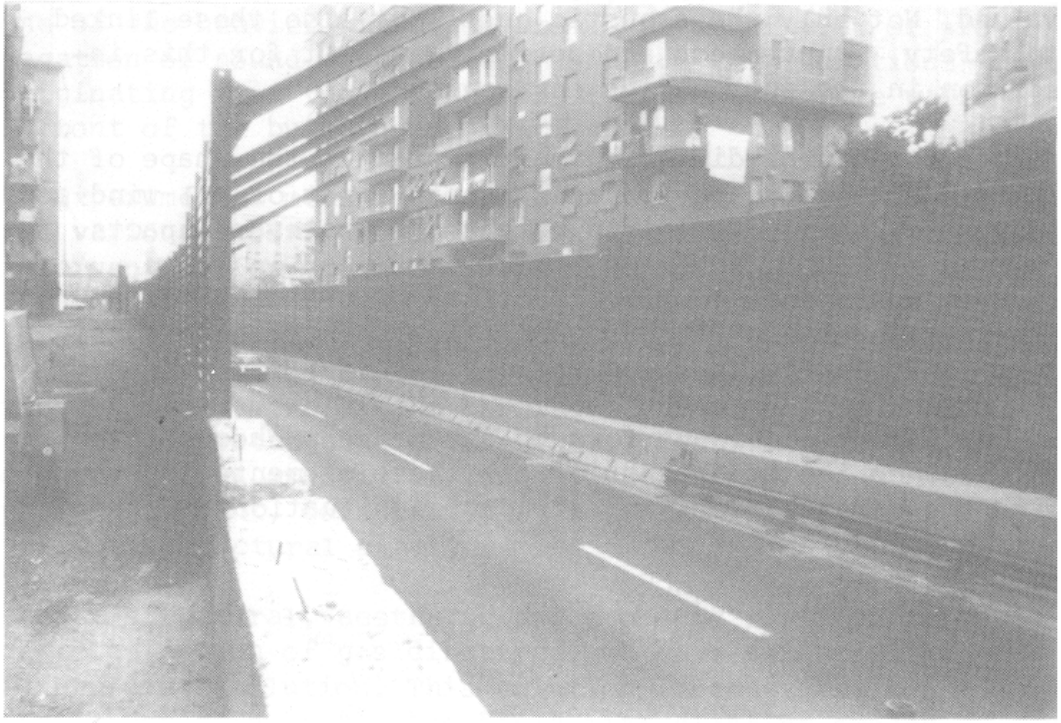

Fig. 1 - Antinoise barriers under construction near Railway on the Highway "A10"