

**inter.noise 2000**

*The 29th International Congress and Exhibition on Noise Control Engineering  
27-30 August 2000, Nice, FRANCE*

---

I-INCE Classification: 7.0

## NOISE MAPPING OF ROAD TRAFFIC NOISE IN PORTUGAL

**J.L. Bento Coelho\***, **J.R. Mateus\*\***, **M.J. Palma\***, **A.M. Almeida\*\***, **C. Patrício\*\***

\* CAPS-Instituto Superior Técnico, Av. Rovisco Pais, P-1049-001, Lisboa, Portugal

\*\* IEP, Praça da Portagem, 2800, Almada, Portugal

Tel.: +351.218419393 / Fax: +351.218465303 / Email: bcoelho@ist.utl.pt

**Keywords:**

NOISE MAP, ROAD TRAFFIC NOISE, ROAD NOISE MAP

### ABSTRACT

The drawing of road noise maps in Portugal is reported in this paper. The new Portuguese noise act, to be published soon, requires the production of noise maps to be used as a planning tool and for noise reduction plans. The Portuguese Road Authority has started a programme for mapping the noise generated by the major roads in the country. This is in line with the new Directive on Environmental Noise being prepared by the EU Commission.

### 1 - INTRODUCTION

The Instituto de Estradas de Portugal (IEP), as the government agency responsible for the road network in Portugal, started a broad project for drawing noise maps for the main roads. The technical work is being developed by the Group of Acoustics and Noise Control at CAPS-IST, Lisbon Technological University, through a co-operation agreement.

The noise maps for two main road sections have already been completed: (i) IC1, one of the main North-South highways, and (ii) Odivelas ring road, near Lisbon.

A noise map is an instrument with enormous potential for planning purposes. It yields a large amount of information on noise pollution. It produces a detailed spatial distribution of sound levels, offering images about the extent of the exposure of people to environmental noise. This structure had shown to be very important for urban planning, allowing the identification of areas where action plans are needed and contributing to major development project plans.

A noise map is also a simple and direct source of information, education and, in a general way, of people sensitiveness, for noise purposes. The production of noise maps for road projects is in agreement with the most recent recommendations of the European Union (EU Green Book on Noise), as a basic tool for planning and a major source of information for the citizens. Both the new EU Directive on the Assessment and Reduction of Environmental Noise, under preparation, and the new Portuguese Noise Act, to be published, will require that the authorities responsible for the major noise generating projects, either government agencies or private investors, produce the corresponding noise maps. These will assess the extent of noise exposure and will give information and help on the establishment of noise reduction plans.

Road noise maps show the noise levels generated by the traffic in the areas close to the road. Calculations of the noise levels for the whole lifetime of the project can be made, by using appropriate traffic data. The results will provide the authorities responsible for road maintenance and construction, as well as the local authorities and the public, with valuable information. It can define the areas where the noise levels can permit, or not, new land occupations with new arrangements for urban areas and where noise control measures should be adopted, with graded priorities.

### 2 - METHOD

The Portuguese Standard 1730 (based on ISO 1996), mentions the noise maps as a means for presentation environmental noise data, for a certain area.

The noise maps were made from calculations. Digitised land data was used together with road and traffic data. These include the road profile and information on the buildings and other constructions in the nearby area. Road traffic hourly counts, heavy-vehicle percentage, average speed and the pavement type were input.

Calculations were performed by using the Soundplan programme and the TRAF road traffic noise prediction programme. The TRAF programme was developed by CAPS/IST for Portuguese road traffic noise predictions and has been seen to produce excellent correlation with measurements, along the years. The major physical phenomena are considered, with absorption from air and from ground, absorption and reflection from obstacles as well as screening effects being taken into account.

Some measurements were made for validation of the calculations. Differences between calculations and measurements were kept below 1.5 dB.

Noise contours were drawn for daytime  $L_{Aeq}$  with 5 dB(A) intervals. Noise zones were colour coded according to NP 1730 Standard (ISO 1996), from  $L_{Aeq}$  levels below 40 dB(A) to above 75 dB(A). The number of people exposed to the different noise intervals can be calculated by correlating the noise levels with the number of inhabitants.

These maps can be updated at any suitable time by changing the data on traffic and on possible land occupation.

### 3 - EXAMPLES

The noise maps for a section of IC 1 (Ponte do Neiva / Darque) and for the Odivelas road were made. The maps show the distribution of  $L_{Aeq}$  from road traffic. The calculations were made in points of a grid with 10 m spacing. This was thought to be adequate for the region. The assessment area was a strip centred on the road and 300 m wide. Although this was found to be reasonable for those cases, a larger area should be considered in general. The next cases will be studied for an area 500 m wide. Figures 1 and 2 show sections of the noise maps of IC 1 and of Odivelas road.

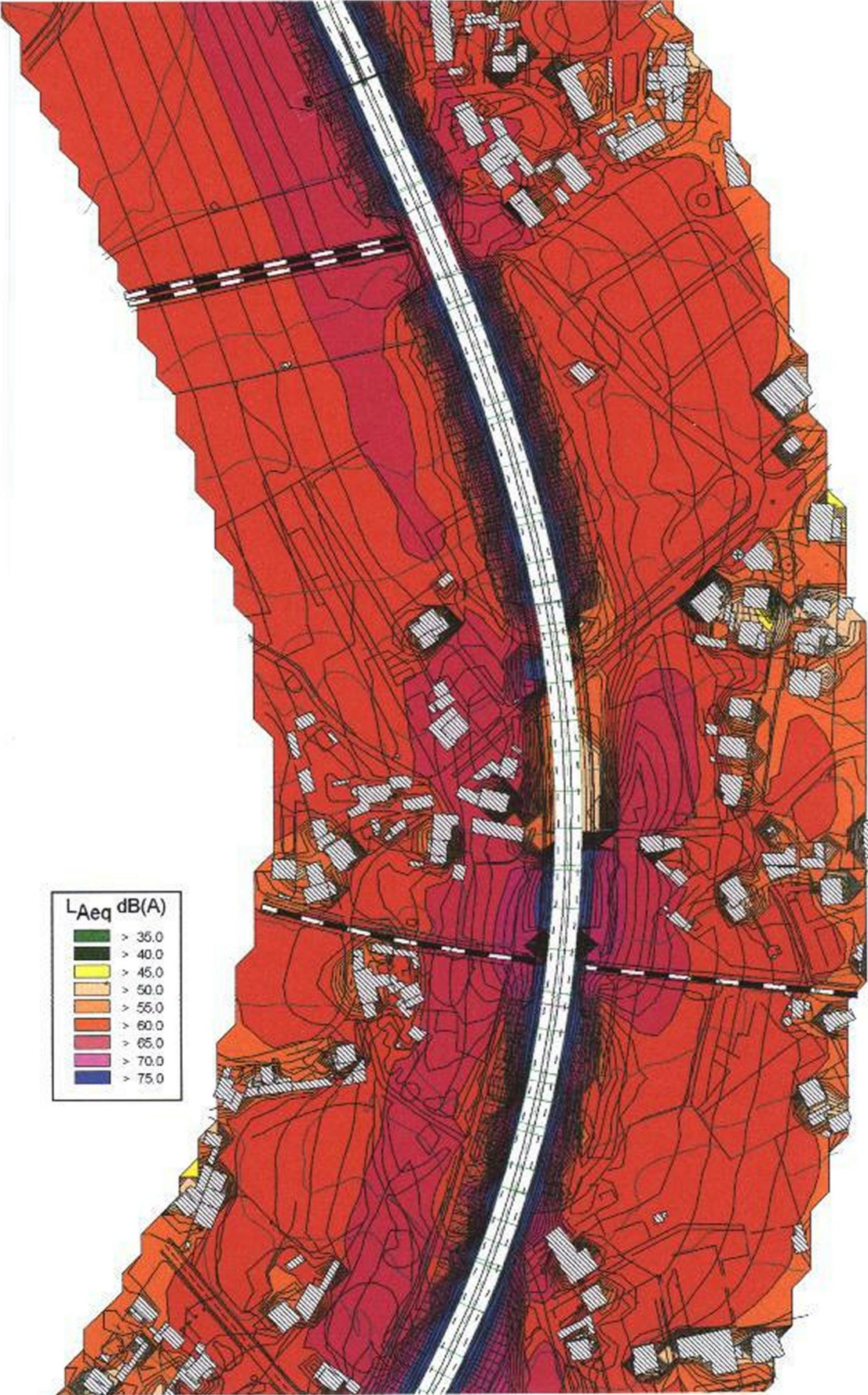


Figure 1: Section of noise map of IC1.

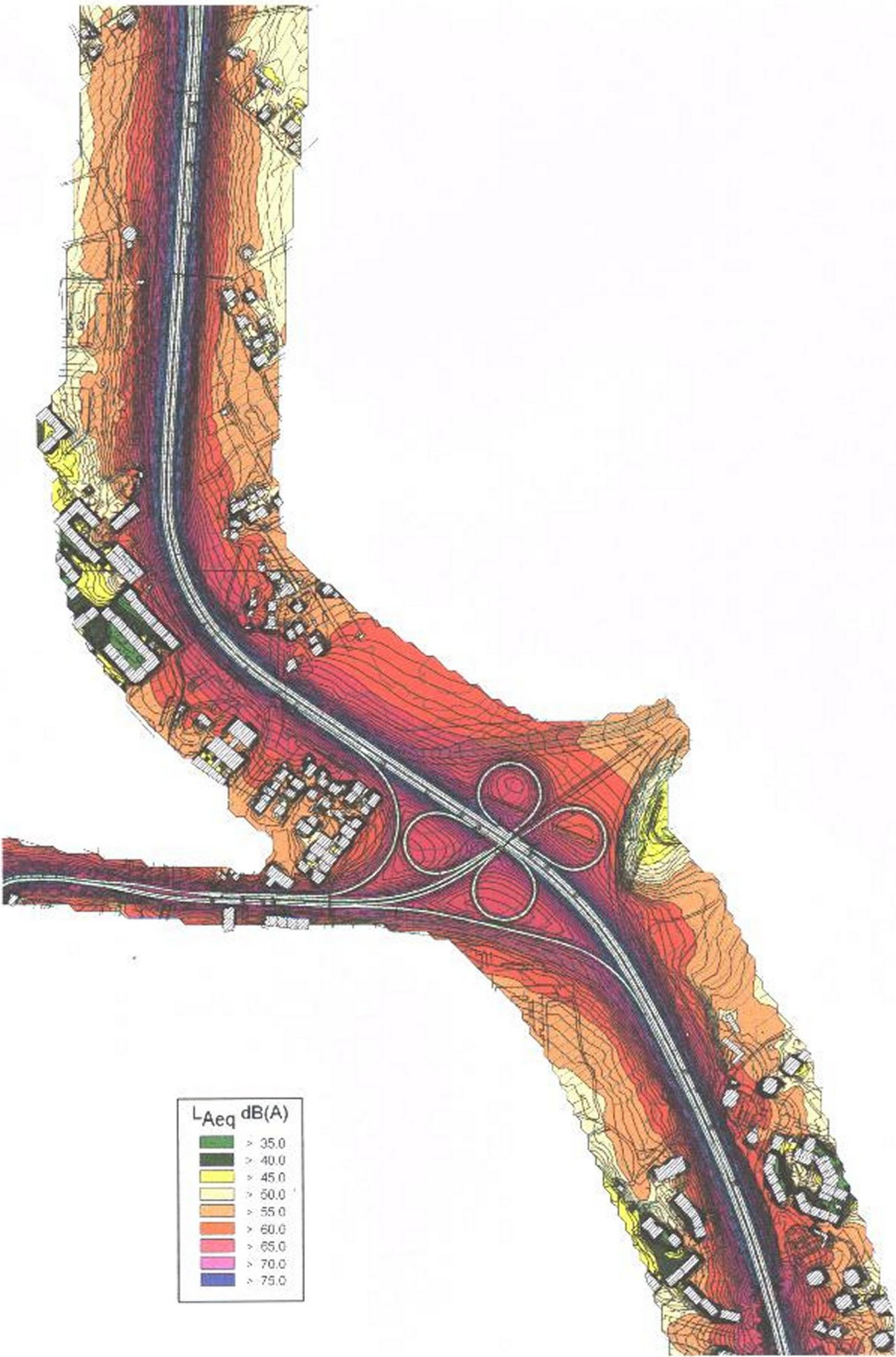


Figure 2: Section of noise map of Odivelas road.