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PROBLEMS WITH TRAFFIC NOISE ASSESSMENT.

R.A. HOOD

RTM PLANNING PARTNERSHIP

In this paper I examine some of the problems that I have come across when describing the impact of a proposed road at a public inquiry. The problems can be divided into four categories, those associated with the subjective response to traffic noise, the presentation of these assessments, the accuracy of traffic noise assessments and summarising these assessments to enable route location decisions to be made.

THE SUBJECTIVE RESPONSE TO ROAD TRAFFIC NOISE

In the past 10 years in excess of 2,000 miles of new road have been built yet our assessment of people's response to disturbance from new roads is still based on a hypothesis. The hypothesis is that disturbance is proportional to change in 18 hour L_{10} facade noise levels. I can find no experimental data to support this hypothesis.

The 18 hour L_{10} facade noise level is a good index for assessing the disturbance due to road traffic on existing roads. If the assessment is undertaken on a group dissatisfaction basis then the correlations are quite good. However, the correlation coefficient for predicting the disturbance to a person from the hr L_{10} facade noise level was very poor. Correlations of only about 0.2 have been found.

THE PRESENTATION OF NOISE IMPACT DATA

If one assumes the hypothesis that the disturbance from a new road is proportional to the change in 18 hour L_{10} facade noise level in dB(A), there is still the problem of how one presents this information. There are two main methods of presentation, the first is the use of noise contours and the second the use of noise impact drawings. Noise contours have been used for some-time to show the noise impact of highway proposals and recently the Leitch Committee recommended the use of these contours. However, there are three factors which in my view limit the value of noise contours. These are the height to which noise contours apply, the interaction between noise and properties and the large number of calculations required to accurately locate a noise contour. In most cases noise assessments are required to assess the impact on residential areas and in such cases the three factors identified above limit the value of the contour method.

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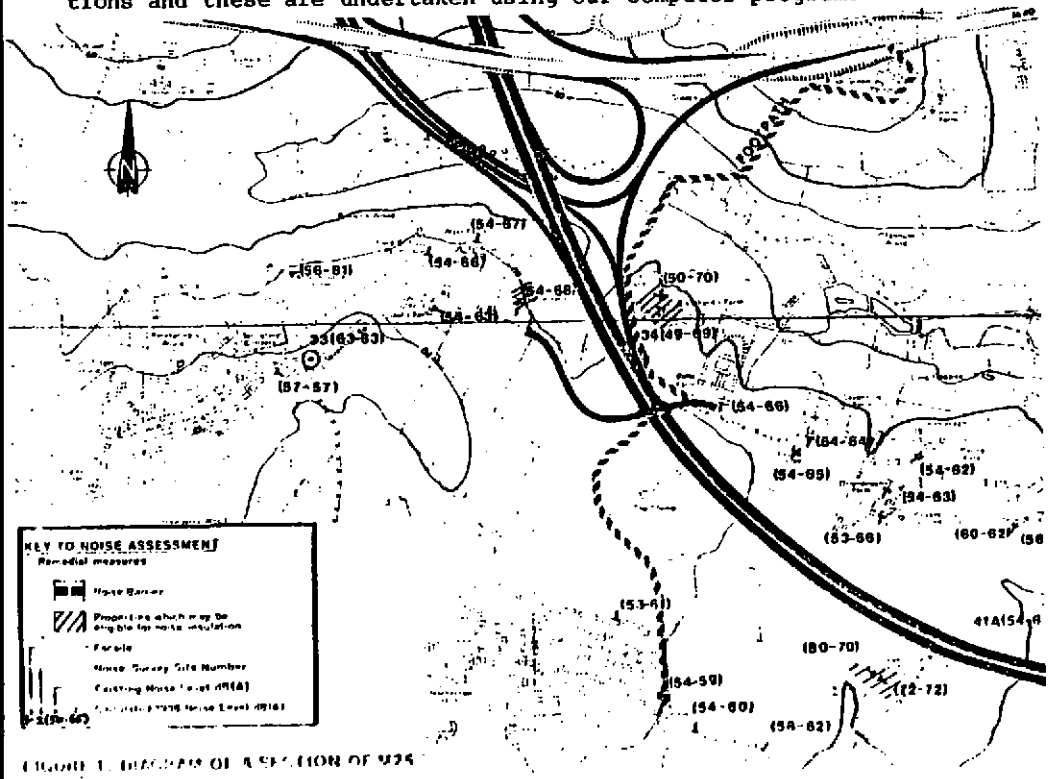
The second way of presenting noise impact information is by way of noise impact drawings, an example of which is given in figure 1. In these drawings we show the existing noise level and the future noise level for a particular facade. The existing noise levels are attained from noise surveys and the future noise levels are calculated. These assessments require a large number of calculations and these are undertaken using our computer program.



THE ACCURACY OF ASSESSMENTS

My main area of concern in traffic noise assessments is the accuracy ascribed to these assessments. The areas where inaccuracies occur are in the estimation of existing noise levels, the calculation of future noise levels and the interpolation between the calculated locations and adjacent locations to obtain the noise impact on any property.

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Accuracy of Existing Noise Levels

An accurate estimation of an existing noise level can only be obtained when there is a high noise level. As the source of the noise is moved away, inaccuracies in determining the existing noise level rapidly increases due to the meteorological effects. Research has shown that noise in a quiet country area can change by ±4 dB(A) depending on the wind direction. A further error arises by not taking a full 18 hour sample to obtain the 18 hour L_{10} facade noise level. If only a 3 hour sample is measured as described in "Calculation of Road Traffic Noise" this induces a ±1.5 dB(A) error, but if only a single measurement is taken, we can see from studying 18 hour readings that errors can be from -4 to +7 dB(A). Consequently any assessment that is based on a single measurement should be viewed with caution.

Calculation Method Accuracy

The accuracy of the calculation method has been found to be ±2 dB(A).

Interpolation Accuracy

The final area where errors are prevalent is in the interpolation from the noise levels calculated or measured at specific locations to adjacent sites. This error can obviously be eliminated by undertaking calculations at every location, but even with our very fast computer program, we cannot arrange to have the required calculation points at the time it is required. This inaccuracy is dependent on the number of calculations that have been undertaken. It is also dependent on the method and scale of presentation of this information. I have assessed that for noise contours drawn on 1:2500 scale, the errors can be up to ±10 dB(A).

The most accurate assessment can be obtained from using noise impact drawings where a large number of measurements have been taken and a large number of sites calculated. In this situation I estimate that in general the noise impact will be within ±4 dB(A).

ROUTE CHOICE

Finally, in trying to decide between two routes, the information one has and the way in which one presents this information, causes problems. SACTRA (Standing Advisory Committee for Traffic Road Assessments) recently suggested a form of presentation which can be most conveniently described as 'acoustic bingo'. An example of the method is given below.

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Units		Blue					Green					
		After Noise Levels						After Noise Levels				
		55-55	60	65	70	70+		55-55	60	65	70	70+
Number of Properties	Before noise levels 55-55	10					55-55	9				
	55	12	23	2			55	12	27	5		
	60	43	7	18	7		60	47	7	26	5	
	65	132	105	16		4	65	163	95	16		9
	70			120			70		16	83		
	70+						70+					

TABLE 1 SACTRA Suggested Method

They produced for each alternative route a matrix showing the number of properties which have existing noise levels and future calculated noise levels in various noise bands. These can be produced for alternative routes and in some cases for the opening and design years. Apart from being very difficult to make sense out of some of these numbers contained in the matrices I would suggest that these matrices are based on two hypothesis. Firstly as discussed earlier the noise disturbance to people living adjacent to new roads is proportional to the change in 18 hour L_{10} facade noise level, and secondly that this disturbance is limited to the existing noise level. I am of the opinion that the simplest way to identify any differences in two alternative route alignments is to study the noise impact drawings and if they do not give a clear picture to produce a table similar to the one below which sums the number of properties within each noise change group

		Approximate Number of Properties	
		Green	Blue
Sever increase	> 20 dB(A)	0	0
Substantial increase	11-20 dB(A)	18	38
Significant increase	5-10 dB(A)	65	34
No. of porperties that may be eligible for noise insulation		0	34

TABLE 2 Non Impact Summary Table.

Even with this type of table problems can occur if there is no clear advantage of one route over another.