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URBAN NOISE MEASUREMENT AND EVALUATION

Assessment of Noise Impact due to Construction Activity

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Noise from construction sites in urban areas frequently has considerable impact on neighbouring communities. Large transportation schemes are probably the prime source of this kind of impact which, though it may be of a temporary nature, can be particularly severe. It has become apparent that there is considerable need for means of assessing and predicting construction noise impact so that the effects of various noise control strategies may be compared.

The types of noise control strategy that may be applied to a construction process are generally dependent on the form of the process itself but may be classified as follows.

1) Modification and/or replacement of equipment. (Source Modification)

2) Selective use of equipment and control of noise propagation. (Use Management)

3) Use of alternate construction schemes, techniques, or locations. (Substitution of Technique or Location)

In order that the noise impact may be predicted and an optimum noise control strategy selected, there are four factors that must be considered.

- The actual or planned situation must be described in such a manner that noise exposure on the relevant scale and to the appropriate accuracy can be predicted at any point.
- The applicable noise control options in terms of Source Modification, Use Management and Substitution of Techniques must be available.
- There must exist a means of estimating the actual impact in terms of total annoyance disturbance and disruption caused by a particular level and type of noise exposure to a given population.

The economic cost associated with each noise control option must be available so that a realistic choice can be made.

A study undertaken for the United States Department of Transportation will be used to indicate how various noise control strategies might be applied to a particular type of transportation construction -- cut and cover tunneling.

The noise control strategies considered were:

a) variation in type of construction scheme;

b) application of 'state of the art' noise control to the noisiest equipment in each scheme;

c) application of advanced noise control to the noisiest equipment in each scheme;

d) application of state of the art noise control to all equipment in each scheme;

e) application of advanced noise control to all equipment in each scheme;

f) use of equipment specifically designed for use in place of extremely noisy machinery.

The phrase 'state of the art' noise control techniques implies the use of noise reduced equipment already available or the application of technology already in use in other fields. The figures applied for advanced noise reduction imply a continuing research effort and a strenuous application of noise reduction technology to construction equipment.

Cut and cover tunneling methods were classified and subdivided into work phases running from site preparation to reinstatement of permanent roadway. The type of equipment used in each phase and construction method was identified and usage factors calculated. Actual field measurements and published data yielded noise generation characteristics of each class of equipment. Equivalent noise levels (L_{eq}) were calculated for each phase and construction type. A summary of the total L_{eq} for each construction method and each noise control strategy is shown in Fig. 1.

The implications of the following figure and the data from which it was derived will be discussed with particular attention being paid to the manners in which prediction techniques might be validated and simplified so that they may be used as planning instruments.

	Noise Control Strategy				
	a	b	c	d	e
Driven Piles and Excavation	93	85	80	84	80
Augered Piles and Excavation	84	81	80	72	68
Temporary Diaphram Wall	84	81	80	72	69
Permanent Diaphram Wall	84	82	81	73	69
Bored Concrete Piles	84	82	81	73	69
f. Pile Driving with specially designed quiet piling rigs					
'Taywood'	83			72	68
'Hush'	83			72	69

Fig. 1. Estimated Equivalent Noise Level at 25 m Over The Whole of Construction Activity.