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The New Museum of Anthropology in Vancouver: An Acoustic Dump

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1976, revised 1980

In recent years there has been a painful increase of ventilation noise in public buildings. The newer the building the more it seems to be pervaded by the low frequency rumble from air conditioning systems.

I became aware of this through some years of listening and decided finally to study the acoustics of one of the newest buildings in Vancouver, the Museum of Anthropology at the University of British Columbia designed by Arthur Erickson Architects. When it first opened in May 1976, I was curious to find out how the architect had dealt with the many questions involved in designing an anthropological museum. I was most interested in the acoustic aspects and wondered whether or not any thought had gone into creating a special acoustic environment that might enhance the visitor's experience of exhibits taken primarily from aural cultures.

I soon realized that this building sounded just like any other new public building. It is but one example of many new buildings that spring up in our cities. Thay all sound identical even though they fulfill different functions, and they all seem to get louder as time goes by.

THE BAD BREATH OF MODERN BUILDINGS

The increased use of air conditioning seems to be part of a major trend in the design of most public buildings in North America. Architecture is becoming the art of creating highly artificial, closed environments. The extent to which this trend has already become an ideal among architects and others involved in the building is exemplified in the following statement by an acoustical engineer:

> **The remarkable growth of the engineering sciences...has contributed to architectural practice to the extent that a building now does much more than provide shelter and protection for its occupants against the thermal, atmospheric, luminous, and sonic fluctuations of the exterior world. Contemporary environmental control can create a complex artificial environment that will meet all the physical, physiological, and psychological requirements of the occupants. This artificially created synthetic environment is in many respects superior to the natural one. No exterior atmosphere is comparable to an air conditioned and humudity controlled room.**
>
> Leslie L. Doelle, Environmental Acoustics. New York;
> McGraw-Hill Book Company, 1972, p.3

In the majority of cases such an attitude results in the creation of the kinds of glasshouses and concrete blocks that make up our urban landscape, and form environments in which

thousands of people work, study or live everyday. Depending on the quality of the exterior environment it might seem beneficial to be isolated from it. In downtown areas, for example, buildings are usually designed deliberately to keep the unpleasant features of the city outside (noise, exhaust fumes, etc.). In other parts of the city or in the country, however, such a separation from the exterior seems senseless. Why should students in so many newly built schools and universities all over North America have to study with artifical lighting, recycled air, often without windows, in isolation from the often very beautiful, still surroundings? Does this not, in fact, alienate the occupants from the experience of the exterior and make them more dependent on artificial living and working spaces? Are architects not helping to create institutions that are more like prisons than stimulating learning places? Or is it merely an economically advantageous trend in building design, which is pursued without much concern for possible side effects on the occupants? Not all artifical environments have to isolating, oppressive spaces. Good designers are able to transcend the artificial separation between interior and exterior, using materials, forms, smells, and sounds from the natural environment. In the MacMillan Bloedel Conservatory at Queen Elizabeth Park in Vancouver, for example, it is easy to forget that one has entered a closed building environment. Every aspect of the space -- the natural light shining through the glass dome, the textures, smells, and colours of plants, the sounds of birds and water, the textures of the trails and the sound of footsteps on walking surfaces -- help overcome the limiting aspects of an artificial building environment. Obviously the majority of new buildings cannot be designed in such an elaborate way, mainly for economic reasons. However, most of them do not show even the beginnings of imaginative design in this direction.
In terms of acoustic aspects of interior design architects and acoustical engineers in recent years have developed a growing awareness of the need for noise control in modern buildings. This concern expresses itself in the specification of background noise criteria recommended for various indoor spaces.

	PNC	dBA
Excellent listening conditions	**less than 20**	**less than 30**
Sleeping, residential, private office, library & classroom spaces	**25-40**	**34-47**
Large offices, stores, cafeterias and restaurants	**35-45**	**42-52**
Lobbies, labrotory, engineering and secretarial spaces	**40-50**	**47-56**
Maintenance, equipment, kitchen and laundry rooms	**45-55**	**52-61**
Shops, garages, power-plant control rooms, etc.	**50-60**	**56-66**

Table 1: Suggested PNC (Preferred Noise Crireria) and equivalent dBA (decibel A-scale) as recommended for various indoor situations (after Beranek, Blazier and Figwer, The Journal of the Acoustical Society of America,1971, p.1227).

from: Handbook for Acoustic Ecology, Barry Truax (Ed.), World Soundscape Project, Simon Fraser University. Vancouver: ARC Publications, 1978, p.81.

Although the importance of such criteria should not be underestimated it should not be forgotten that these criteria are quantitative in nature and give no indication about the quality of an environment. For example, a building may meet the recommended noise criteria, yet it may be acoustically dull. In fact, most new public buildings fit into this category: they all sound monotonous. Their ambient sound is the continuous hum of air conditioning, often accompanied by an aggravating 60-cycle hum from florescent light fixtures. Yet they do meet the recommended noise criteria.
Although the sound of air conditioning may appear to the uncritical listener like a mere by-product of the system's main function (that of air circulation), it, in fact, is often

purposely designed to function as a noise control device in the sense of masking other sounds.

> **The phenomenon of masking noise is uninterrupted and not too loud, and if it has no information content, it will become an acceptable background noise and will suppress other objectionable intruding noises, making them psychologically quieter. Ventilating and air conditioning noises; the noise created by uninterrupted traffic flow on a highway, and the sound of a water fountain are good masking-noise sources.**
>
> Doelle, op. cit., pp.19-20

The use of air conditioning as a means of noise control, however, merely tends to cover up the real sources of noise and thus avoids the real problems of noise control: it makes the space "psychologically quieter" and thus gives the impression that the noise problem no longer exists. In reality more sound is created. But because of the even, uninterrupted quality it is an easy sound to ignore. It has no information content and thus, insidiously, makes us believe that we are surrounded by peace and quiet. Often only a power failure can demonstrate effectively to the occupants that walls of sound surround them every day. Whoever has experienced this knows what it feels like to be relieved from this constant acoustic stimulus.
The main concern in architectural acoustics obviously still lies in the area of noise control (in the form of meeting recommended noise criteria and in the form of masking). Possibilities of acoustic design have hardly been explored. In other words, an effort is made to insulate and mask a space from intruding noises, but little care is taken to create a quiet but stimulating sound environment.
Arthur Erickson Architects are victims of this general trend. in the new museum they have apparently not even worried about meeting the recommended noise criteria, let alone put some effort into the creation of an interesting sound environment that might enhance the visitor's experience of the exhibits.

THE MUSEUM OF ANTHROPOLOGY -- AN ACOUSTICALLY OPPRESSIVE ENVIRONMENT

The Museum of Anthropology is "situated on the most impressive site on the campus of the University of British Columbia, overlooking the Straight of Georgia and the North Shore mountains." (from a pamphlet informing the visitor about the museum). Could one imagine a more suitable site for a museum that preserves primarily West Coast Indian artifacts and objects? It is a place, although within Vancouver city boundaries that still retains some features typical of British Columbia's West Coast, and is usually quiet enough to let the visitor imagine another time in another culture.
As visitors enter the building and the heavy glass door closes behind them this is easily forgotten. The sound "as of a mighty wind" suddenly dominates the entrace hall: it is the air conditioning rushing through the closed but not air-tight door. As one proceeds further into the museum the tune changes. The attentive listener will perceive a continuous low frequency rumble from the air conditioning system that pervades the whole space. It is a familiar sound, the keynote sound of all new public buildings. In fact, it is so familiar to most of us that we tend to ignore it. Yet it is always there, accompanying us on our journey through the museum, sometimes louder, sometimes less audible. The map below indicates the sound levels in the various areas of the building, both during and after visiting hours.

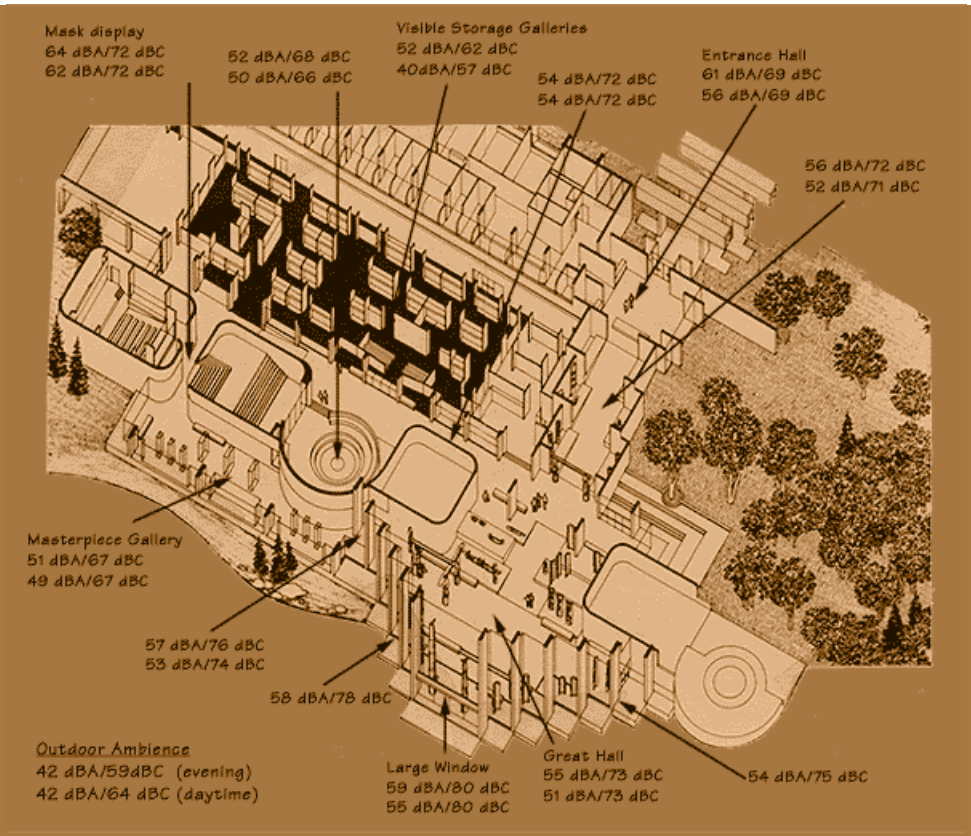


Figure 1: Ambient Sound Levels in the Museum of Anthropology, 1976*
(dBA/dBC: levels during visiting hours
dBA/dBC: levels after visiting hours)

Illustration used by permission of the museum of Anthropology.

*** Repairs in the air conditioning system lowered the sound levels in the museum by an average of 5 dBA and 1.5 dBC by January 1980. This average, however, is increased by one change only in the museum. The Mask Display (see above map) was as high as 62 dBA in 1976 because of air conditioning wind produced by a closed but not air-tight window. This display has been removed and in the same place is now the entrance to the new theatre. Without the wind sound the levels now are 40 dBA and 64 dBC. In the other parts of the museum, however, levels have been lowered by an average of 2.5 dBA and 1 dBC only. In addition 60-cycle hums from faulty lighting fixtures are as much part of the ambience as the air conditioning is. In other words, an ambience lowered by a few decibels only and without any qualitative changes cannot be considered an improvement. The ear simply does not perceive a change of a few decibels.**

The most striking result of the measurements made in the museum is the discovery that the ambience outside is quieter than that of most areas inside (except where the exhaust system of the building itself raises the ambient exterior noise level to 66 dBA and 76 dBC -- measured on the trail at an approximate distance of 12 feet). Only the Visible Storage Galleries are quiet. They are, in fact, the only place in the entire museum which meets the noise criteria recommended for museums, libraries, and similar such spaces (40 dBA/57 dBC in empty museums).

The loudest area of the museum is the Great Hall, the large central space that houses a magnificent collection of Haida and Kwakiutl totem poles, house posts, and other alrge carvings. Not apparent from the sound level readings in the Great Hall is the presence of a 60-cycle hum that continuously stings the visitor's ears. Its source is flourescent light that is turned on throughout the day inspite of the windows that "tower 45 feet high, enabling the giant totem poles to be seen in natural light." (From a pamphlet informing the visitor about the museum). This large window area does indeed provide excellent lighting. In fact, it is such an overpowering sight that it makes one forget the sound of air conditioning. It is probably no coincidence then that hte highest noise levels were found right at the windows.

Our ears naturally discriminate against low frequencies. We simply do not perceive them as loud as higher frequencies. Thus, in sound level readings, it is necessary to employ two seperate scales of measurement. The decible A-scale (dBA) measures sound intensity exactly

as the human ear perceives it, and is the one most commonly used to measure environmental sound. The decibel C-scale (dBC), on the other hand, measures the intensity of the entire frequency spectrum, including those low frequencies which the ear, and the A-scale, discriminate against. Our bodies are like the C-scale: they do not discriminate against low frequencies. Low frequency sounds tend to vibrate our bodies, and particulaly the stomach area. When a truck passes or when we listen to rock music this becomes obvious, since we can feel our body stimulated continously. In urban environments it is considered normal to have a 10 decibel difference between dBA and dBC measurements, sice most technological sounds contain a high proportion of low frequencies. In nature differences between dBA and dBC seldom exist (except, possibly, right beside a waterfall). But a comparison between the two kinds of measurements made in the museum shows that the dBC levels are 15 to 25 decibels higher than the dBA levels! (see above map).

> **In museums and libraries every reasonable effort should be made to provide the quiet environment essential for studying or reading or contemplating works of art.**
>
> Doelle, op. cit.,p.212

Besides the loudness of a sound and its physical impact and effect, one must consider its quality and also the meaning it has to the people that occupy the space. Air conditioning sound is without information content; visitors to the museum are not supposed to listen to it. Whereas in public buildings in the downtown areas such sound sometimes has the function of masking a continuous barrage of abnoxious sounds, this function becomes irrelevant in the surroundings of the museum. Besides the occasional airplane there is nothing to mask here except perhaps the sounds of visitors. And this is, indeed, what it does, more so in some area than in others. When comparing the measurements made during visiting hours with those made in the empty museum it becomes obvious that there is no significant difference between the two, especially in the case of the dBC measurements (see above map). Although many people were visiting the museum, and were talking, when I made the measurements during visiting hours, their presence hardly registered on the scale. Their acoustic presence was masked by the air conditioning hum in most areas of the museum. In the Great Hall in particular the combination of reverberant surfaces, the air conditioning hum and the 60-cycle hum contributed collectively to mask and diffuse the sounds made by visitors.

I analyzed the spectrum of the tape recordings made in two different areas of the museum. The purpose was to compare the frequency content of the ambience during and after visiting hours, that is, with and without people present. There is very little difference in the shapes of the curves between Figures 2a and 2b. Figures 3a and 3b, on the other hand, demonstrate considerable difference. Although voices are audible in the Great Hall during visiting hours they are mostly masked by the air conditioning rumble, as can be seen in Figure 2. Only the higher frequencies of speech register on the graph (see arrows on 2b).

The two graphs in Figure 3 are from recordings made in the Visible Storage Galleries, which is the quietest area in the whole museum. As a result human speech during visiting hours changes the acoustic quality of the ambience considerably. Here the air conditioning is not loud enough to mask visitor's sounds. it is interesting to note that this area in the museum is always full of visitors. Whether this is related to the quietness or simply to the larger quantities of artifacts exhibited here is hard to say. Probably both.

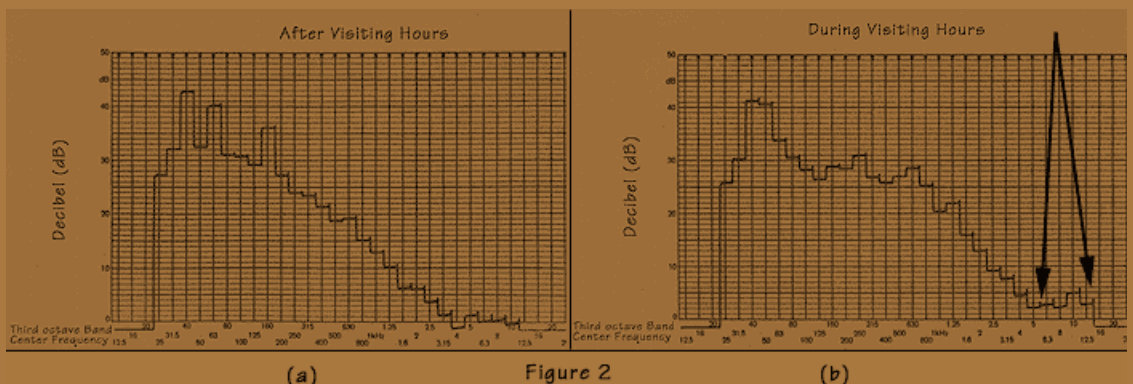
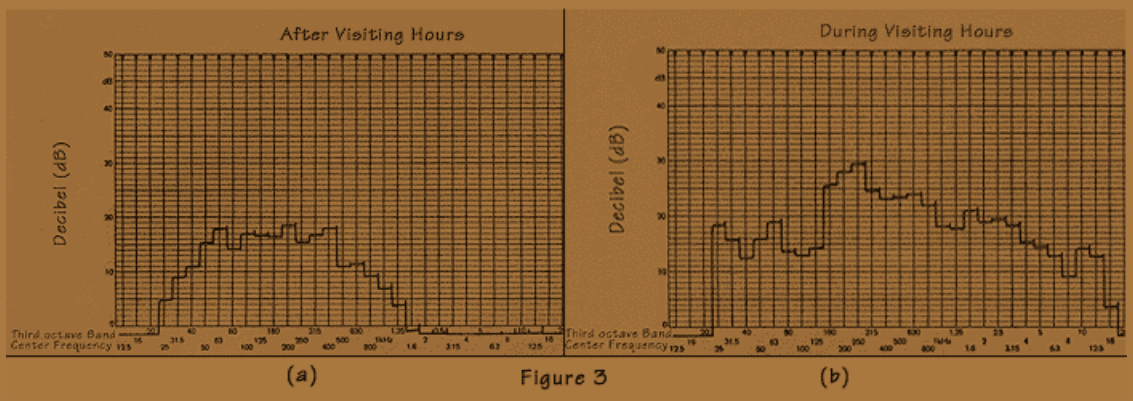


Figure 2

Sound spectrum of the ambience in the Great Hall, showing a high proportion of low frequency content in the air conditioning (a) that masks human speech almost entirely except the higher frequency range (b, see arrows).



Sound spectrum of the ambience in the Visible Storage Galleries, showing comparitively low proportion of low frequency content in the air conditioning (a). Here visitors' sounds predominate above the sound of air conditioning (b).

In most other parts of the museum, the air conditioning continues to rule the space. The soundwalls created by the air conditioning enwrap each person in a private space of meaningless sound. This, in turn, creates -- often unconsciously -- feelings of distance and isolation in the individual, not only from the other people but also from the artifacts, and the general museum environment. The experience of the artifacts is one step removed.

The visitor who visits the museum for only half an hour might not be conscious of this at all. However, the museum staff and the guards have become very aware of the presence of the air conditioning sound. They have told me many times that they are bothered by the noise in their areas. Psychologically the sound seems louder over time, because ther is no getting away from it, no getting out of it. it gives a sense of isolation, of being locked in, in the same way a wall without windows does.

THE TOTEM POLE AS AN ACOUSTIC EVENT

The quality of a soundscape always influences the quality of our experiences within an environment. Imagine, for example, a tranquil mountain lake. Imagine further that you are hearing a call of a loon. Imagine now the same tranquil lake with the sound of a speedboat. In the same way let us examine one specific area in the museum: the Great Hall. You came here to see and experience the totem poles for which the hall was designed. The natural lighting through the large window and the view outside are perfect. You are seeing the totem poles almost as you would see them in their natural context. The acoustic accompaniment, however, is the low rumble from the air conditioning system, a penetrating 60-cycle hum and the sound of reverberant, diffused voices from other visitors.
"...it is in their true home that these picturesque creatins can be seen to best advantage. At the edge of the ocean, amid tall cedars and hemlocks, and in the shadow of lofty mountain peaks..." (Marius Barbeau, Totem Poles, Bulletin No. 119, Vol. 1, Department of Resources and Davalopment, National Museum of Canada, 1951, p. 1.) Now imagine this accompanied by the sound of distant waves, wind in the forest, ravens calling, perhaps some rain falling, perhaps some voices from the village.
But the poles have been removed from their original context, and therefore an ideal experience is no longer possible. We must ask ourselves, therefore, if, under these circumstances, it is still possible to experience them in a meaningful way, to recognize their images, to hear the stories they tell. It is this question that should challenge the architect who designed an environment for these poles.

Every totem pole tells a story. it is as much a carrier of an aural tradition as are the songs, narratives and rituals of an aural culture. Totem poles stand silently; listening to the forest, ocean, wind and rain, to ravens and frogs and eagles: listening to everything they are telling

us about; made of the material their surroundings are made of; their surroundings collected in them and brought to new expression in their large silence silent structure. Each totem pole is an acoustic event for those who want to hear, for those who listen to its voices and the stories it has to tell.
Ideally it is for the survival of this "acoustic event" and not just for the physical survival of the totem pole that the architect must aim for in his design of the museum. For a totem pole whose voices can no longer be heard is nothing but a dead structure from a dead culture, and the space in which it stands is nothing but a mausoleum.
Without the air conditioning the Great Hall is a reverberant but quiet space. In that state it has all the potential for a stimulating acoustic environment. it could be transformed into the clear reverberant space of a forest environment in which totem poles stand; an environment whose quietness is punctuated by sounds in the same way a forest silence is punctuated by a multitude of natural sound; an environment whose quietness stimulates one's acoustic imagination. In quietness our ears can reach out and find stimulation. In air conditioned spaces a continous wall of broadband noise -- even if it is relatively quiet -- makes it uninviting for the ears to liten. In such a space the tendency is not to listen, because there is nothing worth hearing and what there is to hear is blurred and hard to locate.
On the other hand, a continuous sound like a creek can be very stimulating even though it creates as much of a sound wall around the listener as air conditioning does. The difference is that one sound is very complex and the other one very dull. The ear is drawn into the complex soundworld of water, so much so that the longer one listens to a creek the more does one begin to imagine other sounds, such as wind and voices. A good example of the use of water can be found in the entrance hall of the Provincial Museum in Victoria, B.C., where what I call a "rain curtain" has been installed. It consists of many one-inch thick strings of plastic stretched between ceiling and floor. Water is running down along each of these strings and is "raining" into a pool at the bottom. Aside from being visually very intruiguing its sound in this West Coast context is very fitting. The overall sound it produces is that of rain and flowing water that one can experience in the forests of British Columbia. Acoustically it puts the totem poles into a familiar context.
By removing totem poles from their original context we have in a sense already begun to rob them of their original voices. They no longer are able to tell the stories they once told to their rightful listeners. In building a museum for them, we have the responsibility of making the vestiges of stories they may still have, somehow available. In a city it might mean that an artificial environment has to be created, since no urban environment can supply the right context for such stories. It may mean that the architect has to create an environment entirely seperate from its surroundings, but utilizing nature's materials, sounds and smells.
The combination of a loud air conditioning system and a very reverberant spaces make the Great Hall what I have called an acoustic dump: a place where all sounds are thrown together into a blurred heap of sound mush. The architect was not concerned with the survival of the totem pole as an acoustic event. Only the physical survival of the poles was considered. The poles have turned into objects to be looked at, objects that have no stories to tell. Even the attentive listener will hear nothing beyond the rumble of the air conditioner and the 60-cycle hum. Meaningless sound masks the voices of the totem poles that might tell us stories and myths, if our ears were free. Not only is the visitor's acoustic existence masked and blurred in this space but his acoustic imagination -- which can only grow and expand in quiet and acoustically stimulating places -- is oppressed as well.

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