Avalanche Workshop, Davos 13-17 May 1990
Presentation:

NORWEGIAN DEMANDS ON AVALANCHE SAFETY - LEGISLATION, QUALITY POLICY AND JUDICIAL PRACTICE

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LEGISLATION

The Building and Planning Act and the Working Environment Act both have demands concerning avalanche safety.
The legal demands concerning avalanche safety were first established in the Building Act of 1924. The act was put into force for the whole country in January 1966.

Instructions on avalanche safety are also established in pursuance of the Act Relating to the Regulation of Water Resources.
On the other hand the Road Act has no demands concerning avalanche safety.

In accordance to the Building and Planning Act development in hazardous areas can be avoided/prohibited at three different stages.
At the level of:
Municipal area planning by tying up potential hazard areas.
At the level of:
Area regulation planning by marking off hazard areas
and thirdly:
in the Building site regulation by the specific safety standards.

The general clause of the Building Regulation states that:

> "Buildings and directly adjacent external areas in use shall be situated, dimensioned and constructed so that there is resonable safety against personal injury occurring because of such loads which may be foreseen.
> .....
>
> Buildings where a total collapse would cause serious or extremely serious risk of personal injury, shall be constructed or situated so that accidental action in a small part of the building will not lead to an extensive collapse."

The safety requirements of the different types of buildings and their outside areas varies according to the probable risk of personal injury.
The classes are as follows (Table 1):
"....."

The tolerated nominal annual probability of hazard for buildings in safety class 3 ($< 10^{-3}$) should be decided on according to the stipulated total risk due to natural hazard. The higher the consequences the lower probability of hazard should be allowed.

Buildings of safety class 2 and 3, which already exist within hazardous areas, can be rehabilitated or restored.
However, the highest nominal, annual probability of hazard should not exceed 3×10^{-3} in class 2 and 10^{-3} in class 3.

As indicated in the general clause buildings and their outside areas may also be dimensioned or otherwise secured so that the specific safety standard is fullfilled.

The competent authority in the case of the Building and Planning Act is the Municipal Council. The Municipal Building Committees recommend the plans. The County Administration is obliged to give guidance.

In the official guidelines to the Building Regulations the local authorities (Municipalities) are adviced to cooperate with the Norwegian Geotechnical Institute to elucidate natural hazard in all area planning.

In case of application for concession in accordance to the Water Resources Act there is a premise that:
. the potential avalanche hazard of the actual areas shall be evaluated by expert during the planning stage.
At this stage:
. the builder or his consultant is responsible for the appropriate steps to be taken.
And:
. the evaluation document should be enclosed the application.

In accordance to the Regulations relating to the Working Environment Act
. The employers are obliged to take precautions to prevent avalanche accidents at all exposed locations in potential hazardous areas.
. The avalanche risk on access roads, camp locations and construction sites have to be evaluated by avalanche expert.
. The expert shall prescribe necessary safety and preparedness measures, and work out an action plan/appropriate precautions to be followed in hazardous situations.
. The builder or main contractor is liable to lead and co-ordinate the safety precautions.

QUALITY POLICY

Norwegian Geotechnical Institute (NGI) is the only institution doing avalanche research and consulting in Norway.

NGI undertakes work according to:
. NGIs General Conditions (which specifies validity, manhour compensation, rental of equipment, refundable expenses, payment, liability, adjustment of rates and possibilty of separate contract.)
. NS 3480 *"GEOTECHNICAL DESIGN Foundation, Earth and Rock Engineering"*
. NS 3403 *"General conditions of contract for design and consulting work carried out by architects and engineers"*.

There is no specific Norwegian Standards, or proposals for such standards, in the field of avalanche zoning and protection. We therefore have to ajust principles from the related field of activity.

Our quality assurance system intend to satisfy the demands in the standards NS-ISO 9000-9004.
Selection of standard is done according to the character of the project, the utilitarian value and agreement with the client.

Particularly important in the process are:
. (at any given time) there should be no doubt as to who is responsible for what
. the professional work should be based on updated professional knowledge and methods
. documentation of data, calculations and techniques should be accessible
. the written documents have to be concise and unambiguous
. the quality assurance system should be as comprehensive as needed to meet the quality objectives

LIABILITY

Consultants are obliged to have a liability insurance which, if possible, covers the full responsibility according to the contract.
NGIs liability towards the client is NOK 5.000.000 for an individual claim and NOK 15.000.000 for all claims in one and the same policy year.
The policy compresses liability under the laws in force which is incurred for damage anywhere in the world.

INSURANCE AND DISASTER ASSISTANCE

In January 1980 a new act became operative in Norway which states that all objects with a Fire Insurance also are obliged to have a Natural Hazard Insurance. Damages caused by avalanches will normally be compensated in full unless gross negligence from the client.
However, the insurance companies will neither initiate any hazard evaluation nor

safety measures.
They may - on the other hand - increase the insurance premium or refuse rebuilding.

Unfortunately, damage caused by avalanches does not automatically provoke evaluation of hazard and safety measures.
The injured parts themselves normally have to take the appropriate steps towards the local authorities and/or the National Fund for Natural Disaster Assistance to have this part of the problem settled.

The local authorities or the National Fund for Natural Disaster Assistance will then contract NGI since we are the only institution doing avalanche consulting in Norway.

Governmental and private enterprises, builders and contractors will contact NGI directly.

JUDICIAL PRACTICE

No legal regulations can prevent Municipal Building Committees, consultants, contractors or any other liable person from making mistakes in our field of work. Occasionallly mistakes may bring negative consequences and judicial proceedings.

Most cases so far are actions brought by private owners against local authorities. The indictment normally concerns location of buildings in areas later shown to be hazardous.
In all final judgements the local authorities have been found guilty of compensatory negligence.

In 1986 a new engineering workshop was completely demolished by an avalanche in North Norway. Close to the site there had been a disastorous snow avalanche in 1956.
Due to the circumstances the insurance company brought a recourse claim of NOK 6.500.000 against the Municipal Council claiming compensatory negligence, pursuant to the Building and Planning Act.
A legal agreement settled on NOK 3.500.000.

Both circumstances demonstrate that the Municipal Building Commitees have to take the Building and Planning Act seriously.

So far there have been no cases in the field of avalanche consulting in Norway. However, in related fields of activity there have been more actions involving consultants, contractors and clients.

From these cases some noticable features can be deduced:

. The experts will be liable for an inevitable and adequate job to be done.
. It is expected that the professional work is based on updated professional knowledge and methods, and that all relevant local information is obtained.
. The written documents have to be concise and unambiguous, and
. the documentation of data, calculations and techniques accessible.

In other respects - the Limitation Act defines limitation periods of 3, 10 and 20 years, respectively. 20 years after the tort a claim for compensation will be statute-barred.

(CONCLUSION)

Conclusively -
The official quality policy have to be taken seriously, because both the human and legal consequences may be considerable if we fail.

Table 1

SAFETY REQUIREMENTS FOR THE LOCATION OF BUILDINGS

Safety Class	Consequence of Structural Failure	Highest Nominal, Annual Probability of hazard	Categories of Buildings
1	Less serious	10^{-2}	. Garages max 2 cars, boat houses etc. . Storage sheds occasionally in use . Halls of plastic-based fabrics . Agricultural buildings etc., if frequently used class 2 or 3.
2	Serious	10^{-3}	. Buildings not exceeding two storeys of moderate span. Normal use. . Industrial and storage buildings of one storey not accessible to public, $\leq$ 5 persons per 100 m^2, distance to other building, road etc $\geq$ height. . Tall masts, independent towers, silos and chimneys outside built up areas.
3	Extremely serious	$< 10^{-3}$ 1)	. Buildings not included in class 1 & 2

1) The Municipal Building Committees shall approve the highest nominal annual probability of hazard in these cases