9. Lithology and foundation characteristics in the 1.5 to 3.5 metres interval
10. Lithology and foundation characteristics in the 3.5 to 5.5 metres interval
11. Lithology and foundation characteristics in the 5.5 to 10 metres interval

The geological-petrographical structure and hydrogeological circumstances of this area calculated on the basis of a great number of data are shown on section maps.

In the 1.5 m thick section two strata could be described recording the thickness, the rock characteristics and the bearing capacity figures.

The foundation and solidity characteristics of the different formations are divided into four categories in case of loose deposits, and into three in the case of solid rocks.

At the same time the unfavourable conditions to be taken into account during foundation works are also described, such as: organic slurry lensing, thick artificial filling, composition flooded by groundwater, presence of aggressive ground-water, area having cut-in cellars underneath. The distribution of soil physical characteristics of the Holocene and Pleistocene deposits is shown in comprehensive diagrams.

12. Building-protection and economic-geological map

This map is an engineering geological "synthetic" or a divided "zoning" map, prepared by summarizing topographic, geological and hydrogeological characteristics of the area.

The borders of the different building areas, districts, are marked on the basis of their topographic conditions, geological lamination, the position of groundwater and aquifers. It suggests a separate consideration in case of the territories having cut-in cellars underneath. Namely these form the valuable part of the city and at the same time without caves the area has favourable geological and hydrogeological characteristics for buildings-up at a greater rate.

This map also shows the utilisable materials of this area, building materials, raw materials for the building material industry, water sources, especially the mineral and medical water springs, thermal water sources.

The bigger rubbish dumps in unfavourable areas are also indicated in the map, drawing attention to this important aspect of environmental protection.

The series of maps made at a scale of 1 : 200 and 1 : 500 on the 90 km cellular network cut into rocks and surveyed during this work stands at the disposal of experts and inquirers in manuscript form.

Connected with the series of maps the characteristic data on excavation, material testing, technical condition are published in the Observation explanatory volume marked Eger-Felnémét, Eger-Belváros, Eger-Lajosvár, the scientific appraisal can be found in the book entitled the Engineering Geology of Eger. The engineering geological and settlement historical study on the cellar network is published separately in the book entitled "The past in the present life of Eger".

References


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METHODOLOGICAL PROPOSAL FOR AN ENGINEERING GEOMORPHOLOGICAL MAP. FORECASTING ROCKFALLS IN THE ALPS

PROPOSITION DE MÉTHODOLOGIE POUR UNE CARTE GÉOTECHNICO-GÉOMORPHOLOGIQUE. PRÉVISION DE CHUTES DE ROCHES DANS LES ALPES.

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Summary

Rockfalls and debris avalanches seem to be a major geologic risk affecting communication routes in the alpine environment.

Within the framework of the project on landslides, promoted by the National Research Council (Laboratory of Applied Geology for Communication Route Planning in Padua), the studies carried out in South Tyrol on rock slope stability provided a methodological example of mapping the risk connected with rockfalls in the design and maintenance problems for the improvement of traffic safety.
In this paper the most convenient scale of the previsional map is defined together with the principal tools for collecting data on those factors controlling rock mass equilibrium such as lithology, jointing, weathering, climate, aspect, vegetation cover, slope gradient and height.

From the relationship between quantitative parameters related to the factors mentioned above, different landslide susceptibility degrees arise thus permitting the zoning of the rockfall risk.

Résumé

Les chutes de roches et les avalanches de débris apparaissent comme d'importants risques géologiques affectant les voies de communication en milieu alpin. Dans le cadre d'un schéma de projet sur les glissements de terrain, entrepris à l'initiative du Conseil national de recherches (Laboratoire de géologie appliquée à la planification des voies de communication, à Padoue), les études effectuées dans le Sud du Tyrol sur la stabilité des pentes rocheuses ont fourni un exemple méthodologique de cartographie du risque lié aux chutes de roches, dans les problèmes d'étude de nouveaux travaux et de conservation des anciens ouvrages en vue de l'amélioration de la sécurité du trafic.

Dans cet article, on définit l'échelle qui convient le mieux à une carte prévisionnelle et on passe en revue les principaux outils qui permettent de réunir des données sur les facteurs qui commandent l'équilibre des masses rocheuses: lithologie, fissuration, altération, climat, orientation, couverture végétale, pente et altitude. D'après les relations entre paramètres quantitatifs liés à ces facteurs, il apparaît plusieurs degrés de susceptibilités aux glissements de terrain, ce qui permet de faire un zonage du risque de chutes de roches.

Introduction

The aim of the research is to find the causes of particular types of landslides in homogeneous geological formations by singling out and verifying how large is the influence of geological and environmental factors which control their occurrence and evolution.

Slope stability evaluation and mapping are basic tools in the design and maintenance stages of communication routes as well as for adopting the most convenient preventive, control and correction measures to improve traffic safety. The adoption of such measures, as well as their location, are strongly conditioned by the forecast of the degree of landslide phenomena.

The Isarco Valley between Bolzano and Ponte Gardena has been chosen because of its homogeneous geological and geomorphological conditions represented by the very thick Palaeozoic series of the "Complesso Vulcanico Atesino" (Fig. 1). This formation is deeply affected by the effects of Quaternary glacial and post-glacial erosion.

Moreover three very important traffic routes (the Brenner highway, the National Road No. 12, the Verona-Innsbruck railway) run at the bottom of the valley in a very narrow band (Fig. 2). These routes are periodically interrupted by landslides of various size and frequency, linked to the peculiar geological and geomorphological conditions of the valley slopes.

Slope development and landslide occurrence

The cross-section of the Isarco Valley along the Bolzano-Ponte Gardena stretch is characterized by very steep and rugged slopes. This condition has forced the communication routes to the valley bottom, over which all the landsliding phenomena impend and particularly those which develop quickly such as rockfalls (Figs. 3, 4, 5, 6).

The volcanic rocks vary widely in hardness and jointing. The frequency and the attitude of the joints crossing the rock mass, together with weathering and other factors in unfavourable topographic conditions, produce unstable situations mainly in the form of rockfalls. These rock failures are also strictly connected with the appearance of voids caused by unloading after the retreat of the Wurmian glacier.

Geological conditions and mechanical properties of the rocks

In the Isarco Valley the "Complesso Vulcanico Atesino" is represented by the three lithological types: