

Geological Engineering

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1. INTRODUCTION

The science of geology is applied to relevant aspect of engineering practices is engineering geology, in a general sense. Association of environmental and engineering geologist states that it is the discipline of applying geological data, techniques, principle to study the rock and soil materials, surface and subsurface fluid and interaction of introduced material with environment so that geological factors are adequately recognized.

The intent of this paper is to describe some modern aspect of engineering geology and environmental engineering in a way that might be of everyone's interest either reader is rookie or experienced in introduced fields. It is important to understand, what aspects we have to keep in our mind while going to investigation a new site? I think an engineer does five things which are of paramount importance because without them we cannot proceed further. Let's have a look of basic points:

1. Preliminary investigation using published information and other existing data.
2. A detailed geological survey of the site.
3. Applied geophysical surveys to provide information about the subsurface geology.
4. Boring, drilling and excavation to provide confirmation of the previous results, and Quantitative detail, at critical points on the site.
5. Testing of soils and rocks to assess their suitability, particularly their mechanical properties (**soil mechanics** and **rock mechanics**), and either *in situ* or from samples.

Therefore in major engineering projects, each of these stages is carried out and reported by a specialising consultant in geology and geophysics. However, where the consultant is employed, an engineer has over super vision and responsibility for the project no matter how intelligent is consultant. The engineer must have enough understanding of geology to know how and when to use the expert knowledge of consultant, and to able read their report intelligently, judge their reliability, and appreciate how the conditions are described might affect the project. When reading report or seeing maps engineer should have clear understanding of geological terms and signs used in map and report. Therefore, it is not difficult to understand the importance of geology.

2. RELEVANCE OF GEOLOGY TO THE CIVIL ENGINEERING

Our main aim is to understand the relevance and importance of geology to civil engineering. Most civil engineering projects involve some excavation of soils and rocks or loading to earth by building on it. In this context firstly we need to understand the Soil, Rock, Water and interaction among them. Because everything is based upon these three constitutes. The planning and designing, the construction and coasting, and the safety of project may depend critically on the geological condition were the construction takes place. The is especially the case in Greenfield sites where the affected by the project stretches in kilometres .live example of this sort of project in India is Tehri dam in state of Uttarakhand which covers surface area of 52km. In this project there are many environmental issues, but I only would like to throws light on dam's geological stability. This dam is located in the central Himalayans seismic gap, a major geologic fault zone. Another pertinent point is that making dams in mountain is relevant or not, because I think making dams in hilly area is simply mountain's destruction. The foundation problems of Dams, Bridges, and Buildings are directly concerned with geology of area where they are to be build. The stability of civil engineering structure is considerably increased if the geological features like faults, fractures, joints, bedding planes etc in the rock bed are properly located. Hence, we can say that importance of geologic aspects cannot be ignored at any coast while dealing with such projects.

3. SOIL MECHANISM

The term soil has various meanings depending upon the general professional field in which it is being considered .to an agriculturist meaning of soil is different than engineer. To an engineer soil are the uncemented deposits of minerals or organic particles covering the large portion of the upper part of the earth called crust. Soil mechanism becomes much important in civil engineering projects while laying the foundation of any project. This is the part in civil engineering which cannot be ignored at any stage because it serves primary purpose. In civil engineering soil is considered as three phase system consisting of solid particles water and air. The void spaces between the soil grains are partly filled with water and partly with air. Interaction among soil water and

rock is also of paramount importance because these are related in many ways. It becomes convenient if we have exact information about these three and if not than it become problem. If I take example of dam like Tehri which is a huge dam if soil and rock around this is weaker than it not hard to predict how hazardous it become. Hence it is important to check the material properly which requires skilled persons.

4. HISTORICAL IMPACT AND CONFUSION BETWEEN GEOLOGICAL ENGINEERING AND ENGINEERING GEOLOGY

During the first four decade of twenty century, more and more educational institute, both in United States and Europe was continued to developed specialized coursework in the application to geology engineering practices. During 1950s and 1960s about twenty universities in United States and Canada introduced degree program in engineering geology and after this many other countries follow the trend.

The introduction of new geological degree programs created some misunderstanding and conflict between two disciplines of engineering. However confusion was cleared up when it was realized that geological engineering program is speciality within the engineering field, requiring and academic preparation that includes coursework in conventional engineering subjects such as strength of material and engineering design and concept along with some geology aspects. On the other hand engineering geology degree program is a geosciences oriented program that focuses coursework geosciences and geology with some engineering course.

5. ENVIRONMENTAL GEOLOGY

This is another branch of applied geology; environmental geology became popular in last two-three decade of twenty century .a definition given by American geological institute is that the application of geologic principles and knowledge to problems created by mans occupancy and exploitation of physical environment. It involves problems concerned with construction of building and transportation facilities. Safe disposal of solid and liquid waste. In terms of its scope and application environmental geology involves study related to the identification and mitigation of natural hazards.

6. ENGINEERING AND ENVIRONMENTAL GEOLOGY

I think I discussed of things about engineering aspects of proposed branches. Now it is time to ask pertinent question, is environmental engineering is same as engineering geology ?In its early years when environmental engineering is just recognized as a new specialty within the geosciences discipline many scholar of engineering geology argued that both the branches are same. But later it was found that both

the branches are not. I think still it become difficult to understand the difference so to avoid this difficulty I have to put forth a healthy explanation. I think engineering geology emphasise the application of geology in civil engineering projects and ground water resource development. Moreover its application can be seen in petroleum engineering especially when detection and exploration of natural gold like minerals, Crude oil etc takes place. Whereas environmental geology besides involving hydrogeology, process geology, engineering geology and so on, it also deals with waste disposal, land use planning, environmental health, pollution prevention and environmental laws. Therefore it is clearly seen that both branches of engineering are not same. There is a difference which should remain as such.

7. IMPACT OF POPULATION GROWTH

The human population in world is quite high and its effect on earth is dramatic. As society needs many things for their comfortable existence. There are two kinds of people in this society one kind is that what they need they consume only that much and say enough for us but another kind is that they never say enough no matter their requirement is fulfilled or not, which leads to setting that requires large –scale infrastructure .this infrastructure includes many other aspects like transpiration for bringing in raw material, housing for workers, shops and community facilities to support the worker and their families, electric power .potable water and waste disposal facilities. For people everything seems to facility, facility but for earth it appears to be overburden due to which environmental hazards takes place.

8. CONCLUSION

In this paper we have seen the importance geology in various fields. We also discussed about the geological and environmental engineering. Soil mechanism and its importance at construction site is also explained .How these branches are unique is also discussed. Importance of both the branches, relevance of geology in civil engineering projects is also explained. Historical impact of proposed engineering braches is explained. Difference between environmental and geological engineering is also mentioned. How and why these breaches become more popular in United States and Canada is explained. What basic parameter keeps into mind while looking a new site for construction is also explained? Environmental hazards and impact of human population on earth is explained.

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