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AN INTEGRATION OF SPACE/ARCHITECTURAL DATA IN TOWN PLANNING PROCESS

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Abstract- For the time being is desirable to use advances of high technologies in variety areas of engineering activities. This approach of technological solutions makes available and opens additional advantages for suitable and purposeful decision during all stages of engineering execution. It relates architectural design process in tow planning.

This paper is dedicated space technology advances use in architectural design for selected area of Gobustan in Azerbaijan. It describes conceptual approach of the process of use space technology in initial stages of design process. It has been applied indicated technology for collection necessary data during execution and decision making of engineering solutions. An advantage of use of space technology is an excellent instrument of merging and integration accessed data into geographical coordination stimulated of easily those definition and importance in all the stage of engineering executions.

Keywords: Gobustan, Space Technology, Data Processing and Integration, Town Planning, Space Image, Stereo Topography.

I. INTRODUCTION

It is highly important and necessary selection of correct method of space science and technology use for town planning. It contains strategic and tactical aspects of technology applications. The factors of space image type selection, data processing method, suitable integration space data with field data as well as other required data are a vital in whole process of execution within town planning stages. Application of technological advances in architectural design became very important in project execution. It relates not only quality of project implementation. It embraces of a best demonstration of expected design, timely delivery all of aspects contenting design issues, convenient source management – human, financial etc. There is no doubt that it has to be forced by appropriate methods, technical and technological fundaments which can be applied in all stage of design and construction processes. They are can be reflected as follow:

- Method definition;
- Required Technology Capabilities identification and definition;
- Preparation works – staff and required equipment, including software;
- Advance technology application.

It is vital issues to consider area features in architectural design in particular in town planning follow up executions. What needed to be undertaken in the process of expected architectural design in the stage of area selection for town planning? We are expressing our vision of conceptual approach of use of space technology advances in architectural design.

II. SPACE TECHNOLOGY - AREA SELECTION CIRCUMSTANCE

Location of Gobustan is in the south-eastern spur of the Great Caucasian Range and situated 60 km south of Baku, capital of Azerbaijan. It is a monticules semi-desert area dissected by numerous gullies and ravines. The region contents of caves and outcropping rocks. Settled since the Stone Age area is one of major and most ancient museums of rock engravings (petrogliphs) in the World.

Gobustan, in the area of this fantastic destruction of mountains Beyukdash, Kichikdadh, Jingirdag, Shongardag and Shikhgaya, in the 'sea of rocks', the witnesses to the past of Azerbaijan people of the Stone Age and subsequent periods are concentrated: these are rock carvings, settlements, tombstones etc.

III. WHY GOBUSTAN?

In 1966 Gobustan was designated as a National Protected Heritage Site with an area of 4400 ha. The main aim of the open-area museum is to preserve the Gobustan site while keeping it open to the public. It makes possible to have a visit the site today and Gobustan now attracts thousands travelers and tourists interested in the early history of civilization from all over the world.

This area has a big interest of people as well as scientists for a wide reason. Gobustan Rock Art Cultural Landscape covers three areas of a plateau of rocky

boulders rising out of the semi-desert of central Azerbaijan, with an outstanding collection of more than 6,000 rock engravings bearing testimony to 40,000 years of rock art. The site also features the remains of inhabited caves, settlements and burials, all reflecting an intensive human use by the inhabitants of the area during the wet period that followed the last Ice Age, from the Upper Paleolithic to the Middle Ages. The site, which covers an area of 537 ha, is part of the larger protected Gobustan Reservation.

Gobustan has outstanding universal value for the quality and density of its rock art engravings, for the substantial evidence the collection of rock art images presents for hunting, fauna, flora and lifestyles in pre-historic times and for the cultural continuity between prehistoric and mediaeval times that the site reflects [1].

It creates an excellent environment for development of required facilities for visitors of the area for their accommodation and arrangements. This circumstance demands to design with further construction of buildings and appropriate infrastructure in the area. In conformity with this it is necessary to consider a large aspects of architectural design and construction standards and requirements embracing all stages of engineering activities.

IV. PRE-ARCHITECTURAL DESIGN DATA OF THE SELECTED AREA

Undoubtedly it has to be done number of executions before architectural design opening advantages for the success of the intended project implementation. It can be presented as follow:

- Historical value of selected area;
- Geological requirements and condition (soil, relief etc.);
- Communication (water, power and gas supply, sewerage system, phone/internet/TV; system, other technical facilities);
- Buffer zone (detailed studies);
- Ecological and environmental studies.

A. Environment

The climate of Gobustan is a dry semi subtropical one, with rather mild winters and very hot dry summers. An atmospheric precipitation is small and so are the springs of Big Caucasus area. The presence of rare and wild flora testifies that the climate of Gobustan some tens of thousands of years ago was damper, and the atmospheric precipitation was sufficient, so springs were abounding with water.

In the remote past, the flora and fauna of Gobustan were incomparably richer. Its landscape represented a kind of savannah with corresponding climate. Here were large herds of wild bulls, goats, deer, wild horses, donkeys, wild boars, and gazelles hunted by lions, wolves, wild cats and leopards.

The vegetative world of Gobustan has a character that is common for deserts and semi-deserts. It consists of ephemeris grasses and bushes, wormwood and similar long-term plants. Among heaps of stones and rocks a wild rose, a dwarfish cherry, Hibernian honeysuckle, a juniper, wild pear, wild fig, wild pomegranate, grapes and some other kinds of trees and bushes are rather often met decorating the stern landscape.

B. Fauna

The fauna of Gobustan has strongly grown poor for the last decades of years. The natural inhabitants of Gobustan now are rare foxes, jackals, wolves, hares and wild cats, mountain chickens, wild pigeons, larks alongside with numerous snakes and lizards and some others.

C. Mud Volcanic

Azerbaijan and its Caspian coastline are home to nearly 400 mud volcanoes, more than half the total throughout the world. In 2001, one mud volcano 15 kilometers from Baku made world headlines when it suddenly started ejecting flames 15 meters high. On the average, every twenty years or so, a mud volcano may explode with great force in Gobustan, shooting flames hundreds of meters into the sky, and depositing tons of mud on the surrounding area.

D. Seismic Data

It has been studied and investigated following areas in seismic point of view of Gobustan:

- Tectonic and sediment transport overview
- Regional Cross-sections
- Seismic Profile Interpretation
- Stratigraphic Columns
- Reservoir Characterization Petrology/Petrography
- Formation Waters
- Clay Data
- Mineralogy of Reservoirs

Although a relationship between the occurrence of large earthquakes and the eruptions of close mud volcanoes is well known, several uncertainties remain on understanding the triggering mechanisms. The effects of two earthquakes of M w 6.18 and 6.08 occurred in the Caspian Sea on 25 November 2000 close to Baku city, Azerbaijan. A total of 33 eruptions occurred at 24 mud volcanoes within a maximum distance of 108 km from the epicenters in the 5 years following the earthquakes [2].

The overall eruption rate in the studied area of the 50 years before the 2000 earthquakes was 1.24 that is much smaller than the eruption rate of 6.6 of the 5 years following these earthquakes. The largest number of eruptions occurred within 2 years from the earthquakes with the highest frequency within 6 months. The calculation of the earthquake-induced static effects shows that crustal dilatation might have triggered only seven eruptions at a maximum distance of about 60 km from the epicenters and within 3 years. Based on this data, dynamic rather than static strain is likely to have been the dominating "promoting" factor because it affected all the studied unrest volcanoes and its magnitude was much larger.

V. SPACE TECHNOLOGY IN ARCHITECTURAL DESIGN

It has been selected Gobustan area of Azerbaijan for town planning. Fir study of the areas was used stereo topographical survey.

VI. STEREO TOPOGRAPHICAL SURVEY

This method is the method of development of the original topographical map based on processing of the photographical images of the area by means of stereo topographic or photogrammetric. The method as a result of stereo topographical survey makes possible an interpretation of aerospace images, conducts stereoscopy acting of relief and develop of original maps.

The aim of the stereo topographical survey is the stereoscopy vision that is ability of human eyes to sense the three-dimensional space [3]. The three-dimensional model understands as decreased spatial optical model of the area which defining in case of crossing of aero or space images generating of stereoscopy pairs. Processing aero or space images (relief survey and horizontal application) is implementing using stereo photogrammetric facilities.

Figure 1 reflects of the map based on the method described above [4,5]. Figures 2-4 space images used for selected area with a different unglues and views integrated to the stereo topographic data [6].

Figure 1. Stereo topographical survey [4, 5]

VII. CONCLUSIONS

The use of space technology in architectural design finds its successfully place in town planning In this paper is reflecting conceptual approach of use of space technology advances for town planning process. It has been selected Gobustan area of Azerbaijan for architectural design of the town. It reflects stages of the design process before, during and as-built part project execution. There is circumstances of remote sensing methods and GIS technology applications is creating positive environment for purposeful and successfully use of collected data for design execution.

It is intending to propose actual architectural design in the selected area with use of space technology in the next step of investigations.

Figure 2. Top view of the selected area [6]

Figure 3. A view of the area with orientation South-North [6]

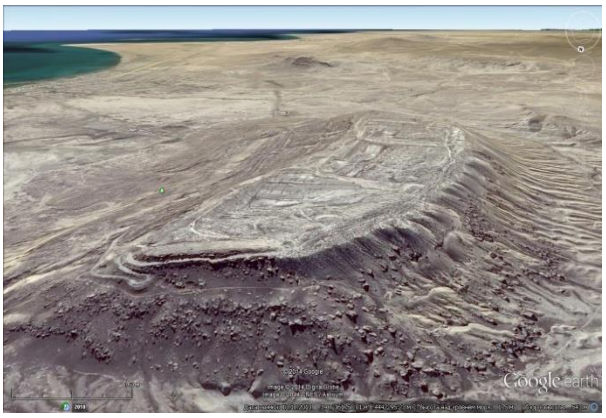

Figure 4. A view of the area with orientation North-South [6]

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BIOGRAPHIES

Nargiz A. Babayeva was born in Baku, Azerbaijan on December 06, 1989. She received the B.Sc. degree in the field of Architecture from Azerbaijan Architecture and Construction University, Baku, Azerbaijan. Currently she is the M.Sc. student in the same field in Azerbaijan State Academy of Fine Art, Baku, Azerbaijan. She has been employed as a Junior Engineer in Encotec Company, Baku, Azerbaijan providing engineering services for the international companies.

Rayiha B. Amanzade was born in Baku, Azerbaijan on June 30, 1948. She has completed her background at the Azerbaijan Politecnical Institute, Baku, Azerbaijan. and graduated in Ph.D. and Doctor of Sciences at the Institute of Archityechture and Art of the Azerbaijan National Academy of Sciences, Baku, Azerbaijan. She is leading researcher of the same institute. She is the author of 4 published books and more than 130 scientific papers.

Namig Rahimov was born in Baku, Azerbaijan, in May 1948. He has a high degree in Mine Engineering with further specialization in Geodesy from Azerbaijan State Oil Academy, Baku, Azerbaijan. He has an experience more than 45 years in the indicated area leading many complicated projects in geodesy. Currently, he is working at Encotec Company, Baku, Azerbaijan providing geodetic and topographic services within the scale of different projects.

Rustam B. Rustamov was born in Ali Bayramli, Azerbaijan, on May 25, 1955. He is an independent expert on Space Science and Technology. In the past, he was in charging of the Azerbaijan National Aerospace Agency activities as an Acting Director General. He has mainly specialized in space instrumentation and remote sensing and GIS technology. He has graduated Ph.D. at the Russian Physical-Technical Institute, S. Petersburg, Russia. He was invited for the work at the European Space Agency within the Framework of the United Nations Program on Space Applications at the European Space Research and Technology Center, The Netherlands. He has appointed for the United Nations Office for Outer Space Affairs Action Teams (member, Vienna, Austria), United Nations Economical and Social Commission for Asia and the Pacific (national focal point, Thailand), International Astronautically Federation (Federation's contact, France), Resent Advances in Space Technologies International Conference Program Committee (member, Turkey). He is an author of 11 books published by the European and United States famous publishers and more than 80 scientific papers.