Report of FIG Commission 5 Technical Seminar on Reference Frame in Practice.

Date and Venue:

The technical seminar on Reference Frame in Practice, focusing on Reference Frame, datum unification and Kinematics took place on 1-2 May 2016 at Redge Latiner hotel in Christchurch, New Zealand. Participant of this seminar were from different parts of the globe and arrived Christchurch a day before the seminar.

Introduction:

This technical seminar was organized keeping the center of interest on surveyors, spatial professionals, students and operational geodesists those who are interested in acquiring the information about the practical aspects of reference frame from some of the world's leading geodesists and surveyors.

The duration of the technical seminar was of two days, and the center of attention of the seminar was on covering reference frame basics, deformation and datum unification.

The modern geodetic methods have enabled the positions on the earth surface with a high level of accuracy within a well defined frame of reference as a result, the periodic movements of the earth's surface can now be monitored at a level of one millimeter per year. The dense network of Continuously Observing Reference Station (CORS) of GNSS/GPS station are useful in observing plate dynamics as they occur in the natural phenomena. In fact global navigation satellite system (GNSS) includes satellites in the orbit, ground stations and user equipments in order to determine position around the globe and are in many application fields of the society. The accuracy and precision of acquiring the position depends in the GNSS data from the points of known positions in the regions such as IGS stations.

Acquiring positions for navigation as well as mobile phones and many other uses in the society take it for granted but there is an immense geodetic science behind it. Therefore this technical seminar as such plays a very important role in educating spatial professionals and many disciplines apart from geodesy.

In case of developing country like Nepal there is a limited experience in the field of modern geodesy; hence this technical seminar played an important role in bringing together leading geodesist and spatial professionals together.

The main objective of the technical seminar:

- **This seminar was focused for surveyors, spatial professionals, and operational geodesists those are working with reference frame issues in the government, semi-government and commercial environment. The seminar was also open to the academicians involved in the field of surveying and related discipline.**

- **The purpose of this technical seminar was to provide participants practical aspects of Reference frame, datum change and particularly dealing with deformation and datum unification.**
- **Provide apple opportunity for networking with other participants in the seminar from different countries and exchange the knowledge.**

Sessions of the technical seminar:

Following are the sessions that took place during the technical seminar:

- **Introduction to 3D reference frame/datums**
- **Introduction to vertical reference frame/datums**
- **Using deformation models**
- **Relationship between local and global datums**
- **Datum unification**
- **Case studies of national and global datums from around the world**
- **Tools of geodetic computations**
- **Future reference frames**

Discussion:

The history of geodetic network of Nepal dates back to 1969. The first order network was established during 1981-1984, with technical assistance from Ministry of Defense United Kingdom, using line-of-sight technology and Nagarkot as its origin with the Spheroid used as Everest 1830.

This conventional geodetic network have served geodetic need of the country, however the recent earth quake occurred in 25th April and its aftershocks have provided an impetus in developing a new dynamic datum based on the most currently available International Terrestrial Reference Frame (ITRF) and develop a capacity to correct for ongoing tectonic deformation.

Re-establishment of the network of such Active Control points can be of great value to monitor and quantify the magnitude of change with the help of CORS in the destruction created by Earthquake in

the geodetic control points and even in the study behavior of earthquake parameters. In this context the existing Geodetic Datum of Nepal will be replaced by semi dynamic Geodetic datum. This will be one of the most reliable networks of control points integrated in world terrestrial reference frame.

The technical seminar on Reference Frame in Practice organized by FIG COMMISSION 5, 1-2 May 2016 at Rydges Latiner, Christchurch which was aimed for operational geodesists and those who are interested in learning more about practical aspects of reference frames from world's leading geodesists and geodetic surveyors had been a great opportunity for me to participate in this technical seminar.

This technical seminar had provided me an apple opportunity to meet leading geodesist actively working in this field of research. I had a very fortunate time to share ideas and develop the guidelines in order to address the crucial time of paradigm shift from passive control points towards network of active control points based on Global Reference System such as ITRF 2014.

Lastly I would like to thank UNOOSA for providing financial assistance for the participants with special preference from the developing countries. My special thanks for UNOOSA for providing me the travel assistance. I would also like to thank Li Zhang and Nic Donnelley personally for helping me and their valuable contribution in making this technical seminar grand success.

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