Establishment of Dubai Virtual Reference System (DVRS) National GPS-RTK Network

Y.Al MARZOOQI, H. FASHIR and Tarig BABIKER, Dubai, United Arab Emirates

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SUMMARY

The Survey Section of the Planning and Surveying Department has now implemented the latest technology for professionals engaged in the fields of Surveying and Construction Engineering. Recent technological advances, both in GPS Survey & digital data, have made it possible to obtain accurate positioning and design data in real time. These changes introduce many new opportunities and exciting challenges to the surveying discipline within today's construction engineering sector. The Survey Section has reinforced its objectives in technology development by establishing the "*Dubai Virtual Reference System*" (DVRS). This represents the latest concept in the field of Global Positioning Systems (GPS).

DVRS consists of five continuously operating Base Stations provided by Swiss instrument manufacturer LEICA, and are located in different sectors of the Dubai Emirate. The Control Room, with a central Server, is situated in the Survey Section offices within the main Dubai Municipality building in Deira. All five stations are continuously receiving GPS data and are linked to the Central Server by dedicated telephone lines. These lines continuously transmit the data to the control unit (Control Central Server), where data is processed, and corrections transmitted to the end-users, as they require.

All GPS continuous operating Base Stations in the network send on-line raw GPS data via permanent connection (Modem lines) to the Control Central Server. Here, data is processed by a software system called GNSMART, produced by Geo++, of Germany. GNSMART performs all quality checks, computes ionospheric, tropospheric and satellite orbit errors, and delivers the corrections to the end-users. Employing a GPS 'Rover' unit, users can directly start survey work anywhere in the Dubai Emirate. When the GPS receiver is operated, it calculates its position to within a few meters and transfers this information to the Control Reference Station via GSM (Mobile) in NMEA format. The Control Central Server sends back valid correctional data to the user in RTCM format. This defines the user's actual position. This complete task is effectively achieved at the 'press of a button' in the field. Such real-time kinematic GPS technology enables work to be carried out within the entire network coverage area, with homogeneous absolute position to centimetre accuracy.

A multiple GPS reference station approach is superior to a conventional RTK single baseline approach, as it allows for "network-based" homogeneous positioning solutions with centimeter accuracy. The DVR System has already been subject to stringent testing, which found that the expected accuracy to be in the order of 2-3 cm in planimetry, and 3-5 cm in altimetry.