



## **Establishment of geodetic control network in northern Saudi Arabia using GPS**

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Current technology of Global Positioning System (GPS) is, indisputably, the best choice to establish ground control for photogrammetric mapping. In this project, a network that covers an area of 300,000.00 km<sup>2</sup> northern the Kingdom of Saudi Arabia (KSA) has been established using GPS within the Saudi Datum called MOMRA Terrestrial Reference Frame for the year 2000 (MTRF-2000), where MOMRA stands for the Ministry of Municipal and Rural Affairs. The network that defines MTRF-2000 is called Saudi Geodetic Network (SGN), and sixty points of this network were used as reference stations for both high level (HL) and low level (LL) photogrammetric Ground Control Points (GCPs). Thus, the project's network consisted of two categories: primary network and secondary network. Primary network is composed of SGN as reference points and HL GCPs, while secondary network is composed of SGN and HL as reference points and LL GCPs. The total number of new HL & LL GCPs that were constructed and observed according to industry standards is 1044 points. GPS data collection operations lasted for 70 business days. The whole newly-established network was first processed using Ashtech Solutions software package to ensure integrity, then precise ephemeris was acquired and GEONAP software package was used for final processing. After that, least squares adjustment was carried out using GEONET and NGS ADJUST software packages by constraining the GCPs of SGN in the primary network and SGN & Primary stations in the secondary network. The achieved accuracy was better than 1 ppm in both cases.