“Present-day Turkmenistan covers territory that has been at the crossroads of civilizations for centuries. The area was ruled in antiquity by various Persian empires, and was conquered by Alexander the Great, Muslim crusaders, the Mongols, Turkic warriors, and eventually the Russians. In medieval times Merv (today known as Mary) was one of the great cities of the Islamic world and an important stop on the Silk Road” (World Factbook, 2012). “Merv suffered a number of attacks over the course of its history, but instead of being rebuilt on top of the older ruins, Merv slowly spread west. In total, five cities were constructed next to each other, largely because of the shifting rivers. The oldest section was the Erk Kala and in later centuries most people lived in the vast walled city called Sultan Kala. All of this was completely eradicated in 1221 under the onslaught of the Mongols. In 1218 Jenghiz Khan demanded a substantial tithe of grain from Merv, along with the pick of the city’s most beautiful young women. The unwise Seljuq response was to slay the tax collectors. In retribution Tolui, the most brutal of Jenghiz Khan’s sons, arrived three years later at the head of an army, accepted the peaceful surrender of the terrified citizens, and then proceeded to butcher every last one of the city’s inhabitants, an estimated 300,000 people” (Lonely Planet, 2012).

By 1912, longitudes had been transmitted via telegraph from Tashkent, Uzbekistan to Asgabat, Merv, and Türkmenbasy. Also, a line of Astro Station observations had been performed from Türkmenbasy up to the Aral Sea and then down southeast along the border with Uzbekistan to the tripoint with Afghanistan. These observations were presumably calculated on the Bessel 1841 ellipsoid where \( a = 6,377,397.15 \) m and \( f = 299.3 \). After the Russian revolution and the founding of the Soviet, geodetic work progressed towards standardization. The country is still on the old Soviet datum, “System 42” with origin at Pulkovo Observatory where: \( \Phi_o = 59° 46' 18.55" \) North, \( \Lambda_o = 30° 19' 42.09" \) East of Greenwich, the defining azimuth at the point of origin to Signal A is: \( \alpha_o = 317° 02' 50.62" \) and the ellipsoid of reference is the Krassovsky 1940 where \( a = 6,378,245 \) meters, and \( f = 298.3. \)

The Russia Belts are a Grid System identical to UTM except that the scale factor at origin is \( m_o = 1.0 \). The closest transformation parameters available for Turkmenistan are the 3-parameter transformation from System 42 to WGS 84 in the Caspian Sea area of Kazakhstan are: \( \Delta X = +14.471 \) m, \( \Delta Y = -132.753 \) m, \( \Delta Z = -83.454 \) m, and are based on an occupation at 5 stations: Bolat, Yesim Sevirne, Dlinnaya Dolina, Daralsai, and Aul.

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