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Upgrade of the Fermilab Booster Accelerator Tunnel Control Network

A precise survey was completed in 1998 for the Main Injector using ten concrete monuments and ten sight riser drop points which were incorporated into a network to provide absolute positioning for the tunnel control system constraints at the +/- 1mm level. The 8Gev Injection tunnel network was tied to the Main Injector network and the surface network using four sight riser drop points. The Main Injector network was upgraded in 2014. In the fall of 2003, to improve alignment tolerances for the Tevatron a new control network was established using concrete monuments around the Tevatron and Main Injector rings. The surface network was tied into the tunnel network at 14 site risers. In 1984 the Booster Accelerator tunnel control network was established and connected to the outside survey using only two site riser points in the Antiproton tunnel through a hatch by a short traverse. The tunnel network was upgraded in 1993 and 2004 but not connected to the outside surface monuments. In 2019 the 8GeV control network was upgraded starting from the Main Injector and extending the network to Booster tunnel. Inconsistencies between the 8GeV and the Booster networks were discovered in the horizontal X and Y coordinates. This paper discusses the survey methodology employed to resolve inconsistencies for the Booster tunnel network upgrade.

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