

Sec. 10.01 General

*The Global Positioning System (GPS) technology is the system created and maintained by the United States. GLONASS is the Russian counterpart to GPS. These two systems combined are now referred to as Global Navigational Satellite System (GNSS) and continues to advance and improve its capabilities which has become a common tool for surveying that is not only “smaller, lighter and faster” but has the ability to perform geodetic control surveying in a fraction of the time as compared to classical terrestrial survey methods with a total station for example. GNSS has enabled surveyors the ability to establish control for a project from known existing control that may be miles away. VDOT utilizes GNSS for securing control values for primary control as well as photo control. VDOT allows other uses of GNSS specifically, the use of Real-Time Kinematic (RTK) GNSS surveying for photo control, right-of-way and corridor baseline stakeout, and also topographic collection when standard industry guidelines are followed. Other divisions within VDOT are also utilizing GNSS in one form or another to collect data for their specific needs.

As with any surveying tool, certain guidelines, specifications and methodologies must be adhered to. The intent of this section of the survey manual is to assist the surveyor in the mission planning, collection and processing GNSS data for VDOT survey projects. The surveyor should consult the publications, “**Geometric Geodetic Accuracy Standards and Specifications for Using GPS Relative Positioning Techniques, Version 5.0: May 11, 1988**” Reprinted with corrections: August 1, 1989, published by the Federal Geodetic Control Committee (FGCC) and also the “**Standards and Specifications for Geodetic Control Networks**” as published by the Federal Geodetic Control Committee (FGCC), Rockville MD, September 1984. Additionally a number of memoranda from the National Geodetic Survey should be followed as a guide when establishing new survey control. Specifically NOAA Technical Memorandum NOS NGS 58, Guidelines for establishing Ellipsoid Heights, and NOAA Technical Memorandum NOS NGS 59, Guidelines for establishing GPS-Derived Orthometric Heights. This chapter was prepared heavily in parts, from these NGS publications. VDOT will continue its procedures to generate, via GNSS survey techniques, state plane coordinates and orthometric heights in U.S. Survey Feet for its Route Survey projects. These values shall be converted to the VDOT Project Coordinates, which are also given in the U.S. Survey foot. For more on Project coordinates, see [Section 10.07](#) regarding LD-200 cards in this chapter. It is important to remember however that legacy projects, projects started or completed before 2014, will reflect a variety of coordinate configurations and VDOT survey control from older projects should be used with this understanding.*

Sec. 10.02 GNSS Equipment

The GNSS geodetic receivers used for static survey operations shall receive both carrier frequencies transmitted by the current constellation of GNSS satellites and shall have the capability of tracking a minimum of eight GNSS satellites simultaneously. The receivers shall have the capability to receive and decode the C/A code and the P-code data on the L1 frequency and the P-code in the L2 frequency. The receivers should have the means to use the encrypted P-code.

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