

**Forest Service Handbook
National Headquarters - Washington Office
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**Forest Service Handbook 5609.11 – Boundary Management Handbook
Chapter 70 - Global Navigation Satellite Systems**

Amendment: 5609.11-2020-1

Effective date: August 25, 2020

Duration: This amendment is effective until superseded or removed.

Superseded Directive:

Approved by: Tina Terrell, Associate Deputy Chief, NFS

Date approved: August 17, 2020

Responsible Staff:

Explanation of changes: Following is an explanation of the changes throughout the directive by section.

70 - Establishes new chapter and sets forth codes, captions, and direction for Global Navigation Satellite Systems. Incorporates direction for Global Navigation Satellite Systems, previously contained in the FSM 7155, Geodetic and Control Surveys. Removes direction provided in FSM 7155.

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70.2 - Objective

Refer to FSM 5610.2 for information on objectives.

70.3 - Policy

Each region shall develop and conduct a program to establish geodetic positions on Public Land Survey System (PLSS) corners and other Land Net corners established by survey. Each region shall establish Geodetic Control Networks, as necessary, to meet survey, engineering, mapping, Geographic Information Systems (GIS), and resource management needs. Geodetic positioning and control surveys shall conform to Federal Geodetic Control Subcommittee, National Geodetic Survey (NGS), Federal Geodetic Control Committee (FGCC), and joint Bureau of Land Management (BLM) and Forest Service Standards for Positional Accuracy Using Global Navigation Satellite Systems Technology.

71 - Global Navigation Satellite Systems Accuracy Standards

All cadastral surveys for both corner positioning and control on public lands using carrier phase Global Navigation Satellite Systems (GNSS, formerly Global Positioning System or GPS) technology shall comply with or exceed the GNSS accuracy standards jointly established and implemented by the Forest Service and BLM.

72 - Geodetic Surveys

Geodetic control and positioning surveys are used to:

1. Establish geographic reference coordinates in a variety of coordinate systems and datum.
2. Establish local Geodetic Control Networks for cadastral surveys.
3. Locate and perpetuate National Forest System property lines, National Forest System parcel boundaries, PLSS corners, and other property boundary controlling corners.
4. Establish National Geodetic Control Networks in cooperation with other Federal, State, and local agencies and departments.
5. Establish Geodetic Control Networks for engineering and other natural resource management functions.
6. Provide geodetic coordinates for other agency cooperative efforts, such as the BLM Cadastral National Spatial Data Infrastructure (CadNSDI).
7. Incorporate Geodetic Control Network surveys using GNSS technology into the National Spatial Reference System (NSRS). If desired, these surveys may be submitted to the NGS in the automated format specified in the Federal Geodetic Control Subcommittee publication "Input Formats and Specifications of the National Geodetic Survey Data Base, The NGS Bluebook" (latest revision), which describes the formats and procedures of submitting data for adjustment and assimilation into the NSRS.

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72.1 - Global Navigation Satellite Systems Position Descriptions

All survey and reporting of GNSS coordinate positions shall comply with the following:

1. Latitude and longitude in degrees, minutes, and seconds (DMS.ssss).
2. State Plane Coordinate System (SPCS) in meters or feet.
3. Universal Transverse Mercator (UTM) coordinates in meters.
4. Unit of measure must be United States Survey Feet as allowed by State statute.
5. International System of Units (SI) metric feet as allowed by State statute.
6. Datum must be current as established by NGS.
7. Geoid Model used to establish elevations must be current as established by NGS.
8. Vertical datum must be North American Vertical Datum of 1988 unless superseded.
9. Horizontal datum shall be on the North America Datum 1983 (NAD 83) or the latest adjustment to meet current survey and mapping requirements.

72.2 - Global Navigation Satellite Systems Control Surveys

The GNSS Control Network positions are extensions or densifications of the NSRS maintained by NGS. The Forest Service uses these land-based monumented positions and the virtual Continuous Operating Reference Stations to provide three-dimensional positional control for cadastral and land surveys, mapping applications, GIS, engineering, and other natural resource applications which require geographic control coordinates using GNSS technology. Point positions established using GNSS-relative positioning techniques must comply with, at a minimum, NGS First Order Standards.

72.3 - Boundary Surveys

Geographic coordinate positions for all cadastral or land surveys must be established either by direct GNSS observation, indirect establishment by means of terrestrial based electro-optical technology (ground geodetic surveying), or indirect establishment by calculation. The method and accuracies shall be dependent on the needs dictated by the project. All cadastral and land surveys using GNSS technology shall comply with BLM/Forest Service Standards for Positional Accuracy Using GNSS Technology.

73 - Geodetic Control Data Management

Establish and maintain an accurate geodetic control database, either tabular and map or GIS format, at the Forest and Regional level. Submit geodetic control information for National Forest System property-controlling corners of PLSS and other land nets to the BLM Cadastral Survey

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for inclusion into the CadNSDI in the format described in the agreement between the two agencies and make these available as a public document.

In order to place geodetic information in the public record, note the coordinate data on at least two corner positions depicted on filed survey plats. The Forest Service Land Surveyor may also consider providing geodetic data on corner perpetuation forms developed by States for recordation in local jurisdictions.