

NSRS2022: A Basic Understanding



What Is NSRS2022?

NSRS2022 is the updated national coordinate system used in the United States. It provides:

- A **geocentric**, more accurate position of Earth's center of mass
 - Coordinates that account for **tectonic motion**, **subsidence**, and other long-term changes
 - A framework designed for modern **GNSS-based surveying** and long-term infrastructure needs
-

Why NAD83 Is Being Replaced

- NAD83 is **not geocentric** and is off by about **2.24 meters** relative to Earth's true center of mass.
 - It does **not model tectonic plate motion**, so coordinates drift over time.
 - NSRS2022 uses **plate-fixed Terrestrial Reference Frames (TRFs)**, which follow the movement of specific tectonic plates.
Result: more stable and consistent coordinates.
-

From Physical Monuments to GNSS

Older systems relied on surface monuments, which can be disturbed or degraded. NSRS2022 relies mainly on:

- **GNSS satellite constellations**
- **Precise satellite orbits**
- **CORS (Continuously Operating Reference Stations)**

Monuments still have value when re-observed and reported, but they are no longer the primary control.

SPCS2022: New State Plane System

Based on the NATRF2022 reference frame

- Zones redesigned to **minimize distortion**
- Grid-to-ground differences are small
- Supports **easy data sharing** between survey, GIS, and agency datasets—often without applying scale factors

Time-Dependent Coordinates (Epochs)

NSRS2022 is **time-dependent**.

Every coordinate has an associated **epoch**—the date the measurement represents.

Why it matters:

- Earth's surface moves
- Coordinates change over time
- Projects with long schedules must track when data was collected

Tools will allow **conversion between epochs** when needed.

International Foot

NSRS2022 uses International **Foot** (NIST 2022).

This ensures:

- One standard nationwide
 - Consistent units across agencies and surveyors
-

Key Takeaways

- NSRS2022 is accurate, geocentric, and time-aware
- It replaces NAD83 to better match modern GNSS needs
- CORS and GNSS now form the backbone of the system
- SPCS2022 improves consistency and reduces distortion
- Epochs **record the date** of all measurements
- One national standard for the foot simplifies data exchange

To Learn More:

- Visit NSPS's [Guide](#) to the Modernized NSRS

