



National Spatial Reference System: Foundational Infrastructure

NOAA's National Spatial Reference System

(NSRS) provides a consistent coordinate and height framework for the Nation. This framework is essential for commerce, monitoring climate, and building infrastructure. Today, amazing new GPS, lidar, and other positioning technologies are collecting heroic amounts of data every day from the land, sky— and even space. The NSRS enables this information to be processed, aligned, and shared across all sectors and integrated into multitudes of applications.

INFRASTRUCTURE

The NSRS is the foundational infrastructure system for building all other infrastructure.

Engineering, architecture, and construction rely on accurate positioning from the NSRS to:

- **know where they are** relative to structures like roads, bridges and dams and how high they are relative to rivers, reservoirs, and the ocean
- **save money and time** by ensuring that different projects—old or new—are interoperable and are all using a consistent, accurate reference frame
- **protect lives** by geo-referencing critical infrastructure. For example, airport runways reference the NSRS to track flight path obstructions like buildings, towers, and mountains

COMMERCE

The NSRS links all transportation systems—connecting land, sea, and air through ports, railroads, highways, and airports. Modernizing the NSRS means:

- **goods move faster** and more efficiently through all modes of transportation benefiting consumers and manufacturers
- **job creation** in industries that use precise positions, like smart cities and autonomous vehicles
- **precision agriculture** that saves time and

money by using accurate elevation information to inform more efficient pesticide and fertilizer application

- **billions of dollars** in socio-economic benefits through improved digital elevation models, flood plain mapping, and flood forecasts *

CLIMATE

The NSRS enables decision makers to understand changing conditions, prepare for impacts, and monitor and recover from disasters. The NSRS is essential for:

- **identifying threats** from flooding, earthquakes, and droughts by bringing together information from GPS, satellites, imagery, and other data sources
- **recovering from disasters** like floods, hurricanes, mudslides, or tornadoes, and informing planning for more resilient communities
- **restoring and reconstructing.** When a community is destroyed by floods or fire, the NSRS helps reconstruct and restore what was once there, even when everything was wiped clean



Smart cities use the accurate location data of the National Spatial Reference System to monitor and manage transportation systems.

For more information, contact NGS:

- geodesy.noaa.gov or
- email ngs.infocenter@noaa.gov

*A 2019 study estimated the modernized NSRS will produce between \$4.2 and \$13 billion in socio-economic benefits over 10 years.

Infrastructure