

The Future Is Here: Introducing the State Plane Coordinate System of 2022

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SUMMARY

Fundamental changes are coming soon to coordinate systems near you. In 2025, NOAA's National Geodetic Survey (NGS) will complete its modernization of the National Spatial Reference System (NSRS), the basis for surveying and mapping in the United States. But one part is done now: the State Plane Coordinate System of 2022 (SPCS2022), a projected coordinate reference system with multiple zones covering all 56 states and territories of the nation. State Plane was originally established by NGS in the 1930s and was redefined in the 1980s as part of changing the national reference frame. SPCS2022 is the third generation of State Plane, developed to accompany the new terrestrial reference frames of the modernized NSRS. Like its predecessors, SPCS2022 consists of the three following conformal map projections: Lambert Conformal Conic, Transverse Mercator, and Hotine Oblique Mercator.

An overview of SPCS2022 is provided, along with key innovations and changes from existing and previous State Plane. The main change is that linear distortion (scale error) is minimized at the topographic rather than the ellipsoid surface (to reduce the difference between "grid" and "ground" distances). To further decrease distortion in areas of high usage, population distribution was accounted for in the design process, using data from the U.S. Census Bureau. Another change is that states can have zone "layers." Every state and territory has a statewide zone to provide complete coverage with a single geometry, particularly useful for statewide Geographic Information Systems. Most states also have either one or two multiple-zone layers, each covering a portion of a state with less distortion than the statewide zone. To reduce distortion even further, 28 states designed their own SPCS2022 zones as so-called "low distortion projections" (LDPs). These LDP zones support surveying and engineering applications by making the difference between "grid" and "ground" essentially negligible. By incorporating zone layers and allowing state contributions, SPCS2022 represents a customer-driven evolution of State Plane, one that is intended to meet the wide-ranging needs of the nation's diverse geospatial community.

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