North Carolina Land Record Management Tile Naming Standard

Issue: Complication due to the shift from U.S. survey feet (US ft.) to international feet (int ft.) for the NCLRM tiles to the North Carolina State Plane 2022 (NCSP2022) reference frame.

Background

The North Carolina Land Records Management (NCLRM) Tile Naming Standard was established to improve the organization, accessibility, and management of land records across county governments. The initiative is overseen by the North Carolina Secretary of State through the North Carolina Land Records Management Program, created under North Carolina General Statute §147-54.3. The program promotes consistent land records practices, data interoperability, and the use of modern mapping technologies by local governments.

During the late twentieth century, counties across North Carolina transitioned from paper tax maps and mylar sheets to digital cadastral mapping systems supported by Geographic Information Systems (GIS). As these systems developed, the need for a consistent framework for organizing map data became clear. The tile naming standard provided a structured method for dividing counties into indexed map tiles; each representing a defined geographic area and assigned a unique identifier.

These tiles serve as the organizational units for managing parcel boundaries, ownership information, subdivision layouts, rights-of-way, and other cadastral features. County land records offices, tax administration departments, GIS divisions, and registers of deeds rely on this system to maintain accurate property mapping and support land records management. In addition, the naming format is used by the North Carolina Statewide Orthophoto Program, where it helps organize aerial imagery into consistent tiles that align with cadastral mapping, facilitating statewide planning, analysis, and integration of imagery with property data.

Although modern GIS platforms allow seamless visualization of parcel data across entire counties, the underlying tile indexing framework continues to provide a consistent structure for maintaining, updating, and sharing land records data. This standard remains an important component of how counties manage parcel information and integrate local datasets with broader statewide mapping initiatives.

Issue

The migration of NCLRM tiles to the NCSP2022 reference frame introduces a complication due to the transition from U.S. survey feet (ft US) to international feet (ft int). If the legacy data is properly georeferenced (correct datum and projection) and two-dimensional, the software should correctly perform the transformation from North Carolina State Plane Coordinate System – NAD83 (2011) to NCSP2022. A direct transformation of existing tile geometries will introduce a systematic scale discrepancy between the U.S. Survey Foot (ft US) and the International Foot (ft int) that is exactly 2 parts per million (ppm). Because the U.S. Survey Foot is slightly longer (1 ft US ≈ 1.000002 ft int) this discrepancy results in a difference of approximately 0.01 feet per mile. As a result, the footprint of each transformed tile will be approximately 1.00009 times larger than its original extent, causing misalignment with the NCSP2022 tiling grid. Although this scale difference is small, it accumulates over large distances and can produce non-negligible positional errors along tile boundaries. Proper handling requires either rescaling the tile geometries or regenerating the tiles directly within the NCSP2022 system to maintain spatial integrity and seamless coverage. Any existing "tile name" attributes must be regenerated to conform to the proposed tile-naming convention.

Discussion

The issue of migrating NCLRM tiles to NCSP2022 and the associated unit conversion from U.S. survey feet to international feet was initially raised within the Ortho and Elevation subgroup of the SMAC. Following preliminary discussion, the topic was presented at the NPM26 kickoff meeting with the vendors responsible for the NC State Orthophoto project to gather their perspectives on potential impacts and mitigation strategies. Feedback from the vendors highlighted the risk of tile misalignment and scale discrepancies if a direct transformation were applied. This input was subsequently reviewed by the working group, and based on these discussions, recommendations were formulated to ensure proper handling of tile boundaries and coordinate system adjustments during the transition.

Recommendation

Based on discussions with vendors during the Northern Piedmont Mountains 2026 (NPM26) kickoff meeting for the North Carolina Statewide Orthophoto Program and other state agencies, it is the North Carolina Department of Transportation Photogrammetry Unit's recommendation that a completely new statewide tile layout be generated programmatically within the NCSP2022 reference frame. This layout should originate at coordinate (0,0) and establish a uniform 10,000 ft × 10,000 ft grid using international feet.

North Carolina Land Record Management Tile Naming Standard

The new tile naming convention should follow the format **EEE_NNN_TS**, where the coordinate reference point is the lower-left corner of each 10,000-foot tile. The first three digits (EEE) represent the millions, hundred-thousands, and ten-thousands place values of the Easting (X) coordinate. The next three digits (NNN) represent the millions, hundred-thousands, and ten-thousands place values of the Northing (Y) coordinate. All six digits are mandatory and must be zero-filled where necessary, including cases where the millions place is zero. An underscore separates the Easting and Northing components, and a second underscore separates these from the final two-digit suffix.

The final two digits (TS) identify the tile size associated with the proposed mapping scale. This systematic approach ensures consistent spatial referencing and simplifies the alignment of orthophoto and elevation datasets within the new datum.

Each 10,000 ft × 10,000 ft tile can be subdivided into four 5,000 ft × 5,000 ft tiles, labeled with suffixes 01–04 and numbered sequentially from the upper-left to the lower-right. Further subdivision into 2,500 ft × 2,500 ft tiles uses suffixes 05–20, and subdivision into 1,250 ft × 1,250 ft tiles uses suffixes 21–84.

Mapping Scale	Tile Size	Tile ID	GSD
1” = 200’	10000-foot	00	1.0 ft int
1” = 100’	5000-foot	01 - 04	0.5 ft int
1” = 50’	2500-foot	05 – 20	0.25 ft int
1” = 25’	1250-foot	21 – 84	0.125 ft int

This hierarchical naming scheme preserves spatial reference, ensures consistent alignment within the new datum, and simplifies the management of high-resolution orthophoto and elevation datasets. The multi-level structure enables precise tiling while providing flexibility for processing data at multiple resolutions.

North Carolina Land Record Management Tile Naming Standard

Appendix A

To implement the North Carolina State Plane 2022 (NCSP2022) tile grid, a new layout will be established starting at the origin (0,0) using a primary 10,000 ft × 10,000 ft tile grid in international feet. Each 10,000 ft tile will follow the **EEE_NNN_TS** naming convention, with the lower-left corner of each tile as the coordinate reference point:

- The first three digits (EEE) correspond to the millions, hundred-thousand, and ten-thousand placeholders of the Easting (X) coordinate.
    - All three (3) digits are mandatory and must be zero-filled where necessary, including cases where the millions place is zero.
- An underscore (_) will be used to separate the Easting digits from the Northing digits.
- The next three digits (NNN) correspond to the millions, hundred-thousand, and ten-thousand placeholders of the Northing (Y) coordinate.
    - All three (3) digits are mandatory and must be zero-filled where necessary, including cases where the millions place is zero
- An underscore (_) will be used to separate the Northing digits from the Tile Size digits.
- The last two digits denote the tile size (TS) associated with the proposed mapping scale.
    - 1” = 200’ 10000-foot tile TS = 00 1.0 feet GSD
    - 1” = 100’ 5000-foot tile TS = 01 – 04 0.5 feet GSD
    - 1” = 50’ 2500-foot tile TS = 05 – 20 0.25 feet GSD
    - 1” = 25’ 1250-foot tile TS = 21 – 84 0.125 feet GSD

Tile Subdivision Structure

Base Tile

- Standard tile size: 10,000 ft × 10,000 ft

Level 1 Subdivision

- Each base tile may be subdivided into four (4): 5,000 ft × 5,000 ft tiles
- Tile suffixes: 01–04
- Numbering sequence: upper-left to lower-right

Level 2 Subdivision

- Each base tile may be subdivided into sixteen (16): 2,500 ft × 2,500 ft tiles
- Tile suffixes: 05–20
- Numbering sequence: upper-left to lower-right

Level 3 Subdivision

- Each base tile may be subdivided into sixty-four (64): 1,250 ft × 1,250 ft tiles
- Tile suffixes: 21–84
- Numbering sequence: upper-left to lower-right

North Carolina Land Record Management Tile Naming Standard

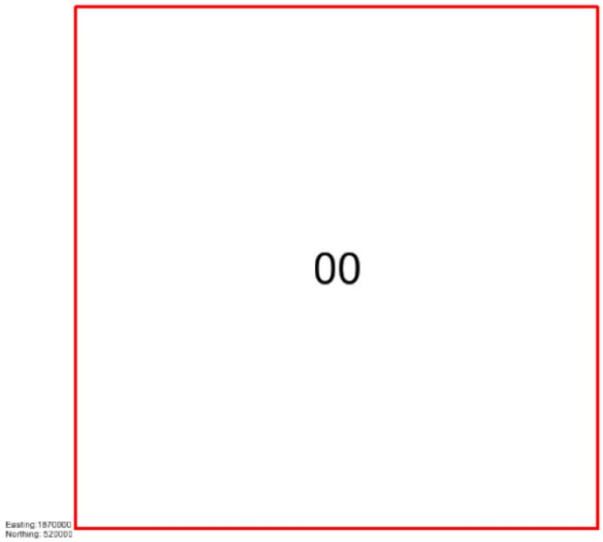
Example of the NCLRM Tile Naming Format
for the different Ground Sample Distance and Mapping Scales.

Coordinate Reference Point: Easting: 1,870,000 Northing: 520,000

Placeholders	Easting	Northing
Millions	1	0
Hundred-thousand	8	5
Ten-thousand	7	2

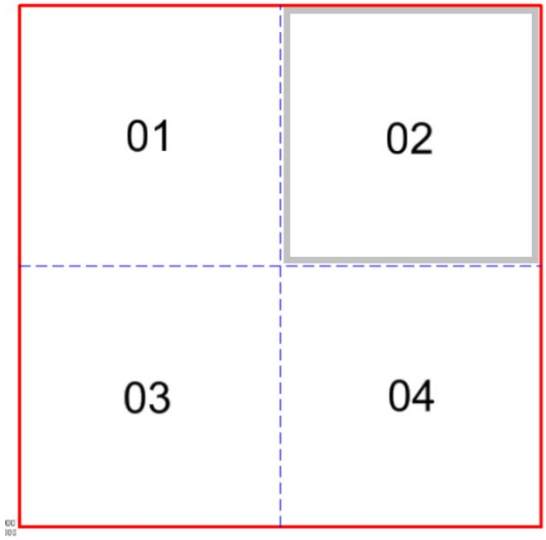
Tile Name: 187_052_TS

1’ = 200’



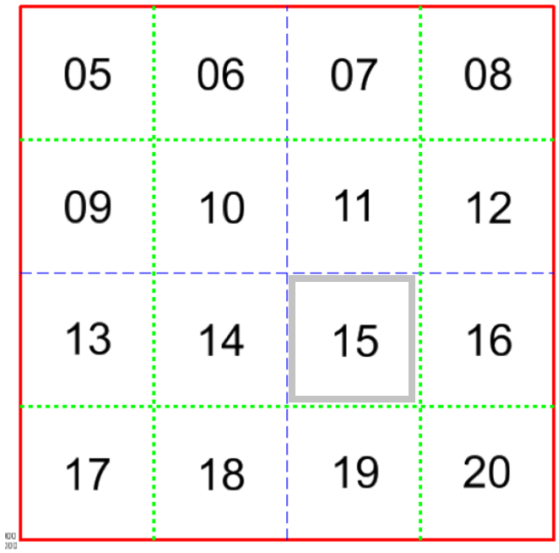
187_052_00

1” = 100’



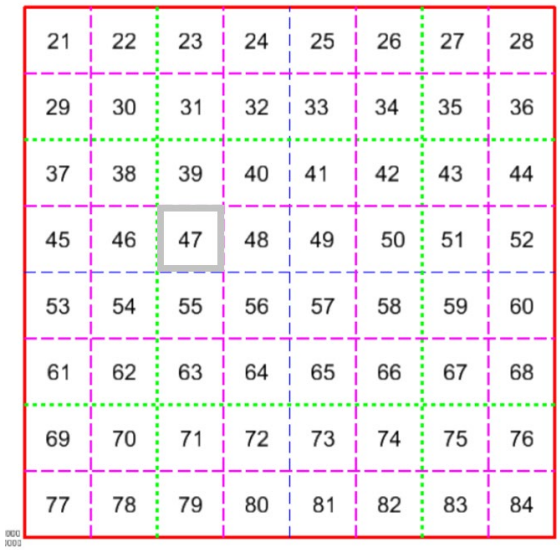
187_052_02

1” = 50’



187_052_15

1” = 25’



187_052_47

Complication due to the shift from U.S. survey feet (US ft.) to international feet (int ft.) for the NCLRM tiles to the NCSP2022 reference frame. June 25, 2026