Pedestrian and Bicycle Infrastructure Network
Geospatial Standards for Planning Grant Communities

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For

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ITRE

Geospatial Standards for Planning Grant Communities

1. BACKGROUND

Recipients of the North Carolina Department of Transporation's (NCDOT) Planning Grant Initiative (PGI) awards must submit digital files including technical drawings, photographs, maps and associated GIS files as part of the deliverables when completing a project. The files must be in a format comatible with NCDOT requirements so that they are available for NCDOT to use. The GIS database created or updated by each Planning Grant Community provides a valuable dataset to be integrated into NCDOT's statewide geodatabase of bicycle and pedestrian infrastructure. This geodatabase (Pedestrian and Bicycle Infrastructure Network, or PBIN) was created in 2013 and is maintained and managed by NCDOT.

Since 2005, plans and GIS files submitted to NCDOT through the PGI have varied in quality, extent of coverage, and details. The lack of standardized terminology and definitions meant that different communities, or consultants they hired, reflected language from their local plan development context in the type of data and attributes seen in the final GIS shapefiles. A review of the GIS files collected by NCDOT through the PGI over the last nine years has shown only one of the 90 plan files included any metadata or file documentation. In some cases, it is also difficult to distinguish between existing and planned infrastructure without cross referencing the maps, map legends and narratives in plan documents, which constrains the usefulness of the GIS files as a standalone deliverable.

This review of the GIS files from the PGI has further revealed formatting disparities among the datasets. Some communities use the Linear Referencing System (LRS) and may have gaps in coverage on local roads. Some communities represent the infrastructure as a line on the Integrated Statewide Road Network (ISRN) or LRS line, while others draw the infrastructure as a buffer adjacent to the road lines. Alignment issues were also noted, which may be due to the mix of different versions of base roadway files, or that a local roadway network file does not align with either the ISRN or the LRS.

The state of the current practice limits the ability to easily aggregate data from municipalities within the same county, planning region, or highway division, which hampers the capability to analyze and understand the non-motorized transportation network at these larger geographic scales.

This document lays out the GIS data standards and formatting to which all PGI communities must adhere so that their datasets may be optimally integrated into the PBIN.

Table 1: Inventory Requirements for Planning Grant Communities

For all Feature Classes:

- **Entity** for the data should be indicated
- **Plan Year** and **Plan Name**
- **Comprehensive Transportation Plan Name**, where applicable
- **Data Collection Year**

Bicycle Plans	Pedestrian Plans	Shared Use Paths (SUP) – All Plans
Linear Data	**Linear Data**	**Linear Data**
Existing Facility Type – Bike Lane, Buffered Bike Lane, Paved Shoulder, Shared Lane, Separated Bike Lane, Contra-flow Bike Lane, Other **Existing Signing and Marking** – Bike Route, Wayfinding, Bicycle Boulevard, Shared Lane Markings **Existing Facility Name** – local, county, state or national **Facility Width** **Proposed Facility Type** - Bike Lane, Buffered Bike Lane, Paved Shoulder, Shared Lane, Separated Bike Lane, Contra-flow Bike Lane, Other **Proposed Signing and Marking** - Bike Route, Wayfinding, Bicycle Boulevard, Shared Lane Markings, Unspecified **Roadway**	**Existing Facility Type** – Sidewalk, Footpath **Material** – Asphalt, Concrete, Gravel Brick/Pavers, Dirt/Natural, Boardwalk **Facility Width** **Proposed Facility Type** – sidewalk, footpath, unspecified **Roadway**	**Existing Facility Type** – Shared Use Path, Sidepath, Unimproved Trail **Material** – Asphalt, Concrete, Gravel, Brick/Pavers, Dirt/Natural, Boardwalk, Other **Width** **Buffer Width** (Sidepath) **Proposed Facility Type** – Shared Use Path, Sidepath, Unimproved Trail **Geographic Reference**
Point Data	**Point Data**	**Point Data**
Existing Feature Type – Bike Corral, Bike Maintenance Station, Bike Lockers, Bike Parking, Bike Share, Bike Detection, Bike Signal, Bike Box, Other Intersection Treatment **Proposed Feature Type** -- Bike Corral, Bike Maintenance Station, Bike Lockers, Bike Parking, Bike Share, Bike Detection, Bike Signal, Bike Box, Other Intersection Treatment, Crossing Improvement, Grade Separation **Roadway**	**Existing Facility** – Marked Crosswalk, Mid-block Crossing, Pedestrian Signal, Rectangular Rapid Flashing Beacon, Pedestrian Hybrid Beacon, Underpass, Overpass **Proposed Facility** -- Marked Crosswalk, Mid-block Crossing, Pedestrian Signal, Rectangular Rapid Flashing Beacon, Pedestrian Hybrid Beacon, Curb Ramp, Crossing Island, Curb Extension, Underpass, Overpass, Grade Separation, Crossing Improvement **Proposed Improvement Type** – High Visibility Crosswalk Upgrade, Curb Ramp Upgrade, Curb Radii	**Existing Access Point** – Trailhead, Access point **Existing Crossing Treatment** - SUP Signal, SUP Overpass, SUP Underpass **Proposed Access Point** – Trailhead, Access point **Proposed Crossing Treatment** – SUP Signal, Bollard, SUP Underpass, SUP Overpass

		Tightening		
		Roadway		

2. COLLECTING DATA FOR PLAN DEVELOPMENT

Historically, PGI communities primarily created shapefiles to produce the maps needed for the planning document, and as such, the type and quantity of data collected was largely driven by the goals and objectives identified through the plan develoopment process. The NCDOT recognizes that every municipality will not have or be able to collect data for each field cataloged in PBIN. It is important, however, that PGI communities collect and report the minimum level of data outlined below to fulfill their deliverable requirements as an award recipient. If the municipality does not have an inventory of the following required data, it is imperative that these collection needs be incorporated into the scope of work negotiated with the consultant selected to develop the bicycle, pedestrian, or combination transportation plan.

2.1. Inventory Requirements

Through the plan development process, there is a minimum level of data that must be collected, updated, or spatially represented in order to clearly understand a community's existing bicycle and pedestrian facility conditions as well as the desirable improvements proposed. The following features must be inventoried and spatially represented using a GIS database:

- **Existing Facilities** - All PGI communities must include an inventory of current existing bicycle or pedestrian facilities. For communities developing combined bicycle and pedestrian plans, all non-motorized facilities must be included. Shared use paths, by their nature, are both a bicycle and a pedestrian facility, and therefore should be included in any inventory to provide a complete picture of the network available to either given transportation mode.
- **Proposed Facilities** – Similar to existing facility requirements, all PGI communities must also include an inventory of proposed bicycle and/or pedestrian facilities By using the inventories outlined in the Data Catalog, communities will be able design their local GIS database to clearly differentiate between existing facilities and those that are being proposed through the plan.

The PBIN Data Catalog lists required fields and attributes to inventory within each feature dataset with an asterisk (*). Communities will utilize the nomenclature and definitions contained within the Data Catalog when creating their inventory. **Table 1** highlights the minimum requirements in each inventory category for PGI Communities. See the PBIN Data Catalog for a comprehensive listing of data elements and detailed definitions for each.

2.2. Use of Data Template

A blank geodatabase template designed with correct field specifications in the PBIN format to be used for the GIS inventory is available upon request from NCDOT. This template should be used so that future integration of the data into the PBIN is streamlined. There are a few things about the Data Template to be aware of prior to adding data. First, ensure that the most current version of the template is being used. Change the name of the template to the

name of the plan and include the year in which the plan was developed and adopted. In the example shown below, "January2016_Blank_Template.gdb" would be changed to "Community Bicycle Pedestrian Plan 2016.gdb." Next, ensure that you change the word "Community" in "Community_BikePedSUP_Assets" to the name of your community or agency and delete the portions of "BikePedSUP" that are not relevant to the planning initiative. The "T" besides each feature class is to indicate that the data is from the Template. This "T" should be changed to the name of the Agency which data is being collected for. These small details will assist with keeping data separate from PBIN data during integration and are also of benefit to the agency receiving the data.
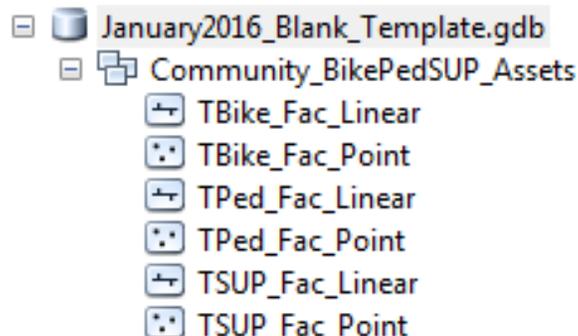
2.3. Detailed Inventory Considerations

Some communities may be interested in a more detailed level of inventory but not have the resources to do so for the entire jurisdiction. The plan development process may be used to solicit input from the steering committee and/or through public outreach to identify focus areas that may be prioritized for a more detailed inventory. Geographic focus areas may be defined around key trip generator origins or destinations, like schools, parks, central business districts, or large employment centers; or, they may be defined as corridors prioritized for the potential connectivity they offer for non-motorized travel. The range of coverage for a focus area may also vary. For example, because Safe Routes to School funding may only be used for projects within two miles of an elementary or middle school, a school-based focus area may use a 2-mile buffer. A community may desire the inventory to have an accessibility focus to include curb ramps and barriers to active travel.

The Data Catalog includes a list of optional data to consider collecting for each focus area.

2.4. General Notes on Creating GIS Data

Accuracy: For all new data, points and lines should be geolocated with accuracy so that cardinal direction data is not necessary to determine which side of an intersection or road the data represents. The cardinal direction field is provided for historical data or in cases where it is necessary to use the cardinal direction data to distinguish the location of a piece of data.

Discreet Data: Each piece of data that represents a facility should have its own unique set of attributes. For example, a bench and a bicycle rack may be spatially located immediately next to each other, but each should have a discreet data point in the GIS database. For example, if there are multiple bicycle racks, each should be represented by a data point. A linear example is that there may be two different linear bicycle facilities on the same section of

roadway such as a bike lane for climbing on one side of the roadway and a shared lane facility with shared lane markings on the other. These should be treated as discreet data pieces, with both lines having their own unique set of attributes. For the shared lane in this example, the facility type would be Shared Lane and the Shared Lane Markings would be indicated within the Existing Signing and Marking field.

Existing vs. Proposed: A record should either be entered into the PBIN template as existing or proposed, but should never represent both.

Shared Lanes: Wide outside lanes and shared neighborhood streets are classified as "shared lanes" since no bicycle facilities are present.

2.5. Flexibility for Customization at the Local Level

Clearly, there are some data that PGI communities may wish to store in their local GIS files which are not part of the statewide PBIN. These may include but are not limited to crash data, transit amenities or related data, or non-motorized volume data. Communities are encouraged to use data beyond what is required if they provide input to or represent outputs from the plan development process. These data should be stored in GIS layers separate from the PBIN template provided by NCDOT. The PBIN data format should not be modified in the final GIS files delivered to NCDOT. It is important to make sure that metadata is included with the data submission.

3. DATA FORMAT

GIS shapefiles shall adhere to the PBIN format regarding nomenclature, structure and the field and attribute specifications outlined in the Data Catalog. Files submitted as deliverables must contain functional GIS files. Submitting .mxd or .pdf files of the data is **not** acceptable. GIS files may be zipped before submitting. PGI communities should use the PBIN Template (.gdb) which is formatted to the details referenced in the Data Catalog and contains all 6 feature classes.. This will ensure a streamlined integration process of the local dataset into the PBIN with minimal chance of error and less need for data cleaning.

3.1. Use the Data Catalog

The Data Catalog provides a description of each field, field type, and field length for data stored within the PBIN, as well as a list of attributes and their definitions contained within each field. It is highly recommended that PGI communities use the digital geodatabase template available from NCDOT to begin any new local GIS dataset, as these files are set up in the proper format. There are six (6) different feature classes available, and depending on the plan type, each PGI community must ultimately supply a minimum of four (4) of them as deliverables:

- Bicycle Linear
- Bicycle Point
- Pedestrian Linear
- Pedestrian Point
- Shared Use Path Linear
- Shared Use Path Point

Unused feature classes in the geodatabase may be left blank but at least four feature classes must be submitted with functional data..

3.2. Supply Documentation and Metadata

It is mandatory that GIS data supplied to NCDOT contain metadata.   The metadata must comply with the NCDOT GIS Metadata Standard. The most current version can be found on the NCDOT GIS Standards and Practices website.

Open the geodatabase in ArcCatalog, click on the Description tab and enter the information shown in ALL CAPS. This must include the AGENCY NAME, PLAN NAME, AGENCY CREDITS, DATA CREATOR – COMPANY, NAME OF PROJECT LEAD, PROJECT NUMBER and any other information that the creator wishes to provide with the data.
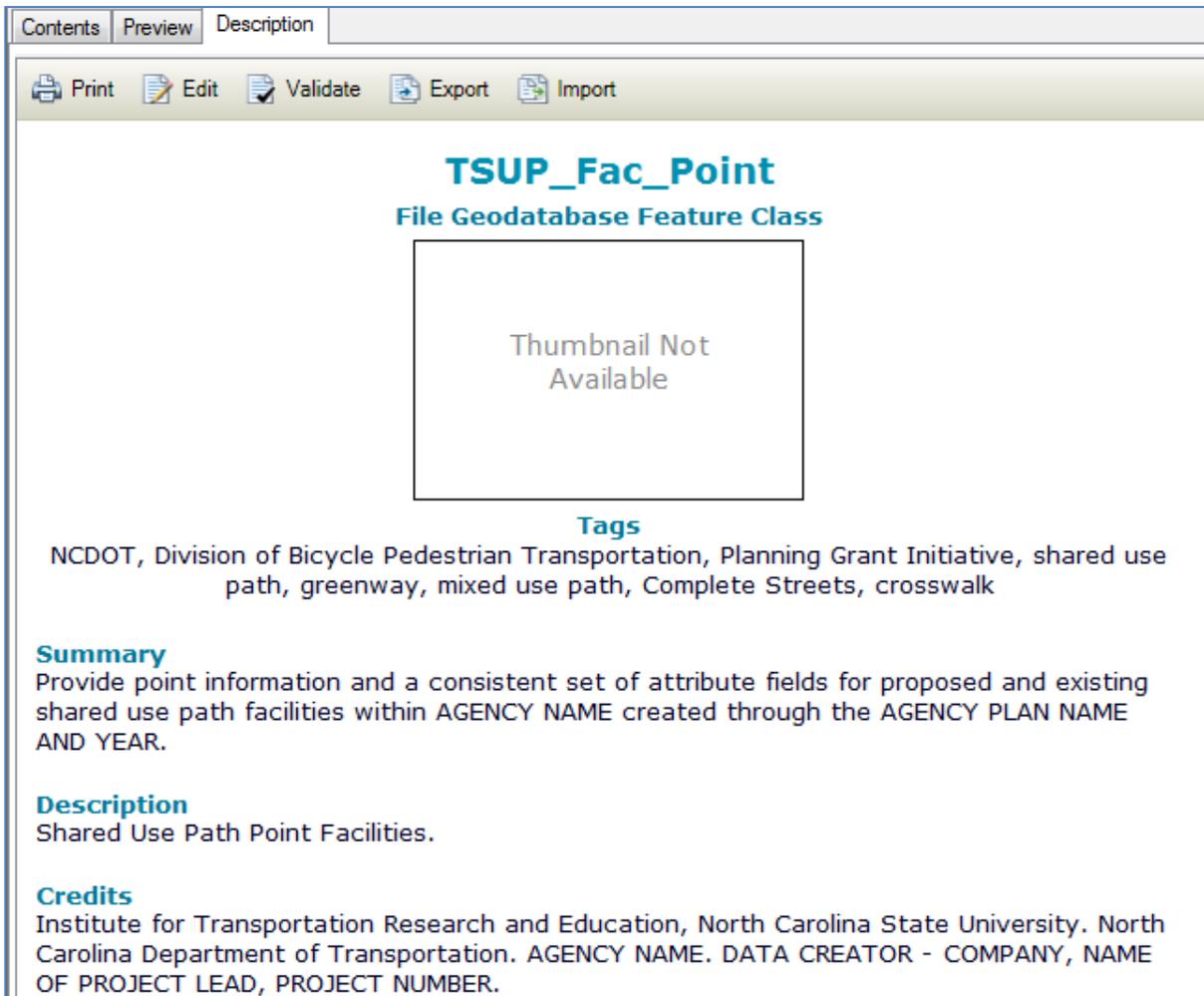
Fill in the ALL CAPS sections in the metadata for the geodatabase itself and also for each feature class.