DRAFT Appendix H: Priority Bicycle Safety Corridors and Intersections Methodology

Contents

Overview

Development of the Priority Bicycle Safety Corridors and Priority Bicycle Safety Intersections required two separate processes. Priority Bicycle Safety Corridors are roadways within the NCTCOG Metropolitan Planning Area (MPA) with a frequency of crashes above the regional average (2.6 crashes per mile). Priority Bicycle Safety Intersections are intersections within the MPA with multiple bicycle crashes at any given location. Analysis to identify corridors and intersections was completed in ArcGIS Pro.

Priority Bicycle Safety Corridors

1: Preparing the TxDOT Roadway Inventory for Analysis

The TxDOT Roadway Inventory layer has a wealth of data of all roadways in the region, but the roadway segments are broken. To resolve this, NCTCOG staff created two different roadway layers with connected segments using the **dissolve tool**.

The first layer created was the TxDOT Roadway Streets layer (also known as *TxDOTRoadway_DissolveSTE* feature class in the Regional Bike Safety Action Plan GDB*)*.

A query was set to only include features that have a value for the street name field, or STE_Name. Doing this excludes all lines that have null values for street names, which is typically highways.

Next the dissolve tool was used. TxDOT Roadway Inventory layer was added to the tool and the dissolve was set based on the fields STE_Name, SPD_Max, F_System, and NUM_Lanes. The "create multipart features" was unchecked. This dissolved the roadways into one segment if the fields listed above matched. However, if there is a field that conflicts, the dissolve will not merge the segment into one. For example, there are some roadways that have the same name, but have vary in the number of lanes depending on the section of the roadway. A roadway such as this would have multiple lines.

The second layer created was the TxDOT Roadway Highways layer (also known as *TxDOTRoadway_DissovleHwy*).

To identify highways, a query was set to only display segments that had a Highway or HWY name value. The dissolve tool was also used on this layer using the same fields mentioned above with addition of Highway Number or HNUM.

After the two layers were created, the highways layers were added to the streets layer using the **paste special tool**.

2. Identifying Corridors with a High Number of Crashes and Injury Severity

Now that roadways segments are grouped based on street name or highway name, system classification, speed, and number of lanes, crashes can be joined to these segments. The spatial join tool was used to identify the total number of crashes on each roadway

segment and a sum calculation of each level of severity (Fatal, Serious, Minor, Possible, Not Injured, Unknown).

Bicycle Crash Severity Weight

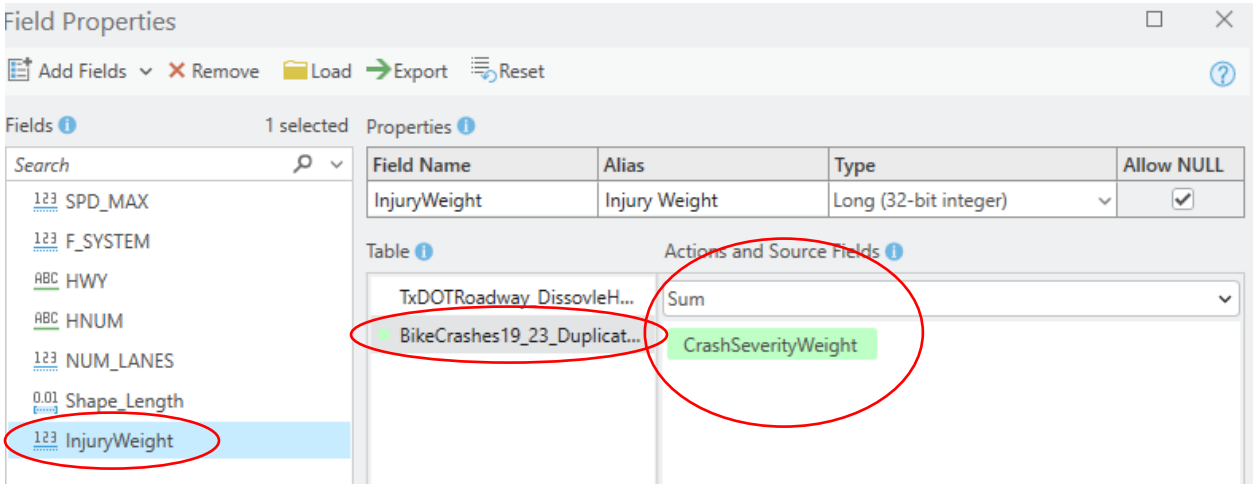
To conduct the injury sum calculation through the spatial join, each crash must be assigned a numeric value depending on the severity. A new field was added to the bicycle crash layer with the values listed below. Crash severity weights closely follow the values assigned in the *TxDOT 2023 Vulnerable Road User Safety Assessment*.[i]

Crash Severity Weights:

- Fatal=5
- Serious=4
- Minor=3
- Possible=2
- Not Injured=1
- Unknown=0

Roadway Segments Spatial Join

The **spatial join tool** was used to count the number of crashes on each corridor as well as calculate the injury severity by adding a new field directly in the spatial join tool. The source of the field was from the bicycle crashes layer, crashes severity weight, and the action was summed (see below). The output is a new layer titled *Corridors*.



3. Identifying Multiple Incident Corridors

The spatial join of bicycle crashes to the target roadways segments will not automatically remove segments with only 0-1 crash. Using the attribute table and select by attribute feature, segments with 0-1 crash were selected and deleted from the layer.

The regional average of the number of crashes per corridor is 3 crashes for the analysis period 2019-2026. Roadway segments below the regional average were removed from the analysis.

4. Adjusting limits based on roadway, land use, and local context

The output of the analysis provides a good starting point to further explore where a road may benefit from further study to implement bicycle safety countermeasures. That said, the output does not reflect real world geography, road characteristics that may be consistent throughout the length of a road (speed, number of lanes), land use along the corridor that may generate bicycle trips, or local knowledge of bicycle activity and future plans. To this end, corridor limits were adjusted to best reflect the real world.

Roadway Characteristics Considerations

As mentioned in step 1, the TxDOT roadway inventory was dissolved based on characteristics such as street name, functional classification, speed, and number of lanes. This was beneficial to connect road segments, but could cause segment breaks in areas that should be joined. For example, functional classification for a road could change but road characteristics such as speed or number of lanes could be consistent throughout the length of the corridor. Because of this, limits were extended to capture where the road showed consistent attributes.

Similarly, speed and number of lanes could change for a few blocks of a road, then change back in the area where there was a concentration of bicycle crashes. In these cases, the limits of the corridor were extended to capture where crashes may happen in the future following the systemic approach.

Land Use Characteristics Considerations

Certain land uses are know has trip generators such as retail, grocery stores, schools, transit, parks, etc. Residential land uses such as single and multi-family housing area known as trip origins. Corridors limits where adjusted based on trips destinations and origins.

Local Context Considerations

NCTCOG staff met with local and State staff to review the limits of the corridors to gain valuable insight into current and future active transportation plans and the bicycle activity of the community. Limits of corridors were adjusted based on this feedback.

Notably, for on-system corridors, TxDOT staff provided valuable insight regarding which identified bicycle safety corridors may not be suitable for bicycle travel on the roadway due to functional classification; however, there could be intersections along the corridor for bicycle safety countermeasures so bicyclists could safely cross the corridor. Thus, further analysis was completed to identify Priority Bicycle Safety Intersections for both on-system and off-system roadways where improvements could be made.

5. Identifying Intersection and Midblock Crashes

To provide more information to State and Local partners, two **spatial join** processes were ran to assign corridors the number of mid-block crashes and intersection crashes.

Mid-Block crashes

The bicycle crash layer was **queried** to only display crashes that occurred at mid-block locations. Then, a **spatial join** was conducted to calculate the value of mid-block crashes.

Intersection crashes

The inverse of the previous **query** was run to the bicycle crash layer so that only intersection crashes (signalized and unsignalized) were displayed. Another **spatial join** was preformed to calculate this number.

6. Crashes Per Mile

To normalize the high number of incidents on longer corridors, the number of crashes per mile was calculated. This field is **Crashes Per Mile.** Using the **Calculate Geometry** tool, the milage of the corridor was calculated. Then, using the **Calculate Field** tool, crashes per mile was calculated by diving the length of the corridor by the count of crashes that occurred along the corridor.

Priority Bicycle Safety Corridors

As mentioned in Step 4, it was necessary to identify intersections with multiple crashes. This analysis was completed by setting a **query** to only show intersection crashes.

After, the **Near** tool was ran to find crashes that occurred within 100 feet of each other. Intersections that had multiple crashes of each other were flagged as Priority Bicycle Safety Intersections.

References

[i] Texas-Vulnerable-Road-User-Assessment-2023.pdf