RISK ASSESSMENT OF COG TRAIL CROSSINGS AND ACCESS POINTS

MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

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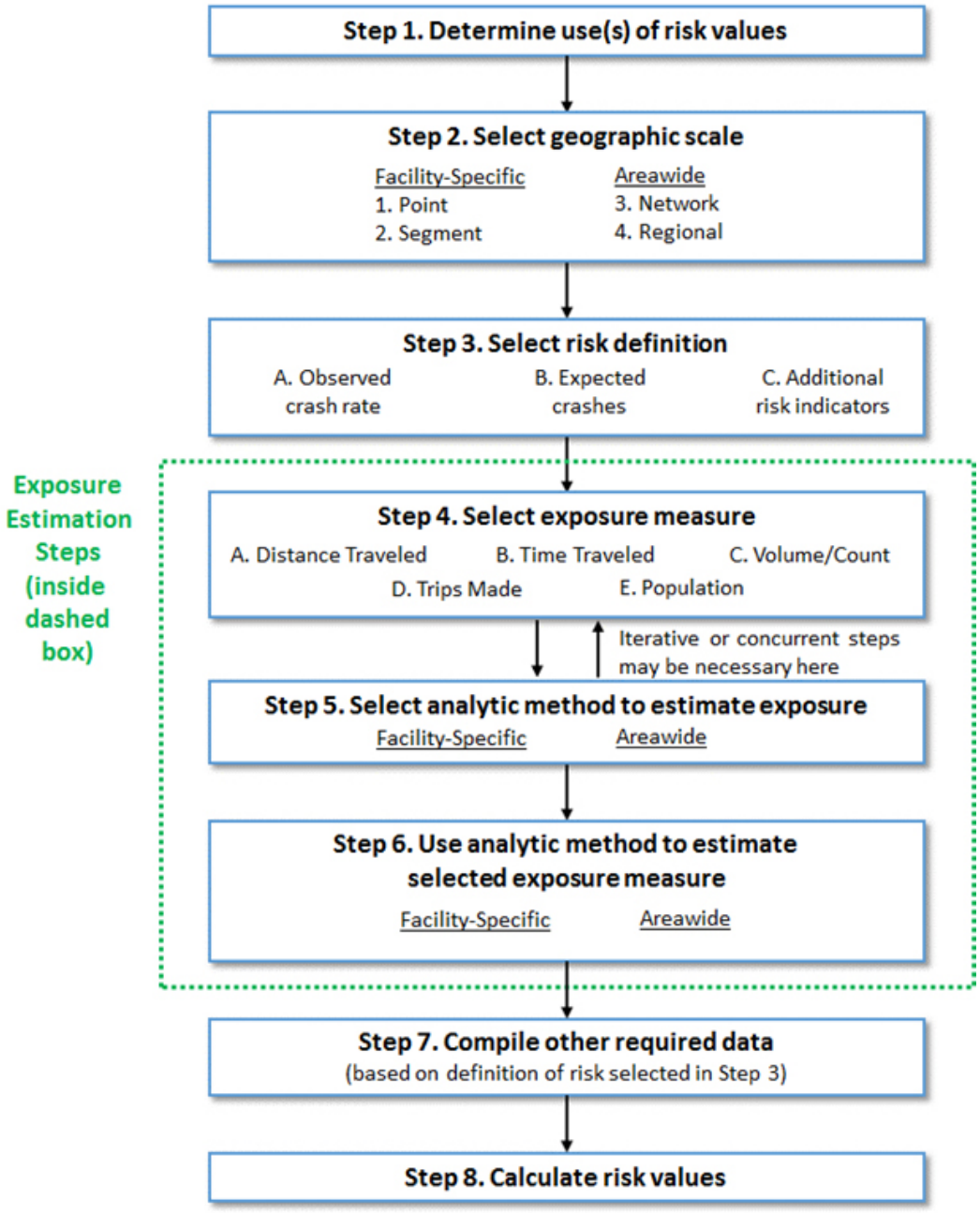
OVERVIEW

The following trail access point risk assessment was conducted following the FHWA Guide for Scalable Risk Assessment Methods for Pedestrians and Bicyclists. The chart in XX illustrates the steps in this process.

FIGURE 1. EIGHT STEPS FOR SCALABLE RISK ASSESSMENT FOR PEDESTRIANS AND BICYCLISTS



Source: https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa18032

STEP 1. DETERMINE USE(S) OF RISK VALUES

The 200+ miles of Central Ohio Greenways (COG) trails represent a significant portion of the region's pedestrian and bicycle network, providing low-stress connections for people of all ages and abilities between employment centers, recreational opportunities, and other destinations. The Mid-Ohio Regional Planning Commission (MORPC), Central Ohio's MPO, annually collects robust non-motorized volume data with partner agencies through the COG monitoring program, providing detailed usage metrics that assist in painting a picture of pedestrian and bicycle travel patterns throughout the region: Average Annual Daily Trail Traffic (AADTT) and Trail Miles Traveled (TMT).

While COG trails are largely separated from roadway rights-of-way, trail users have the potential to come into conflict with motorized vehicles at points where trails cross roadways at-grade and where trails are accessed. This potential for conflict, or risk, is known, however methods to understand, quantify, and address the risk at these locations and others have not yet been employed. Additionally, many locations throughout the region that are perceived as "high risk" by non-motorized users are not brought into MORPC's focus due to an absence of crash reporting (i.e. "near miss" locations). Due to the severity of non-motorized crashes when they do occur, it is of great importance to understand and address potential high-risk locations.

Because of the lack of a current, in-depth understanding of risk experienced by non-motorized users regionally, and the availability of robust non-motorized volume data and usage metrics along the COG network, the potential to utilize risk assessment methodologies creates an opportunity to improve regional safety by addressing high-risk trail crossings and access points. MORPC will also be in a position to boost future data analysis products and technical assistance services provided to member agencies.

A numeric index was developed that quantifies the risk experienced by non-motorized users of the region's transportation network at trail crossings and access points. The development of a risk index was ultimately used to prioritize trail crossing and access point locations for advanced facilities and crossing treatments using a methodology that is generalizable to other portions of the region's transportation network to allow for future analysis in a larger geographic context. MORPC member agencies will be directly linked to countermeasure-based recommendations that address risk experienced by non-motorized users and improve transportation safety on a regional scale. These countermeasure recommendations, and the observed risk-related issues they address, will be packaged within an application for funding for implementation purposes.

To complete this analysis, MORPC made use of the datasets and attributes listed in the chart in Figure 2, which were available at a regional scale.

FIGURE 2. REGIONAL DATASETS AND ATTRIBUTES

DATASET	ATTRIBUTES	SOURCE
Street Centerlines	AADT	MORPC/ODOT
	Number of Lanes	MORPC
	Posted Speed	MORPC
	Bike Facility	MORPC
Trail Network	AADTT	MORPC
Aerial Imagery	Crosswalk Type	MORPC
	Crossing Length	MORPC
	Street Parking	MORPC
	Median/Refuge Island	MORPC
Intersections	Signalization	MORPC
	Pedestrian Signal	MORPC
	Signage	MORPC
Crashes	Crash Type	ODOT/ODPS
	Crash Severity	ODOT/ODPS
	Crash Location	ODOT/ODPS
Sidewalk Network	Sidewalk Type	MORPC
Transit Network	Transit Routes	COTA
Parcels	Land Use	MORPC
	Number of Dwelling Units	MORPC

STEP 2. SELECT GEOGRAPHIC SCALE

Because the analysis employed by MORPC involved the calculation of risk experienced by non-motorized users at 110 regional trail crossings and access points, the geographic scale was at the facility level.

STEP 3. SELECT RISK DEFINITION

As mentioned previously, many locations throughout the region that are perceived as “high risk” by non-motorized users are not brought into MORPC’s focus due to an absence of crash reporting. Because of this, locations exhibiting low crash frequencies may not accurately represent the actual risk levels experienced by non-motorized users if risk is only defined by observed crash statistics.

To account for these factors, and to ensure the generalizability of risk calculation to other locations around the region, MORPC employed an “additional risk indicators” method of defining risk where risk is a function of multiple risk indicators, including roadway, crossing, and site context characteristics.

STEP 4. SELECT EXPOSURE MEASURE

Because of the availability of detailed and comprehensive average annual daily traffic counts for both non-motorized trail users and vehicular traffic along roadways, MORPC selected the volume/count method of exposure calculation as most appropriate to assess the exposure associated with non-motorized users at trail crossings and access points.

STEP 5. SELECT ANALYTIC METHOD TO ESTIMATE EXPOSURE

As noted in Step 4, because of the availability of comprehensive trail and roadway volume data, site counts were selected as the exposure estimation method of choice. However, the intention to make exposure and risk estimation methods generalizable to other locations of interest around the region without detailed non-motorized count data in future analyses necessitated the inclusion of an index that approximates non-motorized demand. Refer to Step 6 for methods of calculating this index.

STEP 6. USE ANALYTIC METHOD TO ESTIMATE EXPOSURE

MORPC, together with regional count partners, annually monitors activity along the Central Ohio Greenways (COG) network of trails. The network of trails is subdivided into 103 discrete monitoring segments based on access points, adjacent land uses, and adjacent development intensity. Count partners maintain 23 permanent, automatic count stations that collect continuous data year-round, supplemented by the collection of 7-day short duration counts along the 80 remaining trail segments on a 3-year rotating cycle. Permanent count data is used to develop factors that allow the short duration counts to be extrapolated into average annual daily trail traffic (AADTT) figures, updated annually.

To estimate exposure based on roadway and trail user volumes, average annual daily trail traffic (AADTT) volumes along trail segments adjacent to crossings were multiplied by vehicular volumes (AADT) associated with the roadway being crossed. AADT for roadways that did not have available count data were estimated based on average statewide AADTs by roadway functional classification. Using the product of motorized and non-motorized volumes helped account for wide differences among trail AADTTs and among roadway AADTs.

In order to generalize exposure and risk estimation methods to areas without non-motorized volume data in future analyses, MORPC also generated an index intended to approximate non-motorized demand. This index is comprised of datasets that are readily available region-wide, including land use mix, dwelling density, pedestrian and bicycle facility density, and the density of streets with posted speeds greater than 25 mph. Note that the non-motorized demand index was used in concert with non-motorized volume data for the purposes of this analysis.

STEP 7. COMPILE OTHER REQUIRED DATA

As noted in Step 3, MORPC employed a definition of risk that incorporates several risk indicators in addition to observed crash frequency and severity. Largely based on FHWA systemic safety analysis recommendations, the following additional risk indicators were used:

- **Intersection signalization**
- **Crossing type**
- **Crossing length**
- **Pedestrian signalization**
- **Presence of warning signage**
- **Presence of refuge island**
- **Number of lanes crossed**
- **Posted roadway speed**
- **Presence of bike lane**
- **Presence of street parking**
- **Presence of sidewalk**
- **Presence of transit route**

STEP 8. CALCULATE RISK VALUES

A composite risk index was generated for each trail crossing and access point using the additional risk indicators outlined in Step 7, as well as the exposure estimates calculated in Step 3 and observed crash frequency/severity. Each indicator was assigned a value between 0 and 10 depending on its influence on risk, and summed using the weighting scheme outlined in the chart in Figure 3.

FIGURE 3. RISK INDICATORS AND EXPOSURE ESTIMATES

	INDICATOR	DESCRIPTION	WEIGHT
Exposure	Product of Non-Motorized and Vehicular Volumes	Higher product = higher level of exposure	5
	Non-Motorized Demand Index	Higher value = higher level of exposure	1
Additional Risk Indicators	Intersection Signalization	Signalization = decreased risk	2
	Crosswalk Type	Greater visibility by crosswalk type = decreased risk	1.5
	Crossing Length	Higher length = higher risk	1
	Presence of Pedestrian Signal	Pedestrian signal = decreased risk	1
	Warning Signage	Greater intensity of warning signage = decreased risk	1.5
	Presence of Refuge Island	Refuge island = decreased risk	2
	Number of Lanes Crossed	Greater number of lanes = increased risk	1
	Posted Speed	Higher speed = higher risk	2
	Presence of Bike Lane	Bike lane = decreased risk	1
	Presence of Street Parking	Street parking = increased risk	1
	Presence of Sidewalk	Sidewalk = decreased risk	1
	Presence of Transit Route	Transit route = increased risk	1
Observed Crashes	Crash Severity (EPDO)	Higher crash severity = higher risk	1

NEXT STEPS (IMPLEMENTATION)

MORPC will be using the calculated risk index and subsequent ranking of trail crossing and access points to prioritize locations for safety investment. Risk indicators that negatively affect high priority locations will be reviewed, and countermeasure-based recommendations will be made that have been demonstrated to address the specific risk indicators. These recommendations, along with the supporting analysis, will be compiled and submitted as an application for funding for systemic countermeasure implementation on behalf of the impacted MORPC member agencies.

GUIDE FEEDBACK

While completing the assessment of risk experienced by non-motorized users at trail crossings and access points throughout Central Ohio, MORPC found that the step-by-step format of the Guide for Scalable Risk Assessment Methods for Pedestrians and Bicyclists provided an easy-to-follow linear process. The guidance allows for flexibility in exposure and risk calculation methods, providing strengths and weaknesses of different methods, and taking into account the wide variety of agency resources, staff expertise, and analytic capabilities. The guide also provides flexibility in methods that best suit differing geographic analysis scales, as well as examples of how to translate/aggregate between scales. In general, we believe that these factors can assist agencies and practitioners in defining and calculating non-motorized exposure and risk in a way that takes into account local conditions, study purpose, and available resources.

In working through our analysis, we were somewhat unclear about how best to tie-in estimated exposure to risk calculation when employing an additional risk indicators approach (refer to p.20 of the Guide). As mentioned in Steps 3 and 8, we wrapped our exposure estimate (product of non-motorized and vehicular volumes) into the calculation of the risk index. In this manner we treated exposure similarly as the additional risk indicators.

We also believe it may be helpful to provide guidance relating how each additional risk indicator listed on p.84 of the Guide influences risk (either positively or negatively) and potentially identify how significantly each indicator affects risk relative to the other indicators. MORPC's method of identifying each additional risk indicator's weight largely relied on professional judgement.