NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

FINAL REPORT
EXECUTIVE SUMMARY
June, 2022

PEDESTRIAN COUNTS PROJECT

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The NJTPA is the federally authorized Metropolitan Planning Organization (MPO) for the 13-county northern New Jersey region, home to 7 million people. It evaluates and approves transportation improvement projects, provides a forum for cooperative transportation planning, sponsors and conducts studies, assists county and city planning agencies and monitors compliance with air quality goals.

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GLOSSARY

ANNUAL AVERAGE DAILY TRAFFIC (AADT): The volume of traffic over an average 24-hour period at a specific location or road/trail segment during a count year. AADBT and AADPT represent, respectively, annual average daily bicycle traffic and annual average daily pedestrian traffic.

ADJUSTMENT FACTORS: Calculations used to estimate annual volume from short-duration counts (see below). Factors are derived from permanent counter data (see below).

CALIBRATION: The adjustment of constants in estimated or asserted models to make the models replicate observed data for a base (calibration) year or otherwise produce more reasonable results. Model calibration is often incorrectly considered to be model validation.

FACTOR GROUP: A set of locations with similar hour-of-day, day-of-week, and seasonal bicycling activity patterns.

OCCLUSION: Undercounting caused by certain technologies' inability to sense when two people are traveling side-by-side.

PERMANENT AUTOMATED COUNTERS: Counters installed at fixed locations that continuously monitor traffic, with the primary goal of understanding time-related activity patterns.

SCREENLINE COUNTS: "Screenline" refers to the imaginary line running across the road that captures both directions of traffic, as opposed to the many different directions of traffic that are captured at an intersection. Permanent screenline counts can serve as calibration factors. Locations such as bridges, trails, and other pinch points or popular routes that provide stable patterns to identify seasonal trends are ideal screenline count locations.

SHORT-DURATION COUNT (SDC): Counts conducted over a limited duration, often between two hours and two weeks, with the primary goal of increasing the spatial coverage of the monitoring program.

VALIDATION: The application of the calibrated models and comparison of the results against observed data. Ideally, the observed data are not used for the model estimation or calibration, but, practically, this is not always feasible.

EXECUTIVE SUMMARY

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PROJECT BACKGROUND

An increasing number of public agencies are developing and implementing programs to count people walking and bicycling. The North Jersey Transportation Planning Authority (NJTPA) understands the importance of expanding data collection and analysis relating to active transportation users to support resource prioritization, facility design decisions, safety analysis, and trend monitoring. Through this project, the NJTPA was interested in understanding pedestrian activity in Environmental Justice (EJ) communities, where walking mode share is especially high, and where residents face higher risks of being injured or killed while traveling as compared to the general population. The growing emphasis on equitable planning practices, as well as the need for performance-based planning and accountability, further strengthens the case for the development of better metrics related to bicycling and walking, which require accurate and reliable underlying data.

While the focus of this project was on pedestrian travel patterns in the region, the NJTPA also collected count data for bicyclists, micromobility users, and turning movements of passenger and heavy vehicles. The purpose of collecting data for additional modes was twofold:

1. These data provide insight into the conditions and safety factors at each site (e.g., volume of turning vehicle traffic pedestrians face while using crosswalks), and
2. They expand the NJTPA's overall understanding of multimodal travel patterns throughout the region.

The counting effort described in this report was intended to test and demonstrate methodologies for accurately counting both bicyclists and pedestrians for use in future NJTPA projects, studies and planning efforts that must consider the needs of all travelers, including active transportation users. Recommendations focus on how NJTPA can use its staff and other resources to effectively implement these counting methods.

SITE SELECTION

The NJTPA's vision for the long-term planning of the transportation infrastructure of Northern New Jersey is one that places great importance on improving transportation equity for all segments of the regional population. To achieve this vision, the NJTPA conducts and oversees an inclusive transportation planning process which leverages both data and insights from diverse communities to shape transportation investments and mobility programs.

For this project, the NJTPA sought out community insights by convening a Technical Advisory Committee (TAC) that included representatives of equity-minded community groups, along with industry experts.

At its first meeting, the TAC established goals and objectives of the project. At its second meeting, the TAC was asked to assess 225 potential count locations identified through a quantitative data model based on factors associated with pedestrian volumes, such as population and employment density, proximity to transit, and roadway type. The TAC helped refine this list to a final set of 100 sites. During the third meeting, the TAC reviewed preliminary findings and analysis from the data collection and discussed use cases for the dataset to support local pedestrian safety priorities.

At each site, the NJTPA collected traffic count data on pedestrians, bicycles, and vehicles, in addition to collecting count data on micromobility modes, which are often not recorded in traditional traffic counts. Micromobility includes e-scooters, e-bikes, and other powered transportation devices.

This information will inform future nonmotorized and micromobility projects at the NJTPA, with a focus on using pedestrian count data to obtain the greatest benefit for local road safety projects. In addition, the results can feed

into more advanced modeling that the NJTPA may conduct in the future, such as estimating pedestrian volumes on a systemwide scale or calculating bicycle and pedestrian crash rates.

COUNT DATA COLLECTION AND ANALYSIS

COUNT DATA COLLECTION

The consultant team contracted a vendor to collect count data. The data collection vendor used JVC Everio GZ-MS120 widescreen video capture equipment to record traffic at all locations, including the following modes:

- Pedestrians
- Bicyclists (standard bicycles and e-bikes)
- Micromobility (skateboards, scooters, e-scooters, and Segways)
- Passenger vehicles (FHWA vehicle classifications 1-3 (Motorcycles, Passenger Cars, Other Two-Axle Four-Tire Single-Unit Vehicles)
- Heavy vehicles (FHWA vehicle classifications 4-13)

Most locations were counted in the fall of 2021, with seasonal locations (such as tourist destinations along the Jersey Shore) counted during peak summer months.

In addition, the vendor also sought to determine demographic characteristics for nonmotorized users based on review of video footage collected; see **Figure 1**. This included estimates of gender and skin tone. These were tallied for pedestrian, bicyclists, and micromobility users separately. Age ranges of nonmotorized users were estimated. Helmet use was collected for bicyclists and micromobility users, and disability data were collected for pedestrians. Demographic data categories included the following information:

- Gender: Male/Female
- Age: Child/Adult/Senior
- Skin Tone: Light/Dark
- Non-Disabled: Yes/No
- Helmet User: Yes/No

No demographic data were collected for vehicle modes. The TAC was interested in gathering demographic data based on video observations. However, using video footage to determine individual characteristics like age, gender, and skin tone (as a proxy for race and ethnicity) is inherently inaccurate because data analysts must make subjective judgments about each user's identity. Best practices in nonmotorized data collection recommend self-reporting of demographics through user intercept surveys. For more information on demographic data collection, see Recommendation 2b.

In total, the vendor collected 24 hours of video data at 101 locations across the NJTPA region, amounting to 2,424 hours. Counts were provided as 15-minute resolution data, and as one of two types:

1. Weekday and weekend: 12-hour count data on a Friday, 7:00 AM – 7:00 PM, and 12-hour count data on a Saturday, 10:00 AM – 10:00 PM (94 locations)
2. Weekend only: 24-hour count data from 12:00 PM noon on Saturday, to 12:00 PM noon on Sunday (seven locations)

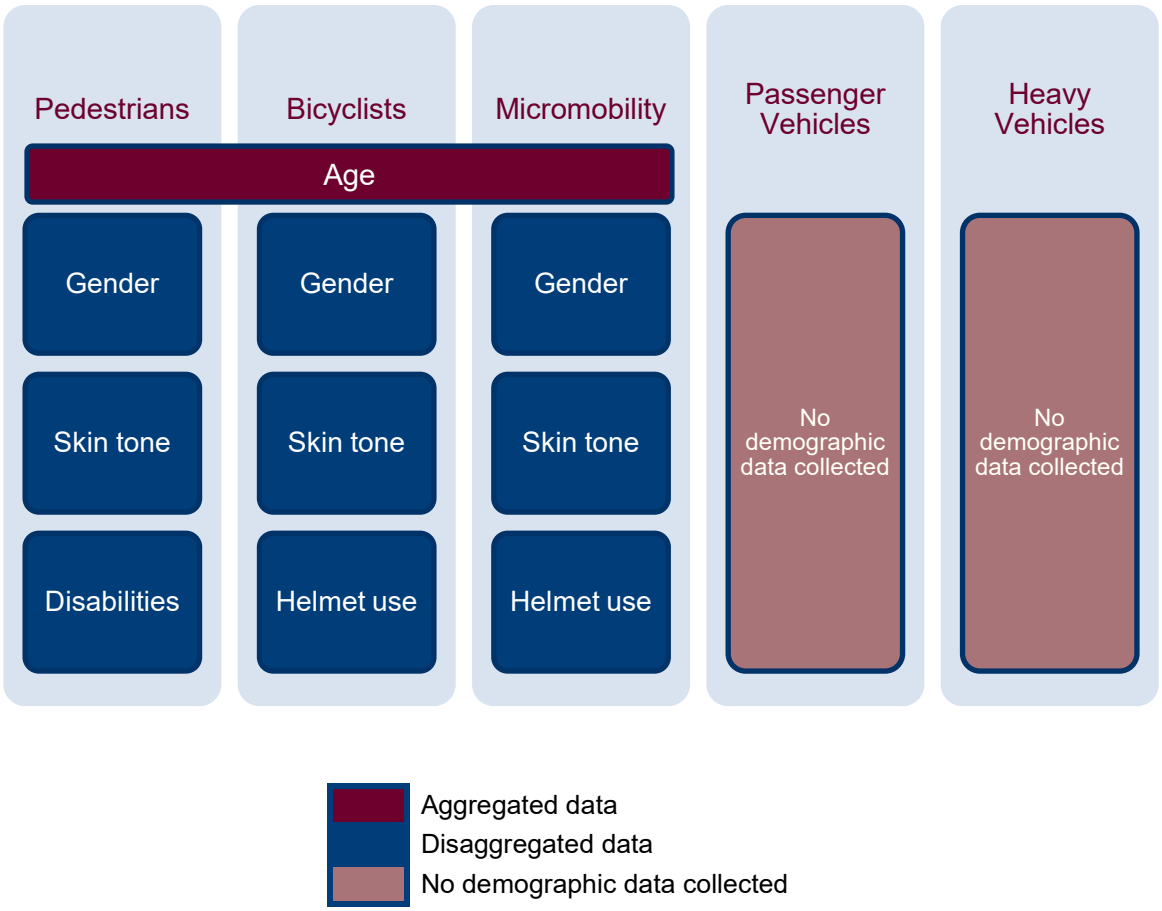

Figure 1: Demographic Data by Mode

ANALYSIS

Count data were analyzed along several axes, with clusters of variables defined for the following categories:

- Total counts by mode
- Percent of total traffic by mode
- Mode with greatest traffic count
- Peak-hour counts by mode[1]
- Peak-hour percent of traffic by mode
- Peak-hour mode with greatest traffic count

The mode types used in this analysis are:

- Pedestrians
- Bicyclists
- Micromobility
- Vehicle

[1] Standard peak hour timeframes as determined by best practices for analytical comparison; this may not reflect actual peak volumes at each location, which are more variable.

- Pedestrians and bicyclists combined
- Pedestrians, bicyclists, and micromobility combined

Travel use patterns were identified for each location, based on the ratios of weekday peak-hour traffic (7:00 – 9:00 AM + 4:00 – 6:00 PM) to off-peak-hour traffic (10:00 AM – 2:00 PM) and weekday traffic (12-hour total) to weekend traffic (12-hour total). **Table 1** shows the travel patterns assigned by the values of these two ratios, for the modes of bike, pedestrian, and the two combination modes (bike+ped, and bike+ped+micro).

Table 1: Peak:Off-Peak Ratio for Nonmotorized Modes

	Peak:off-peak ratio > 1	Peak:off-peak ratio < 1
Weekday:weekend ratio > 1	Commute	Mixed
Weekday:weekend ratio < 1	Mixed	Recreation

Table 2 shows the travel use pattern labels used for the vehicle mode.

Table 2: Peak:Off-Peak Ratio for Motorized Modes

	Peak:off-peak ratio > 1	Peak:off-peak ratio < 1
Weekday:weekend ratio > 1	Commute	Non-commute
Weekday:weekend ratio < 1	Non-commute	Non-commute

Additionally, “classification groups” were developed for each mode, for both weekday and weekend count data, based on the level of modal traffic and level of nearby population density. The modal traffic levels and population density were each classified into low, medium, and high ranges, and the classification groups consisted of each possible combination of the two labels; for example:

- Low population density, Low bicycle traffic
- High population density, Medium pedestrian traffic

Locations with high modal counts were identified by quantiles (5) and mapped, for both weekday (12-hour, 7:00 AM – 7:00 PM) and weekend (10-hour, 12:00 PM – 10:00 PM) count data.[2] Classification groups for nonmotorized modes consist of recreation, commute, or mixed based on the variables mentioned above. **Appendix F: Maps** shows modal use patterns for pedestrians; bicyclists; pedestrians and bicyclists combined; and pedestrians, bicyclists, and micromobility users combined.

KEY FINDINGS AND DATA SUMMARY

Nearly three million observations were recorded across all 101 count locations. Most of these observations (87 percent) were vehicular traffic movements, and nonmotorized users accounted for the remaining 14 percent. Figure 2 shows the percent modal breakdown for all data collected, with raw numbers listed below:

- Vehicles: 2,575,269
- Pedestrians: 353,988
- Bicyclists: 29,716

[2] For the 94 locations where both weekday and weekend data were collected, the Saturday data collection started at 10 AM. For the seven locations where only weekend data were collected, the data collection started at 12 PM. To examine the Saturday pattern across all 101 locations, 12 PM to 10 pm is the 10-hour period that all locations have in common.

- Micromobility: 4,477

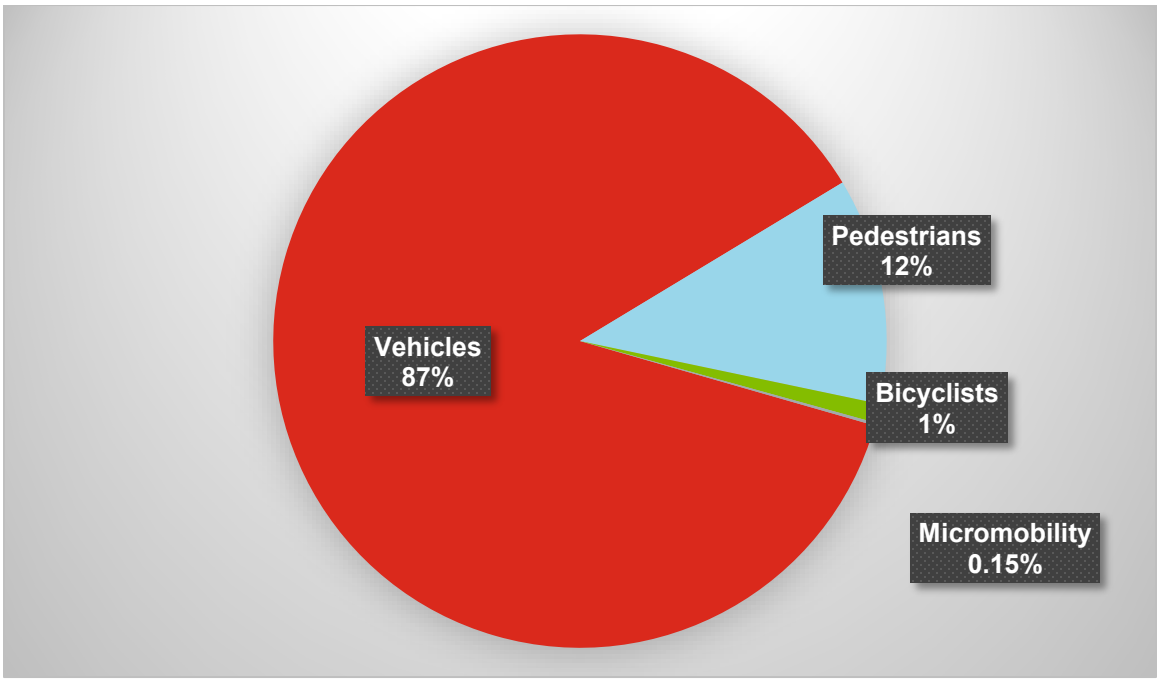

Figure 2: Percent Modal Breakdown

There were eight locations in the region where active transportation users were the most common mode for combined weekday and weekend activity, which included a mix of large city and suburban contexts. Locations with high pedestrian, bicyclists, and micromobility volumes are shown in **Table 3.**

Table 3: Top Active Transportation Locations

Intersection	County	Municipality	Totals
Pedestrians			
1. Adams St & Ferry St	Essex	Newark	25,385
2. **Grove St & Newark Ave**	Hudson	Jersey City	19,601
3. **Ocean Ave & Arnold Ave**	Ocean	Point Pleasant Beach	18,621
4. **Bergenline Ave & 60th St**	West New York	Hudson	16022
5. **Hudson St & Montgomery St/Exchange Pl**	Hudson	Jersey City	15,808
Bicyclists			
1. **US 9W/Sylvan Ave & Palisade Ave (CR 505)**	Bergen	Englewood Cliffs	2,213
2. **Jersey Ave & Grand St**	Hudson	Jersey City	2,119
3. **Hudson Ter (CR 505) & Bruce Reynolds Blvd**	Bergen	Fort Lee	1,538
4. **Frank Sinatra Dr & Sinatra Dr N**	Hudson	Hoboken	1,489
5. **Ocean Ave btwn Madison Ave & Whitman Ter**	Monmouth	Long Branch	1,345
Micromobility			
1. **Academy St & Bergen Ave**	Hudson	Jersey City	333
2. **Adams St & Ferry St**	Essex	Newark	283
3. **Bergenline Ave & 60th St**	Hudson	West New York	239
4. **Jersey Ave & Grand St**	Hudson	Jersey City	206
5. **Frank Sinatra Dr & Sinatra Dr N**	Hudson	Hoboken	196

Pedestrian activity at 52 locations was higher during the weekday than the weekend, and pedestrian activity at 26 locations was lower during the weekday than the weekend. The remaining locations did not have sufficient weekend or weekday data for proper equivalent comparisons.

RECOMMENDATIONS

These recommendations will help advance the NJTPA's ability to standardize nonmotorized data collection and expand its existing count database. Each recommendation is supported by one or more actions, divided into two tiers:

- **Short-term** actions that will help the NJTPA develop a standard approach to project- and corridor-specific counts.
- **Long-term** actions needed to establish and maintain a permanent nonmotorized count program.

Table 4 provides an overview of short and long-term recommendations NTJPA staff can take for each action. They are described in more detail on the following pages.

Table 4: Recommendations Summary

Recommendation/Action	Short-Term	Long-Term
1. Build nonmotorized count capacity.		
a) **Work with subregions to continue performing short-duration counts (for example, through the consultant assistance program).**	✓	
b) **Encourage subregions to install permanent counters at screenline locations.**		✓
c) **Encourage subregions install permanent counters by default with all new trail projects.**		✓
d) **Develop investment scenarios for permanent counter acquisition and installation.**		✓
2. Coordinate count efforts internally.		
a) **Determine benefits of project specific corridor counts and how to integrate them with broader regional count efforts.**	✓	
b) **Identify best practices for collecting demographic information.**	✓	
3. Enhance data management and analysis processes.		
a) **Establish quality control protocols.**	✓	
4. Share data, analysis, methodologies, and standards with subregional partners and the public.		
a) **Establish and maintain a centralized online platform where count data is regularly uploaded, as well as publication of data analysis and findings.**	✓	
b) Request subregions to send existing and ongoing count data to incorporate into online data platform.	✓	
c) **Provide guidance on site selection, data format, and standardization to local jurisdictions conducting their own counts.**	✓	
5. Determine resources needed for a nonmotorized monitoring program.		
a) **Conduct strategic planning.**		✓
b) **Determine staffing.**		✓
6. Develop and apply factor groups.		
a) **Define factor group thresholds.**		✓
b) **Monitor and adjust factors annually based on analysis of datasets.**		✓
c) **Assign factor groups to short duration count locations based on matching patterns for established thresholds.**		✓
7. Calibrate and validate third-party data.		

a) **Obtain third-party, segment-level pedestrian and bicycle volume estimates.**		✓
b) **Collect count data for calibration and validation.**		✓
c) **Conduct calibration and validation study.**		✓
8. Establish performance measures.		
a) **Develop nonmotorized count program performance measures that align with existing NJTPA targets.**	✓	
b) **Conduct pre-/post-construction AADBT and AADPT estimates on TIP projects.**	✓	
c) **Calculate bicycle and pedestrian crash rates at high-crash locations.**		✓