THE UNIVERSITY of NEW ORLEANS
UNO TRANSPORTATION INSTITUTE

Count Dat – Background and Methodology

July 2023

The ***Count Dat*** initiative is a collaborative endeavor intended to support active transportation data collection, analysis, and dissemination within the City of New Orleans. The data documents New Orleans' investments in developing a connected, low-stress network of walking and bicycling facilities, analyzing safety, mobility, and accessibility outcomes resulting from those investments. Specifically, ***Count Dat*** aims to:

1. Support ongoing implementation of the Moving New Orleans Bikes Plan and other pedestrian and bicycle facility enhancements through maintenance of existing continuous counters and continuation of seasonal short-duration counts to monitor trends over time, specific project "before and after" impacts, and advance data-driven Complete Streets policy implementation.
2. Support data analysis and public dissemination as tools to demonstrate the impact of active transportation infrastructure investment on safety, accessibility, and a culture of health.

Background

This initiative leverages and integrates previous work supported by several sponsors and partners. From 2010-2017, the New Orleans Regional Planning Commission supported the Pedestrian and Bicycle Resource Initiative, a joint project with UNO Transportation Institute (UNOTI) focused on collecting and analyzing active transportation volume and safety data through implementation of an annual count program and biennial crash data analysis. This program created a robust foundation from which to assess changes in active transportation patterns and demand over time, during a period of rapid network and population growth.

Subsequently, a program of continuous, short-duration automated, and manual counts was initiated in 2019 with external funding from People for Bikes to support count data collection and evaluation of the City's efforts to implement the Moving New Orleans Bikes Blueprint in connection with People for Bikes' Big Jump and Final Mile initiatives, which sought to install 75 miles of low-stress bikeways targeting underserved communities. UNOTI's role was to help the city better understand travel patterns, trends, and provide baseline data against which to measure the results of improvements to bicycle and pedestrian network connectivity.

Meanwhile, UNO Transportation Institute has been leading ongoing research with the Louisiana Transportation Research Center (LTRC) to support systematic, statewide active transportation data collection using automated count devices. The first phase of this research focused on the logistics of developing a statewide multimodal count program, and resulted in the development of a basic guide for local, regional, and statewide implementation. The second phase focused on implementing and applying multimodal demand data.

This partnership between UNOTI, the City of New Orleans, and external public and private research sponsors, resulted in the installation of six new permanent count stations (in addition to one existing semi-permanent count station on Baronne St), 18 short-duration automated pneumatic tube counts at 16 locations with dedicated bikeways, and manual (8 hour) counts at 33 locations where existing facilities and/or project construction schedules made automated count collection infeasible. The third (and current) phase of research supported by LTRC leverages the data already collected, plus emerging new data sources, to expand the analytic possibilities of count data across networks, support intergovernmental coordination, and further build capacity for data-driven local planning and decision-making.

One of the most common uses for pedestrian and bicycle volume data is to conduct "before and after" comparisons as new bikeways are completed. Due to delays in facility construction related to COVID-19, severe weather, citywide contracting issues, and other factors, effective evaluation requires routine, regular monitoring to achieve meaningful results. Moreover, the effects of COVID-19 have notably impacted both ridership volumes and trends citywide: employment and commute patterns have been disrupted, key trip generators have been closed or experienced reductions in operations, events were cancelled, etc. Therefore, data collected during 2020-2021 may not be fully representative of long-term ridership trends. Ongoing data collection and analysis were needed to articulate the scale and extent of disruptions and monitor long-term impacts of City infrastructure investments. The ***Count Dat*** initiative aims to fill this gap by extending data collection activities, while providing capacity-building support to the City to encourage sustainable, ongoing monitoring and performance evaluation.

Moreover, previous grant-sponsored programs have culminated in detailed, comprehensive research reports and spatial/tabular datasets, but have not provided for means by which to share findings in a visually appealing, public-facing format. As a result, data collected have been largely inaccessible to the public and underutilized in stakeholder communication. ***Count Dat*** aims to remedy this shortcoming by producing accessible data products illustrating New Orleans' achievements, outcomes, and trends.

Why Count People Walking and Bicycling?

Government agencies at all levels across the nation are increasingly interested in adopting a "complete streets" approach to infrastructure development by implementing or upgrading facilities for walking, bicycling, and transit use. The complete streets approach represents a substantive shift in how infrastructure is planned, constructed, and evaluated to accommodate multiple modes of transportation. Understanding how many people are traveling on foot or by bicycle on Louisiana's roadways is critical to understanding transportation patterns and trends, identifying appropriate, context-sensitive interventions, and evaluating safety outcomes. However, while motor vehicle counts are conducted regularly throughout the state, most communities have little or no data available about how, when, and where people are walking or bicycling on their roadways.

Government agencies, researchers, and communities have initiated pedestrian and bicycle count programs for a variety of reasons, including:

- To track changes in overall active transportation trends (volumes as well as behavioral) over time
- To understand spatial variation in user volumes across a geographic area and determine existing travel patterns
- To plan for and prioritize future infrastructure investments
- To develop more nuanced extrapolation factors for estimating volumes from short-duration counts
- To benchmark progress toward transportation and/or public health policy goals
- To evaluate the impacts and/or efficiency of previous investments
- To make applications for funding to support active transportation more competitive
- To incorporate into next-generation travel demand and network analysis models

Overview of Count Methods

In the broadest terms, pedestrian and bicycle counts can either be collected manually with human observers in the field or reviewing video data, or using automated technology to capture counts continuously over periods of 24 hours or more. They may be short in duration (one hour to several months) or long-term/permanent. Counts can either collect user volumes passing a specific point along a roadway segment, or total volumes or specific types of movements through an intersection. The ***Count Dat*** initiative utilizes both manual and automated counts to better understand and share findings about who is walking and bicycling in New Orleans, and what their patterns and behaviors can tell us about barriers to and opportunities for safe, healthy, active communities.

Manual counts, conducted by trained paid or volunteer observers in the field (or remotely reviewing video camera footage), have been used widely for local count data collection, including in Louisiana. Of all count methods, manual counts offer the lowest barrier to entry: start-up costs are low, technical expertise needed is limited, and a relatively large number of count locations can be covered quickly and inexpensively. Manual counts are useful to track overall trends over time, demonstrate user demand, compare different types of facilities or locations, and understand demographic and behavioral characteristics of users.

Automated Counts Compared to manual counts, automated counts provide significant advantages in terms of data applications and per-hour costs of data. Increasingly, local and state agencies involved in pedestrian and bicycle data collection are switching to primarily automated count programs, with manual counts in a supporting role to validate and prepare for automated counting, fill in gaps in count coverage over a priority network, and/or enrich and contextualize findings with qualitative information. The most common automated, mechanical count technologies for counting pedestrians and/or bicyclists include: pneumatic tubes, infrared sensors, and inductive loop counters. In addition, video-based automated data analysis is an area of rapid growth and enormous potential to solve challenges of data collection for intersections, locations that do not currently have dedicated pedestrian and/or bicycle infrastructure, and other hard-to-count contexts.

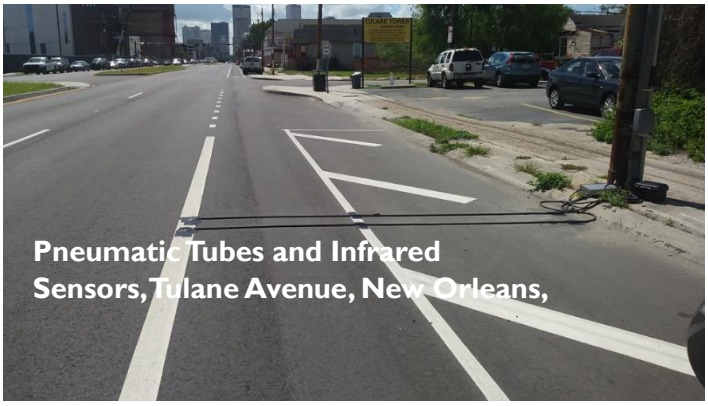
- **Passive Infrared Counters** may be used to count combined volumes of pedestrians and bicyclists on facilities that do not permit motor vehicle travel, but cannot distinguish between user types unless combined with other technology. They generally cannot be used to count on-street bicyclists.


Passive Infrared sensor in housing, Lafitte Greenway, New Orleans

- **Inductive loops**, which are installed within or on the surface of the pavement to detect bicycle activity through the disruption of their electromagnetic field by metallic objects, are also commonly used in motor vehicle monitoring and can be used to count bicycles in either restricted or shared bicycle/motor vehicle facilities. On a restricted facility (i.e., trail or sidepath), these can be combined with an infrared sensor to calculate pedestrian and bicycle traffic independently. They may also be installed in shared travel lanes, although accuracy has been found to be reduced.


Installation of Inductive Loop Detector, Tammany Trace, Mandeville,

- Widely used for motor vehicle counts**,** **pneumatic tube counters** may also be used to collect bicycle volume data. These devices, in which one or more tubes are stretched across a right-of-way, record when vehicles pass over and depress the tubes. Counters can be bicycle-specific or may record and differentiate among multiple categories of road user, including bicycles. Some models also provide speed data. Research has found that counters developed specifically for bicycle counting, however, tend to be more accurate.

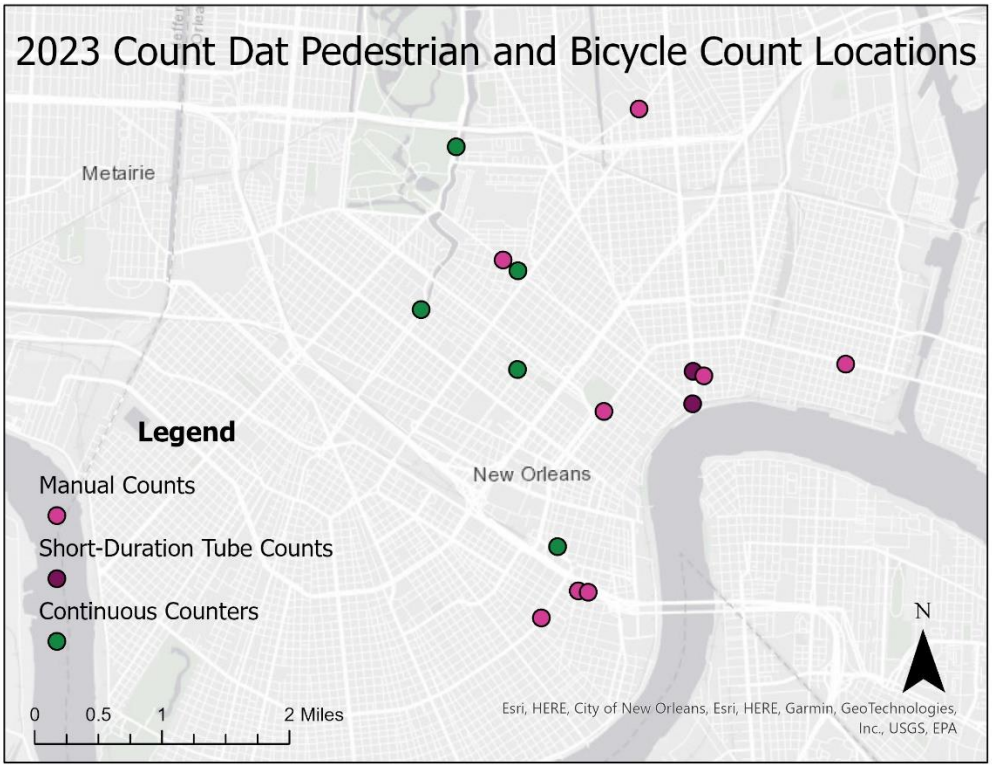

Pneumatic Tubes and Infrared Sensors, Tulane Avenue, New Orleans,

- Using **automated video technology** for bicycle and pedestrian counting programs is relatively new but has shown significant promise. Through the use of a camera and computerized algorithms, automated video counting systems can collect and catalog data instantaneously, potentially simultaneously providing data for all travel modes and allowing data collection in locations where

road configuration, user behaviors, or other factors make the use of traditional methods difficult or impossible. In the future, it is anticipated that this technology (including open-source or low-cost processing software) will become more widely available and affordable, with many practitioners predicting an ever-increasing share of data collection will employ these methods. At present, most available products and services are recommended primarily for pilot study use, so that additional research on their efficacy can be conducted. Although this type of count is not currently a part of ***Count Dat's*** scope, previous research in Louisiana has demonstrated its future potential.

Count Dat Methodology Notes

Count Dat takes advantage of a mix of manual and automated methods to measure various aspects of active transportation activity.



Manual counts to capture "snapshot-in-time" data about people walking and bicycling at a wide range of locations, and to involve students directly in data collection and interpretation. All UNOTI manual counts represent the cumulative total of 8 hours of manual observation. Data collected from 2010-2017 was completed through the Pedestrian Bicycle Resource Initiative under methodology described in the 2017 Pedestrian and Bicycle Count Report. This method included 8 total hours of AM and PM weekday peak counts completed during Spring months during reasonably favorable weather, only.

Data for 2019-2021 was completed in service to the People for Bikes and City of New Orleans Big Jump Project/Moving New Orleans Bikes program and consists of 8 hours of counts at varying times: weekday

AM peak, mid-day, PM Peak, and weekend midday counts. Counts were completed during both Spring or Autumn months during reasonably good weather conditions. The methodology used is based on national best practice and modeled off recommendations developed by Krista Nordback at the University of North Carolina Highway Safety Research Center. Data collected through the ***Count Dat*** initiative in 2023 utilizes the same methodology. Note that comparisons between unadjusted 2010-2017 manual count totals and 2019-2023 count totals should be made with caution due to the shift in data collection times and days of week; additional research is needed to adjust and convert these raw counts to standardized, annualized average daily traffic (AADT) volumes.

Pneumatic tube counters are used to collect short-duration volume data for on-street bikeways. ***Count Dat*** deploys these counters exclusively on protected bike lanes, where the bikeway is physically separated from motor vehicle traffic, in order to reduce equipment damage and facilitate safe installation and removal. The counters distinguish travel direction (i.e., inbound vs. outbound) and data are binned in 15-minute intervals. Data are automatically transmitted to the database daily. Counts are collected for a minimum of one week per location (two weeks preferred, particularly if inclement weather is present). Data are validated during a one-hour manual observation period, typically at the time of installation. Pneumatic tubes may also be used to collect long-duration counts on protected bikeways (e.g., Baronne St), with regular replacement of tubes.

Infrared sensors are used to count pedestrians and/or mixed users on sidewalks, trails, or other off-street facilities. These sensors do not differentiate between modes, but do identify travel direction of users. Data are binned in 15-minute intervals and automatically transmitted to the database daily. Counts are collected for a minimum of one week per location (two weeks preferred, particularly if inclement weather is present). Data are validated during a one-hour manual observation period, typically at the time of installation. Infrared sensors may also be used to collect long-duration counts (e.g. Algiers Mississippi River Trail), where modal differentiation is not required or site limitations prohibit in-ground installation.

Inductive loops are used to collect long-duration volume data for on-street bikeways, including conventional and protected bike lanes. These sensors may or may not distinguish travel direction (i.e., inbound vs. outbound), depending on configuration and site requirements, and data are binned in 60-minute intervals. Data are automatically transmitted to the database daily. This equipment type is currently in use on Esplanade Avenue (two units).

A combination sensor that includes inductive loops and infrared is used for monitoring mode-differentiated travel volumes on shared-use paths or trails. These sensors distinguish travel direction (i.e., inbound vs. outbound) and data are binned in 60-minute intervals. Data are automatically transmitted to the database daily. This equipment configuration is in use on the Lafitte Greenway, Norman C. Francis Parkway Trail, Wisner Trail, and Behrman Park (currently out of service).

Data validation and QA/QC for permanent counters includes a minimum of eight hours of manual observation, and extensive analysis and data cleaning to identify and remove erroneous data. Detailed protocols are documented here. For specific count dates and detailed count information, refer to primary count database, housed at UNOTI. Data not previously published may be available by request to project manager Tara Tolford, tmtolfor@uno.edu.

Acknowledgments

Count Dat operates with guidance from a variety of stakeholders, including:

- The City of New Orleans Department of Public Works
- The City of New Orleans Health Department
- The City of New Orleans Office of Resilience and Sustainability
- The City of New Orleans Office of Information Technology and Innovation
- Bike Easy
- The New Orleans Complete Streets Coalition
- Friends of the Lafitte Greenway

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Disclaimer

Louisiana roadway and active transportation facility usage data contained herein is prepared solely for the purpose of identifying, evaluating and planning safety improvements on public roads which may be implemented utilizing federal aid highway funds; and is therefore exempt from discovery or admission into evidence pursuant to 23 U.S.C. 407.

Data provided via the Count Dat initiative is for advisory purposes only. UNOTI and its partners are not responsible for any errors arising from any use of or alterations made to the data nor is it responsible for third party data analysis used to generate this document. There is no guarantee or warranty concerning the accuracy or evaluation of the data. Users should not use this data for critical applications without a full awareness of its limitations.

Appendix - Translating Walk/Bike Trips to Climate and Public Health Impacts: Working Draft Methodology

September, 2023

As part of its mission to highlight the impacts of City of New Orleans investments in active transportation infrastructure, and in support of achieving the objectives outlined in the City's climate action plan, *Count Dat* aims to advance a defensible working method for estimating the approximate carbon mitigation impact of people choosing to walk and bike, rather than drive.

Various approaches to measuring the emissions reduction potential of active transportation options are in use. Count Dat's estimation template calculates estimated pounds or tons of carbon mitigated (as well as estimated calories and pounds burned), based on inferred average trip length and duration and published factors for converting the resulting active travel miles and minutes to carbon or energy outputs. This represents a rough, back-of-the-envelope estimation method to quantify the cumulative value of walk or bike trips, for any location where count data is available. However, results are likely to be more meaningful for locations, corridors, or networks where more robust count data is available (i.e., continuous counts of all trips for one year or greater, rather than short-duration counts which have not been expanded to average annual daily non-motorized traffic volumes).

Typically, analytic approaches to measuring carbon impacts of active transportation (including ours) may significantly underestimate actual reductions, because they assume a 1:1 relationship between one mile of walking or bicycling, and one vehicle mile. In reality, the impacts may be much greater (as much as 12 motor vehicle miles for every additional mile walked or biked, per one study), because active modes tend to be used for shorter trips (which have higher relative emission rates, especially in urban contexts when taken by car), and because modal shifts resulting from infrastructure investment can influence trip behavior more broadly.[1]

On the other hand, it should also be noted that this template assumes that all walk or bike trips taken on the facility where counts are measured would otherwise be taken by single occupancy vehicle. In the case of facilities which are used for recreational (e.g., exercise) purposes, many trips would not be assumed to substitute for vehicle trips. However, many such trips, especially on key, urban trails, potentially mitigate driving trips to access less conveniently located recreational amenities, such as gyms or more remote trails. Additional research is needed to better understand the specific usage of urban trails and bikeways to refine these rough estimates based on local data and behavior patterns.

[1] https://www.vtpi.org/nmt-tdm.pdf

The estimation model relies on the following basic assumptions:

- Each count registered by a pedestrian or bicycle sensor reflects one (one-way) trip.
- Typical private, single-occupancy vehicles generate .96 pounds of CO2 per passenger mile.[2]
- Bicycle trips (including manufacturing) generate .07 pounds of CO2 per mile, [3] while walking trips are assumed to produce no additional CO2.
- Average trip distances and durations are roughly equal to national average walk and bike trip lengths (for all purposes), based on National Household Travel Survey data[4]. For bicycle trips, these figures were compared to data for average trip length for trips taken using Blue Bikes (reflecting a limited sample of all trips). While Blue Bikes average trip distances are somewhat shorter on average than NHTS averages (1.5 miles versus 2.3 miles), trip durations are roughly comparable (21.14 minutes for Blue Bikes trips versus 19.4 minutes NHTS). Walk trips are assumed to meet the national average of .68 miles or 16.4 minutes. Additional research is needed to better understand trip characteristics in New Orleans, specifically.
- Calorie expenditure is based on a 150 lb adult traveling at a "moderate" bike speed (9.9 calories per minute) or 3mph walking pace (115 calories per mile).[5]
- Count data collected using older, modally non-differentiated counters (i.e., bicyclists and pedestrians counted together) is presumed to maintain the average mode split (i.e., % bicyclists or pedestrians) as the average for all years for which mode data is available. For Norman Francis Parkway, mode split is estimated at 52% bicyclists, 48% pedestrians. For the Lafitte Greenway, mode split is estimated at 65% bicyclists, 35% pedestrians.

Bicycle Trips:

*(Total Bike Trips Counted * 2.3) x (.96 - .07) = estimated pounds of CO2 mitigated*

*Total Bike Trips Counted x (9.9 calories per minute * 19.4) = estimated calories burned*

Walk Trips

*(Total Trips Counted * .68) x .96 = estimated pounds of CO2 mitigated*

*Total Trips Counted x (115 calories per mile * .68) = estimated calories burned*

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2 https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/PublicTransportationsRoleInRespondingToClimateChange2010.pdf

3 https://www.bikeradar.com/features/long-reads/cycling-environmental-impact/

4 https://onlinepubs.trb.org/onlinepubs/trnews/trnews280www.pdf; https://www.vtpi.org/short_sweet.pdf

5 https://www.healthline.com/health/how-many-calories-do-you-burn-biking; https://www.prevention.com/fitness/fitness-tips/a41048373/calories-burned-walking/