



MOBILITY AWARDS' 2022 Citizen Bike Count:

Mandaue – Bicycle and Pedestrian Count Results

Everyone Counts, everyone matters!⁸²



Organized by:

Cebu Leads Foundation Inc. (CFLI)

In partnership with:

Local Government of Mandaue City
The Institute for Climate and Sustainable Cities
The Climate Reality Project Philippines
350.org Pilipinas
MNL Moves
Pinay Bike Commuter Community

Editorial board:

Elizar Sabinay Jr., Cebu Leads Foundation Inc. (CFLI)
Aldrin Pelicano, Institute for Climate and Sustainable Cities
Arielle Celine Tabinga, Institute for Climate and Sustainable Cities
Maria Golda Paz Hilario, Institute for Climate and Sustainable Cities

Calculations on the observations:

Jephraim Manansala, Institute for Climate and Sustainable Cities
Marion Lois Tan, Institute for Climate and Sustainable Cities

Graphic Design:

Joseph Manalo, Gerimara Manuel, Rosalie Agustin

Correspondence:

mobility@icsc.ngo; info@icsc.ngo

Published by:

October 2022





Acknowledgments

The organizers of the Mandaue – Bicycle and Pedestrian Count would like to thank the 29 volunteers who contributed to this effort:

Michael Abis

Wilbert Basanez

Arnel Brigoli

Ronnie Buhawe

Ronald Bustamante

Ana Marie Dela Cruz

Chiquito Lepon

Romeo Perez

Cherry Taborada

Celadonia Tariman

Eriberto Jose Alvarado

Roland Templado Jr.

Alfhon Del Castillo

Lorenzo Jugan

Roberto Enriquez

Miichael Cruz

Romeo Calixton

Mario Luna

Loreto Carayo

Jesus Beltran

Ezra Tid-ong

Rejane Lopera

Lucio Ecarma

Annalisa Rojo

Jorge Morgan Albano

Arnel Dela Cuesta

Marlo Ocleasa

Charlene Canete

Beverly Barrita



Introduction

This report summarizes the results of the Mandaue – Bicycle and Pedestrian Count that was held from June 13 to 19 wherein 29 volunteers, government personnels, and active mobility advocates in partnership with the Local Government of Mandaue City counted people-on-bicycles, pedestrians, and personal mobility device users (PMD-users) in three locations (*Annex 1*).

The Mandaue – Bicycle and Pedestrian Count is an initiative organized by the Cebu Leads Foundation Inc. (CFLI) in partnership with the convenors of the Mobility Awards and the Local Government of Mandaue City. The Mandaue Bicycle and Pedestrian counts aims to achieve the following:

1. Serve as the quantitative baseline data for SBLB and at the same time
2. Serve as means of monitoring the effectiveness of the bike lanes and lastly;
3. Serve as a main reference for future route network planning both on the location and type of bike lanes to be installed and the improvement/add safe and effective sidewalks.



What did we count?

The 2022 Mandaue Bicycle and Pedestrian Counts in Mandaue City ran from June 13 to 19 conducted across 3 different count locations (See Annex 1). The count was conducted during the peak hours of 6AM - 8AM and 4PM to 6PM by **29** volunteers. We counted and analyzed:



A. People on bicycles!

This refers to pedal powered 2-wheeled bicycles, 3-wheeler bicycle (three users would count as three cyclists), recumbent bike users, street vendors using bicycles, pedicabs, hand cyclists, tandem bikes.



B. Pedestrians



C. Personal Mobility Devices (PMDs) users

(ie: as kick-scooters, electric scooters, hoverboards, unicycles, etc.)



D. Gender Distribution and Helmet Use

The volunteers were stationed on screenline, T-junctions, roundabout, and in 4-corner intersections.



- **Screenline counts** - Screenline counts are done by establishing a visible or invisible line across a roadway or sidewalk and counting the number of cyclists who pass over that line. Often, screenline counts indicate direction of travel for cyclists. They are used to identify trends in volume and factors influencing cycling



- **T - junctions** - are turning movement counts are done where two roadways intersect, capturing turning or travel direction of cyclists.



- **Intersection counts** - Intersection turning movement counts are done where more than two roadways and/ or major commercial driveways meet. At minimum, these counts capture turning movement counts.



How did we count?

The Bike Count Project is an event conducted by volunteer counters on standardized count sheets adapted from the **US National Bicycle and Pedestrian Documentation (NBPD) Project**¹ (*Annex 2*). The Bike Count Project is considered a short-duration count program which is one of the two basic elements of a bicycle and pedestrian count program done in other countries.

Prior to the count, volunteer orientations were conducted so volunteers can familiarize themselves with the count form, and to also level off on how the count can be synchronized.



Where did we count?

There were 3 count sites for Mandaue City considering borders connecting exit and entry points across neighboring cities, historical count locations, areas with bike lanes and bike facilities, high collision areas, major streets near transit, and locations as recommended by respective LGUs. The count locations [See Image 1] were also determined by the availability and number of volunteers per city [See Table 1].

Table 1. Distribution of Count Location and Volunteers in Mandaue City

Count Location	Location Type	Minimum No. of Volunteers Assigned (Per day and hour)
Ariston Ceniza (A.C.) Cortes	Screenline	4
Manuel Cabahug (M.C.) Briones	Screenline	4
Ouano Avenue	Screenline	4

¹Complete information on the project is available at bikepeddocumentation.org.



Where did we count?

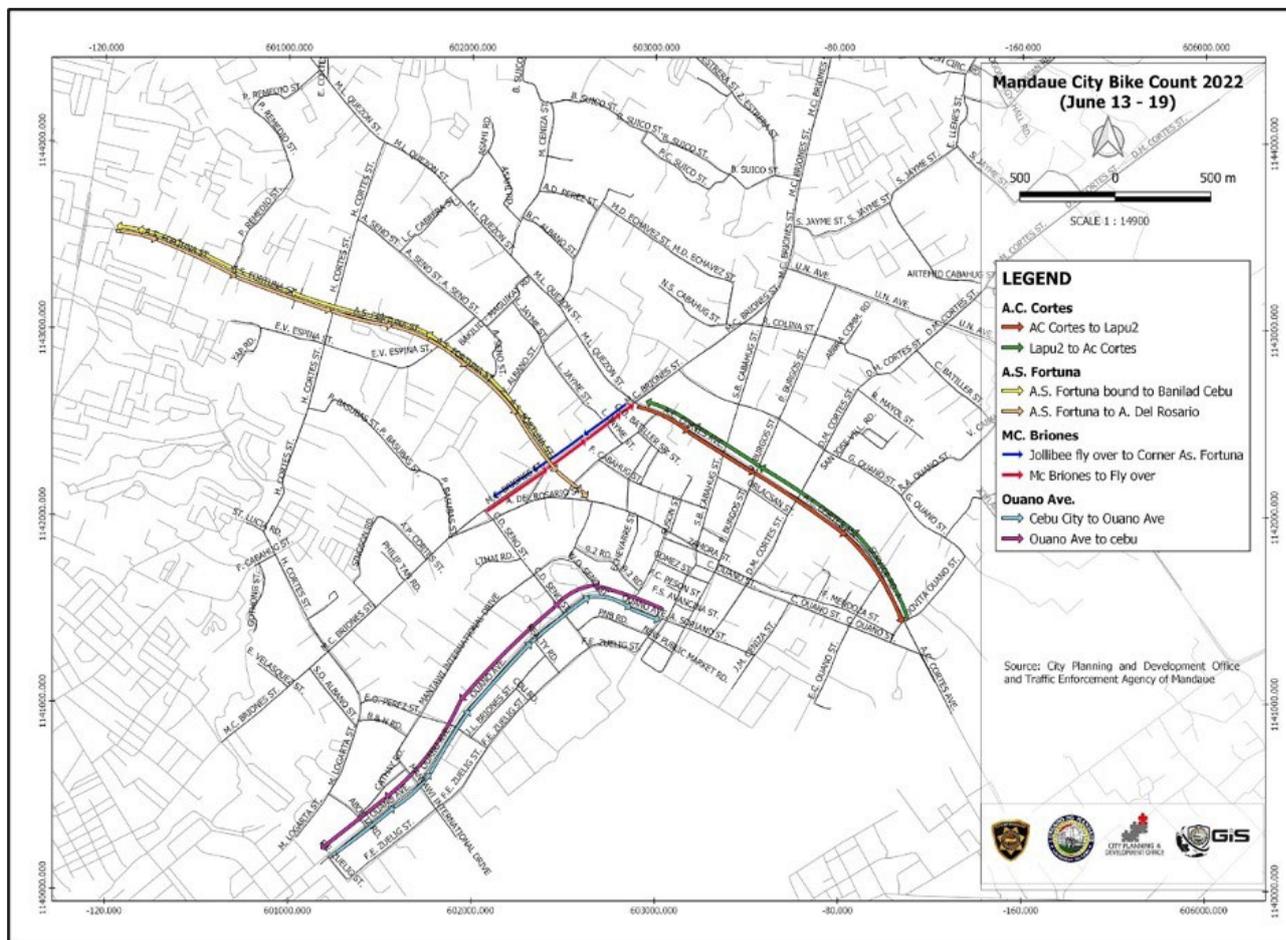


Image 1. Map of Count Locations in Mandaue City



What can we analyze from the count?

We equate the number of people on bicycles on the road to their contribution on:

- (a) Generating cumulative savings from fuel costs avoided;
- (b) How they can practically reduce fossil fuel consumption on our roads.

We used the number of cyclists counted to illustrate the benefits of active transport using the key formula and key assumptions:

Unit	Definition	Assumptions
Total No. Of Cyclists (passenger) per Day	Total number of cyclists data was collected	
Equivalent No. of Cars on the road	This represents the total number of cars that would have been replaced, if passengers opted to cycle instead	Average Occupancy of a Car - 1.7 (MUCEP 2012-2014)
Equivalent No. of Motorcycles on the road	This represents the total number of motorcycles that would have been replaced, if passengers opted to cycle instead	Average Occupancy of a Motorcycle - 1.2 (MUCEP 2012-2014)
Estimated Fuel Cost Savings per KM of Avoided Car and Motorcycle costs	This represents estimated fuel costs savings in 1 KM. This was avoided since passengers opted to cycle instead.	<p>Savings (PHP/KM) = fuel consumption per kilometer (L/vkm) x fuel price (PHP/L) x Number of vehicles (v)</p> <p>Average fuel consumption per kilometer of Toyota Vios 1.5 = 0.065L/KM</p> <p>Average fuel consumption per kilometer of Yamaha NMax 125 = 0.022 L/KM</p> <p>Average Gasoline Price Per Liter (June, 2022) = ₱81.02 (Statista, 2022)</p>
Estimated Tons of CO2 Emissions Avoided	This represents the total emissions avoided driven in 1 KM since passengers opted to cycle instead.	<p>T_CO2 = Emission factor of vehicle (g/vkm) x Distance Traveled by vehicle (km) x Number of vehicles (v)</p> <p>Emission factor of vehicle (Toyota Vios 1.5 MPG) = 158.5 g/vkm</p> <p>Emission factor of vehicle (Yamaha NMAX 125) = 54g/vkm</p> <p>Emissions considered are only CO2. We do not include other emissions such as NOx, PM, etc.</p>



Limitations of the count

The count was implemented still within the COVID-19 pandemic period as an operating context. Although there were already gradual removal of restrictions, we still observed basic health and safety protocols, and observed physical distancing during the actual count. This affected the quality and accuracy of several data gathered.

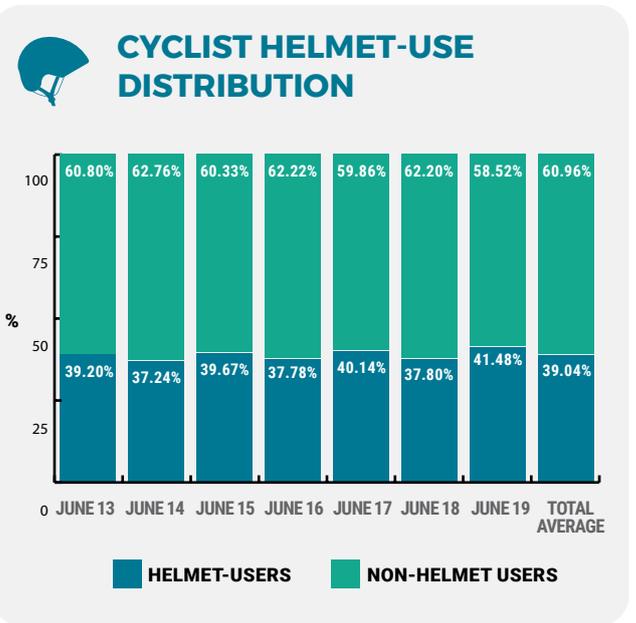
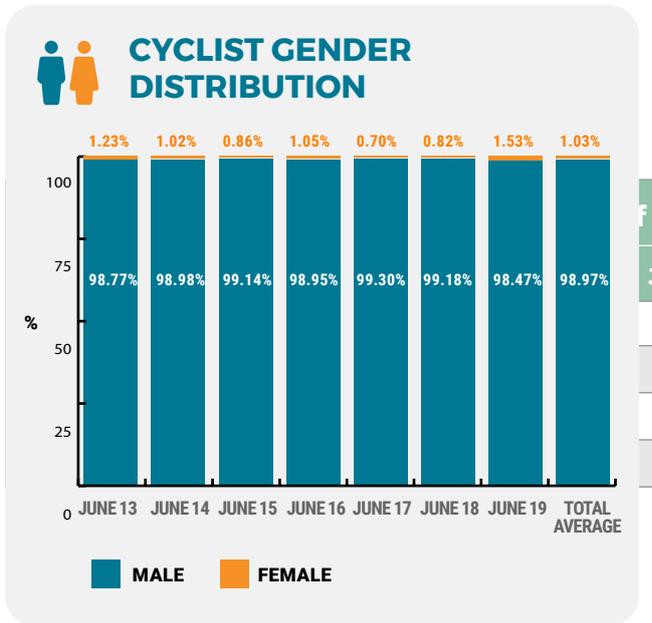
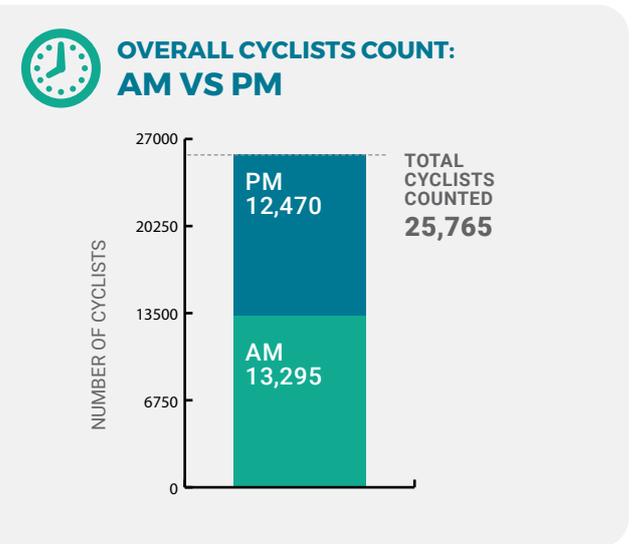
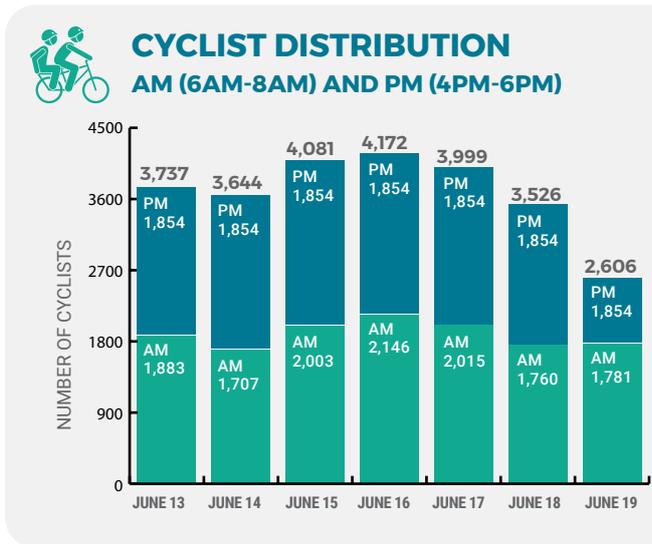
Other limitations include lack of manpower and resources to do a 16-hour count, which would have been the ideal in order to estimate the annual average daily bicycle and/or pedestrian traffic.



Count Results

 Total Bicycle: 25,995	 Total Pedestrian: 244	 Total PMD-Users: 10
--	--	--

Total Volume of Cyclists Per Day								
Location	June 13	June 14	June 15	June 16	June 17	June 18	June 19	Total
A.C. CORTES	1,478	1,494	1,765	1,792	1,690	1,279	1,367	10,865
M.C. BRIONES	1,857	1,764	1,906	1,906	1,877	1,828	975	12,113
OUANO AVENUE	402	386	410	474	432	419	264	2,787
Total	3,737	3,644	4,081	4,172	3,999	3,526	2,606	25,765





Count Results

Growth Rate: Y1 (2021) vs Y2 (2022) Comparison			
Data	2021 Data (June 7-13, 2021)	2022 Data (June 13-19, 2022)	Growth Rate
Total No. of Cyclists Counted	12,120	25,765	▲ 112.58%
Total No. of Male Cyclists Counted	7,488 (61.78%)	25,506 (98.97%)	▲ 240.63%
Total No. of Female Cyclists Counted	4,632 (38.22%)	259 (1.03%)	▼ -94.41%
Total No. of Helmet Users Counted	5,626 (46.42%)	10,036 (39.04%)	▲ 78.39%
Total No. of Non-helmet Users Counted	6,494 (53.58%)	15,729 (60.96%)	▲ 142.21%

The local government of Mandaue City piloted the count last 2021 in the same duration (1 week) in the same locations using their own forms. Results showed a 112.58% increase in the number of bicycle riders counted! The increase in numbers can be attributed to the easing of COVID-19 protocols and mobility restrictions as the alert system remains at Alert Level 1 and are already demonstrating a momentum of daily cyclists. This further affirms our earlier observation that mobility revolution is already underway even outside of Metro Manila.

Additionally, gas prices has increased during the start of June, 2022. People might have opted to cycle rather than use motorized vehicles. Moreover, the increase in the count can be attributed to the increase of counters provided that there were citizen volunteers who joined the count. Thus, resulting to better capacity to accurately and efficiently capture more data.

However, there is a significant decline in the overall count of female cyclists by -94.41%. This can be attributed to the lack of protected bike lanes in Mandaue City since most of the bike lane posts were damaged by Typhoon Odette last December 2021. The bike lanes have yet to be restored.

Potential contribution of cyclists on the road

What does the 25,765 of people-on-bicycles mean?







Count Date	Total No. Of Cyclists (passenger) per Day	Equivalent No. of Vehicles Avoided	Estimated Daily fuel costs Savings (per KM)	Estimated TONS OF CO2 Emissions Avoided (in a 1 KM drive)
June 13, 2022	3,737	2,198	₱19,680.16	0.35
June 14, 2022	3,644	2,144	₱19,190.40	0.34
June 15, 2022	4,081	2,401	₱21,491.77	0.38
June 16, 2022	4,172	2,454	₱21,971.00	0.39
June 17, 2022	3,999	2,352	₱21,059.93	0.37
June 18, 2022	3,526	2,074	₱18,568.97	0.33
June 19, 2022	2,606	1,533	₱13,723.98	0.24
Overall Total	25,765	15,156	₱135,686.22	2.40 tCO2

*Average occupancy rate of a car is 1.7 passenger, MUCEP (2012-2014)







Count Date	Total No. Of Cyclists (passenger) per Day	Equivalent No. of Motorcycles Avoided	Estimated Daily fuel costs Savings (per KM)	Estimated TONS OF CO2 Emissions Avoided (in a 1 KM drive)
June 13, 2022	3,737	3,114	₱6,660.98	0.17
June 14, 2022	3,644	3,037	₱6,495.21	0.16
June 15, 2022	4,081	3,401	₱7,274.14	0.18
June 16, 2022	4,172	3,477	₱7,436.34	0.19
June 17, 2022	3,999	3,333	₱7,127.98	0.18
June 18, 2022	3,526	2,938	₱6,284.88	0.16
June 19, 2022	2,606	2,172	₱4,645.04	0.12
Overall Total	25,765	21,471	₱45,924.57	1.16 tCO2

*Average occupancy rate of a motorcycle is 1.2 passenger based on MUCEP (2012-2014);

- More people are moved by bicycles, compared to cars and motorcycles. 25,765 people on bicycles during the three-day count is equivalent to 15,156 cars or 21,471 motorcycles taken off the road.
- As bicycles do not consume gasoline or diesel as fuels, the 25,765 people riding on bicycles were able to save an accumulated ₱45,924.57 - ₱135,686.22 worth of fossil fuels per kilometer driven. These estimates do not include savings from regular maintenance, parking and mortgage.
- Using GHG emissions reported by known car and motorcycle brands, it is also estimated that the 25,765 cyclists were able to avoid 1.16 to 2.40 tons of CO₂-emissions per kilometer.



Key Recommendations

1. **Bike count should be an institutionalized and funded bi-annual program of the City.** The two bike counts per year will greatly help in the city's planning and implementing active transport initiatives.
2. **City to invest and Integrate Automated Counters in Bike Counts:** Implementing a permanent count program is crucial in order to accurately estimate the annual average daily traffic of cyclists.

Investing on automated counters by local government units is highly recommended especially in dedicated bike lanes that had the highest number of pedal traffic. A permanent counter is an automated device in place 24 hours per day, 365 days per year. Its purpose is to gather a continuous record of how bicycling changes over time and over external factors such as weather and infrastructure, policy changes. Francisco Llamas St. and Colon St. are suggested locations for the installment of permanent counters due to its high volume of traffic.

3. **Expand the count window to 3 hour** ideally 5AM - 8AM in the morning and three hours in the afternoon: 4PM - 7PM. There should at least be 2 counts (1 weekday and weekend) to compare the mobility of the people during weekdays and weekends. It is recommended to conduct it during Mondays, Friday, Saturday, or Sunday.
4. **Preparation is key.** The success of manual bike count is contingent on the commitment and turn out of volunteer counters. Volunteer orientations and training are key, and enough lead time should be devoted for the preparations.
5. **For Bike Count organizers to increase location coverage** including secondary roads and more entry and exit points in the city. All boundaries of a city must be covered so that we know the movement of the bikers who move-in and move out of the city. This way we can use the data to lobby with several municipalities to synergize their active transport initiatives.
6. **Recommendations on the Bike Count Trainings.** Several dry run simulations be done prior to the actual count to help volunteers familiarize with the area and to scout for a strategic count station where they can observe the traffic and movements of cycling public.

For more accurate data and for validation purposes, it is recommended to form a bike count team in each observation station or count location. It is ideal that they be equipped with cameras to record the area where they are counted, and with click counters. It is also recommended that the team in an area be composed of at least 3 members: 1 member to be assigned to count using bike flow directional movements, another member to capture different genders and the last member to capture helmet use.

In case there are enough volunteers, it is ideal that the fourth volunteer be assigned as an alternate to relieve a team member in case the volunteer goes into health break. If the count will be repeated in the next season, or in the next year, it is ideal to assign that an experienced bike count volunteer be assigned in each team to coach and mentor new volunteers.

It is also recommended to provide more resources to volunteers additional resources such as counter clickers, clipboards, and tumblers for hydration to avoid the use of plastic bottles. It is also ideal that budgets and resources are allocated to organize dry runs and orientations before the actual count, and after the count to allow debriefing and data consolidation.

- 7. Conduct Supplemental Studies to Understand Cycling Behaviors and also Generate more baseline Data.** One of the highlights of the bike count is documenting the significant gender gap in everyday cycling that needs to be addressed urgently. While the bike count is limited to those who rode their bicycles during the peak commuting hours, the bike data strongly suggests that there is work to be done to encourage more women to cycle as mobility or trip choice. More studies should be done to learn and understand the unique cycling needs and preferences of women in an urban context.

Another key area for study and action is bicycle users' behavior. Turning movement counts are useful for traffic impact studies and safety studies. These counts are used to determine exposure rates at high collision crossings, as well as to retime or reconfigure traffic signal phasing. Rather than penalizing what are seemingly illegal bike traffic flow such as counterflowing, policymakers, traffic planners and others need to collect data on cycling movements, relate it to cyclists needs and preferences to produce better bike facilities like bidirectional bike lanes, bike, and pedestrian bridges, end-of-trip facilities (bike parking), etc.

Likewise, more accurate data on savings and GHG emissions can be generated if there is a baseline data on the average distance traveled by people riding bicycles, and comparison be done using average trip distance of other modes of transport particularly motorcycles and cars in Mandaue City.



References

Bicycle and Pedestrian Count Programs: Summary of Practice and Key Resources. (n.d.). Retrieved August 4, 2022, from https://www.pedbikeinfo.org/cms/downloads/PBIC_Infobrief_Counting.pdf

Biona, J.B. Manuel & Mejia, Alvin & Tacderas, Mark Angelo & Cruz, Nathaniel & Dematera, Kathleen & Romero, Jane. (2017). Alternative Technologies for the Philippine Utility Jeepney A COST-BENEFIT STUDY. 10.13140/RG.2.2.21019.57128.

Institute for Climate and Sustainable Cities (2019). #PHmobility: Active mobility survey in Metro Manila. Retrieved October 17, 2022, from icsc.ngo/active-mobility-survey/

Fajardo, Joselle Marie (2022). #ShareTheRoadWithHer: Evaluating Women's Landscape Preference of Cycling Infrastructure in Quezon City Based on Mobility Needs

Japan International Cooperation Agency (JICA) & Department of Transportation and Communications (DOTC). (2015, December). The Project for Capacity Development on Transportation Planning and Database Management in the Republic of the Philippines: MMUTIS Update and Enhancement Project (MUCEP). <https://openjicareport.jica.go.jp/pdf/12247623.pdf>

Average retail price of one liter gas in the Philippines from 2019 to 2022, (2022). Published by: Statista Research Department, Retrieved October 17, 2022 from <https://www.statista.com/statistics/1306971/philippines-average-fuel-retail-price-per-liter/>

Yamaha NMAX 125 - Features and Technical Specifications". www.yamaha-motor.eu.



Annex

Annex 1: Bike Count Forms

Sugbu Bike Lanes Board (SBLB) Pedestrian and Bicycle Counts

TABLE COUNT FORMS: Designed to capture gender distribution, helmet-use, and during peak hours

Location:	Date:	Time: 06:00 am – 08:00 am
Weather:	Name:	
Notes:		

	BICYCLE						PEDESTRIAN			OTHERS (EKS, skateboards ,roller-skates, wheelchair, etc.)					
	MALE		FEMALE		NOT DETERMINED		MALE	FEMALE	NOT DETERMINED	MALE		FEMALE		NOT DETERMINED	
	With Helmet	No Helmet	With Helmet	No Helmet	With Helmet	No Helmet				With Helmet	No Helmet	With Helmet	No Helmet	With Helmet	No Helmet
06:00 – 06:15															
06:15 – 06:30															
06:30 – 06:45															
06:45 – 07:00															
07:00- 07:15															
07:15 – 07:30															
07:30 – 07:45															
07:45 – 08:00															

Figure 1. Mandaue Bicycle and Pedestrian Count Form

