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Project Padyak: Traffic Analysis Simulation on the Integration of Bicycle Lanes Encompassing Jose Abad Santos Ave. (JASA) to Magalang-Arayat Road Using LocalSim Microscopic Traffic Simulation Software

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Abstract:
Cycling is a popular active transportation mode in Arayat, Pampanga. However, the municipality's road infrastructure does not support active transportation as it lacks bike lanes. This study aims to plan a bike lane network and assess its impact using surveys, interviews, and traffic simulations. The study revealed that the cyclists' and locals' surveys show that the lack of bike lane infrastructure affects traffic flow and cyclist safety on JASA and Magalang-Arayat Road. The researchers surveyed 273 cyclists and 31 residents face-to-face, utilizing convenience sampling techniques. Results suggest that bike lane integration can address cyclists' safety concerns in bicycle-related accidents, making bike lane integration feasible for the simulation findings. Incorporating the bike lane layout was assessed through manual counting of vehicles at three intersections on the study's two roads, Jose Abad Santos Ave. (JASA) and Magalang-Arayat Road. The LocalSim simulation software parameters used were vehicle type percentage distribution, vehicle configuration, and the dynamic distribution for origin-destination demand. For the intersections' simulation results on LocalSim with bike lanes based on GEH statistics: Intersection 1 consisted of 112 links, which had 92 acceptable fit links and 20 acceptable remarks, whereas Intersection II had 99 acceptable fit remarks and 13 acceptable, in Intersection III 72 were acceptable links, and 12 were only acceptable. Hence, LocalSim revealed that integrating shared lane pavement markings (sharrows) bike lanes in JASA and Magalang-Arayat road is feasible as it also improved the traffic condition of the road sections based on the results generated through GEH Statistics and Level of Service (LOS). Further research on the current road conditions is needed to explore additional traffic control measures to improve traffic conditions in Arayat, Pampanga.

Keywords ***—active transportation, bike lanes, manual counting, LocalSim simulation software, GEH statistics, Level of Service (LOS), shared lane pavement markings (sharrows)***

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I. INTRODUCTION

In a time greatly affected by suffocating vehicular smoke and endearing traffic, people have sought solutions to the problem of crossing distances. Due to this, people are often discouraged from going to certain places due to vehicular and traveler circumstances. However, one mode of transportation has been under the spotlight for its potential benefits in global communities. Cycling may be the bridge needed for the mutual benefit of cyclists and places.

Transportation involves the transfer of people, animals, and commodities from one location to another. This

movement can occur through various modes of transport, including air, land, sea, cable, pipeline, and space transport. Given the diversity of transportation modes, the methods for conveying people and goods also differ. Thus, among the typical vessels for transportation are vehicles, trains, ships, spacecraft, and pipelines [1].

Hence, one mode of transportation where mobility forms such as walking, cycling, and using wheelchairs fall under is active transportation. The abovementioned form of active transportation is a functional replacement for motor-generated vehicles as it reduces vehicular smoke and consumes zero-free fuel. In addition, electric bikes and scooters are also encompassed under active transport [2]. As such, active transportation like walking and cycling, conveniently seen to be eco-friendly means of transport, brings affirmative benefits to communities, the communal environment, and public health. Therefore, it is important to expand and improve cycling infrastructure, not only in urban regions but across the nation [3].

Throughout the years, cycling transportation has evolved along with time. It was seen as a remarkably sustainable mode of crossing distances that promotes eco-friendliness. Also, due to its being noise-free, it has become one of the preferred transport forms due to that feature.

In the Philippines, various city localities have implemented bike-related infrastructure initiatives that show advocacy for cycling. Such cities in the country include Iloilo, Baguio, Marikina, Naga, Pasig, and Taguig City [4].

Bicycling is known acceptably worldwide because of its benefits, and the Philippines is one of the countries that acknowledges cycling as one of the entities in their transportation. As such, according to the survey conducted by Social Weather Stations (SWS) in 2022, one out of four Filipino households have a bicycle, and it is a notable increase from the reported data from 2021 which only shows that one-fifth of Filipino households own a bike. This data demonstrates an increasing interest in cycling as a practical leisure mode for Filipinos [5].

Cycling is not only advantageous environmentally, but this mode of transport encompasses improvement for bike-user's well-being and leisure experiences. Consequently, a cross-sectional study with 194 respondents yielded positive perceptions of cycling. Among the 194 respondents, 85% of them expressed that cycling should be furthered in the transportation sector and recreational reasons. To boot, 70% of the respondents acknowledged that biking helped in their sense of relaxation and well-being. These findings supported the benefits of cycling in physical and mental health and the capacity to cultivate a heightened sense of community and connection among individuals due to their case for the environment [6]. Another survey by the Social Weather Stations revealed that three out of 10 Philippine households can now be classified as cycling households. Households have increasingly incorporated cycling into their daily routine and activities. Consequently, the role of cycling transcends the improvement of health. It extends to the improvement of the overall quality of life of both individuals and communities [5].

Thus, a well-developed network of bike lanes is an essential pillar of a modern and sustainable infrastructure. Safe and designated routes for cyclists can reduce traffic congestion, lower emissions, and promote a healthier and more active lifestyle. Specifically, close passing, or when car riders do not give enough width for bicycles to pass, is a significant concern. Close passings are positively related to road collisions [7]. Thus, the risks for cyclists extend beyond close passings, as bicycle-related accidents continue to be a concern in the Philippines. According to statistics by the Metropolitan Manila Development Authority (MMDA), bicycle accidents have been on the rise in Metro Manila, accounting for a notable portion of road traffic injuries. The MMDA reported that in 2021 alone, there were 33 bicycle-related fatalities and 2,397 injuries in the metropolitan area [8]. Another concern is the underreporting of bicycle accidents, as not all incidents are recorded. The lack of accurate data may underestimate the true extent of the problem. Additionally, a research article in the Transportation Science Society of the Philippines (TSSP) highlighted those factors such as unsafe bike infrastructure, road design flaws, and a conflict with other road users contribute to the occurrence of bicycle accidents [9].

Researchers reveal that bicycle lanes reduce both perceived and actual motor-bicycle crashes. Consequently, traffic injuries are reduced while cycling participation significantly increases [10]. Additionally, bike routes make cities vibrant and livable, fostering a sense of inclusion for the locals and enhancing the overall quality of urban life.

Implementing a well-planned and easily accessible bike lane is a commitment to building inclusive, sustainable, and healthy communities and a means of mobility. In addition to lowering air pollution and traffic congestion, creating safe spaces for bikers also improves mental and physical health. A progressive urban environment must include bike lanes, and their accessibility should be improved and expanded to benefit present and future generations.

To model bicycle traffic in a given area, start by identifying dedicated bicycle routes and general networks where bicycles are allowed. Classify links, including bicycle paths, pedestrian bicycle paths, contraflows, and streets with various bicycle traffic allowances. Accurate classification is vital for mapping road features and selecting bike routes. When a bicycle road runs parallel to a standard road, simplify by treating them as one link in the model, using specific distribution parameters to eliminate traffic influences [11].

The LocalSim software provides a solution for traffic modeling to address problems in the Philippine transportation sector, primarily utilizing the simulation for local traffic while also considering the behavior of Filipino road users. It is designed for use by a Local Government Unit (LGU), specifically by their traffic management officer, to simulate road traffic [12]. In this study, the researchers focused on a route from the boundary of Sta. Ana and Arayat to the Magalang-Arayat road (from km post 0088 to kilometer post 0096), a crucial route frequented by bikers from various towns, including Magalang, Sta. Ana, Candaba, and neighboring provinces such as Tarlac and Bulacan. The use of LocalSim on this selected route would provide valuable insights into traffic patterns and potential improvements for the benefit of road users in the area.

In Pampanga, Philippines, the cities of San Fernando and Angeles have already established bike lane networks in their areas. Meanwhile, Mabalacat is currently exploring the implementation of the same in their locality. With a density of 1077 per sq. km, the municipality of Arayat has become the present study's context of interest. Arayat, Pampanga, is a suburban area ideal for integrating a bike lane network, given its enriched landscape with tourist attractions and urbanized zones [13].

The Municipality of Arayat has the potential to become one of these developed cities. With a semi-dense population and a surge in commercial establishments, the desire for a healthy, active transportation mode, the area is conducive to developing a bicycle-friendly environment. One of the reasons why the selected route is rich in tourist attractions is the place's healthy environment. Bike lanes would boost the locality's tourism, nurture nature, and encourage the locals to switch from fuel-run vehicles to pedal-run bicycles.

Furthermore, a secondary factor for integrating bike lanes in the selected routes is the presence of tourist destinations that may be found along it and may serve as a way for other routes or shortcuts leading to mountainous attractions. Tourist attractions play a pivotal role in local tourism development, positively increasing individual tendency to venture beyond the usual surroundings and means of traveling [14]. Thus, tourist attractions are one of the many reasons cyclists tend to visit and traverse the route of JASA and Magalang-Arayat road.

The rarity of integrating cycling infrastructure into the local transportation network underscores the need for a comprehensive evaluation of their relationship, particularly from the perspective of the primary stakeholders—the cyclists themselves. The study aimed to fill this research gap by exploring the synergy between cycling infrastructure, represented by the proposed bike lane network, and the road network in Arayat, Pampanga. The research sought to present a vision where cycling seamlessly integrates with the road infrastructure, enhancing sustainability, accessibility, and the area's overall appeal. By focusing on the cyclists' perspective, the study endeavored to shed light on how integrating a bike lane network can contribute to the holistic development of Arayat.

Considering this evolving trend and the prospective advantages brought by cycling, the present research embarked on a journey to explore establishing a bike lane road plan in the road strip along the Jose Abad Santos Ave. to Magalang-Arayat road in Arayat, Pampanga. By aligning this network with the region's road infrastructure, the researchers aimed to demonstrate how cycling infrastructure can be leveraged to enhance traffic conditions and promote sustainable transportation. Simultaneously, the natural beauty of the scenic destinations found along the study route are perks of the to-be-integrated bike lane. In the following sections of the study, the researchers showcased the vast potential and benefits of building a well-designed bike lane network in the road-rich sector of Arayat, Pampanga.

In conclusion, the Philippines is a prime example of the global trend toward sustainable mobility, which has been sparked by things like an increase in bicycle tourism following COVID-19. Research conducted in Metro Manila and Arayat, Pampanga, underscores the advantages of bicycle tourism for the economy and ecology, as well as the necessity for improved infrastructure. But as bicycle-related incidents increase, so does the need for better infrastructure and safety protocols, which is in line with the goals of the Philippine Bicycle Act. Arayat can promote environmentally friendly transportation through implementing bike lane infrastructures. Despite the challenges faced, cities like Iloilo, Baguio, and Marikina are now successfully implementing bike lanes and serving as role models for Arayat.

Furthermore, addressing the problems of car-centric infrastructure is important to promote cycling and enhance road safety in the Philippines. The goal of this study was to close the gaps about the impacts of car-centricity and to identify the potential benefits of implementing bike lanes. Through an analysis of the effects of car-centric infrastructure, the implementation of the Philippine Bicycle Act, and the possibility of integrating bike lanes in Arayat, the study sought to improve sustainable mobility, economic growth, and individual safety. Software like AutoCAD 2D and LocalSim boost road efficiency and safety by facilitating the simulation of traffic situations and the construction of road infrastructure. The GEH formula is a crucial technique in traffic engineering for analyzing congestion patterns and optimizing transportation networks. Intersection management techniques, such as signalization, are necessary to improve traffic flow and safety, particularly in areas with unsignalized crossroads like Arayat. In the end, these initiatives ought to support active and sustainable transportation, which would make cities healthier and more livable.

A. Background of the Study

Cyclists often go to places with high slopes. Arayat is a mountainous area renowned for its breathtaking landscapes. This makes Arayat appealing to cyclists, which is perfect for their recreational activity such as mountain biking - a cycling activity often done over rough terrain. However, the municipality's road infrastructures do not support active transportation, especially cycling despite the number of cyclists visiting Arayat. According to the Department of Tourism of Arayat, the province has many well-known tourist sites and offers breathtaking landscapes for those who enjoy the outdoors. Some main attractions are New GintungPakpak, Rodriguez Nature Ecopark, Bale Batu, Baliti Dam, and Kape Sinukuan. San Juan Bano and Treehouse are also the most visited places by cyclists. These locations, surrounded by lush forests, add to the allure of the surrounding scenery and make Arayat a popular travel destination. This brings up the possibility of constructing a bike lane.

Cyclists commonly cross JASA and Magalang-Arayat Road when visiting tourist attractions in Arayat, which is an ideal route to install bike lanes to provide safety and a sense of belongingness to cyclists when visiting these places. In a preliminary investigation, the researchers observed significant daily traffic on JASA and Magalang-Arayat Road during peak hours (7:00 AM - 8:00 AM and 4:00 PM - 5:00 PM), as shown in Figure 1.5. The one-week traffic volume was

gathered using a manual counting method. 26 These data were utilized to generate other pre-requisite traffic data requirements for LocalSim, such as hourly flow rate, vehicle percentage distribution, and traffic demand distribution.

JASA and Magalang-Arayat Road can be classified as car-centric infrastructure because they need more active transportation infrastructure. One of the consequences of being a car-centric road is the safety of people using active transport, especially cyclists. This shows that motorized vehicles compromised the safety of cyclists due to a lack of cycling infrastructure. Cyclists experienced bicycle accidents along JASA and Magalang-Arayat Road, but the incidents were not reported according to Arayat's Philippine National Police (PNP). Installing bike lanes would help Arayat achieve the goal of SDG11, which is to make the area safe and sustainable. This would also give the cyclists a sense of belongingness whenever visiting Arayat, which could attract more cyclists from other places.

Fig 1: Map of Arayat, Pampanga

II. METHODOLOGY

The methodology section outlines the systematic approach used in conducting the research. This chapter details the research design, data collection methods, and analytical techniques, offering a guide to comprehend the study's execution and the reliability of its findings. The content of the thesis was outlined in the frameworks made by the researchers employing the appropriate methods in gathering and analyzing the information that supplements the study.

B. Methodological Framework

Shown in Figure 1 is the methodological framework of the study. Online resources such as articles, journals that have been published, and related review literature were used in Phase 1 of the framework's information acquisition process. These data were aggregated to obtain a network of bike lanes in Arayat, Pampanga. This also illustrates the study's objectives. To create the goals required to solve these challenges, the researchers identified the research problems and the specific routes cyclists constantly traverse.

The current road condition of JASA and Magalang-Arayat Road was assessed in the second phase, including its road width and the type of material used on the road. The researchers also evaluated the bicycle trend in this phase. These data would be used to lay out different kinds of bike lanes.

Phase 3 involved data collection of traffic conditions from Jose Abad Santos Ave. to Magalang-Arayat Road, such as traffic volume and bicycle traffic accidents. A manual counting method was used to calculate the traffic volume, and as bicycle accidents are frequently unreported, information on them was obtained through interviews. The existing road widening plans of JASA and Magalang-Arayat Road from the Department of Public Works and Highways were obtained to evaluate the road construction plan used for the bicycle lane. The perception of cyclists, locals, and Arayat authorities was also gathered in this phase. LocalSim was used to simulate the data collected, while the respondents' perceptions were evaluated using descriptive analysis.

Quantitative data and simulated data were discussed to develop the last phase of the study, a plan for bike lanes in JASA and Magalang-Arayat Road that satisfied both methods' criteria. AutoCAD 2D was utilized in this phase.

Phase 1: Proposal if Bike Lane in JASA and Magalang-Arayat Road - Review of Related Literatures - Identifying Research Problems - Identifying Research Objectives - Identifying Research Locale
Phase 2: Assessment of Current Road Condition of JASA and Magalang-Arayat Road - Assessment of Bicycle Trends (Number of Cyclists and Trail of Cyclists) - Road Width - Road Materials - Plotting of Bike Lane
Phase 3: Data Gathering - Perceptions of Cyclists, Locals, and Authorities - Traffic Conditions (Traffic Volume and Accident Data) - Existing Road Development Plan
Phase 4: Evaluation of Quantitative Data - Simulation of Traffic Design Using LocalSim
Phase 5: Plan of Bike Lane in JASA and Magalang-Arayat Road that Satisfied the Same Criteria for both Simulated and Descriptive Analysis

Fig. 2 Methodological Framework

III. RESULTS AND DISCUSSION

This chapter presents the study's results, discussions, and interpretations based on the data gathered using the instruments. The results and their interpretations are presented in an orderly manner that is related to the identified specific problems. Traffic and necessary data were gathered using the manual counting method to do this. Through these data, an analysis of traffic, both existing road systems and the bike lane road system, was conducted, and the interpretation and discussion are in this chapter.

C. Survey Questionnaire Findings

The study used a descriptive quantitative research approach to gather data on bicycle accidents in Arayat, Pampanga. The quantitative survey questionnaire was divided into two distinct parts. The first part gathered data on the cycling exposure of

the respondents, likely asking how often they ride bicycles, for what purposes, on what types of roads, and other questions to quantify their overall bicycling habits. The second survey identified details on the context of any bicycle accidents the respondents have been involved in. After collecting the statistical survey data, the researchers also conducted a structured quantitative interview. This was to gather residents' narrative responses about their perceptions of bicycle safety issues in the area, any additional bicycle crashes they were aware of, and their thoughts on potential infrastructure improvements like bike lanes to improve cyclist safety.

The findings reported by the respondents included cyclists who travel within Arayat, Pampanga. The results reveal interesting insights into the perspectives and experiences of cyclists traveling within Arayat. The researchers got a total of two hundred seventy-three (273), surpassing the targeted sample size of two hundred sixty-seven (267) respondents. The data was collected through surveys and interviews targeting cyclists in the Arayat, Pampanga. The researchers took care to analyze the data and present the results in a logical, structured way that directly connects to the research questions and goals. The researchers primarily asked about the age of the respondents, where the majority, or 29.7%, were in the age bracket of 16-20 years old. 24.9% of the respondents belong to the age bracket of 21-25 years old, while 19.4% were 10-15 years old. Moreover, 10.3% were 51 and above, and 8% were 31-40 years old. Minorities were 4.8% of 26-40 years old, and 2.9% were 41-50 years old. Overall, the age distribution was skewed towards younger populations under 30 years old, with a secondary cluster of middle-aged and older respondents over 50. This age profile provides a critical demographic context to analyze the survey results and understand the perspectives most strongly represented in the sample.

The researchers conducting the study sought to determine the sexuality of the participants surveyed. Out of the total 273 respondents, the vast majority were male, with 262 participants (96%) identifying as such. The data indicates that competitive cycling remains male-dominated, with men making up the overwhelming proportion of cyclists at this level of competition. The small minority of female cyclists totaled just 11 participants, a mere 4% of the overall respondent pool.

The researchers also collected comprehensive data about the geographic origins of the cyclists visiting Arayat, Pampanga. The researchers specifically asked each respondent to provide their home address. After gathering all the addresses, the researchers systematically analyzed the data to determine where the cyclists traveled. The analysis revealed that a substantial majority - nearly three-quarters - of the cyclists hailed from various municipalities within Pampanga province. Specifically, 199 of the 273 total respondents, or 72.9%, listed their home addresses in different towns and cities across Pampanga. This indicates that Mount Arayat is a local attraction for most cyclists, with many making the trip from their homes in nearby Pampanga municipalities. Meanwhile, a smaller but still significant portion came from farther away. 42 cyclists, accounting for 15.4% of the total, traveled from the province of Bulacan to visit Mount Arayat. In addition, 31 respondents, or 11.4%, traveled from towns and cities in Nueva Ecija province. Only one cyclist came from the farther province of Tarlac. So, while Pampanga residents make up the vast majority of the population, Arayat also attracts cyclists from other Central Luzon provinces. The data makes it clear that Arayat is a regional draw, appealing to cyclists across Pampanga and nearby provinces eager to take on the challenge of biking up the iconic mountain. To supplement these statistics, the researchers also gathered quantitative data by asking respondents about the roads and overall cycling experience in Arayat. The goal was to understand the nature of the routes that cyclists commonly traverse and their level of comfort and safety while cycling in the area. Respondents provided opinions on the need for road markings, bike lanes, and road signage that could enhance the cycling experience. This feedback highlights areas for potential infrastructure improvements and reveals cyclists' desire for a more bicycle-friendly transportation network in Arayat.

Overall, the multifaceted data presented in Table 3.2 provides a nuanced profile of cycling in Arayat from the perspectives of local riders. The table captures key elements that shape the cycling experience, including behavior patterns, route preferences, safety concerns, and suggestions for enhancements. The data serves as a valuable basis for understanding and improving the cycling culture, infrastructure, and policies in Arayat, Pampanga.

D. Road Intersection Data Analysis Result

IntersectionI(Magalang-ArayatandJASARoad)

The map shows the main road (Intersection I) in the center of Arayat, Pampanga, divided into five entry points. The five-point intersection consisted of Magalang-Arayat Road, JASA Arayat, JASA Sta. Ana, Palengke Arayat, and Calle-Onse Road.

Fig. 3 Intersection I (Magalang-Arayat and JASA Road)

IntersectionII (Along Magalang-Arayat Road and Gatiawin, Arayat)

The main road (Intersection II) in Gatiawin, Arayat, Pampanga, was divided into a four-point intersection. Composed of eight (8) links, this four-point intersection has roads leading to Arayat, Magalang, Barangay Lacmit, and Barangay Gatiawin.

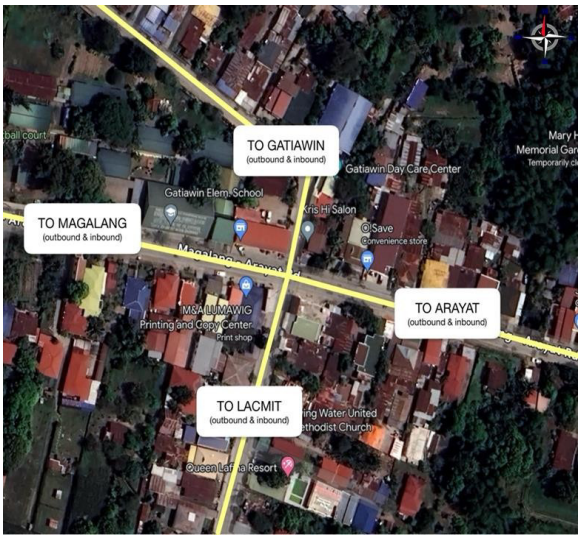

Fig. 4 Intersection II (Along Magalang-Arayat Road and Gatiawin, Arayat)

Intersection III Arayat-Magalang-Mexico (ArayatBoundary)

Illustrated on the map are the main roads of the third intersection (Intersection III). Located on theArayat-Magalang-Mexico road junction, it leads precisely to the road's name, going to the towns ofArayat, Magalang, and Mexico.

Fig. 5 Intersection III Arayat-Magalang-Mexico (Arayat Boundary)

E. Evaluation of LocalSim Results

The researchers simulated three (3) intersections on JASA and Magalang-Arayat Road to examine the flow of traffic and road conditions. A simulation was conducted under two (2) scenarios to evaluate the effects of adding bike lanes: the model with sharrows and the current road condition without bike lanes. Since the chosen route's road dimensions did not meet the requirements of the dedicated bike lane classification—which stipulates that the bike lane has a designated lane for cyclists and that no other vehicles are permitted to enter the dedicated lane—the simulation for the scenario under the dedicated bike lane was not suitable.

TABLE I
LOCALSIM EVALUATION RESULT FOR MONDAY MORNING WITHOUT BIKE LANES

JANUARY 22, 2024 (MONDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.12	Acceptable Fit	A
OutSta.Ana	3.13	Acceptable	B
InSta.Ana	3.24	Acceptable	C
OutArayat	4.08	Acceptable	B
InArayat	2.87	Acceptable Fit	B
OutMagalang	0.3	Acceptable Fit	C
InMagalang	2.34	Acceptable Fit	B
Calle-Onse	0.096	Acceptable Fit	A
INTERSECTION II			
OutArayat	0.93	Acceptable Fit	C
InArayat	0.14	Acceptable Fit	C
InMagalang	0.69	Acceptable Fit	C
OutMagalang	0.14	Acceptable Fit	C
OutLacmit	0.5	Acceptable Fit	A
InLacmit	0.22	Acceptable Fit	B
InGatiawin	1.03	Acceptable Fit	A
OutGatiawin	1.01	Acceptable Fit	A
INTERSECTION III			
OutArayat	2.44	Acceptable Fit	B
InArayat	2.50	Acceptable Fit	B
InMagalang	0.61	Acceptable Fit	C
OutMagalang	1.04	Acceptable Fit	C
OutMexico	2.34	Acceptable Fit	B
InMexico	1.13	Acceptable Fit	B

For the morning portion of Intersection I station, the above Table 1 shows the validated values from the LocalSim software of the GEH Statistics and LOS marks. For the GEH statistics validated results, of all the eight (8) links, five (5) had “Acceptable Fit” links while three (3) links, namely Out Sta. Ana, In Sta. Ana, and Out Arayat had “Acceptable” results. On the other hand, the LOS marks of the station had three (3) LOS ratings: two (2) links with LOS rating A, four (4) links with LOS rating B, and two (2) links with LOS rating C. In conclusion, from the validated values for GEH statistics in the table, the simulation of all the links resulted in an overall acceptable outcome.It also displays the verified data for Intersection II during the morning period. These verified values were extracted from the LocalSim software's GEH Statistics and LOS marks. Each of the eight links featured in the table is labeled with a level of validity termed "Acceptable fit." The simulation outcomes for these links are considered acceptable based on this data. It also discusses the values of the validated results of the GEH statistics (Validation Values) and LOS Marks on Monday morning at Intersection III station. From the validation values of GEH statistics results, all six (6) links did not exceed the 3.0 guidance, meaning their

values are less than 3.0, making them "Acceptable Fit." Furthermore, for the LOS Marks, four (4) of them were classified to be of LOS rating B since their validated values ranged from 0.21-0.50, while the remaining two (2) links had a level C category where their values ranged from 0.51-0.70. To sum up, all six links validated results for the GEH statistics had all "Acceptable" remarks, making the simulation of the Monday morning station acceptable.

TABLE III
LOCALSIM EVALUATION RESULT FOR TUESDAY MORNING WITHOUT BIKE LANES

JANUARY 23, 2024 (TUESDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	3.64	Acceptable	A
OutSta.Ana	2.84	Acceptable Fit	B
InSta.Ana	4.06	Acceptable	B
OutArayat	1.13	Acceptable Fit	C
InArayat	2.4	Acceptable Fit	B
OutMagalang	3.14	Acceptable	B
InMagalang	3.42	Acceptable	C
Calle-Onse	2.11	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.25	Acceptable Fit	B
InArayat	2.4	Acceptable Fit	B
InMagalang	2.35	Acceptable Fit	B
OutMagalang	1.12	Acceptable Fit	B
OutLacmit	0.49	Acceptable Fit	A
InLacmit	2.08	Acceptable Fit	A
InGatiawin	1.29	Acceptable Fit	A
OutGatiawin	3.14	Acceptable	A
INTERSECTION III			
OutArayat	0.59	Acceptable Fit	B
InArayat	3.41	Acceptable	B
InMagalang	1.47	Acceptable Fit	B
OutMagalang	0.29	Acceptable Fit	B
OutMexico	0.60	Acceptable Fit	B
InMexico	1.13	Acceptable Fit	B

The table above depicts all of the GEH statistics, validated results, and the LOS marks for the station on Tuesday morning. The GEH statistics of all eight links had four (4) "Acceptable Fit" classifications, whereas the other half (4) were classified only as "Acceptable," with their validated values stretching from 3.0 to 5.0. The majority of the LOS marks of eight (8) links had level B (0.21-0.50) as their category, which were four (4) links, and level A (0 -0.20) rating for the roads of In Palengke & Cale-onse while level C (0.51-0.70) rating for Out Arayat & In Magalang. This means that all of the eight (8) links had an "Acceptable" standard classification for every link, making the simulation of acceptable classification as well. For Intersection II, most links, totaling seven, were classified as having a validity level of "Acceptable Fit," as their respective GEH Statistics range from 0.49 (OutLacmit Link) to 2.4 (InArayat Link). However, the OutGatiawin Link, with a GEH Statistic of 3.14, surpassed the 3.0 threshold yet still maintained an "Acceptable" status. Despite this deviation, the results remain acceptable. It also shows the GEH statistics and the Level of Service (LOS) validated values on Tuesday morning at Intersection III station. The GEH statistics validation values results show the five (5) links did not exceed 3.0 guidance, which means they were "Acceptable Fit." In contrast, one (1) link of "In Arayat" fell under "Acceptable," ranging from 3.0 to 5.0. All LOS Marks are in Level B, ranging from 0.21-0.50. The GEH statistics results of all the links had an acceptable status.

TABLE IIIII
LOCALSIM EVALUATION RESULT FOR WEDNESDAY MORNING WITHOUT BIKE LANES

JANUARY 24, 2024 (WEDNESDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0	Acceptable Fit	A
OutSta.Ana	2.7	Acceptable Fit	C
InSta.Ana	2.42	Acceptable Fit	B
OutArayat	0.58	Acceptable Fit	C
InArayat	0.78	Acceptable Fit	C
OutMagalang	4.38	Acceptable	B
InMagalang	4.32	Acceptable	C
Calle-Onse	2.21	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.25	Acceptable Fit	B
InArayat	2.4	Acceptable Fit	B
InMagalang	2.35	Acceptable Fit	B
OutMagalang	1.12	Acceptable Fit	B
OutLacmit	0.49	Acceptable Fit	A
InLacmit	2.08	Acceptable Fit	A
InGatiawin	1.29	Acceptable Fit	A
OutGatiawin	3.14	Acceptable	A
INTERSECTION III			
OutArayat	2.94	Acceptable Fit	B
InArayat	3.51	Acceptable	B
InMagalang	4.42	Acceptable	B
OutMagalang	0	Acceptable Fit	B
OutMexico	2.68	Acceptable Fit	A
InMexico	2.49	Acceptable Fit	B

The table represents the values validated from the GEH statistics and LOS marks. The GEH statistics part had validation results for eight (8) links; six (6) links were in the "Acceptable Fit" category, while two (2) had the "Acceptable" fit category. In the LOS mark part, the LOS rating A was classified into the In Palengke & Cale-onse, while LOS rating B was given to the In Sta. Ana & Out Magalang. The other four (4) links' LOS rating mark is in the "stable flow" (level C) category. Lastly, the GEH statistics results revealed that the rest of the road links were acceptable, meaning the simulation of the eight(8) links are regarded as acceptable. It displays the Wednesday morning segment of Intersection II. Each of the eight links was categorized as "Acceptable Fit" regarding validity, as their GEH Statistics fall within the range of >3.0. Overall, the GEH-validated statistics indicate that all results are acceptable, rendering the simulation of all eight links acceptable.On Wednesday morning at Intersection III station,the validation results of GEH statistics and Level of Service (LOS) Marks. The GEH statistics values indicate that four (4) links were "Acceptable Fit." The values are < 3.0, while the two (2) road links fell under "Acceptable," which means the results range from 3.0 to 5.0. The Level of Service five (5) was classified as "reasonably free flow" and identified as Level B, While the remaining 1 (link) of "Out Mexico" was in "free flow," known as Level A. The GEH statistics results of the validated values at the station are acceptable.

TABLE IVV
LOCALSIM EVALUATION RESULT FOR THURSDAY MORNING WITHOUT BIKE LANES

JANUARY 25, 2024 (THURSDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.49	Acceptable Fit	A
OutSta.Ana	1.06	Acceptable Fit	D
InSta.Ana	2.12	Acceptable Fit	B
OutArayat	2.87	Acceptable Fit	C
InArayat	1.83	Acceptable Fit	D
OutMagalang	3.26	Acceptable	C
InMagalang	2.08	Acceptable Fit	A
Calle-Onse	0.6	Acceptable Fit	C
INTERSECTION II			
OutArayat	3.7	Acceptable Fit	B
InArayat	0.21	Acceptable Fit	B
InMagalang	3.19	Acceptable Fit	B
OutMagalang	0.11	Acceptable Fit	B
OutLacmit	1.33	Acceptable Fit	A
InLacmit	1.17	Acceptable Fit	A
InGatiawin	0.18	Acceptable Fit	A
OutGatiawin	2.09	Acceptable Fit	A
INTERSECTION III			
OutArayat	4.18	Acceptable	B
InArayat	0.80	Acceptable Fit	B
InMagalang	1.68	Acceptable Fit	B
OutMagalang	0.90	Acceptable Fit	B
OutMexico	0.37	Acceptable Fit	B
InMexico	0.16	Acceptable Fit	B

The table shows the illustrated validated values of GEH statistics of the station's eight (8) links and the LOS marks. Starting with the GEH statistics, the eight (8) links consisted of seven (7) "Acceptable Fit" status and one (1) "Acceptable" link. With the LOS marks, the eight (8) links generally had four (4) categories: two (2) LOS rating A (0-0.20), one (1) LOS rating B (0.21-0.50), three (3) LOS rating C (0.51-0.70), and two (2) LOS rating D (0.71-0.85). The collected validated data for GEH statistics means that seven (7) links had generally "Acceptable Fit" results and one (1) "Acceptable" link, thus the simulation results of the station concluded with all eight (8) linkages having acceptable simulation results. It also represents the Thursday morning report of Intersection II. Results show that the majority (6) of the links, which are the InArayat, InMagalang, OutMagalang, OutLacmit, InLacmit, InGatiawin, and OutGatiawin were "Acceptable fit" on the level of validity as their respective GEH Statistic. Meanwhile, the remaining (2) were considered "Acceptable" as their GEH Statistic exceeded the range to be considered "Acceptable". It is also shown the validated values of GEH statistics and the Level of Service Marks of the Intersection III station. Of the six (6) links, five (5) links had an "Acceptable Fit" category ranging from < 3.0, while one (1) link ranged from 3.0 to 5.0, which is an "Acceptable" category. All Level of Service Marks fell under Level B, "reasonably free flow," ranging from 0.21 to 0.50. The simulation for Intersection III on Thursday morning is considered acceptable.

TABLE V
LOCALSIM EVALUATION RESULT FOR FRIDAY MORNING WITHOUT BIKE LANES

JANUARY 26, 2024 (FRIDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.19	Acceptable Fit	A
OutSta.Ana	3.51	Acceptable	B
InSta.Ana	2.76	Acceptable Fit	C
OutArayat	2.75	Acceptable Fit	D
InArayat	2.47	Acceptable Fit	C
OutMagalang	2.24	Acceptable Fit	C
InMagalang	2.96	Acceptable Fit	C
Calle-Onse	2.53	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.68	Acceptable Fit	B
InArayat	0.11	Acceptable Fit	C
InMagalang	0.07	Acceptable Fit	B
OutMagalang	0.11	Acceptable Fit	B
OutLacmit	4.13	Acceptable	A
InLacmit	1.36	Acceptable Fit	A
InGatiawin	3.68	Acceptable	A
OutGatiawin	1.48	Acceptable Fit	A
INTERSECTION III			
OutArayat	0.57	Acceptable Fit	B
InArayat	0.80	Acceptable Fit	B
InMagalang	2.32	Acceptable Fit	B
OutMagalang	1.34	Acceptable Fit	B
OutMexico	2.61	Acceptable Fit	B
InMexico	0.32	Acceptable Fit	B

The morning of Friday at Intersection I station is presented above, with the validated values of GEH statistics and LOS marks displayed. The GEH statistics on the table dictate that seven (7) out of eight (8) links had an "Acceptable Fit" status for their values ranging below 3.0. In contrast, the remaining one (1) link was categorized as "Acceptable." For the LOS marks, two (2) links were labeled level A (free flow) while one (1) was categorized as level B (reasonably free flow) and one (1) with level D (approaching unstable flow) remark. The values of the four (4) links ranged from 0.51-0.70, which put them in the level C (stable flow) category. Thus, the GEH-validated statistics indicate that all eight (8) links were of "acceptable" standard, deeming the simulation for all named eight (8) links acceptable. During the Friday morning period at Intersection II, the validated values of GEH statistics and LOS marks for eight (8) road links. The majority, comprising six links, were labeled as "Acceptable Fit" in terms of validity because their respective GEH statistics fell within the range of >3.0. These six links include OutArayat (LOS Rating B), InArayat (LOS Rating C), InMagalang (LOS Rating B), OutMagalang (LOS Rating B), InLacmit (LOS Rating A), and OutGatiawin (LOS Rating A). Conversely, the remaining links—OutLacmit Link and InGatiawin Link—with LOS Rating A were classified as "Acceptable" due to their GEH Statistics exceeding 3.0. Overall, the findings of this study are considered acceptable. For Station III the presented table above shows the six (6) links validated values of GEH statistics and the Level of Service Marks of the station. All of the six (6) links in Mexico Friday morning were considered as "Acceptable Fit," ranging from < 3.0. Meanwhile, the LOS falls under Level B, which implies that all of the six (6) links

have reasonably free flow. With that, the GEH statistics are regarded as acceptable.

TABLE VI
LOCALSIM EVALUATION RESULT FOR SATURDAY MORNING WITHOUT BIKE LANES

JANUARY 27, 2024 (SATURDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	3.33	Acceptable Fit	A
OutSta.Ana	2.75	Acceptable Fit	B
InSta.Ana	4.36	Acceptable	C
OutArayat	2.11	Acceptable Fit	C
InArayat	2.97	Acceptable Fit	C
OutMagalang	4.15	Acceptable	D
InMagalang	2.68	Acceptable Fit	C
Calle-Onse	0.86	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.66	Acceptable Fit	C
InArayat	1.93	Acceptable Fit	C
InMagalang	1.06	Acceptable Fit	C
OutMagalang	2.15	Acceptable Fit	C
OutLacmit	2.88	Acceptable Fit	B
InLacmit	1.86	Acceptable Fit	B
InGatiawin	2.36	Acceptable Fit	A
OutGatiawin	3.79	Acceptable	A
INTERSECTION III			
OutArayat	0.99	Acceptable Fit	B
InArayat	4.03	Acceptable	B
InMagalang	2.95	Acceptable Fit	B
OutMagalang	2.72	Acceptable Fit	B
OutMexico	3.76	Acceptable	B
InMexico	0.36	Acceptable Fit	B

Shown on table above, which presents the validated data for the GEH statistics and LOS marks. With the GEH statistics, on eight (8) links, six (6) were of "Acceptable Fit" remark while the other three (3) links were categorized as "Acceptable" for their validated value ranging from 3.0-5.0. The LOS marks of the station had two (2) LOS rating A, one (1) LOS rating B, four (4) LOS rating C, and one (1) LOS rating D for the link of Out Magalang. Since, in general, all of the simulated results of GEH statistics fell on the scope of acceptable, the simulation of eight (8) links was regarded as acceptable. It also illustrates the Saturday morning segment at Intersection II. The majority, comprising seven links, were deemed to have a validity level of "Acceptable Fit" because their respective GEH Statistics fell within the range of >3.0. However, the OutGatiawin Link, despite its GEH Statistic of 3.79 exceeding 3.0, was labeled as "Acceptable." Nevertheless, the overall results are considered acceptable. It also shows the validated values for the GEH statistics and Level of Service marks. From the validation values of GEH statistics results, four (4) links did not exceed the 3.0 guidance, which means their values are < 3.0, making them "Acceptable Fit." The remaining two (2) links fell under "Acceptable" and range from 3.0 to 5.0 values. However, for the LOS Marks, all six (6) links were classified as Level B since their values ranged from 0.21 to 0.50. This means that the GEH statistics result is in an acceptable classification.

TABLE VII
LOCALSIM EVALUATION RESULT FOR SUNDAY MORNING WITHOUT BIKE LANES

JANUARY 28, 2024 (SUNDAY) Without Bike Lane (Morning)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.46	Acceptable Fit	A
OutSta.Ana	1.7	Acceptable Fit	B
InSta.Ana	3.52	Acceptable	C
OutArayat	3.71	Acceptable	C
InArayat	2.6	Acceptable Fit	C
OutMagalang	0.99	Acceptable Fit	C
InMagalang	1.44	Acceptable Fit	C
Calle-Onse	1.8	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.48	Acceptable Fit	C
InArayat	4.55	Acceptable	C
InMagalang	0	Acceptable	C
OutMagalang	4.7	Acceptable	C
OutLacmit	0.78	Acceptable Fit	A
InLacmit	1.85	Acceptable Fit	A
InGatiawin	0.21	Acceptable Fit	A
OutGatiawin	4.69	Acceptable	A
INTERSECTION III			
OutArayat	2.53	Acceptable Fit	B
InArayat	1.25	Acceptable Fit	B
InMagalang	3.33	Acceptable	B
OutMagalang	2.05	Acceptable Fit	B
OutMexico	1.43	Acceptable Fit	B
InMexico	2.95	Acceptable Fit	B

Represented at the top are values of the validated GEH statistics and LOS. The results of the validated data for GEH statistics suggest that the eight (8) links were only divided into two (2) categories, which are: six (6) “Acceptable Fit” and two (2) “Acceptable.” For the part of LOS marks, two (2) links were of the free flow (level A) category while the link of Out Sta. Ana had a level B (reasonably free flow) classification. The remaining five (5) links fell on the LOS rating/level C for their value range of 0.51 – 0.70. The presented data above for GEH statistics says that the general classification of the eight (8) links is acceptable, and taking into consideration the simulation, the simulation is regarded to be acceptable as well. For Intersection II, out of the eight (8) links, five were categorized as having a level of validity of "Acceptable fit" since their GEH statistics fell within the range of >3.0. These links are OutArayat (LOS Rating C), InMagalang (LOS Rating C), OutLacmit (LOS Rating A), InLacmit (LOS Rating A), and InGatiawin (LOS Rating A). Conversely, three links out of the eight, InArayat (LOS Rating C), OutMagalang (LOS Rating C), and OutGatiawin (LOS Rating A), were labeled as "Acceptable". For Intersection III the table shows the validated values of GEH statistics and the Level of Service Marks. Of the six (6) links, only five (5) links had an "Acceptable Fit" category ranging from less than 3.0, and the remaining one (1) link from "In Magalang" ranged from 3.0 to 5.0 was considered as "Acceptable." For the Level of Service marks, all the validated six (6) links fell under reasonably free flow (Level B), meaning the values range from 0.21 to 0.50. All in all, the simulation for the station on Sunday morning is considered an acceptable result.

TABLE VIII
LOCALSIM EVALUATION RESULT FOR MONDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 22, 2024 (MONDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.64	Acceptable Fit	A
OutSta.Ana	0.36	Acceptable Fit	C
InSta.Ana	2.03	Acceptable Fit	C
OutArayat	0.95	Acceptable Fit	B
InArayat	2.07	Acceptable Fit	B
OutMagalang	3.5	Acceptable Fit	C
InMagalang	1.46	Acceptable Fit	C
Calle-Onse	3.89	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.23	Acceptable Fit	C
InArayat	2.53	Acceptable Fit	C
InMagalang	1.79	Acceptable Fit	C
OutMagalang	1.15	Acceptable Fit	C
OutLacmit	1.59	Acceptable Fit	A
InLacmit	1.01	Acceptable Fit	B
InGatiawin	3.85	Acceptable	A
OutGatiawin	0.92	Acceptable Fit	A
INTERSECTION III			
OutArayat	2.46	Acceptable Fit	B
InArayat	0.57	Acceptable Fit	B
InMagalang	2.4	Acceptable Fit	C
OutMagalang	1.13	Acceptable Fit	C
OutMexico	0.77	Acceptable Fit	B
InMexico	1.24	Acceptable Fit	B

For the part of the afternoon, the table above sorts out the validated values in terms of GEH statistics and LOS marks. For the GEH statistics part, six (6) of the links were categorized as “Acceptable Fit,” while two (2) links had only the “Acceptable” status with values that ranged from 3.0 to 5.0. For the LOS marks, two (2) links had scores ranging from 0-0.20, earning them a “free flow” (level A) category, and where two (2) more links had a score ranging from 0.21-0.50, making them level B (reasonably free flow) status. Additionally, four (4) links scored higher than the prior two links, with their validated values ranging from 0.51-0.70, making them a stable flow (level C) category. All the GEH statistics validated results were deemed acceptable; thus, the whole simulation for the eight (8) links are acceptable. It also illustrates the confirmed data of GEH statistics and LOS marks for eight (8) road links. Among these, only the InGatiawin Link at Intersection II, with a Level of Service (LOS) rating of A, attained an "Acceptable" level of validity, boasting a GEH of 3.85. Meanwhile, the other seven links were categorized as "Acceptable fit," with their GEH Statistics below 3.0. Overall, the outcomes for this part are regarded as acceptable. The table illustrates the GEH statistics and validated values for the Level of Service (LOS). The validation values of GEH statistics results show that all six (6) links did not exceed the 3.0 guidance, meaning they are "Acceptable Fit." However, in the LOS Marks, four (4) links were classified as Level B considering that they ranged from 0.21-0.50, while the two (2) links of "In Magalang" and "Out Magalang" had a Level C where their values ranged from 0.51-0.70. With that, all of the six (6) links validated results for GEH statistics are all in the "Acceptable" status, and the simulation of the station is also considered acceptable.

TABLE IX
LOCALSIM EVALUATION RESULT FOR TUESDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 23, 2024 (TUESDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.76	Acceptable Fit	A
OutSta.Ana	1.50	Acceptable Fit	B
InSta.Ana	3.83	Acceptable	B
OutArayat	3.80	Acceptable	B
InArayat	3.15	Acceptable	B
OutMagalang	1.93	Acceptable Fit	B
InMagalang	1.80	Acceptable Fit	B
Calle-Onse	1.84	Acceptable Fit	A
INTERSECTION II			
OutArayat	3.05	Acceptable	B
InArayat	2.038	Acceptable Fit	B
InMagalang	4.04	Acceptable	B
OutMagalang	2.13	Acceptable Fit	B
OutLacmit	3.54	Acceptable	A
InLacmit	3.6	Acceptable	A
InGatiawin	3.09	Acceptable	A
OutGatiawin	3.86	Acceptable	A
INTERSECTION III			
OutArayat	0.37	Acceptable Fit	B
InArayat	1.79	Acceptable Fit	B
InMagalang	1.55	Acceptable Fit	C
OutMagalang	1.31	Acceptable Fit	B
OutMexico	2.36	Acceptable Fit	B
InMexico	1.14	Acceptable Fit	B

The table displays the validity level of the LOS and GEH Statistics. According to the afternoon's GEH Statistics, four (4) of the links were an acceptable fit, and the other half (4) were of acceptable status. With a mark ranging from 0.21 to 0.50, the LOS for the six (6) links between the initial and last links was categorized as reasonably free flow or level B. The initial and last two (2) links were regarded as free flow, with marks ranging from 0 to 0.20. In conclusion, the link of In-Arayat had a sufficiently free flow level of service. In contrast, the validation of Day 2 afternoon regarding GEH statistics was deemed acceptable due to its mark of below 5.0 validated values. On the portion of Intersection II, the table presents the validated values of GEH statistics and LOS marks of eight (8) road links. Most (6) of the links had "Acceptable" as a level of validity due to their respective GEH statistics greater than 3.0. These six links are the following: OutArayat (LOS Rating B), InMagalang (LOS Rating B), OutLacmit (LOS Rating A), and InLacmit (LOS Rating A). InGatiawin (LOS Rating A), and OutGatiawin (LOS Rating A). Meanwhile, the remaining (2) links—InArayatLink and the OutMagalang Link—have the same LOS Rating B and are "acceptable fit" due to the GEH statistics that are in between the range of >3.0. Overall, the results of this study are acceptable. For Station III, the GEH statistics, and the validated Level of Service (LOS) values. The validated values in GEH statistics were "Acceptable Fit," and all the links did not exceed 3.0. While the LOS Marks, five (5) road links were classified as Level B, and the remaining one (1) link fell under Level C; the values range from 0.51-0.70. Overall, the GEH

statistics results did not exceed 3.0. The simulation is considered acceptable for all links of the station.

TABLE X
LOCALSIM EVALUATION RESULT FOR WEDNESDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 24, 2024 (WEDNESDAY) Without Bike Lane (Afternoon			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.18	Acceptable Fit	A
OutSta.Ana	0.61	Acceptable Fit	B
InSta.Ana	0.94	Acceptable Fit	B
OutArayat	2.68	Acceptable Fit	B
InArayat	2.46	Acceptable Fit	C
OutMagalang	2.47	Acceptable Fit	C
InMagalang	0.49	Acceptable Fit	C
Calle-Onse	3.46	Acceptable	A
INTERSECTION II			
OutArayat	3.18	Acceptable	B
InArayat	0.88	Acceptable Fit	B
InMagalang	1.67	Acceptable Fit	B
OutMagalang	1.73	Acceptable Fit	B
OutLacmit	0.64	Acceptable Fit	A
InLacmit	4.8	Acceptable	A
InGatiawin	1.77	Acceptable Fit	A
OutGatiawin	0.27	Acceptable Fit	A
INTERSECTION III			
OutArayat	3.92	Acceptable	B
InArayat	2.74	Acceptable Fit	B
InMagalang	2.07	Acceptable Fit	B
OutMagalang	3.69	Acceptable	C
OutMexico	0.390	Acceptable Fit	B
InMexico	3.19	Acceptable	B

For the afternoon part of the station, the table is shown above, displaying the validated results of the GEH statistics and LOS marks. For the GEH statistics part, only one (1) link was categorized as “Acceptable.” In contrast, according to the GEH table guide, the remaining seven (7) links were classified as “Acceptable Fit” because their values range below 3.0. On the portion of the LOS mark, the first and last links were free flow (level A) category, while three (3) links were reasonably free flow (level B) with their range values of 0.21-0.50. The remaining three (3) links fell into the category of stable flow with values ranging from 0.51-0.70 (level C). To sum up, all of the eight (8) links’ validation results for GEH statistics were regarded to be “Acceptable,” which makes thesimulation acceptable status as well. For the portion of Intersection II. Six (6) out of the eight (8) links were deemed as "Acceptable Fit" as their GEH Statistic fell under the range of >3.0. On the other hand, the remaining (2) link had "Acceptable" as the level of validity as they exceeded the maximum value of 3.0. In Intersection III, the six (6) links validated values of GEH statistics and the Level of Service Marks. Three (3) links were classified as "Acceptable Fit," while the remaining three (3) links are "Acceptable." For the level of service, five (5) of them fall under Level B since their validated values ranged from 0.21-0.50. While the remaining one (1) link of "Out Magalang" had a Level of C where the values ranged from 0.51-0.70. To conclude, the GEH statistics are all "Acceptable" remarks. The simulation of the Wednesday afternoon station is acceptable.

TABLE XI
LOCALSIM EVALUATION RESULT FOR THURSDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 25, 2024 (THURSDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.17	Acceptable Fit	A
OutSta.Ana	0.99	Acceptable Fit	C
InSta.Ana	2.28	Acceptable Fit	B
OutArayat	3.06	Acceptable	C
InArayat	2.62	Acceptable Fit	C
OutMagalang	1.96	Acceptable Fit	C
InMagalang	1.05	Acceptable Fit	C
Calle-Onse	1.81	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.25	Acceptable Fit	B
InArayat	2.14	Acceptable Fit	B
InMagalang	1.67	Acceptable Fit	B
OutMagalang	1.44	Acceptable Fit	B
OutLacmit	1.01	Acceptable Fit	A
InLacmit	0.53	Acceptable Fit	A
InGatiawin	0.17	Acceptable Fit	A
OutGatiawin	0.37	Acceptable Fit	A
INTERSECTION III			
OutArayat	3.75	Acceptable	B
InArayat	2.05	Acceptable Fit	B
InMagalang	4.18	Acceptable	C
OutMagalang	4.94	Acceptable	B
OutMexico	1.40	Acceptable Fit	B
InMexico	0.17	Acceptable Fit	B

For the Thursday afternoon of the station I, the table above shows the validation results for the GEH statistics and LOS marks. In the GEH statistics validated results, only one (1) link, which is the Out Arayat link, had earned a status of just “Acceptable,” while the rest of the seven (7) links were of “Acceptable Fit” status. For the part of the LOS marks, only three LOS rating categorizations were divided into three (3): In Palengke & Cale-Onse were of free flow (level A), In Sta. Ana & In Arayat was reasonably free flow (level B), with the remaining four (4) links classified only as stable flow (level C) with values ranging from 0.51 to 0.70. Based on the GEH statistics validated outcomes, the eight (8) links shared generally similar status, which is of “Acceptable” regard, making the simulation of acceptable status to the rest of the simulated links in the afternoon part of Thursday. It also displays the segment of Intersection II. Each of the eight links was deemed "Acceptable Fit" regarding validity, as their GEH Statistics fell within the range of >3.0. Overall, the results of the GEH-validated statistics indicate that all outcomes are acceptable, ensuring the simulation of all eight links is satisfactory. In Intersection III, three (3) of the links were Acceptable Fit," ranging < 3.0. The remaining links, which were also three (3), fell under the "Acceptable" category. At the same time, the five (5) links of Level of Service were categorized as Level B (reasonably free flow) ranging from 0.21 to 0.50. In comparison, Level C (stable flow) ranged from 0.51 to 0.70. Overall, the simulation for Intersection III on Thursday afternoon is also considered acceptable.

TABLE XII
LOCALSIM EVALUATION RESULT FOR FRIDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 26, 2024 (FRIDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.79	Acceptable Fit	A
OutSta.Ana	1.42	Acceptable Fit	C
InSta.Ana	2.70	Acceptable Fit	B
OutArayat	3.58	Acceptable	B
InArayat	4.24	Acceptable	C
OutMagalang	2.52	Acceptable Fit	C
InMagalang	3.24	Acceptable	B
Calle-Onse	1.05	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.34	Acceptable Fit	D
InArayat	3.4	Acceptable	D
InMagalang	1.4	Acceptable Fit	D
OutMagalang	1.43	Acceptable Fit	D
OutLacmit	4.27	Acceptable	B
InLacmit	1.36	Acceptable Fit	B
InGatiawin	1.27	Acceptable Fit	A
OutGatiawin	2.29	Acceptable Fit	A
INTERSECTION III			
OutArayat	2.03	Acceptable Fit	B
InArayat	1.63	Acceptable Fit	B
InMagalang	3.63	Acceptable	C
OutMagalang	1.37	Acceptable Fit	C
OutMexico	2.22	Acceptable Fit	B
InMexico	2.50	Acceptable Fit	B

The table illustrates the validated values for the GEH statistics and LOS marks. The GEH statistics for all eight (8) links were generally of "Acceptable Fit" status, with only two (2) being categorized as "Acceptable." For the part of LOS marks, it had three various LOS ratings: two (2) level A (free flow) category, three (3) level B (reasonably free flow) category, and three (3) level C (stable flow) remark. In conclusion, all eight (8) road links were simulated with an acceptable result. For the segment at Intersection II. Among the eight (8) links, six were categorized as having a level of validity of "Acceptable fit" because their GEH statistics fell within the range of >3.0. These six links are OutArayat (LOS Rating D), InMagalang (LOS Rating D), OutMagalang (LOS Rating D), InLacmit (LOS Rating B), InGatiawin (LOS Rating A), and OutGatiawin (LOS Rating A). Conversely, two links out of the eight, InArayat (LOS Rating D) and OutLacmit (LOS Rating B), were labeled as "Acceptable". In Intersection III, it shows that, out of the six (6) links, five (5) of them were "Acceptable Fit," which means the values are less than 3.0. The remaining one (1) link, "In Magalang," had a value of 3.62, which is also in the acceptable category. The Level of Service, four (4) of them were in the category of reasonably free flow (Level B) with values of 0.21 to 0.50, and the other two (2) fell under Level C, which is stable flow with values ranging from 0.51 to 0.70. All in all, the station's simulation is considered acceptable for Friday afternoon in Mexico.

TABLE XIII
LOCALSIM EVALUATION RESULT FOR SATURDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 27, 2024 (SATURDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.66	Acceptable Fit	A
OutSta.Ana	3.31	Acceptable	C
InSta.Ana	3.05	Acceptable	C
OutArayat	0.86	Acceptable Fit	C
InArayat	4.43	Acceptable	C
OutMagalang	1.53	Acceptable Fit	D
InMagalang	3.75	Acceptable	C
Calle-Onse	1.37	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.61	Acceptable Fit	E
InArayat	0.665	Acceptable Fit	D
InMagalang	1.85	Acceptable Fit	D
OutMagalang	0.32	Acceptable Fit	D
OutLacmit	2.06	Acceptable Fit	B
InLacmit	1.74	Acceptable Fit	B
InGatiawin	1.95	Acceptable Fit	A
OutGatiawin	0.53	Acceptable Fit	A
INTERSECTION III			
OutArayat	0.79	Acceptable Fit	B
InArayat	0.69	Acceptable Fit	B
InMagalang	2.42	Acceptable Fit	B
OutMagalang	1.23	Acceptable Fit	B
OutMexico	2.63	Acceptable Fit	B
InMexico	1.75	Acceptable Fit	B

The table above shows the validated values of the GEH statistics and LOS marks. For the GEH statistics validation results, four (4) were regarded to be "Acceptable Fit," while the other four (4) links' statuses were "Acceptable." On the part of the LOS mark, the eight (8) road links consisted of three categories: LOS rating/level A, C, and D. The In Palengke & Cale-onse were categorized as level A (free flow). In contrast, the only level D (approaching unstable flow) is the link of Out Magalang. The remaining five (5) links were categorized to have a LOS rating of C, which indicates stable flow (0.51-0.70). In general, the GEH-validated statistics results were all acceptable, making the simulation on all eight (8) links acceptable. For Intersection II, each of the eight links was classified as "Acceptable Fit" regarding validity, as their GEH Statistics fell within the range of >3.0. Overall, the results of the GEH-validated statistics indicate that all outcomes are acceptable, ensuring the simulation of all eight links is satisfactory. For Intersection III, the validation values of GEH statistics show that all six (6) links had results of less than 3.0, meaning they fall under "Acceptable Fit." All the values range from less than 3.0. Furthermore, in the Level of Service, all of the six (6) links were classified as Level B, the values ranging from 0.21 to 0.50, and these are reasonably free flow. The GEH statistics results did not exceed 3.0; the simulation of the station on Saturday afternoon is considered acceptable.

TABLE XIV
LOCALSIM EVALUATION RESULT FOR SUNDAY AFTERNOON WITHOUT BIKE LANES

JANUARY 28, 2024 (SUNDAY) Without Bike Lane (Afternoon)			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.20	Acceptable Fit	A
OutSta.Ana	4.69	Acceptable	B
InSta.Ana	4.46	Acceptable	C
OutArayat	3.36	Acceptable	C
InArayat	3.06	Acceptable	C
OutMagalang	0.03	Acceptable Fit	C
InMagalang	4.25	Acceptable	C
Calle-Onse	2.25	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.53	Acceptable Fit	E
InArayat	1.29	Acceptable Fit	D
InMagalang	0.03	Acceptable Fit	D
OutMagalang	4.12	Acceptable	E
OutLacmit	0.77	Acceptable Fit	B
InLacmit	0.99	Acceptable Fit	B
InGatiawin	1.7	Acceptable Fit	A
OutGatiawin	1.11	Acceptable Fit	A
INTERSECTION III			
OutArayat	0.79	Acceptable Fit	B
InArayat	0.35	Acceptable Fit	B
InMagalang	0.71	Acceptable Fit	B
OutMagalang	1.79	Acceptable Fit	C
OutMexico	2.10	Acceptable Fit	B
InMexico	3.04	Acceptable	B

Tabulated on top are the data for the GEH statistics and LOS marks. In the GEH statistics validated results, the five (5) links are of “Acceptable” status, meanwhile, the other three (3) links are of “Acceptable” remark. The LOS marks of this afternoon’s station had three categories: two (2) links with 0 – 0.20 range (level A, free flow), one (1) link with 0.21 – 0.50 range (level B, reasonably free flow), and five (5) links with 0.51 – 0.70 range (level C, stable flow). On the GEH statistics results, the eight (8) links had all acceptable values, confirming that every link or leg of the selected station had acceptable validation outcomes. For the segment of Intersection II. The majority, comprising seven links, had a validity level of "Acceptable Fit" because their respective GEH statistics fell within the range of >3.0. However, the OutMagalang Link, despite its GEH Statistic of 4.12 exceeding 3.0, was labeled as "Acceptable." Nevertheless, the overall results are deemed acceptable. In Intersection III, the five (5) links are considered an "Acceptable Fit." The values did not go beyond 3.0, while the remaining one (1) link in "In Mexico" falls under acceptable, ranging from 3.0 to 5.0 values. For the LOS Marks, of the six (6) links, five (5) of them were reasonably free flow (Level B) with values ranging from 0.21 to 0.50, and the one (1) link from "Out Magalang" fell under stable flow (Level C) the values ranged from 0.51 to 0.70. Overall, the GEH statistics have an acceptable result.

TABLE XV
LOCALSIM EVALUATION RESULT FOR MONDAY MORNING WITH BIKE LANES

JANUARY 22, 2024 (MONDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.1	Acceptable Fit	A
OutSta.Ana	3.43	Acceptable	B
InSta.Ana	0.61	Acceptable Fit	C
OutArayat	3.99	Acceptable	C
InArayat	3.64	Acceptable	B
OutMagalang	2.58	Acceptable Fit	C
InMagalang	1.56	Acceptable Fit	B
Calle-Onse	1.94	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.46	Acceptable Fit	C
InArayat	0.69	Acceptable Fit	C
InMagalang	3.24	Acceptable	B
OutMagalang	0.42	Acceptable Fit	C
OutLacmit	1.16	Acceptable Fit	B
InLacmit	0.88	Acceptable Fit	B
InGatiawin	0.97	Acceptable Fit	A
OutGatiawin	1.32	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.07	Acceptable Fit	B
InArayat	1.28	Acceptable Fit	B
InMagalang	1.54	Acceptable Fit	C
OutMagalang	0.15	Acceptable Fit	C
OutMexico	1.02	Acceptable Fit	B
InMexico	3.21	Acceptable	B

The level of validity for LOS and GEH Statistics for Monday morning in the Intersection of Arayat, Magalang, and Sta. Ana, Pampanga is shown in the table. The intersection consists of eight (8) road links, of which five (5) were "Acceptable Fit" while three (3) links were "Acceptable." Among eight (8) road links, three (3) road links had a reasonably free flow (Level B), and another three (3) links had stable flow (level C). The remaining two (2) were free flow (level A) with a volume capacity ratio of less than 0-0.20. The simulation's validity greatly depends on the level of GEH Statistics; as per the condition of the Validation Process provided by the LocalSim, the model is accepted and validated if the calculated GEH of all movements is less than or equal to 5. Therefore, Day 1 morning is considered acceptable for having all eight (8) links regarded as an acceptable validation remark.The Station IIIshows the intersection of Arayat, Magalang, and Brgy. Gatiawin, and Brgy. Lacmit consisted of eight(8) lanes, 2 lanes per direction. Among the eight (8) lanes' GEH statistics, seven (7) links fell under the "Acceptable Fit" guidance, while the remaining one (1) link, the link "In Magalang," was just acceptable, having a GEH statistic of 3.24 which is <3.0. Meanwhile, for the LOS of eight (8) road links, two (2) of them were categorized as free flow (level A), having a LOS mark range of 0-0.20, whereas three (3) are only stable flow (level C) indicating a range of LOS mark of 0.51-0.70, and three (3) links with a reasonably free flow (level B), having a range of 0.21-0.50. Thus, from the GEH statistics, the validated values indicate that the simulation results from the LocalSim software simulation are considered acceptable, with all the GEH statistics' eight (8) links having a validated mark of acceptable with all the links. Consequently, the morning of the first day

of the station is deemed to be acceptable.At the Station III on Monday morning, there are six lanes, each accommodating two lanes per direction. The provided table showcases both GEH Statistics and Level of Service (LOS) validation values. Out of the six lanes' GEH statistics, five links adhered to the "Acceptable Fit" criteria, while one link, denoted as "In Mexico," fell just within the acceptable range with a GEH statistic of 3.21, slightly above the 3.0 threshold. In terms of LOS, four (4) of the six-road links are classified as reasonable free flow (level B), whereas two indicate stable flow (level C). Overall, the simulation results from the LocalSim software are deemed acceptable, with all six (6) links meeting the validation criteria.

TABLE XVI
LOCALSIM EVALUATION RESULT FOR TUESDAY MORNING WITH BIKE LANES

JANUARY 23, 2024 (TUESDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	3.11	Acceptable	A
OutSta.Ana	1.76	Acceptable Fit	B
InSta.Ana	2.95	Acceptable Fit	B
OutArayat	4.02	Acceptable	C
InArayat	0.33	Acceptable Fit	B
OutMagalang	1.45	Acceptable Fit	B
InMagalang	1.04	Acceptable Fit	C
Calle-Onse	1.6	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.25	Acceptable Fit	B
InArayat	2.4	Acceptable Fit	B
InMagalang	2.35	Acceptable Fit	B
OutMagalang	1.12	Acceptable Fit	B
OutLacmit	0.49	Acceptable Fit	A
InLacmit	2.08	Acceptable Fit	A
InGatiawin	1.29	Acceptable Fit	A
OutGatiawin	3.14	Acceptable	A
INTERSECTION III			
OutArayat	3.77	Acceptable	B
InArayat	1.95	Acceptable Fit	B
InMagalang	2.65	Acceptable Fit	C
OutMagalang	1.1	Acceptable Fit	C
OutMexico	1.45	Acceptable Fit	B
InMexico	1.82	Acceptable Fit	B

The table above shows the validity level of LOS and GEH statistics for Tuesday morning in the station of Intersection I. The GEH Statistics of Tuesday morning fell under acceptable fit and acceptable; six (6) out of eight (8) road links were acceptable fit with a mark ranging from 0.33 to 2.95, and two (2) were acceptable with a mark of 3.71 and 3.97. The validity level of the presented LOS indicates that four (4) of the links were categorized as reasonably free flow (Level B). At the same time, two (2) of them were considered as free flow (Level A), and the remaining two (2) links had just stable flow (Level C). Therefore, Day 2 morning is acceptable since all the movements were less than 5. At Intersection II, the statistics inserted for the GEH formula's validation process resulted in seven (7) links having an "Acceptable Fit" marking, whereas the remaining one (1) from the link of "Out Magalang" had a score of 3.02, which falls under the "Acceptable: For Local Roadway Facilities" range of 3.0-5.0. The LOS markings for the morning part had four (4) free flow (level A) categories and another four (4) for the remaining links with the category of (level B) or links with reasonably free flow. On that account, the GEH statistics for Tuesday morning of the station, where all validated values earned an acceptable status, dictates that the simulation for this station is on an acceptable level, too. For Station III, among the GEH statistics, five (5) links received an "Acceptable Fit" marking, while the link "Out Arayat" scored 3.77, falling within the range of "Acceptable: For Local Roadway Facilities" (3.0-5.0). For LOS markings, four (4) categories were classified as reasonable free flow (level B), with the remaining two (2) links categorized as stable flow (level C). Consequently, all validated values for the GEH statistics on Tuesday morning at the station earned an acceptable status, indicating that the simulation for this station is also acceptable.

TABLE XVII
LOCALSIM EVALUATION RESULT FOR WEDNESDAY MORNING WITH BIKE LANES

JANUARY 24, 2024 (WEDNESDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.69	Acceptable Fit	A
OutSta.Ana	3.71	Acceptable	B
InSta.Ana	3.97	Acceptable	B
OutArayat	0.88	Acceptable Fit	C
InArayat	2.23	Acceptable Fit	C
OutMagalang	1.85	Acceptable Fit	C
InMagalang	0.54	Acceptable Fit	B
Calle-Onse	0	Acceptable Fit	A
INTERSECTION II			
OutArayat	0.89	Acceptable Fit	B
InArayat	1.72	Acceptable Fit	B
InMagalang	0.59	Acceptable Fit	B
OutMagalang	1.54	Acceptable Fit	B
OutLacmit	1.42	Acceptable Fit	A
InLacmit	0.07	Acceptable Fit	A
InGatiawin	3.09	Acceptable	A
OutGatiawin	3.08	Acceptable	A
INTERSECTION III			
OutArayat	0.53	Acceptable Fit	B
InArayat	3.51	Acceptable	B
InMagalang	1.49	Acceptable Fit	C
OutMagalang	2.71	Acceptable Fit	B
OutMexico	1.52	Acceptable Fit	B
InMexico	1.59	Acceptable Fit	B

The verified information for LOS markings and GEH Statistics for Wednesday morning of Intersection I is shown in the table above. With a GEH Statistics score of less than three, six (6) road links, or the majority, were classified as "acceptable fit," whereas two (2) were deemed acceptable with scores of 3.71 and 3.97, respectively. Additionally, it was determined that three (3) linkages had LOS of reasonably free flow (level B), three (3) links had stable flow (level C), and only two (2) had free flow (level A). The simulation as a whole is deemed acceptable by the GEH Statistics validated results. In segment of Intersection II, each of the eight links was categorized as "Acceptable Fit" regarding validity, as their GEH Statistics fall within the range of >3.0. Overall, the GEH-validated statistics indicate that all results are acceptable, rendering the simulation of all eight links acceptable. Regarding the Intersection III, the GEH statistics, Wednesday morning at the station consists of five (5) links,

with the first earning an "Acceptable Fit" validation result. At the same time, the last one (1) fell within the acceptable range of 3.0-5.0. Five (5) out of six (6) links were categorized as Level B on the LOS marks, indicating reasonably free flow, whereas one (1) fell into the category of stable flow (level C). Therefore, the simulation of Wednesday morning at the station attained an acceptable status based on the GEH statistics results.

TABLE XVIII
LOCALSIM EVALUATION RESULT FOR THURSDAY MORNING WITH BIKE LANES

JANUARY 25, 2024 (THURSDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	3.26	Acceptable	A
OutSta.Ana	2.47	Acceptable Fit	B
InSta.Ana	4.85	Acceptable	B
OutArayat	2.5	Acceptable Fit	C
InArayat	3.4	Acceptable	B
OutMagalang	1.11	Acceptable Fit	B
InMagalang	2.81	Acceptable Fit	C
Calle-Onse	2.32	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.54	Acceptable Fit	B
InArayat	2.16	Acceptable Fit	C
InMagalang	2.02	Acceptable Fit	B
OutMagalang	0.55	Acceptable Fit	C
OutLacmit	2.29	Acceptable Fit	A
InLacmit	2.07	Acceptable Fit	A
InGatiawin	0.18	Acceptable Fit	A
OutGatiawin	1.52	Acceptable Fit	A
INTERSECTION III			
OutArayat	2.82	Acceptable Fit	B
InArayat	0.8	Acceptable Fit	B
InMagalang	2.9	Acceptable Fit	C
OutMagalang	2.32	Acceptable Fit	C
OutMexico	1.49	Acceptable Fit	B
InMexico	3.29	Acceptable	B

From the values in the table above, the GEH Statistics showed that Thursday morning is generally acceptable. Of the eight (8) links at the Arayat, Magalang, and Sta. Ana junction, five (5) had acceptable fits with scores ranging from 1.11 to 2.81, while the other three (3) had just acceptable status with scores of 3.26, 3.4, and 4.85. With a mark of 0.43 and 0.49, the LOS of the specified period was seen as having a reasonably free flow (level B) for the four (4) links of the station. The remaining two (2) linkages were viewed as free flow (level A) except for another two (2) linkages, which were considered to have stable flow (level C). Therefore, Thursday morning is acceptable based on the displayed GEH Statistics data. For Intersection II, results show that the majority (6) of the links, which are the InArayat, InMagalang, OutMagalang, OutLacmit, InLacmit, InGatiawin, and OutGatiawin were "Acceptable fit" on the level of validity as their respective GEH Statistic. Meanwhile, the remaining (2) were considered "Acceptable" as their GEH Statistic exceeded the range to be considered "Acceptable". The GEH statistics data includes six (6) links representing intersection III. On the morning of Thursday, all links in the station scored less than 3.0, indicating that five (5) out of six (6) links are deemed "Acceptable Fit." One (1) link scored 3.29, slightly higher than 3.0 which made it an acceptable remark. Regarding LOS marks, the station had two (2) categories: Level B for Out Arayat, In Arayat, Out Mexico, In Mexico links, and Level C for In Magalang & Out Magalang links. Overall, the validated results of GEH statistics suggest that the station simulation on Thursday morning is acceptable.

TABLE XIX
LOCALSIM EVALUATION RESULT FOR FRIDAY MORNING WITH BIKE LANES

JANUARY 26, 2024 (FRIDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	2.02	Acceptable Fit	A
OutSta.Ana	3.06	Acceptable	B
InSta.Ana	4.58	Acceptable	C
OutArayat	3.99	Acceptable	C
InArayat	3.51	Acceptable	C
OutMagalang	2.8	Acceptable Fit	C
InMagalang	2.17	Acceptable Fit	C
Calle-Onse	1.69	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.45	Acceptable Fit	B
InArayat	2.87	Acceptable Fit	C
InMagalang	0.37	Acceptable Fit	B
OutMagalang	2.61	Acceptable Fit	C
OutLacmit	1.95	Acceptable Fit	A
InLacmit	1.28	Acceptable Fit	A
InGatiawin	1.22	Acceptable Fit	A
OutGatiawin	1.02	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.49	Acceptable Fit	B
InArayat	3.14	Acceptable Fit	B
InMagalang	0.64	Acceptable Fit	C
OutMagalang	0.24	Acceptable Fit	C
OutMexico	3.73	Acceptable Fit	B
InMexico	1.56	Acceptable Fit	B

The table above illustrates the result of GEH Statistics and LOS of each link for Friday morning at the Intersection I station. The GEH statistics of the simulation projected great results, in which four (4) of the eight (8) links were considered to be acceptable fit with a mark less than 3.0, while the remaining four (4) links were marked under the range of 3 to 5, which makes them acceptable. The LOS of the links generally fell under the state of stable flow, with five (5) links having their mark ranging from 0.52 to 0.68, two (2) links having free flow, and the final link considered as reasonable free flow with a mark of 0.49. The GEH Statistics for Friday morning projected an acceptable result for its simulation. For Station II, the validation results of all eight (8) road links for the station's Friday morning were in the "Acceptable Fit" category. To boot, the LOS marks' validated results had level B category for Out Arayat & In Magalang (0.21- 0.50), whereas the links of In Arayat & Out Magalang got a range of 0.51-0.70 (stable flow). The last four (4) links were all in the same category, Level A, with values amounts ranging from 0 to 0.20. To conclude, based on the GEH statistics and validated results, the LocalSim simulation of Intersection II on Friday morning is regarded to be acceptable. In Station III, the GEH statistics reveal that all six (6) road links for Mexico on Friday morning were classified in the "Acceptable Fit"

category, indicating satisfactory performance. Furthermore, the LOS marks' validated results showed four (4) level B categories for its links, indicating reasonable free flow within the range of 0.21-0.50, whereas two (2) were classified as stable flow with a range of 0.51 - 0.70. Based on the validated GEH statistics results, the LocalSim simulation on Friday morning is deemed acceptable, suggesting smooth traffic flow and efficient operation of the intersection.

TABLE XX
LOCALSIM EVALUATION RESULT FOR SATURDAY MORNING WITH BIKE LANES

JANUARY 27, 2024 (SATURDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.16	Acceptable Fit	A
OutSta.Ana	2.09	Acceptable Fit	C
InSta.Ana	3.08	Acceptable	C
OutArayat	2.11	Acceptable Fit	C
InArayat	3.13	Acceptable	C
OutMagalang	3.98	Acceptable	D
InMagalang	2.28	Acceptable Fit	C
Calle-Onse	2.01	Acceptable Fit	A
INTERSECTION II			
OutArayat	3.44	Acceptable	C
InArayat	0.26	Acceptable Fit	C
InMagalang	4.42	Acceptable	C
OutMagalang	1.36	Acceptable Fit	C
OutLacmit	0	Acceptable Fit	A
InLacmit	2.91	Acceptable Fit	A
InGatiawin	0.62	Acceptable Fit	A
OutGatiawin	0.8	Acceptable	A
INTERSECTION III			
OutArayat	3.67	Acceptable	B
InArayat	2.36	Acceptable Fit	B
InMagalang	1.85	Acceptable Fit	B
OutMagalang	2.65	Acceptable Fit	C
OutMexico	2.93	Acceptable Fit	B
InMexico	3.28	Acceptable	B

Listed above is Table XX, indicating the validated data for GEH statistics and LOS marks. Starting with the GEH statistics validation results, the eight (8) links of the intersection consisted of five (5) "Acceptable Fit" statuses and one (3) "Acceptable" status ranging from 3.0-5.0 according to the GEH Statistic table guide. In line with this, their Level of Service (LOS) marks consist of two (2) level A (0-0.20), one (1) level D (0.71- 0.85), and five (5) level C or stable flow category with a range of 0.51 to 0.70. Weighing the validated results from the GEH statistics, it can be concluded that the simulation for this station is acceptable due to the presence of five (5) links with the "Acceptable Fit" category and three (3) links with the "Acceptable" category GEH statistic results.The presented data above features the validated results for GEH statistics and LOS marks. Divulging first the GEH statistics, six (6) out of eight (8) links scored <3.0, deeming them to be an "Acceptable Fit" category, while the links of Out Arayat & In Magalang both had values that ranged from 3.0 to 5.0 which is an "Acceptable" category on GEH guide table. The rest of the eight (8) links for the LOS mark's validation only had two categories, and those are level C (stable flow), which ranges from 0.51 to 0.70 for the first four (4) initial links, and level A (free flow) for the last four (4) links (0 to 0.20). With the basis of the GEH statistics validated results, the simulation for the links of Intersection II Saturday morning is considered to be acceptable. For Intersection III, beginning with the GEH statistics, four (4) out of six (6) links scored below 3.0, categorizing them as "Acceptable Fit," while the links of Out Arayat & In Mexico fell within the 3.0 to 5.0 range, classifying them as "Acceptable" according to the GEH guide table. Additionally, the validation of LOS marks for the six (6) links resulted in two categories: level C (stable flow) for the Out Magalang link, with a range from 0.51 to 0.70, and level B (reasonably free flow) for the remaining five (5) links, with a range from 0.21 to 0.50. Considering the GEH statistics' validated results, the simulation for the stations' links on Saturday morning is considered acceptable.

TABLE XXI
LOCALSIM EVALUATION RESULT FOR SUNDAY MORNING WITH BIKE LANES

JANUARY 28, 2024 (SUNDAY) (MORNING) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.16	Acceptable Fit	A
OutSta.Ana	2.09	Acceptable Fit	C
InSta.Ana	3.08	Acceptable	C
OutArayat	2.11	Acceptable Fit	C
InArayat	3.13	Acceptable	C
OutMagalang	3.98	Acceptable	D
InMagalang	2.28	Acceptable Fit	C
Calle-Onse	2.01	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.13	Acceptable Fit	C
InArayat	1.59	Acceptable Fit	C
InMagalang	1.35	Acceptable Fit	C
OutMagalang	0.03	Acceptable Fit	C
OutLacmit	1.21	Acceptable Fit	A
InLacmit	2.35	Acceptable Fit	A
InGatiawin	1.31	Acceptable Fit	A
OutGatiawin	0.83	Acceptable Fit	A
INTERSECTION III			
OutArayat	0.93	Acceptable Fit	B
InArayat	0.14	Acceptable Fit	B
InMagalang	0.69	Acceptable Fit	B
OutMagalang	0.14	Acceptable Fit	B
OutMexico	0.5	Acceptable Fit	B
InMexico	0.22	Acceptable Fit	B

The table illustrates the validation outcomes derived from the GEH formula and Level of Service (LOS) assessments. Regarding the GEH statistics, the validation outcomes for all eight (8) road links at the station on Sunday morning were categorized into two (2) groups: six (6) links fell under the "Acceptable Fit" category, and the remaining four (2) links were deemed "Acceptable." Conversely, the LOS mark validation for the same eight (8) links was characterized by three categories: level C (stable flow) encompassed the five (5) links, level A (free flow) applied to two (2) links (0 to 0.20), and level D (approaching unstable flow) was attributed to the remaining one (1) link. Based on the GEH statistics validation outcomes, the simulation for the links at intersection on Saturday morning was deemed acceptable. It also displays the validated values for the GEH statistics and LOS marks. In the GEH statistics' validated results, no one exceeded the <3.0 threshold, which equated to all of the values being of "Acceptable Fit" status. On the part of LOS

marks, four (4) road links were classified to be of stable flow (level C) with their values of 0.51- 0.70, and the other four (4) links were deemed as free flow (level A) with their range values from 0 to 0.20. This means that the GEH statistics result in an acceptable classification, as well as the simulation principle. For Intersection III, the validated GEH statistics, six (6) out of (6) links fell within the less than 3.0 threshold, indicating they fall within the "Acceptable Fit" category. As for the LOS marks, all of the six (6) road links were identified as experiencing reasonably free flow (level B), with values ranging from 0.21 to 0.50. This underscores that the GEH statistics yield an acceptable classification, aligning with the simulation principle

TABLE XXII
LOCALSIM EVALUATION RESULT FOR MONDAY AFTERNOON WITH BIKE LANES

JANUARY 22, 2024 (MONDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.94	Acceptable Fit	A
OutSta.Ana	2.91	Acceptable Fit	B
InSta.Ana	1.89	Acceptable Fit	C
OutArayat	0.89	Acceptable Fit	B
InArayat	3.97	Acceptable	B
OutMagalang	0.42	Acceptable Fit	C
InMagalang	1.58	Acceptable Fit	B
Calle-Onse	1.36	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.68	Acceptable Fit	C
InArayat	2.67	Acceptable Fit	C
InMagalang	1.79	Acceptable Fit	C
OutMagalang	1.31	Acceptable Fit	C
OutLacmit	1.46	Acceptable Fit	A
InLacmit	0.27	Acceptable Fit	B
InGatiawin	2.75	Acceptable Fit	A
OutGatiawin	2.91	Acceptable Fit	A
INTERSECTION III			
OutArayat	2.42	Acceptable Fit	B
InArayat	1.45	Acceptable Fit	B
InMagalang	1.73	Acceptable Fit	C
OutMagalang	2.66	Acceptable Fit	B
OutMexico	0.19	Acceptable Fit	B
InMexico	3.94	Acceptable	B

For the part of the afternoon, the table above sorts out the validated values in terms of GEH statistics and LOS marks. For the GEH statistics part, six (6) of the links were categorized as “Acceptable Fit,” while two (2) links had only the “Acceptable” status with values that ranged from 3.0 to 5.0. For the LOS marks, two (2) links had scores ranging from 0-0.20, earning them a “free flow” (level A) category, and where two (2) more links had a score ranging from 0.21-0.50, making them level B (reasonably free flow) status. Additionally, four (4) links scored higher than the prior two links, with their validated values ranging from 0.51-0.70, making them a stable flow (level C) category. All the GEHstatistics validated results were deemed acceptable; thus, the whole simulation for the eight(8) links are acceptable.For Intersection II, the table above shows the GEH Statistics and Level of Service (LOS) validated values. In the portion of GEH statistics, eight (8) road links were considered as well, with all of them scoring below 3.0 statistics, which meansthat they are all "Acceptable Fit," according to the GEH table guide. For the LOS validation, three (3) scored 0-0.20, which means that the links were in the free flow (level A) category, while the other four (4) had scores ranging from 0.51-0.7 which categorizes these four links: Out Arayat, In Arayat, In Magalang, and Out Magalang, with stable flow links. The remaining one (1) link had a category of reasonably free flow (level B), specifically the In Lacmit link. Therefore, the Monday afternoon of the station is acceptable, with its simulation-validated results earning an acceptable status.On Intersection III, among the six (6) lanes' GEH statistics, five (5) links meet the "Acceptable Fit" criteria, while one (1) link, identified as "In Mexico," is just within the acceptable range with a GEH statistic of 3.94 (between 3.0 - 5.0). Regarding LOS, five (5) road links are categorized as reasonable free flow (level B), while one(1) indicates stable flow (level C). Overall, the simulation results from the LocalSim software are considered acceptable, as all six (6) links meet the validation criteria. Consequently, the afternoon of the first day at the station is acceptable.

TABLE XXIII
LOCALSIM EVALUATION RESULT FOR TUESDAY AFTERNOON WITH BIKE LANES

JANUARY 23, 2024 (TUESDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	4.20	Acceptable	A
OutSta.Ana	0.33	Acceptable Fit	B
InSta.Ana	2.15	Acceptable Fit	B
OutArayat	4.14	Acceptable	B
InArayat	3.19	Acceptable	B
OutMagalang	2.98	Acceptable Fit	B
InMagalang	3.48	Acceptable	B
Calle-Onse	1.84	Acceptable Fit	A
INTERSECTION II			
OutArayat	1.08	Acceptable Fit	B
InArayat	3.97	Acceptable	B
InMagalang	3.34	Acceptable	B
OutMagalang	3.09	Acceptable	B
OutLacmit	2.13	Acceptable Fit	A
InLacmit	2.12	Acceptable Fit	A
InGatiawin	0.54	Acceptable Fit	A
OutGatiawin	0.44	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.1	Acceptable Fit	B
InArayat	2.51	Acceptable Fit	B
InMagalang	0.98	Acceptable Fit	B
OutMagalang	3.62	Acceptable	B
OutMexico	0.2	Acceptable Fit	B
InMexico	4.17	Acceptable	A

The table displays the validity level of the LOS and GEH Statistics. According to the afternoon's GEH Statistics, four (4) of the links were an acceptable fit, and the other half (4) were of acceptable status. With a mark ranging from 0.21 to 0.50, the LOS for the six (6) links between the initial and last links was categorized as reasonably free flow or level B. The initial and last two (2) links were regarded as free flow, with marks ranging from 0 to 0.20. In conclusion, the link of In-Arayat had a sufficiently free flow level of service. In contrast, the validation of Day 2 afternoon regarding GEH statistics was deemed acceptable due to its mark of below 5.0

validated values. For Intersection II, eight (8) links represented Intersection II, and five (5) had GEH-validated statistics of less than 3.0 values. In comparison, the other three (3) links, In Arayat, In Magalang, and Out Lacmit, had ratings of 3.0-5.0, classified as acceptable. In the LOS marks, the initial four (4) links from the table had a range score of 0.21-0.50, which means that they were of reasonable free flow (level B) category. The other four (4) links fell into the category of Level A, which means that their Traffic Volume-Capacity ratio ranges from 0-0.20, which is considered to be free flow. In short, the Tuesday afternoon part of the LocalSim simulation, where all its GEH statistics were of acceptable values, is regarded to be acceptable.At the Station III, six (6) links were analyzed, with four (4) links having GEH-validated statistics below 3.0. On the other hand, the remaining two (2) links, "In Mexico" and "Out Magalang," fell within the acceptable range of 3.0 - 5.0. Regarding LOS marks, the first five (5) links had a range score of 0.21-0.50, indicating reasonable free flow (level B), while the other one (1) link fell into the Level A category, representing free flow with a Traffic Volume-Capacity ratio ranging from 0-0.20. In summary, the Tuesday afternoon part of the LocalSim simulation, where all GEH statistics were acceptable, is considered acceptable overall.

TABLE XXIV
LOCALSIM EVALUATION RESULT FOR WEDNESDAY AFTERNOON WITH BIKE LANES

JANUARY 24, 2024 (WEDNESDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.04	Acceptable Fit	A
OutSta.Ana	0.75	Acceptable Fit	B
InSta.Ana	0.62	Acceptable Fit	B
OutArayat	3.13	Acceptable	C
InArayat	2.65	Acceptable Fit	B
OutMagalang	0.66	Acceptable Fit	C
InMagalang	0.62	Acceptable Fit	C
Calle-Onse	2.75	Acceptable Fit	A
INTERSECTION II			
OutArayat	0.08	Acceptable Fit	B
InArayat	0.44	Acceptable Fit	B
InMagalang	0.65	Acceptable Fit	B
OutMagalang	0.36	Acceptable Fit	B
OutLacmit	0.51	Acceptable Fit	A
InLacmit	1.91	Acceptable Fit	A
InGatiawin	0.86	Acceptable Fit	A
OutGatiawin	0.27	Acceptable Fit	A
INTERSECTION III			
OutArayat	0.92	Acceptable Fit	B
InArayat	2.82	Acceptable Fit	B
InMagalang	1.64	Acceptable Fit	C
OutMagalang	2.07	Acceptable Fit	B
OutMexico	0.96	Acceptable Fit	B
InMexico	0.51	Acceptable Fit	B

The LOS and GEH statistics for the afternoon of Wednesday are displayed in the table. With a GEH value ranging from 0.62 to 2.75, all eight (8) links were categorized as acceptable fits, indicating a significant improvement in the GEH statistics. The link score (LOS) was the same as it was on Day 3 morning: three (3) links were deemed to be reasonably free flow (Level B), with a score between 0.44 and 0.47; three (3) links were deemed to have stable flow (Level C), with a score between 0.53 and 0.63; and two (2) links were deemed to be free flow (Level A), with a score between 0.08 and 0.13. This demonstrates that the afternoon simulation on Day 3 is regarded as acceptable. For Intersection II, exhibits the rest of the eight (8) links' validated values for GEH statistics and LOS marks. For Intersection II, the road links' displayed values for GEH statistics indicate that the rest of the eight (8) links were classified as an "Acceptable Fit" according to the GEH table guide and based on the values that range less than 3.0 in all links. Moreover, on the part of the Level of Service, the primary four (4) links, having a validated LOS mark of 0.21-0.50 markings, were categorized to be reasonably free flow (level B). The remaining four (4) links got a category of free flow (level A) based on their values ranging from 0-0.20. To sum up, the rest of the links in Intersection II were of "Acceptable Fit" status, making the simulation of the rest of the links acceptable.

For Intersection III, three (3) links were classified as "Acceptable Fit," while the remaining three (3) links are "Acceptable." For the level of service, five (5) of them fall under Level B since their validated values ranged from 0.21-0.50. While the remaining one (1) link of "Out Magalang" had a Level of C where the values ranged from 0.51-0.70. To conclude, the GEH statistics are all "Acceptable" remarks. The simulation of the Wednesday afternoon station is acceptable.

TABLE XXV
LOCALSIM EVALUATION RESULT FOR THURSDAY AFTERNOON WITH BIKE LANES

JANUARY 25, 2024 (THURSDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.77	Acceptable Fit	A
OutSta.Ana	3.77	Acceptable	C
InSta.Ana	3.63	Acceptable	B
OutArayat	3.38	Acceptable	B
InArayat	1.17	Acceptable Fit	C
OutMagalang	3.81	Acceptable	C
InMagalang	0.37	Acceptable Fit	C
Calle-Onse	0.62	Acceptable Fit	A
INTERSECTION II			
OutArayat	3.4	Acceptable	B
InArayat	0.73	Acceptable Fit	B
InMagalang	2.16	Acceptable Fit	B
OutMagalang	1.4	Acceptable Fit	B
OutLacmit	0.15	Acceptable Fit	A
InLacmit	1.01	Acceptable Fit	A
InGatiawin	1.58	Acceptable Fit	A
OutGatiawin	0.97	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.96	Acceptable Fit	B
InArayat	2.44	Acceptable Fit	B
InMagalang	2.1	Acceptable Fit	B
OutMagalang	3.69	Acceptable	B
OutMexico	1.35	Acceptable Fit	B
InMexico	3.66	Acceptable	B

The table above illustrates the validity level of GEH Statistics and LOS for Thursday afternoon. Half of the eight (8) links of the intersection of Arayat, Magalang, and Sta. Ana were categorized as an acceptable fit as their marks were acceptable with their GEH Statistics marks ranging from 0.37

to 1.17. The GEH Statistics of the remaining four (4) links ranged from 3.38 to 3.81, which fell under the acceptable category. On the other hand, the LOS of the links generally became stable flow (Level C); four (4) of the links fell under this category, and two (2) of them were reasonably stable (Level B) with marks of 0.47 and 0.48. In contrast, the remaining two (2) links were considered free flow (Level A) with a mark ranging from 0 to 0.20. The simulation of the intersection of this station for Thursday afternoon is considered acceptable because GEH Statistics categorized all its links as acceptable fit.From the values presented in the table above, the GEH statistics represent the data gathered and validated and the LOS mark from the LocalSim software. Of the eight (8) links representing the lanes of Intersection II, seven (7) of them got an "Acceptable" fit score from the GEH table guide of less than 3.0 value. The remaining link of "Out Arayat" had a GEH statistic of 3.4 which indicates that it is acceptable as well. On the other note, the LOS mark of eight (8) links were also validated, with four (4) of the links earning a category of free flow (level A) with their value ranging from 0-0.20 and the other (4) with values ranging from 0.21-0.50 making their category as reasonably free flow. All in all, for Thursday afternoon of Intersection II, the station's simulation is considered acceptable, with all its links having an acceptable validation result. In Intersection III, four (4) out of six (6) links representing the lanes of the station received an "Acceptable Fit" score from the GEH table guide, with values below 3.0. Additionally, "Out Magalang" had a GEH statistic of 3.69, and "In Mexico" had a GEH statistic of 3.66, both deemed acceptable. Moreover, all six (6) links earned a category of level B for LOS marks, with values ranging from 0.21 - 0.50, indicating reasonable free flow. Overall, the simulation is considered acceptable for Thursday afternoon at the station, with all links having an acceptable validation result.

TABLE XXVI
LOCALSIM EVALUATION RESULT FOR FRIDAY AFTERNOON WITH BIKE LANES

JANUARY 26, 2024 (FRIDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	0.83	Acceptable Fit	A
OutSta.Ana	0.57	Acceptable Fit	C
InSta.Ana	2.38	Acceptable Fit	C
OutArayat	1.52	Acceptable Fit	C
InArayat	2.08	Acceptable Fit	C
OutMagalang	2.01	Acceptable Fit	C
InMagalang	0.92	Acceptable Fit	C
Calle-Onse	0.16	Acceptable Fit	A
INTERSECTION II			
OutArayat	2.6	Acceptable Fit	D
InArayat	0.18	Acceptable Fit	D
InMagalang	1.19	Acceptable Fit	D
OutMagalang	1.04	Acceptable Fit	D
OutLacmit	0.11	Acceptable Fit	B
InLacmit	2.51	Acceptable Fit	B
InGatiawin	2.15	Acceptable Fit	A
OutGatiawin	0.07	Acceptable Fit	A
INTERSECTION III			
OutArayat	0	Acceptable Fit	B
InArayat	1.28	Acceptable Fit	B
InMagalang	0.07	Acceptable Fit	B
OutMagalang	3.05	Acceptable	C
OutMexico	0.79	Acceptable Fit	B
InMexico	1.32	Acceptable Fit	B

The traffic flow of Intersection I on Friday afternoon showed significant improvement, and all eight (8) road links were regarded as an acceptable fit, as their GEH Statistics indicated less than 3. The majority of the junction's links, or six (6) of them, were classified as stable flow (LOS rating C), while two (2) of them were free flow (LOS rating A). Along with having LOS of stable flow, the interpreted category of the simulation is also acceptable due to all eight (8) links having generally acceptable status. For Intersection II, With the GEH statistics for this station, eight (8) road links were taken into consideration as they are intersections, and all of the links had a result of less than 3.0 using the GEH formula. This means that all links are in the "Acceptable Fit" category. Meanwhile, for the segment of LOS marks, the first four (4) links fell under the category of Level D, which means that the links are approaching unstable flow. The following two (2) links were categorized as reasonably free flow (Level B), while the last two (2) categories were Level A (free flow). Overall, since none of the GEH-validated values exceeded the 3.0 threshold, the simulation is deemed to be acceptable. Considering the GEH statistics for Intersection III, six (6) road links were evaluated, with five (5) out of six (6) links scoring below 3.0 using the GEH formula, placing them in the "Acceptable Fit" category. Regarding LOS marks, five (5) links were classified as Level B, indicating they are of reasonable free flow, while the "Out Magalang" link was categorized as stable flow (Level C). Overall, the simulation is considered acceptable since most GEH-validated values fell below the 3.0 threshold.

TABLE XXVII
LOCALSIM EVALUATION RESULT FOR SATURDAY AFTERNOON WITH BIKE LANES

JANUARY 27, 2024 (SATURDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	1.57	Acceptable Fit	A
OutSta.Ana	2.80	Acceptable Fit	C
InSta.Ana	2.05	Acceptable Fit	C
OutArayat	3.31	Acceptable	C
InArayat	2.75	Acceptable Fit	C
OutMagalang	0.30	Acceptable Fit	D
InMagalang	1.25	Acceptable Fit	C
Calle-Onse	0.35	Acceptable Fit	A
INTERSECTION II			
OutArayat	3.3	Acceptable	D
InArayat	1.32	Acceptable Fit	D
InMagalang	2.19	Acceptable Fit	D
OutMagalang	0.73	Acceptable Fit	D
OutLacmit	1.24	Acceptable Fit	B
InLacmit	0.66	Acceptable Fit	B
InGatiawin	2.15	Acceptable Fit	A
OutGatiawin	2.72	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.33	Acceptable Fit	B
InArayat	0.17	Acceptable Fit	B
InMagalang	0.93	Acceptable Fit	B
OutMagalang	1.46	Acceptable Fit	C

OutMexico	1.05	Acceptable Fit	B
InMexico	0.54	Acceptable Fit	B

The table above showcases the validation values of the GEH statistics and LOS marks. The GEH-validated statistics consisted of seven (7) road links with "Acceptable Fit" status, whereas the other one (1) link of Out Arayat was regarded to be "Acceptable" only. Further, for validated LOS marks, the links of In Palengke & Cale- onse both had values ranging from 0-0.20, considered level A, while the Out Magalang is the sole link with level D remark (0.71-0.85). In addition, the other five (5) road links were categorized as level C (stable flow) because of their validated values ranging from 0.51-0.70. Overall, the validated values of GEH statistics show that the station simulation is deemed acceptable based on the computed data from the GEH formula. For Intersection II, the GEH statistics' validated results for eight (8) links had seven (7) "Acceptable Fit" statuses and one (1) "Acceptable" status scoring 3.3, which fell under the category of "Acceptable: For Local Roadway Facilities" (3.0 - 5.0) and is the link of "Out Arayat." The LOS marks validation results consisted of three categories: two (2) Level A (free flow), two (2) Level B (reasonably free flow), and four (4) Level D (approaching unstable flow). From the validated values of GEH statistics, the rest of the eight (8) links for the simulation of the Saturday afternoon at Intersection II are considered acceptable.The validated results for Intersection III GEH statistics indicate that all six (6) links fall within the "Acceptable Fit" category. Regarding LOS marks validation results, there were two (2) categories: five (5) links classified as Level B (reasonably free flow), and one (1) link categorized as Level C (stable flow). Based on the validated values of GEH statistics, this implies an acceptable classification for the results, aligning with the simulation principle.

TABLE XXVIII
LOCALSIM EVALUATION RESULT FOR SUNDAY AFTERNOON WITH BIKE LANES

JANUARY 28, 2024 (SUNDAY) (AFTERNOON) With Bike Lane			
Link Name	GEH Statistics	Level of Validity	Level of Service
INTERSECTION I			
InPalengeke	3.33	Acceptable	A
OutSta.Ana	4.54	Acceptable	B
InSta.Ana	3.73	Acceptable	C
OutArayat	2.41	Acceptable Fit	D
InArayat	2.22	Acceptable Fit	D
OutMagalang	1.54	Acceptable Fit	D
InMagalang	3.27	Acceptable	C
Calle-Onse	3.53	Acceptable	A
INTERSECTION II			
OutArayat	0.75	Acceptable Fit	E
InArayat	2	Acceptable Fit	D
InMagalang	3.04	Acceptable	D
OutMagalang	0.34	Acceptable Fit	D
OutLacmit	0.77	Acceptable Fit	B
InLacmit	0.49	Acceptable Fit	B
InGatiawin	1.6	Acceptable Fit	A
OutGatiawin	0.86	Acceptable Fit	A
INTERSECTION III			
OutArayat	1.17	Acceptable Fit	B
InArayat	0	Acceptable Fit	B
InMagalang	1.04	Acceptable Fit	B
OutMagalang	1.62	Acceptable Fit	C
OutMexico	1.65	Acceptable Fit	B
InMexico	1.22	Acceptable Fit	B

In the afternoon session of IntersectionI station on Sundaypresents the GEH statistics and LOS marks from the simulated results. For the GEH statistics, eight (8) road links were assessed, considering the intersection's layout, with eight (8) links showing a result of less than 5.0, indicating their statuses as three (3) "Acceptable Fit" and five (5) "Acceptable" according to the GEH formula. Regarding the LOS marks, out of the eight (8) links, two (2) were categorized as Level C, indicating speeds near free flow. The following two (2) links were classified as Level A (free flow), while the final four (4) links were divided, with one (1) classified as Level B (reasonably free flow) and the other three (3) links as Level D (approaching unstable flow). In conclusion, based on the results of the GEH-validated values, the simulation was considered acceptable. For the segment of Intersection II. The majority, comprising seven links, had a validity level of "Acceptable Fit" because their respective GEH statistics fell within the range of >3.0. However, the OutMagalang Link, despite its GEH Statistic of 4.12 exceeding 3.0, was labeled as "Acceptable." Nevertheless, the overall results are deemed acceptable. Meanwhile Intersection III, with all six (6) road links at the Mexico station falling within the "Acceptable Fit" category on Sunday afternoon. Additionally, the validated results for LOS marks indicate that five (5) links are categorized as level B, signifying reasonably free flow within the range of 0.21 to 0.50. However, the "Out Magalang" link approached the level C category, indicating stable flow ranging from 0.51 to 0.70. In conclusion, based on the validated GEH statistics results, the station simulation on Friday morning is deemed acceptable according to the LocalSim software outcomes.

IV. SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

A. Summary of Findings (Survey & Interview)

In this study, researchers utilized the descriptive quantitative method in gathering information related to bicycle accidents in the study area, Arayat, Pampanga. The employed research instrument was a survey questionnaire, and it was used in the determination process of bike exposure of the respondents and the causality of bike crashes, which generates what happened during the cycling accident in the study area. Additionally, structured interviews were conducted with the residents to obtain their opinions about bike-related accident occurrences such as bike-to-pedestrian accidents or bike to vehicle collisions and many more. The use of such methods gave tremendous insight into what the current riding experience using bikes is like in Arayat and the safety concerns that tag along with it.

The results of the study conducted in Arayat, Pampanga, show that the researchers had a lot of useful information to share with local riders. Their poll, which found that most bike owners were young men between the ages of 16 and 20, offered important insights into the demographics, riding habits, and safety concerns around bicycles in the area. The

researchers discussed important information about how they ride and their safety issues. Moreover, the respondents were mostly from towns around Pampanga province and nearby provinces which indicated a broad regional interest in cycling. Another important point noted by researchers was the evolving nature of cycling habits such that many riders engaged in cycling for leisure purposes rather than simply using them for the transportation of goods or doing errands. Meanwhile, the divergent experiences within this community were evident through respondents' variations in preferred routes, satisfaction levels, and perceptions about safety. Many expressed concerns about unsafe bike lanes revealing an urgent demand for improved infrastructural facilities. Consequently, via mapping respondents' preferred routes researchers have been able to acquire a detailed knowledge about roadways commonly used by cyclists. Researchers stressed that to improve cycling safety and community involvement, it is imperative to solve limiting infrastructure issues, particularly the gaps in bikeways. Furthermore, their thorough analysis of bicycle crash data produced important new insights into the number, location, temporal patterns, and causes of accidents, highlighting the need for focused efforts to lower risks and enhance road networks for cyclist safety. Researchers emphasized the urgent need to address limiting infrastructure difficulties, notably the gaps in bikeways, to increase cycling safety and community involvement. In addition, their comprehensive examination of bicycle crash data yielded significant new insights into accident frequency, site selection, temporal patterns, and causes, underscoring the necessity of concentrated efforts to reduce risks and improve road networks for the safety of cyclists.

Furthermore, researchers emphasized the significance of individuals' attitudes in addressing concerns around safety. When it comes to improving the health and safety of bikers, the researchers emphasized the need to collaborate on projects and initiatives, such as the construction of bike lanes. Locals suggested that implementing bike lanes will strengthen cycling safety in Arayat, eventually increasing cycling's popularity and the safety of cyclists in the area. These findings helped the researchers fully understand the safety concerns of cycling in Arayat. This research gives policymakers in Arayat, Pampanga, solid evidence to build plans to improve safety and road infrastructure, aligning active transportation.

B. Summary of Findings (Simulation)

The software LocalSim was used by the researchers since its features provide important data in generating quantities using the collected traffic data for morning and afternoon in seven successive days. Moreover, the researchers primarily focused on three junctions under their study area, where they collected traffic data on seven consecutive days, considering the morning and afternoon portions per day. The gathered data was put into a table and analyzed thoroughly. To uphold the accuracy and reliability of the results, researchers validated the data using known transportation standards such as the Level of Service (LOS) table and the GEH statistic guide table for well-grounded interpretations. This approach assisted the researchers in making their study's conclusion concrete and valid.

Intersection I:

The findings at the station of Intersection I, particularly the simulations with no bike lane, illustrated that across all the eight linkages and on seven different consecutive days (both morning and afternoon), 79 of the linkages were classified as "Acceptable Fit" and 33 links of the 112 links were of "Acceptable" classification based on the GEH statistics from Tables 3.10 - 3.23. This would mean that there were zero instances in which a particular "link" was classified as "Unacceptable," as all the GEH statistics fell within the categories of "Acceptable Fit" or "Acceptable." Thus, the proponents concluded that the first junction without a bike lane gained an acceptable validation remark based on these results. Furthermore, at the same station but with bike lanes, the station gathered 76 of its 112 links to have an "Acceptable Fit" status, while the remaining 36 links were "Acceptable." From Tables 3.24-3.37, no indication or value fell into the category of an "Unacceptable" remark, which means that the Intersection I station with bike lanes was Acceptable from its GEH statistics validated results. On the other note, when the same intersection was analyzed with designated lanes for bicycles, the study found that out of 112 links, 76 were categorized as "Acceptable Fit," and the remaining 36 links were classified as "Acceptable." The analysis process for this was based on data from Tables 3.24 to 3.37. Coincidentally, with Intersection I without the bike lanes portion, there were no instances where the traffic flow results from the GEH statistics were deemed "Unacceptable." This indicates that Intersection I, with bike lanes, also performed acceptably according to the study's validation results from LocalSim.

For Intersection I, without bike lanes, there were four categorizations out of 112 links: 28 had a LOS rating of A (free flow), 30 links had a LOS rating of B (reasonably free flow), 49 links were rated as C (stable flow), and 5 were rated as D (moderately heavy flow). In the scenario with bike lanes, all 112 links were considered: 28 had a LOS rating of A, 31 were rated as B, 47 were rated as C, and 6 were classified as D. These findings suggest that there was not much change in terms of LOS rating A between scenarios with and without bike lanes, as they both had 28 equal links. However, with bike lanes, the number of links rated as B increased by one compared to the scenario without bike lanes, indicating better performance. Regarding the portion rated as C without bike lanes, bike lanes had 47 level C ratings, which is two links fewer than without bike lanes, suggesting that bike lanes performed better in terms of stable flow. For the D rating, without bike lanes classified 5 links as D, while with bike lanes had 6, indicating that with bike lanes had one more link with "moderately heavy flow" performance. Thus, the scenario without bike lanes outperformed the scenario with bike lanes in terms of the D rating by a small margin. Overall, the scenario with bike lanes demonstrated a much better level of service than the scenario without bike lanes, according to the computed LOS values of the 112 links.

Intersection II:

Moreover, the research conducted an extensive analysis of the second intersection of the study area, which is in Gatiawin, Arayat, Pampanga, considering both analyses with and

without bike lanes. For the analysis without bike lanes, the study used data from tables 3.38 to 3.51, covering 112 links over seven days and including morning and afternoon periods. Of all the 112 links, 92 were classified as "Acceptable Fit" whereas only 20 had acceptable categorization. The process at the second intersection concludes that the scenario with no bike lanes performed well based on the GEH statistics and Level of Service (LOS) standards. Hence, the study also examined the scenario with bike lanes at Intersection II, where the values were displayed in Tables 3.52-3.65. In the examination, 99 out of 112 links fell under the "Acceptable Fit" category and the remaining "13" were only "Acceptable." The 99 acceptable fit results were found using the GEH statistics data generated by the LocalSim traffic simulation software. All in all, the results in this second intersection suggest that the presence of bicycle lanes contributes to an acceptable performance concerning the traffic flow and safety in Arayat, Pampanga.

For the part of the second junction where there is no presence of bike lanes, five classifications were categorized into the 112 links: 42 links had a level A (free flow) rating, 41 links had a level B (reasonably free flow) rating, 17 links had stable flow (level C) rating, 9 links had level D rating and only 3 links were unstable flow. In comparison, when bike lanes were present, all 112 links were evaluated: 42 had a LOS rating of A, 41 were rated as B, 17 were rated as C, 9 were classified as D, and 3 were classified as E. These findings reveal a significant difference in the A rating, with the scenario consisting of bike lanes having 47 links scored as A, indicating enhanced free flow conditions. However, there was a decrease of 17 links rated as B compared to the scenario without bike lanes. Regarding the portion rated as C, the presence of bike lanes resulted in 19 level C ratings, two more than without bike lanes, indicating enhanced stability of flow. For the D rating, without bike lanes classified 9 links as D, while with bike lanes had 11, suggesting slightly heavier flow with the presence of bike lanes. Conversely, for the E rating, the scenario with bike lanes demonstrated better performance, with only 1 link classified as unstable flow compared to 3 links without bike lanes. Overall, the scenario with bike lanes exhibited a significantly improved level of service across the 112 links compared to the scenario without bike lanes, as evidenced by the computed LOS values.

Intersection III:

Intersection III, similar to the previous intersections, had two classifications for the last intersection: without and with bike lanes. All the validated data for both portions, with and without bike lanes, were tabulated with the necessary information required to validate the results from the LocalSim simulation. Starting with the without bike lane's part, since it only had six links, and multiplying that by 14 for the seven days, considering the morning and afternoon data, it would result in a combined 84 links. Out of all those 84 links, for the without bike lane's part, 69 of the links fell into the category of "Acceptable Fit," whereas the remaining 15 were classified as "Acceptable." The basis for these categorizations was thoroughly presented in Tables 3.66-3.79. All the essential data for the bike lanes were tabulated through Tables 3.80-3.93, along with their validated marks. The bike lanes of Intersection III consisted of 72 links with "Acceptable Fit" remarks, while the other 12 links had a status of "Acceptable." From the results drawn from both with and without bike lanes at the third junction, most of the links had "Acceptable Fit" remarks, with the remaining links falling into a generally acceptable status. Thus, all simulation validation results from the LocalSim software indicate acceptable performance.

Overall, the LocalSim traffic simulation findings suggest that bike lanes can positively impact traffic flow and safety at intersections. The thorough validation process using LocalSim and established standards such as Level of Service (LOS) and GEH statistics ensures the reliability and validity of the study's conclusion.

For Intersection III, without bike lanes there were three classifications out of 84 links: 5 links had a LOS of rating of A (free flow), 69 links had a LOS of rating B (reasonably free flow), and 10 links were rated as C (stable flow). In comparison, with bike lanes, all 84 links were considered: 1 had a LOS rating of A, 68 were rated as B, and 15 were classified as C. These findings indicate a remarkable change in LOS rating A, with bike lanes having 1 link and 5 links without bike lanes rated as A, suggesting improved free-flow conditions. However, for those without bike lanes, the total number of links rated as B increased by one compared to the classification of those with bike lanes, which reveals a better performance for those without bike lanes. The portion rated as C without bike lanes, which is five links fewer than with bike lanes, suggests that bike lanes execute better in terms of stable flow. Overall, the scenario with bike lanes illustrated a remarkable level of service than the scenario without bike lanes, in line with the computed LOS values of the 84 links.

C. Conclusion

In conclusion, this study has explored the various road conditions and bicycle trends in the study area. Through a comprehensive analysis of determining the traffic volume that was used for simulation activities, as well as getting the perspectives of the cyclists and residents, the researchers gained insights into the improvement of mobility in Arayat, Pampanga, concerning the safety of the cyclists as well as the other road users. The findings underscore the importance of having a designated bicycle lane for the safety of cyclists, offering valuable contributions to the traffic flow of the municipality of Arayat. Nevertheless, researchers reiterate that only the use and implementation of pavement markings was their only objective for the proposed bike lane project which does not entail structural modifications on the existing road infrastructure along the study's route. Furthermore, this study would serve as a groundwork for future researchers aiming to propose alternative routes in other sections of Pampanga, specifically for the benefit of cyclists who intend to visit various tourist spots other than Arayat, Pampanga. Addressing such research gaps may help future researchers in building the strength of their research findings, to where it will continue to benefit a roster of transportation engineering-related researchers. Overall, this proposal is living proof of the endeavors and effort brought by the proponents in exploring

transportation improvement in Arayat in terms of bike lane implementation, which safeguards the cycling experience.

D. Recommendations

In this section, the researchers present recommendations based on the findings obtained by the study. The recommendations presented are formulated based on the thorough analysis of different road conditions in Arayat, Pampanga as well as on the perspectives of the cyclists.

These recommendations are intended to assist the study's stakeholders such as local government unit officials, transportation engineers, the community in Arayat, and cyclists. Adhering to these recommendations, the study's stakeholders can assist in the transport sector enhancement of the Arayat municipality.

a. Explore otherLocalSim parameters. It is recommended that adding more LocalSim settings, like the static feature, ensures consistent results in parameter changes. This approach provides insights into the system's behavior and response to various input settings, as well as strengthening the study and a detailed understanding of its fundamental dynamics.

b. Utilization of other simulation software. It is recommended to utilize other simulation software such as PTV Vissim, SUMO, and CORSIM. An in-depth understanding of the precision of the simulated data can be made possible by incorporating other simulation tools. By doing so, it is easier for the researchers to identify the differences or modifications that may occur. The validity of the simulation results is improved through this cross-validation procedure.

c. Consideration of public transportation stops. Public transportation stops should be considered to improve road planning efficiency. Taking this into consideration can reduce traffic jams, provide organized public transportation, and encourage eco-friendly travel choices. The idea of urban development for having an inclusive and sustainable environment can be achieved by incorporating BUS stops and PUV stops.

d. Road safety audit and traffic management plan. Simulation of road network design 197 incorporating road signages and signalized intersections should be done by future researchers to understand their effects on traffic efficiency and flow. Results from the simulation of signalized and unsignalized intersections can show the variation and help to learn how traffic lights affect traffic management. Providing bicycle stops can enhance safety and provide convenience to cyclists. The study helps to have a better understanding of traffic congestion, vehicular movement optimization, and improvement of road networks in a signalized intersection. These insights can help to develop efficient traffic management plans and improve road safety.

e. Implementation of bike lanes in the portion of JASA-Arayat Road. The construction of dedicated bike lanes should be prioritized by local government officials as a means of improving rider safety along JASA-Arayat Road. This initiative enhances the popularity of nearby tourist attractions while simultaneously promoting safer cycling transportation for cyclists. Moreover, integrating bike lanes into urban planning endeavors advances broader sustainability objectives by reducing reliance on cars, curbing carbon emissions, and mitigating traffic congestion.

f. Stationing. It is recommended that proper surveying be conducted at each station to obtain the necessary measurements for the road plan in the area. These measurements include the elevation and width of the roads between the intersections in Arayat. The improvement of the detailed road plan will assist the implementing agencies in doing a cost-benefit analysis

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