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Safety And Accessibility Enhancement Through Pedestrianization And Bike Lanes: Revitalizing The University-Cbd Corridor In Urdaneta City

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Introduction: The central business district (CBD) of cities focusseson the economic development and often the most densely populated. In the Philippines, CBD Urdaneta city in Pangasinan is no exclusion with a conservative volume of pedestrian end user and vehicular movement. On the hand,students in different universities and college are populating the highway during entering and departing during school days. To address these issues, urban planner and policymakers are exploring ways to revitalize the CBD and make it more accessible and livable.

One solution is to implement pedestrianization and bicycle lanes in the CBD, which can help to reduce traffic congestion, improve air quality, and promote physical activity. These measures can also make the CBD more attractive to businesses, residents, and tourists.

This study aims to explore the potential benefits of revitalizing the Urdaneta Pangasinan CBD through pedestrianization and bicycle lanes. The study will employ a qualitative method approach. Interview as qualitative method that will be use to gather information about the community's perceptions and preferences regarding pedestrianization and bicycle lanes.The findings of this study can inform policymakers, urban planners, and community members about the potential benefits of pedestrianization and bicycle lanes in the University - CBD corridor.

The study can also serve as a model for other urban areas in Pangasinan and beyond that are seeking to revitalize their CBD's and make them more accessible and livable.

The University-CBD route in Urdaneta city in Pangasinan is currently facing several challenges related to the following:

1.) The inadequate visibility of pedestrianization allotment and absence of dedicated bicycle lanes creates unsafe conditions for pedestrians and cyclists, compromising their well-being and mobility within the route.

2.) Pedestrians walking on the road and lacking accessibility that hinders the movement of individuals exposing them to greater risk and possible road accidents.
Furthermore, the route doesn't have proper maintenance and upkeep of pedestrianization for their sustainability which includes ensuring proper signages, line markings, and streetlight/traffic lights.

3.) There are no local policies that integrate safety measures, such as implementing traffic calming measures, establishing proper pedestrian crossings/walkways, providing road signages, and incorporating well-designed bicycle lanes with appropriate separation from vehicular traffic.

For the research questions, to achieve the aims of the research, the study is dealing with the following research questions:

Figure 1 Top: Crossroad -2 at San Vicente Central, Middle: Cross road-1 at CBD Urdaneta, Bottom: Merging Road entering at University Belt.

1. How do residents, bike enthusiasts, all pedestrian users and stakeholders in the University- CBD corridor perceive the potential benefits and difficulties associated from implementing pedestrianization and dedicated bicycle lanes in the area?
. What are the main considerations that should be considered when designating pedestrianization and bicycle lanes in the University-CBD corridor in order to enhance safety, promote accessibility, and ensure long-term sustainability?
.What are the recommendations and policies that can be proposed to DPWH with the LGU to address the identified challenges and concerns in order to ensure the successful implementation of pedestrianization and bicycle lanes in the University-CBD corridor?

Figure 2. Map of the Philippines retrieved from QGIS Smart maps.

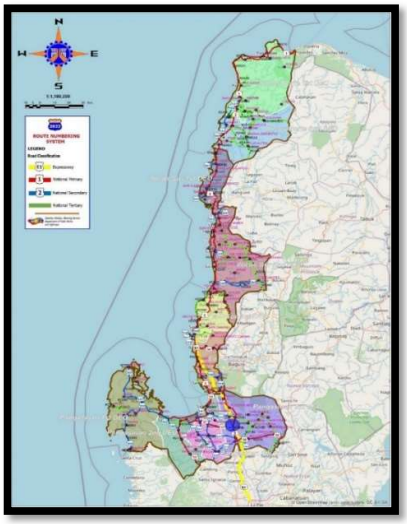


Figure 3. Pangasinan-Urdaneta City Location Map retrieved from QGIS Smart maps.

Urdaneta is a landlocked component city in the coastal province of Pangasinan.

Urdaneta is in the province of Pangasinan which is 158.95 km North of Manila (map, 2022)). Nearby towns are Binalonan on the North, Villasis on the South, San Manuel and Asingan on the East, and Manaoag, Sta. Barbara on the West (Figure 4). Figure 5 indicates the location of the study.

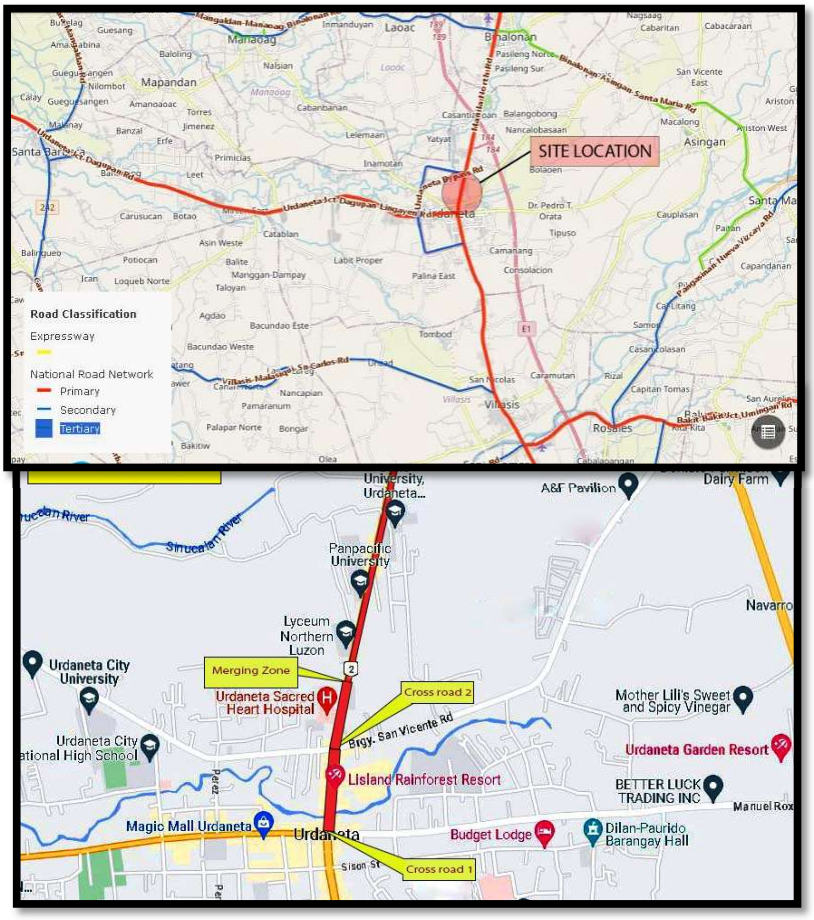


Figure 5. Urdaneta City Mc Arthur National Highway Location with other Facilities retrieved from QGIS Smart maps.

Objectives: This study aims to study deeper with the following specific objectives:

1. To identify the benefits of implementing pedestrianization and bicycle lanes in the University-CBD corridor based on the perceptions/concerns of the residents, bike enthusiasts, all pedestrian users and stakeholders.
2. To examine the main considerations that should be considered when designating pedestrianization and bicycle lanes in the University-CBD corridor in order to enhance safety, promote accessibility, and ensure long-term sustainability.
3. To examine solutions and recommendations that can be suggested to the DPWH with the collaboration of the LGU to address the identified challenges and concerns, ensuring a successful implementation of pedestrianization and bicycle lanes in the University-CBD corridor.

Scope and Limitations:The focus of this research study is to promote the enhancement of safety and accessibility of pedestrians and bicycle lanes from the University Belt to Urdaneta CBD. Since the location of the proposed research is within the National Highway, its main concerns are the residents, bike enthusiasts, all pedestrian users and stakeholders. The analysis and other studies were based on the location site.

Providing an independent single lane for bicycles all the way to Crossroad 1 passing through Crossroad 2 up to Merging zone (Manantan Technical School),on the other hand, from Merging zonepassing through different universities/collegesjoining with shared roadway for both bicycle lanes and motorized vehicles. This includes the part of the shared roadways will designate as a slow lane for motorized vehicles. The

sidewalk will be provided with minimum width of 1.30m ((DPWH, 2012) along the 4 lane Road.

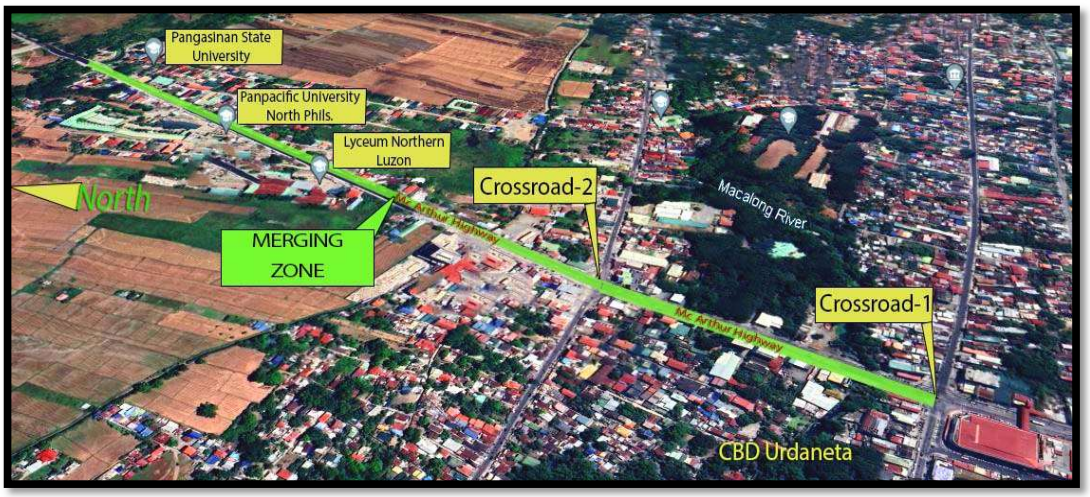


Figure 6. Mc ArthurNational HighwayNorth to South bound starting from Pangasinan State Universityto Cross road 1 measuring the length of 1.50 km.

Review and Related Literature:

Pedestrianization:Baguio City is well known as the "Summer Capital of the Philippines." This has affected the vehicular and pedestrian movements in Lower Session Road, which led to the proposal of pedestrianization of the area. Pedestrianization is a traffic-calming method wherein a portion of Lower Session Road is closed for vehicles to give way to pedestrians(Agustin, Buhay-Et-al, 2017).

There are different meanings regarding pedestrianization. The simplest meaning of it is the removal of vehicular traffic from city streets. For example, in Hong Kong, pedestrianization is defined by the transport department as "to restrict vehicle access to a street or area for exclusive use of pedestrians"(Nasim Iranmanesh,, 2008).

Bicycle Lanes: On the other hand, in the most comprehensive look at bicycle and road safety to date, researchers at the University of Colorado Denver and the University of New Mexico discovered that it's not the cyclists, but the infrastructure built for them, that is making roads safer for everyone."So, it would seem that a city with a lot of bicycling is more dangerous, but the opposite is true. Building safe facilities for cyclists turned out to be one of the biggest factors in road safety for everyone."(Marshall, May 2019)

Despite bicycling being considered ten times more dangerous than driving, the evidence suggests that high-bicycling-mode-share cities are not only safer for bicyclists but for all road users.The results suggest that more bicyclists are not the reason these cities are safer for all road users. Better safety outcomes are instead associated with a greater prevalence of bike facilities – particularly protected and separated bike facilities – at the block group level and, more strongly so, across the overall city.(Marshall, W., Ferenchak, N., June 2018)

Pedestrian and Bike Lane Design and Planning:

Bicycle lanes are now standard design in new national road and bridge construction or future expansion of projects in the Philippines.

The integration of bike lanes into the design of public roads is seen as a welcome move, especially that the recent Covid 19 pandemic has brought out various initiatives by civic groups and personalities to provide bicycles for frontliners and workers who are challenged by the limited public mass transportation during the community quarantine.

The new policy to address the needs and safe access to bicyclists and other road users is detailed in the Department of Public Works and Highways (DPWH) Order No. 88, series of 2020, published on October 16, 2020.

Under the guidelines, class, width, and directional criteria for the construction of new bike lanes will be established based on motor vehicle volume and operating speed, available road, shoulder and sidewalk space, lane

configuration, bicycle demand, and other driveway and parking conflict.
(The Good News Pilipinas Team, Nov. 2020)
If our cities design our streets and road corridors to be more people-centric instead of car-centric and they integrate more vibrant walkable and bikeable urban environments, then we will have safer and more inclusive, dynamic, and environment-friendly public spaces and communities. It will take a lot of effort from both the public and private sectors, but as Jan Gehl put it, it is by willingly giving people the spaces they need that we can create a truly livable and healthy city.(Palafox, April 2022)

National and Local Policies:
***House Bill # 40 "Philippine Bicycle Act*":** In essence, the Philippine Bicycle Act is a policy that seeks to define and implement the needs and rights of cyclists. Instead of having different rules and regulations per local government unit, this bill wants to formalize an overall set of rules for the country. Apart from the rules, the bill also wants to be able to create infrastructure.
Designation of Bicycle Lanes: Section 6. The act proposes that a designated bicycle lane will be put on all primary and secondary roads for the exclusive use of cyclists.
However, in cases where the installation of a physical barrier is not feasible, the lane shall be identified through reflectorized yellow painted lines.(Salapantan, August 2022)

DPWH Department order No.34 s. 2012:Guidelines on theImplementation ofPedestrian refuge
Island alongNational roads. In order to provide additional safety measures for pedestrians crossing the national road andas a suppletory to D.O. No. 62, series of 2011, pedestrian refuge island shall be providedalong the center of the carriageway where pedestrians may safely wait until vehicular trafficclears. Henceforth, the following guidelines on the proper location and installation ofpedestrian refuge island in conjunction with the pedestrian crossing markings.

DPWH Department order No.65 s. 2013: Revised Guidelines on theInstallation of PedestrianCrossing Markings along National Roads.

DPWH *Department order No.88 s. 2020*: prescribing guidelines onthe design of bicycleFacilities along nationalRoads. Providing a uniform design of bicycle facilitiesin order to achieve a consistent approach that will meet the needs and safe access ofbicyclists and other road users, is hereby prescribed for the guidance and compliance of allconcerned. All projects of DPWH that involve new road and bridge construction or future expansion torelieve traffic congestions such as road/bridge widening, diversion/bypass roads, amongothers, shall include in its design the provision of bicycle facility, if feasible, based on thestudies of this Department.

Senate Bill No.1290, also known as the "Walkable and Bikeable Communities Act," approved a bill which seeks to provide safe and convenient pathways for pedestrians, bikers, and non-motorized vehicles. More Filipinos had taken to cycling, especially after lockdowns were imposed on public transportation due to the COVID-19 pandemic.

*Senate Bill No. 285: Bicycle act of 2019,*An Act Promoting and recognizing bicycles as an alternative mode of Transportation, and for other purposes. This bill proposes to recognize bicycles as one of the alternative and sustainable modes of transportation in the country. The need for corresponding bicycle infrastructures and facilities are also provided for in this bill in order to properly integrate bicycles as part of the Philippine public transportation system.

Pedestrian and Bike Lane Standards:
A Bike Lane is a portion of the roadway that has been designated by striping, signage, and pavement markings for the preferential or exclusive use of bicyclists. Bike lanes enable bicyclists to ride at their preferred speed without interference from prevailing traffic conditions and facilitate predictable behavior and movements between bicyclists and motorists. Conventional bike lanes run curbside when no parking is present, adjacent to parked cars on the right-hand side of the street or on the left-hand side of the street in specific situations.

(NACTO, 2022)

Methodology: The researcher decided to adopt a qualitative study approach, and this will serve as the study's foundation. Qualitative research aims to gather an in-depth understanding of human behavior and the reasons that govern such behavior. The researcher will use a combination of semi-structured interviews, questionnaires, and onsite observations to collect data. The target sample will include residents, students, business owners, local authorities, and other relevant stakeholders.

The questionnaires designed to address the research questions and objectives. It includes relevant questions related to pedestrianization, bicycle lanes, safety, accessibility, and sustainability in the University-CBD corridor.

The number of respondents targeted should be determined based on the available resources, time constraints, and the desired level of representation. The researcher will distribute it to approximately 70 respondents including residents, college students, business owners, local authorities and other relevant stakeholders. The questionnaires will collect both subjective and objective data to obtain results that are statistically significant. Random sampling or purposive sampling methods can be employed to select the respondents, ensuring that they represent the different stakeholder groups within the corridor.

SWOT Analysis:

A. Strengths	B. Weaknesses
1. Improved Safety: Dedicated bicycle lanes and pedestrianization would increase safety for both bicyclesandpedestrians. 2. IncreasedAccessibility:Itwouldbesimplerfor people to move around, enhancing accessibility to important sites inside the corridor and easing congestion. 3. Environmental Sustainability: A cleaner and more sustainable environment would result from theinitiative'spromotionofnon-motorizedformsof transportation like walking and cycling, which would lower carbon emissions, air pollution, and traffic congestion. 4. Health Benefits: By encouraging active lives andphysicalactivity,pedestrianizationandbicycle lanes would enhance the health and wellbeing of local citizens and commuters. 5. Economic Boost: The corridor's redevelopment might draw more tourists, locals, and businesses, boosting the local economy and possibly opening up new job opportunities.	1. Resistance to Change: Some people might resist the idea of pedestrianization and bicycle lanes, especially if it requires modifying existing infrastructure or reallocating road space. Overcoming resistance and convincing stakeholders could be a challenge. 2. Limited Space: The corridor may not have enough room to designate bicycle lanes, and doing so could mean taking space away from other modes of transportation or narrowing existing roads, which might face opposition or difficulties. 3. Initial expenditure: Implementing pedestrianization and bicycle lanes would require a significant initial investment, including infrastructure development, signage, and public awareness campaigns, which might pose financial challenges.

C. Opportunities	D. Threats
1. **Improved Livability:** By making the area more attractive to residents, students, and businesses, revitalizing the corridor may improve the area's overall livability, raising property values and quality of life. 2. **Potential for tourism**: Urdaneta might market itself as a city that encourages walking and bicycling, drawing visitors looking for eco-friendly and active transportation options. This might help local companies and the tourism sector in the area. 3. **Encourage** more individuals to use bicycles as sustainable transportation. More bike lanes encourage more bike commutes which in turn reduces greenhouse gas emissions and improves health. 4. **Collaboration and Partnerships:** The project offers a chance for local government, academic institutions, corporations, and community organizations to collaborate in order to achieve a shared objective.	1. **Lack of Public Support:** The effectiveness of the project may be hindered if there is a lack of public knowledge of the advantages of pedestrianization and bicycle lanes. 2. **Financial Restraints:** The implementation and long-term sustainability of the project may be threatened by a lack of financing or by conflicting priorities within the local government. 3. **Maintenance and Enforcement**: It may be difficult to sustain ongoing resources, such as routine maintenance, signage, and traffic control enforcement, in the long run, to maintain and enforce the pedestrianization and cycling lanes. 4. **Unanticipated Challenges:** The project's success and timeline may be affected by unforeseen hurdles during the implementation process, such as unexpected opposition, construction delays, or unforeseen logistical problems.

Results and Discussion:

The integration of bicycle lanes will encourage people and more cyclists to use bikes as sustainable transportation option that will contribute to reduced carbon emissions, decreased traffic congestion. The local administration will provide ways on how to enhance their operations and regulate such policies to ensure the safety of the individuals and the community.

Overall, the hypothesis that the revitalization of the University-CBD corridor through pedestrianization and bicycle lanes will result in positive outcomes for safety and accessibility.

This research will result in a reduction in accidents and conflicts between pedestrians, cyclists, and vehicles, providing a safer environment for all users.

A survey has been done to 70 people coming from residents, students, business owners within the zone and local

authority.

Sex:

Respondents	
Male: 40	**Female: 30**

Age:

18-30 Years old	31-40 Years old	41-50 Years old	51 and above
20 Respondents	10 Respondents	22 Respondents	18 Respondents

Figure 7. Statistics shows the number of respondents participated in survey

1. ***What is your affiliation with the University–Central Business District (CBD) corridor in Urdaneta, Pangasinan?*** **Residents Students**

You are(resident, student, businessowner, Business Owner localauthorityetc.)?Local Authorities

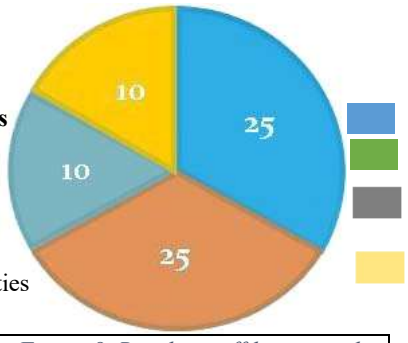


Figure 8. Result on affiliation with the University

2. ***Have you experienced passing by in the University - Central Business District (CBD) corridor?(If yes, can you share your experience? (How safe or unsafe is it to walk, ride a bike, cross the road to that place?)***

According to the feedback received.Thisworriesthem from the high volume of traffic, including large and fast-moving vehicles, which creates an environment lacking sufficient space for pedestrians and cyclists which includes undisciplined drivers. Additionally, the absence of designatedcrossinglanes adds to theconfusion faced bypedestrians. Anotherissue highlightedis the inadequate presence of traffic enforcers, particularly in areas frequently crossed by students. Furthermore, the problem of illegal parking exacerbates traffic

disruptions, forcing pedestrians to navigate along the highway without alternative options.

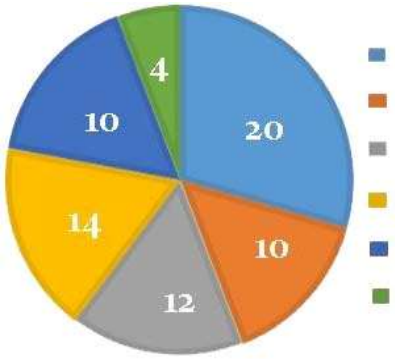
3. *Do you agree if there will be an implementation of pedestrianization and dedicated bicycle lanes in the University- Central Business District (CBD) corridor from the Local government/DPWH? (Yes or No) Why?*

Respondents:

Yes	No
58	12

According to the feedback received, a majority of respondents expressed concerns about their safety.The presence of traffic enforcer will eventually drivers are compelled to follow the road safety rules.

4. *Fromyourperspective,whatarethepotentialbenefitsofimplementingpedestrianizationand dedicated bicycle lanes in the University- Central Business District (CBD) corridor? Select by checking as applicable as you can.*



Improved safety for pedestrian and cyclist
Enhanced accessibility for different user groups
Reduce traffic congestion and other related accidents
Promotion of a healthier and more active lifestyle
Reduction in Carbon emission and environmental sustainability
Economic revitalization and support for local businesses

Figure 9. Potential benefits of implementing pedestrianization and dedicated bicycle lanes in the University-CBD corridor favor the improved safety for pedestrian and cyclist.

5. *Inyourexperienceorobservations,whatarethemainchallengesordifficultiesthatmayarise intheprocessofimplementing pedestrianizationandbicyclelanesinthe University-Central Business District (CBD) corridor?*

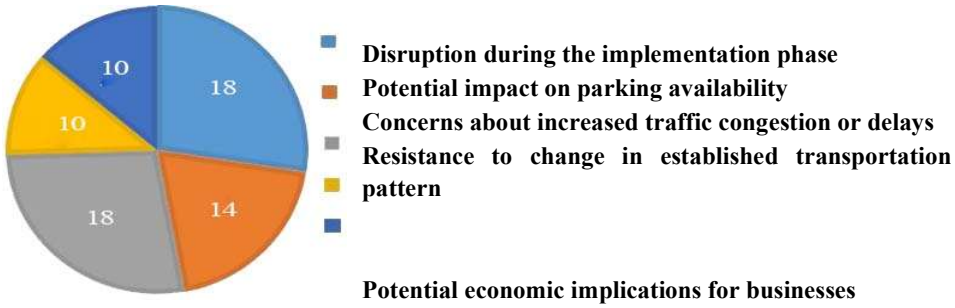


Figure 10. Main challenges or difficulties that may arise in the process of implementing pedestrianization and bicycle lanes in the University-CBD corridor favors between disruption during the implementation phase and concern about increased traffic congestion.

Summary and Findings:

Basedonthefeedbackreceived,itisevidentthattherearеconcernsregardingthesafetyof pedestriansand cyclistsin the University-CentralBusinessDistrict(CBD)corridor.The absence of designated crossing lanes, heavy traffic, and insufficient enforcement contribute to the perceived risks.

The majority of respondents agreed that implementing pedestrianization and dedicated bicycle lanes would be beneficial in addressing these issues. They highlighted the need for reallocation ofroad space orwidening to accommodate these lanes.However,some respondents also acknowledged potential budgetary constraints as a challenge to implementation.In terms of the impact on local businesses and economic revitalization, respondents expressedoptimism.

Overall, the findings highlight the importance of addressing safety concerns, involving the community in decision-making processes, and considering the economic benefits when implement

ting pedestrianization and bicycle lanes in the University-Central Business District corridor.

Resultofthefindingsinidentifyingtheactualsiteroad widthinapplicabilityofimplementingpedestrianizationandbicyclelanes	
CBD Cross road 1 (South) toImmerging zone	Immerging zoneto PSUCampus (North)
6lanes:21 meters (Two way)	4lanes: 14 meters (Two way)
3.5mperlanes	3.5perlanes
3.75Sidewalkbothside	1.2sidewalkbothside
Totalof28.50NationalRoad	Totalof16.4NationalRoad
Findings:Therefore,implementation of one lane for bicycles (independent) and 2 lane sidewalks. ---2.45-meter-wideBicycleLane and 1.30 meter for sidewalk	Findings:Therefore,implementation of one lane for bicycles for sharedroadway (motorizedvehicles) and 2 lane (1.20m) sidewalk

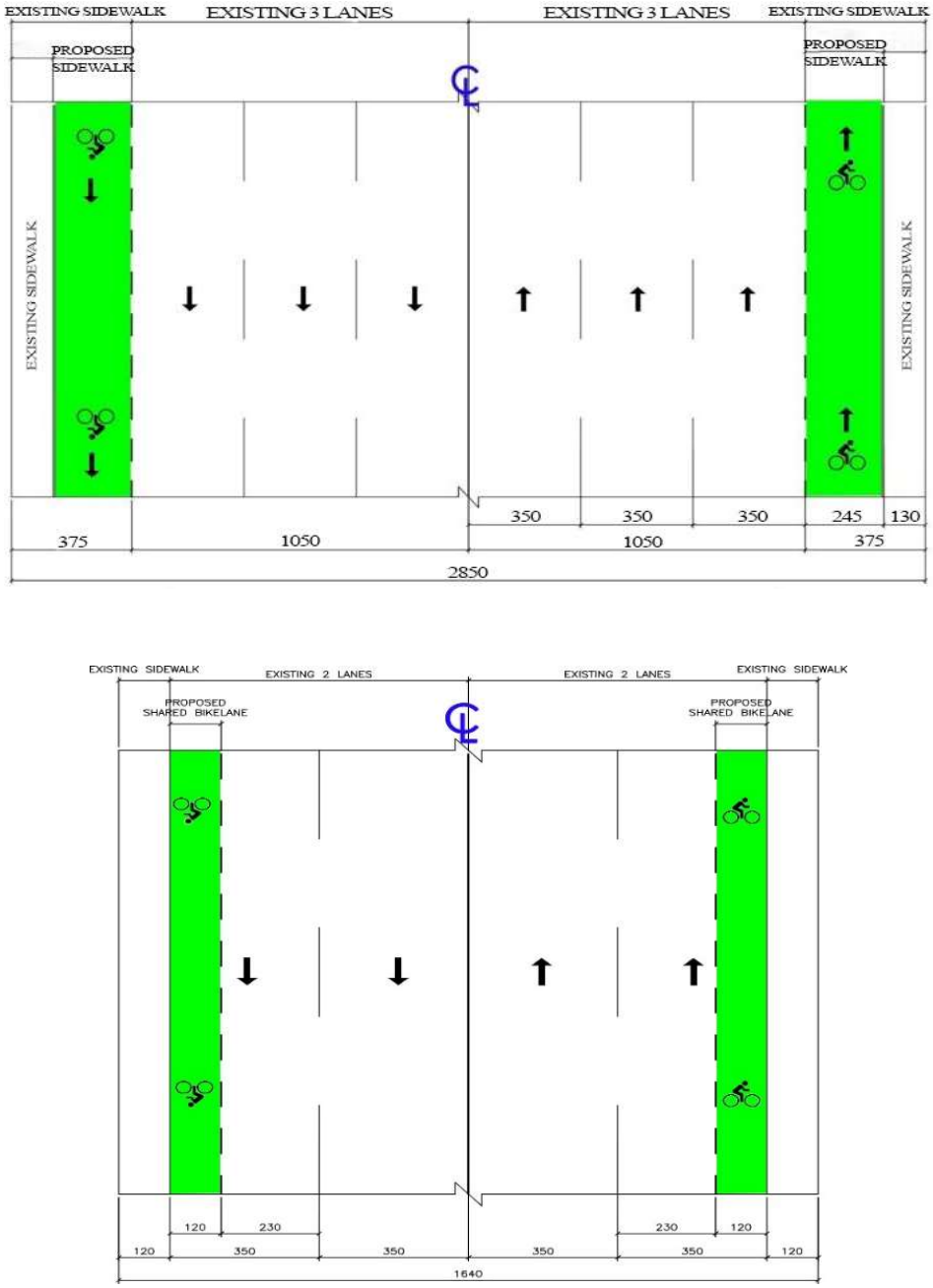


Figure 12. 4 Lanes National Highway with shared bike lane road on both sides.

Solutions:

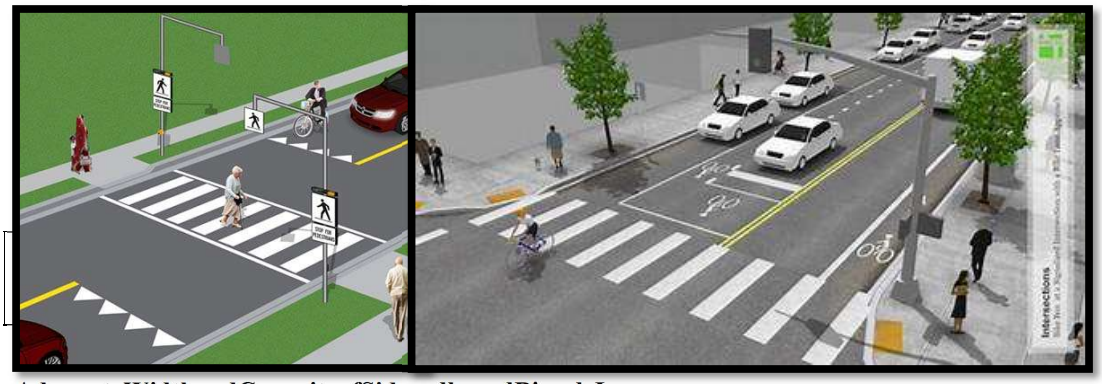
1. VisibilityofRoadMarkingsandClearSignages.

Ensurethatpedestrianizationandbicycle lanes have clear signage and road markings that clearly demarcate the spaces for pedestrians, cyclists,andvehicles.Consistencyindesignthroughoutthecorridorwillhelpusersunderstand and follow the designated routes.

F bike
P rking

2. RegulationsandTrafficRules:

Toensurethatmotorizedvehiclesdonotencroachuponor misuse the other lanes and they mustbe disciplined and responsible on their road limits.



3. AdequateWidthandCapacityofSidewalksandBicycleLanes:

Providingsufficientwidthto accommodate the expected volume ofuserscomfortably.Thisincludesconsidering the needsof different user groups, such as pedestrians, cyclists, individuals with disabilities, etc.

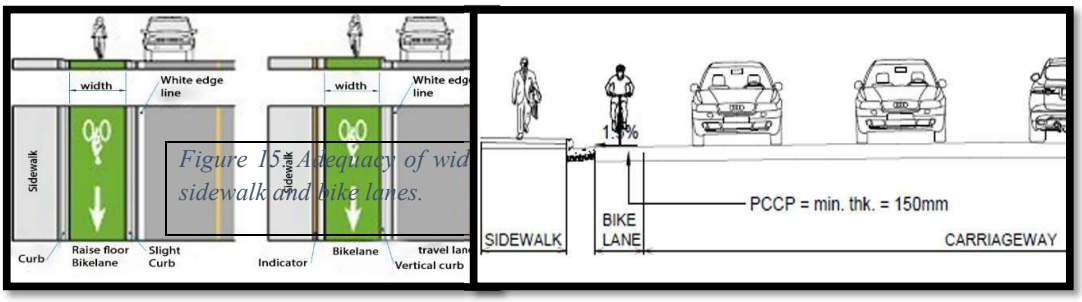
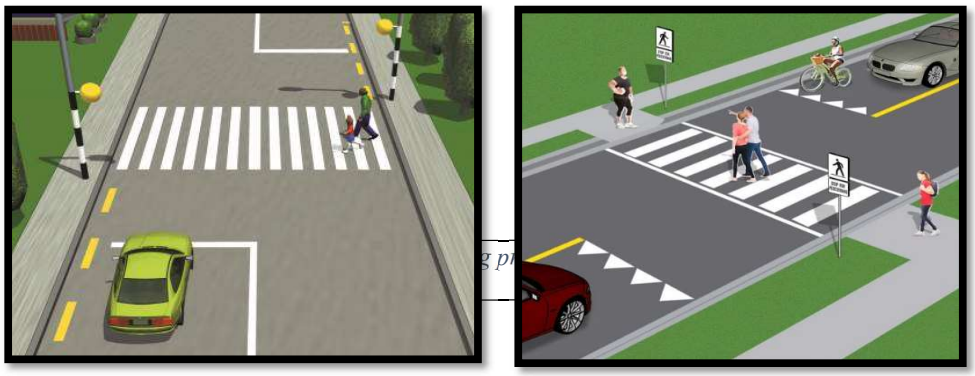


Figure 15 Adequacy of wid sidewalk and bike lanes.

4. **Proper distances of pedestrian crossing:**

Pay special attention to intersections and designatedcrossingpointsforpedestriansandcyclists.Aswellastheproperdistancesfor pedestrian crossing.



5. **LightingandVisibility:**

Installadequatelightingalongpedestrianizationandbicyclelanesto enhance visibility during night time hours such as street lights with builtin solar panels for environmental sustainability purposes.

6. their usability and safety.This includes repairing any damages,removing debris,and keeping the lanes free from obstructions.

Conclusion:

Thefeedbackrecommendedabsoluteconcerns abouttrafficcrowding and security along the University-Central Business District (CBD) route. To assurethethrivingperformanceofpedestrianization and bicyclelanes,itisessentialto enthusiasticallycommit the community in the decision-making development. The conducting of extensive analysisfacilitates the compilation of importantobservation and feedback from residents, bike enthusiasts, all pedestrian users, and other stakeholders. By integrating their point of views, concerns, and desire into the planning development.

The implementing of pedestrianization and cycling infrastructure control theenormousprovableregenerationof theUniversity-CBD corridor, not onlyincondition of safetyand accessibilitybut also intermsofbenefitting with the

economy.Furthermore,thearrangementofsafewalkingpassage andcyclingstrengthenpeople to scrutinize and indulge into various formation in the locale,promoting a vibrantand thriving community.
Totally, the implementation of pedestrianization and bike lanes in the University-CBD routehas the capacity to carry on theimportant absolutedevelopment. By enhancing safety, developing mobility, and inspiring the economic activity, the resourcefulness can conceive a more livable and sustainable environment for all users. It represents a transformative amplification towards creating a vibrant and comprehensive urban spacethat prioritizes the well-being of its community members.

Recommendations:

To conduct adetailed study on the University - Central Business District (CBD) routefor assessing the safety considerationof pedestrian and cyclists. Whichinclude of gatheringdata on assessment of accident.
To Evaluatethecurrent trafficmovementand determinecongestionwheredevelopment canbemade. The assessment shouldconsider factors such as road space, traffic contents, and the existence of pedestrian crossings.To collaborate between Department of Public Works and Highways (DPWH)andlocalgovernmentagenciestoestablishan extensive plan for the application of pedestrianization and bicycle lanes.
To establish everyone's involvement, which includes nearby businesses and the general public,andgiventhechancetooffersuggestionsduringthecommendationdevelopment by promoting a strong connection and commitment. This will easeto relieve worries and gain support for the suggested changes. And finally, to monitor and assess the impact of the implemented pedestrianization and bicycle lanes overtime.

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