JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE PROJECT FOR COMPREHENSIVE TRAFFIC MANAGEMENT PLAN FOR METRO MANILA

TECHNICAL REPORT NO. 6 ROAD INVENTORY SURVEY MANUAL

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ABBREVIATIONS

CTMP	Comprehensive Traffic Management Plan
JICA	Japan International Cooperation Agency
JPT	JICA Project Team
LGU	local government unit
MMDA	Metropolitan Manila Development Authority
TBN	traffic bottleneck

1 INTRODUCTION

A road's physical characteristics determine its level of service and overall performance. Certain conclusions can be made about the causes of traffic congestion based on lane information, public transport stop locations, road conditions, and land use, among others. Thus, collecting such data is necessary to address traffic problems.

1.1 Objectives

In the CTMP project, the JPT performed a road inventory survey in the 17 LGUs in Metro Manila to collect information on road infrastructure, conditions, and corresponding facilities. In addition, satellite images were taken throughout the survey to capture street level information. This technical report describes the result of inventory survey and how to conduct the survey for development and updating by MMDA and LGUs after the projet.

1.2 Scope of Work

The scope of the survey is divided into two scales wherein the first covers class A and B roads throughout the entire Metro Manila, which can be seen in Figure 1. Also, as trial for minor road, the second scale covers class C roads in Mandaluyong and Pasig City, as seen in Figure 2 and Figure 3, respectively.



Figure 1.1: Class A and Class B Roads in the whole Metro Manila



Figure 1.2: Class A, Class B and Class C Roads of Mandaluyong City



Figure 1.3: Class A, Class B and Class C Roads of Pasig City

1.3 SOFTWARE REQUIREMENTS

The following software were used throughout the project:

- (i) Microsoft Access: for encoding of information
- (ii) QGIS: for the spatial visualization of GIS data
- (iii) Mapillary: for viewing of street view imagery

1.4 METHODOLOGY

The methodology is divided in to three parts: preparatory works, field work, and processing as seen in Figure 1.4.



Source: JPT

Figure 1.4: Project Workflow

First, preparatory works were done to have a basis for encoding data. Then, the actual field work was performed. Lastly, the collected data were encoded and processed for submission.

2 PREPARATORY WORKS

2.1 **Preparatory Works**

Prior to the road inventory survey, the following preparatory works need to be performed:

- (i) Visit of the target roads to validate the survey form.
- (ii) Getting the approval of concerned authorities to conduct the survey.
- (iii) Hiring of survey staff and preparation of survey kits.
- (iv) Training of survey staff as necessary.
- (v) Conducting dry runs to review and finalize the content of the survey forms and to ensure that the survey staff understood the task.
- (vi) Creating of the road network shape file.

2.2 **Data Format**

Data coding is done by assigning unique identifiers, called link codes, for each road link. This will allow the data to be analyzed using MS Excel, GIS, and other software.

Targeted Corridor Name	Link Code
(example) Corridor A (A)	LA001-LAXXX
EDSA (ED)	LED001- LEDXXX
C5 (C5)	LC5001- LC5XXX
Ortigas Avenue (OA)	LOA001- LOAXXX
Alabang-Zapote Road (AZ)	LAZ001- LAZXXX
Shaw Boulevard (SB)	LSB001- LSBXXX
Source: IPT	

Table 2.1: Example of Link Coding

Source: JP1

The complete and accurate information for analysis can be obtained only if survey forms are filled in correctly and the filled information are encoded carefully. Therefore, collected data should be thoroughly checked and filed by supervisors and the survey chief by survey types and survey sections. Proper number codes for each item should also be carefully chosen and handwritten codes should be legible. Poor or indistinct handwriting can be misinterpreted easily by encoders, resulting in errors and inefficient work.

Firstly, the base map shape file should be formulated, which contains the road network classified as Expressway, Class A Roads, Class B Roads, Class C Roads. The files can be accessed via the following link:

https://www.dropbox.com/sh/h0ugvlwwggxbmla/AADAOKwl5eMRCt5KC65ONZnBa?dl=0

3 FIELD WORK

3.1 Organizational Setup

The survey team should be formed to ensure quality output and should consist of the following staffs:

- (a) **Survey chief:** S/He must have adequate experience with similar surveys and should coordinate the entire survey team under the supervision of the JPT.
- (b) **Supervisors:** They must prepare survey plans and work assignment schedules for survey staffs and give appropriate instructions.
- (c) **Surveyors:** They will conduct the field surveys at each link and node and reflect the information on the survey forms.
- (d) **Encoders:** They will encode the collected data to the data entry software.

In addition, the supervisor should implement a system for survey management to cover the following issues:

- (i) Operators/surveyors assignment.
- (ii) Schedule management; and,
- (iii) Quality control.

3.2 Survey Timeline

The timeline in Table 3.1 was implemented beginning with the preparatory works. Dates highlighted in green refer to the collection and processing of data while those in red correspond to the submittals. The activities began in the middle of August 2021 and finished by late October of the same year.

A = 11, 111 = -	August					September				October						
Activities	1	0-13	3 16	-20	23-2	27	30-3	6-1	0 1	3-17	20-24	27-1	4-8	11-15	5 18-22	25-29
I. Preparatory Works																
1 Coordination Meeting with JICA Project Team (JPT) & MMD	/															
2 Inspection and Preparation of Raw Road Data from JPT																
Coordination with Concerned Govt. Agencies and Local																
Government Units (LGUs)																
4 Orientation Meeting of the Project Team																
5 Dry Run of Field Survey																
6 Research Work																
II. Field Works																
7 Ocular visit of the target roads																
8 Street-view Survey																
III. Processing, Encoding and Preparation of Outputs																
9 Processing of field work data																
10 Encoding of Survey Forms																
11 GIS Conversion and Analysis Works																
12 Quality Assurance Check	_				_											
13 Preparation of Outputs and Submittals																
IV. Submisssion of Reports and Outputs																
14 Submission of Draft Database					_											
15 Submission of Final Database																
16 Submission of Accoplished Survey Forms																
17 Submission of GIS datasets and Maps																
18 Submission of Progress Reports																

Table 3.1: Sample of Work Schedule

3.3 Responsibilities

The supervisor should be responsible for the following:

- (i) Preparation of a detailed survey methodology and schedule in English, which should be approved prior to the commencement of the surveys;
- (ii) Establishment of office(s) as the headquarters for survey activities;
- (iii) Consideration of an appropriate survey organization for efficient operation;
- (iv) Training of the survey staff to ensure their full understanding of the survey objectives, contents, and methodologies;
- (v) Securing of insurance for the safety of surveyors;
- (vi) Obtaining of official permits from concerned authorities to conduct the surveys and;
- (vii) Conduction of regular onsite checks to monitor/control the surveys

3.4 Field Survey

In the field, the surveyors should install high resolution 360 camera on the vehicle to expedite the capture and utilize street-view technology (Mapillary¹) to collect imageries of the target. Also for survey items that require measurement, such as the width of bicycle lanes, the surveyors will manually observe and record the data.



Source: JPT

Figure 3.1: Installation of 360 Camera and Camera View

Upon return to office, the survey team shall organize, transmit and back up all road information data they have collected from the field. Street view imageries will also be uploaded for processing. Before and parallel to the field works, road information such as road width, road length, sidewalk width, no. of lanes, start and end point coordinates of each road segment shall be generated using GIS techniques. In turn, this information shall be validated in the field works and street-view imageries.

¹ Mapillary is the platform that makes street-level images and map data available to scale and automate mapping. They use technology designed to blur any faces and license plates our algorithms detect within the imagery to help reduce privacy impact.



Figure 3.2: Sample Image in the Mapillary

4 PROCESSING

4.1 Image Data Uploading into Mapillary

All data collected from the field will be stored in a database organized primarily by road class and then by road names. The geotag imageries, front and back photos, were stitched together to create a 360 image. PhotoKMLs were produced and plot out on the map to check the location of the images. Street-view imageries were processed using GoPro Fusion, GeoSetter and QGIS software and uploaded into Mapillary, a free web site where users can view their captured street-view imageries. In this site, encoders can rotate the imageries in 360 and will be able to zoom in and out. The encoders can also view the next road segment or go back to the previous section. The virtual drive-thru of the captured imageries will be guided by a parallel interactive map.

4.2 GIS Works (QGIS)

Parallel to the field works being conducted, GIS works has also commenced and involves generating measurements of the road data based on Google Earth imageries. Information generated from this activity are the total width, carriageway and sidewalk widths, length and median width of each road segments.

Location of road bridges were also researched and mapped in GIS based on existing bridge inventory from the Department of Public Works and Highways (DPWH).

4.3 Encoding Works (MS ACCESS)

Based on the survey data, encoding to input the collected data into electronic files using MS Access, wherein the outputs will be in forms, CSV and shape file formats. The encoding of data should be done accurately and in a timely manner and regular checks should be performed.

The survey covers information about the lanes, public transportation, road conditions, etc. that describe the overall physical characteristics of each road. The complete list of data items can be found in Annex A. The following steps describe how to fill out the data for each field, beginning with MS Access.

(a) Open windows explorer and go to 2022_MMRoadDB > 10_Database > 02_IndRoads and double-click on a particular road such as L5A1_5thAvenue.



Figure 4.1: Folders per Road

(b) Open windows explorer and go to 2022_MMRoadDB > 10_Database > 02_IndRoads and select a particular road such as L5A1_5thAvenue by double-clicking on the folder.

^	Name	
	J5A1_5thAvenue	
	LAB1_A	
	[■] LC51_C5	
	LCA1_CommonwealthAvenue	
	LED1_EDSA	
	LOA1_OrtigasAvenue	
	LQA1_QuezonAvenue	
	📕 LQH1_QuirinoHighway	

Figure 4.2: Selecting the folder for a specific road (5th Avenue)

(c) Double-click on 01_AccessForms.





(d) Double-click on the Access file.

	~
Name	
L5A1_5thAvenue	
J.	
Source: JPT	



(e) The access file will open as shown below.

8	り、ペーマ LSA1_Stha	venue : Database- M:\99_Submittals\2022_MN	1RoadDB\10_Database\02_IndRoads\L5	A1_5thAvenue\01_Accessi	form\LSA1_5thAvenue.accdb (Cor	ina Manansala 📥 —	ο×
File	Home Create Ext	ernal Data Database Tools Help	P Tell me what you want to a	do			
View	Paste S Format Painter	Image: Selection of the second ing Image: Selection of the second ing Filter Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second ing Image: Selection of the second	Refresh Save ♡ Spelling All × × Delete × □ More ×	$ \begin{array}{c} \bigcirc & \bigcirc & & \\ & \bigcirc & & \\ & \rightarrow & \\ & & & \\ $	B I U <u>A</u> - <u>∠</u> - <u>△</u> - ≡ 3		
All	Clipboard Is	Sort & Hiter	Records	Find	Text Formatting		^
All J Search	Access Obj 🙂 👘						
Table	s 🖈 🗖						
-	BR_MaintenanceCondition						
	BR_Structure						
-	Class_Administrative						
-	Class_Functional						
	CW_Condition						
-	CW_PavementType						
-	CW_RoadMarking						
-	FacilityType						
	LGU						
	LU_CommercialBig						
	LU_CommercialSmall						
	LU_indugmai						
-	Lo_residental						
-	Met Dame						
-	Observe Direction						
-	Paste Errors						
	Ped_Bridge						
Ready							Num Lock
Sou	rce: JPT						

Figure 4.5: MS Access Interface

(1) Understanding the Access Form

The Access Form got its design from the survey form and includes all the road and facilities attributes required for collection and inclusion in the inventory database. The form has several main sections starting with the Link Code and Road Name.

(2) Link Codes and Road Names

Unique link codes were assigned for each road sections (see Figure 4.1). Road names were also encoded in advance.

L	ED	1	001	001
Defined a " Link "	s Abbreviation of road name, e.g. ËDSA became ED	Road Class 1=Class A 2=Class B 3=Class C 4=Class D	Road Direction 001 for Northbound * this will apply for two-lane roads, 002 for Southbound	Unique segment number

Table 4.1: Link Code Format

LINK CODE	L5A1001001	
ROAD NAME	5th Avenue	
CLASS (Administrative)	National Primary	~
CLASS (Functional)	A	~
LGU	Caloocan	~
OWNERSHIP	DPWH	~
MAINTENANCE	DPWH	~
BEGIN OF POINT: LONGITUDE	120.978475	
BEGIN OF POINT: LATITUDE	14.644705	
END OF POINT: LONGITUDE	120.977766	
END OF POINT: LATITUDE	14.644737	
OBSERVATION DIRECTION	2	~
STRUCTURE	x	~
LENGTH	76.43	

Figure 4.6: Link Code and Road Name Fields

(3) Class Administrative and Class Functional

The Class Administrative field classify roads as either national primary, national secondary or national tertiary. This field was designed as a drop-down so that encoders can simply select the appropriate road classification.

LINK CODE	
ROAD NAME	
CLASS (Administrative)	Barangay Roads 🗸 🗸 🗸
CLASS (Functional)	National Primary
Ien ,	National Secondary
LGU	National Tertiary
OWNERSHIP	Provincial Roads
MAINTENANCE	Municipal and City Roads
	Barangay Roads
EGIN OF POINT: LONGITODE	Expressways
EGIN OF POINT: LATITUDE	Bypasses
END OF POINT: LONGITUDE	Provincial
END OF POINT: LATITUDE	Other

Source: JPT

Figure 4.7: Class Administrative Field

The Class Functional field classify roads as either class A, B or C and corresponds to the Class Administrative field.

LINK CODE		
ROAD NAME		
CLASS (Administrative)	Barangay Roads	×.
CLASS (Functional)		×.
LGU	A	
OWNERSHIP	В	
MAINTENANCE	D	
BEGIN OF POINT: LONGITUDE	E	
BEGIN OF POINT: LATITUDE	F	

Source: JPT

Figure 4.8: Class Functional Field

(4) Location

The Location field shows to what city or municipality or province the road section is located. However, some road segments cross between locations or LGUs. To address this, a condition was set such that, wherever the majority of the road segment is located, that is the LGU it corresponds to. Additional research regarding LGU borders may be necessary.



Figure 4.9: Road Segments Crossing over Two LGUs

(5) Road Management Ownership and Maintenance

The Ownership and Maintenance field pertains to the government body responsible for a specific road.

OWNERSHIP		~
BEGIN OF POINT: LONGITUDE	DPWH	
BEGIN OF POINT: LATITUDE	MMDA	
END OF POINT: LONGITUDE	LGU	
END OF POINT: LATITUDE	Private	
OBSERVATION DIRECTION	Provincial	
STRUCTURE	Barangay Other	

Figure 4.10: Ownership and Maintenance Field

(6) Coordinates of beginning and end of a road segment

The access form also records the x,y coordinates of the beginning and end point of each road segment or in this case the longitude and latitude position. These values are generated using GIS and are already incorporated in the access form.

BEGIN OF POINT: LONGITUDE	120.978475	
BEGIN OF POINT: LATITUDE	14.644705	
END OF POINT: LONGITUDE	120.977766	
END OF POINT: LATITUDE	14.644737	

Figure	4.11:	Coordinates	Fields

(7) Observation Direction

The observation direction records how the validation team observed the road during field work. The options are either "1" in which observation was conducted from beginning to end of the road or "2" in which observation was conducted from end to beginning of the road segment.

STRUCTURE	Other	
OBSERVATION DIRECTION	Provincial Barangay	
END OF POINT: LATITUDE	Private	
END OF POINT: LONGITUDE	LGU	
BEGIN OF POINT: LATITUDE	DOTr	
BEGIN OF POINT: LONGITUDE	MMDA	

Figure 4.12: Observation Direction Field

(8) Structure

Structure describes the road foundation. The field is a drop-down list and has six (6) options to choose from.

STRUCTURE		Other
	<u>Structure</u> <u>Types:</u>	O: Overpass/ U: Underpass/ B: Bridge/ <u>T:Tunnel</u> / V:Viaduct/ X: Others

Source: JPT

Figure 4.13: Structure Field

O : Overpass	B : Bridge
U : Underpass	T : Tunnel
V : Viaduct	X : Others (leveled roads)

(9) Road Measurements

The road measurements section of the form has nine (9) fields. These values are generated using GIS and were already incorporated in the forms except for the number of lanes that needs verification using the streetview imageries.

LENGTH	0
TOTAL WIDTH (m)	0
SIDEWALK WIDTH 1 (m)	0
CARRIAGEWAY WIDTH 1 (m)	0
NO. OF LANE 1	0
MEDIAN	0
CARRIAGEWAY WIDTH 2 (m)	0
SIDEWALK WIDTH 2 (m)	0
NO. OF LANE 2	0

Source: JPT





Source: JPT Figure 4.15: Representation of each Road Parts

Another method is by complying with the standard DPWH lane widths on national roads that states one lane has a width of 3 meters. By multiplying this standard with the number of lanes observed will give you the carriageway width. However, this does not apply to certain junctions where road widths change due to variations in the number of lanes, starting point of overpasses or underpasses or where the road branches out to several segments.

Medians refer to the center islands and they require measuring based on available satellite imagery of the road, in addition verification in the field. This also applies to measuring sidewalks.

(10) Bridge Information

The bridge information section has six (6) fields starting with the Bridge Structure which is a drop-down with the following options.



Source: JPT

Figure 4.16: Bridge Structure Types

The year the bridge was constructed would require research if no information was found during field work. SRDP referred to the DPWH Roads and Bridges Information portal to find out the details on these fields.

	BRIDGE YEAR CONSTRUCTED	0
	BRIDGE LENGTH (m)	0
	BRIDGE WIDTH (m)	0
דחו	BRIDGE WEIGHT LIMIT (Ton)	0

Source: JPT





Figure 4.18: DPWH Roads and Bridges Inventory Portal

The bridge weight limit is sometimes observe in the fieldwork and can be seen clearly on the streetview imageries.



Source: JPT

Figure 4.19: Bridge Weight Limit Signage

The same goes with the determination of the bridge maintenance condition which has three options: 1 for poor condition, 2 for acceptable and 3 for good condition. This field is a dropdown box and encoders only need to select the appropriate answer.

Factors were defined to determine the bridge maintenance condition.

Bridge Maintenance Condition	Factor/s
1 for poor condition	Bridge is unpaved or under construction
	No road markings or signages
	No bridge railings
	Appearance seems dilapidated.
2 for acceptable condition	Bridge is paved but without road markings
	Signages are faded out or old
	Bridge railings are unpainted or seems old.
3 for good condition	Bridge is paved, well-constructed
-	Have clear road markings and new signages
	Railings are painted and made of stronger material

Table 4.3:	Bridge Maintenance Condition Factor	rs
------------	-------------------------------------	----

Source: JPT



Figure 4.20: Example of a Bridge in Good Condition



Figure 4.21: Bridge with Acceptable Condition

(11) Railway Information

The railway information section has three (3) fields: Line, Structure and Station Name. All of the fields are in drop-down format in the access form.

Table 4.4:	Railwav	Information	Fields

Railway	Line	"LRT 1", "LRT 2", "MRT 3", "PNR"
	Structure	"Elevated", "At-grade", "Underground", "Other"
	Station Name	ex) Buendia

Source: JPT

The Railway Line field was observed during fieldwork. Another reference used was by looking at online maps such as OpenStreetMap or thru local knowledge of the encoders.



Figure 4.22: OpenStreetMap Reference

The Railway Structure field has four options (elevated, at-grade, underground and other). This information were observed during field work and recorded on the street view imageries.



Figure 4.23: Example of an At-grade Railway Structure



Source: JPT

Figure 4.24: Example of an Elevated Railway Structure

The Railway Station field were observed during field work and referenced with OpenStreetMap or other online maps.



Source: JPT

Figure 4.25: Ayala MRT Station

(12) Safety Facilities

The Safety Facilities section has six (6) fields: Pedestrian Crossing, Pedestrian Bridge, Underground Passage, Traffic Sign, Street Light and Street Tree.

Safety Facilities	Pedestrian Crossing (Y: Yes/ N: No)	ex) Y
	Pedestrian Bridge (Y: Yes/ N: No)	ex) N
	Underground Passage (Y: Yes/ N: No)	ex) N
	Traffic Sign (Number)	ex) 2
	Street Light (Number)	ex) 3
-	Street Tree (Y: Yes/ N: No)	ex) N

Table 4.5: Safety Facilities field

Pedestrian Crossing pertains to road crossings marked on the roads. In the form, the field is a drop-down with only two options: Y for Yes and N for No.



Source: JPT

Figure 4.26: Example of a Pedestrian Crossing

Pedestrian Bridge are overpasses crossing the roads. In the form, the field is a drop-down with only two options: Y for Yes and N for No.



Source: JPT

Figure 4.27: Example of a Pedestrian Bridge

Underground passages are much harder to determine and may require local knowledge and field verification.



Figure 4.28: Entry point of an Underground Passage

Traffic Sign pertains to the different signages found along the road. These signages have to be counted along a particular road segment.



Source: JPT

Figure 4.29: Example of Traffic Signages

Street Light are counted based on what was observed during fieldwork and reflected on the streetview imagery.



Figure 4.30: Street Lights

The field Street Trees determined if there are trees along a particular road segment and is in Yes or No format.



Source: JPT

Figure 4.31: Street Trees along the Sidewalks

(13) Dedicated Traffic Lane

The Dedicated Traffic Lane section focuses on only three types of transport: bus, motorcycle and bicycle and requires the assigned number of lanes and lane width.

 Table 4.6:
 Dedicated Traffic Lane Fields

Dedicated Traffic	Bus Lane (Number)	ex) 1
Lane	Bus Lane Width (m)	ex) 5.00
	Motorcycle Lane (Number)	ex) 1
	Motorcycle Lane Width (m)	ex) 2.00
	Bicycle Lane (Number)	ex) 1
	Bicycle Lane Width (m)	ex) 2.00

Source: JPT







Figure 4.33: Example of Motorcycle Lane

As before, the standard DPWH road widths are apply in measuring the road width of the assigned lane for buses and motorcycles. For bicycle lanes, these have to be measured physically in the field.



Figure 4.34: Measuring the Bicycle Lane

U-turn slots are also included in the inventory. The numbe of lanes it covers and road widths are determined based on captured streetview imagery and physical measurements during field work.



Source: JPT

Figure 4.35: U-turn Slot

(14) Public Transport

The Public Transport section determines PUJ and PUB stops along a particular road segment. These were observed during field work and records both on-street and off-street stops. The team has to count the number of stops made by each transport type.

 Table 4.7:
 Public Transport Fields

Public Transport	PUJ Stop	On-street	ex) 1
	(Number)	Off-street	ex) 1
	PUB Stop	On-street	ex) 1
	(Number)	Off-street	ex) 1



Figure 4.36: Screenshot of a PUB off-street stop

(15) Parking Facilities

In this section, there are two (2) fields: On-Street Parking Slot and Off-Street Parking Slot. Encoders have to record the number of parking spaces based on the streetview imagery. For Off-Street Parking Slot, aside from entering the number of parking spaces, the encoder has to enter that facility type that provides that parking.

Parking Facilities	On-Street Parking Slot (Number)	Number of parking	ex) 1
	Off-Street	Number of parking	ex) 30
	Parking Slot provided by Bldg.	Facility Type	"Residence", "Commercial Institution", "Office/Bank", "Factory/Warehouse", "School/University", "Park/Recreational", "Medical/Welfare", "Religious/Social", "Wholesale/Retail shop", "Restaurant/Entertainment", "Other"

Table 4.8:	Parking	Facilities	Fields
------------	---------	------------	--------

Source: JPT



Figure 4.37: On-Street Parking (Cars parked by the Sidewalk)



Figure 4.38: Example of Off-Street Parking

For basement and building parking, the team had to conduct research and interview on-site to collect the number of parking slots.

(16) Traffic Regulation

The Traffic Regulations section has six (6) fields pertaining to enforcement of traffic rules in each road.

Traffic Regulation	Speed Limit (km/ h)	ex) 40
(if yes, please	One-Way (N: No, if Yes, AM/PM Hour should be described)	ex) 6AM–9PM
indicate time)	Prohibition (N: No, if Yes, AM/PM Hour should be	ex) N
	described)	
	Truck Ban (N: No, if Yes, AM/PM Hour should be described)	ex) 6AM–9PM
	Parking Prohibition (N: No, if Yes, AM/PM Hour should be described)	ex) N
	Load/ Unload Prohibition (N: No, if Yes, AM/PM Hour should be describe)	ex) 6AM–9PM

Table 4.9: Traffic Regulations Fields

Source: JPT

Except for the Speed Limit, all the fields are answerable by either Yes or No with the time of enforcement included.

(17) Road Maintenance

The Road Maintenance section deals with the pavement type and condition of the carriageway and sidewalk with all the fields in drop-down format. Some factors were put into place to determine if the sidewalk and pavement condition are poor, acceptable or good.

Table 4.10: Road Maintenance Field

Road Maintenance	Sidewalk	Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground
		Condition	ex) 1: poor 2: acceptable 3: good
	Carriageway	Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground
		Condition	ex) 1: poor 2: acceptable 3: good
		Road Marking	ex) 1: poor 2: acceptable 3: good

Sidewalk Condition	Criteria
Good	1. The sidewalk is leveled and concrete
	2. No obstructions.
	3. No potholes
	4. Clearly marked or painted
	5. Width is 2meters or wider
Acceptable	1. Sidewalk slope slightly changes and is made of concrete.
	2. Minimal obstructions
	3. Some potholes
	4. Faded markings
	5. Width is 1.5 to 2 meters
Poor	1. Sidewalk slope changes drastically
	2. Not made of concrete
	3. Lots of potholes
	4. No markings or paint
	5. Width is smaller than 1.5 meters

Table 4.11: Sidewalk Condition

Source: JPT

|--|

Pavement Condition	Criteria
Good	1. Pavement is made of asphalt or concrete
	2. Clearly marked
	3. No potholes
Acceptable	1. Pavement is made of asphalt or concrete
	2. Faded road markings
	3. Some potholes
Poor	1. Pavement is bare ground or soil
	2. No road markings
	3. Lots of potholes
	4. Under construction

Source: JPT



Source: JPT

Figure 4.39: Example of a Good Pavement Condition

(18) Roadside Land Use

This section pertains to the land or building use surrounding a particular road segment and is answerable by yes or no.

		CA) 1. p00
Roadside Land	Commercial (roadside shop or small) (Y: Yes/ N: No)	ex) Y
Use	Commercial (medium or shopping mall) (Y: Yes/ N: No)	ex) N
	Industrial (Y: Yes/ N: No)	ex) Y
4	Residential (Y: Yes/ N: No)	ex) Y

Table 4.13: Roadside Land Use Fields

Source: JPT

Table 4.14:	Criteria of Commercial	
		1

Commercial Size	Criteria
Small	 Roadside shop Local commercial establishments such as eatery, laundry, small convenient store, car wash, etc. Typically, the commercial shop is situated at the ground level of a residential building.
Medium	 Shopping malls Commercial establishment is situated at the ground level of a condominium or corporate building. Gasoline stations Popular fastfood or fine dining restaurants

4.4 Accessing the Mapillary Website

The satellite images collected throughout the survey were stored in the Mapillary website, which can be accessed via www.mapillary.com. Click "explore map data", zoom in to Metro Manila, and navigate to the desired area. Since it is an open-source website, inputs that are not from SRDP, under the username srdpmapping, should be filtered out.



Source: JPT

Figure 4.1: Sample Street View Imagery from Mapillary
ANNEX A: Data Items

Data items				Data input	Data format
Link Code				ex) LA001	String (10 digits)
Class (Administrative)				"National Primary", "National Secondary", "National Tertiary", "Provincial Roads", "Municipal and City Roads", "Barangay Roads", "Expressways", "Bypasses", "Provincial", "Other"	String (30 digits)
Class (Functional)				ex) A: Class A, B: Class B, C: Class C. D: Class D, E: Class E, F: Other	String (1 digits)
Location LGU (Metro Manila)/ Province Name		"Manila", "Pasay", "Makati", "Taguig", "Mandaluyong", "San Juan", "Quezon", "Caloocan", "Valenzuela", "Malabon", "Navotas", "Marikina", "Pasig", "Pateros", "Paranaque", "Muntinlupa", "Las Pinas", "Bulacan", "Cavite", "Laguna", "Rizal", "Other",	String (15 digits)		
Road management	Ownership			"MMDA", "DPWH", "LGU","DOTr", "Private", "Provincial", "Barangay", "Other"	String (10 digits)
	Maintenance			"MMDA", "DPWH", "LGU","DOTr", "Private", "Provincial", "Barangay", "Other"	String (10 digits)
Coordinates		Beginning	Longitude	ex) 14.562519	
			Latitude	ex) 121.043057	
		End	Longitude	ex) 14.563837	
			Latitude	ex) 121.044271	
Observation Direction	(1: Begin->End, 2:	End->Begin)		ex) 1	Integer (1 digits)
Structure				O: Overpass/ U: Underpass/ B: Bridge/ T:Tunnel/ V:Viaduct/ X: Others	String (1 digits)
Length (m)				ex) 500	Integer (10 digits)
Carriageway	Total Width (m)			ex) 30.00	Real (6 digits and the 2 nd decimal places)
	Sidewalk Width (1 st direction) (m)		ex) 2.50	Real (6 digits and the 2 nd decimal places)
	Carriageway Wic	oth (1 st direction) (n	n)	ex) 10.00	Real (6 digits and the 2 nd decimal places)
	Number of lane (1 st direction)		ex) 2	Integer (2 digits)

	Data items	Data input	Data format
	Median (m)	ex) 5.00	Real (6 digits and the 2 nd decimal places)
	Carriageway Width (2 nd opposite direction) (m)	ex) 10	Real (the 2 nd decimal places)
Carriageway	Number of lane (2 nd opposite direction)	ex) 2	Integer (2 digits)
	Sidewalk Width (2 nd opposite direction) (m)	ex) 2.50	Real (6 digits and the 2 nd decimal places)
	Structure	01 Beam, 02 Truss, 03 Cantilever, 04 Arch, 05 Tied Arch, 06 Suspension, 07 Cable-stayed, 99 Other.	String (2 digits)
Bridge			
	Year constructed	ex) 2000	Integer (4 digits)
	Length (m)	ex) 100	Integer (5 digits)
	Width (m)	ex) 3.50	Real (6 digits and the 2 nd decimal places)
	Weight Limit (ton)	ex) 20.5	Real (6 digits and the 1 nd decimal places)
	Maintenance Condition	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
Railway	Line	"LRT 1", "LRT 2", "MRT 3", "PNR"	String (15 digits)
	Structure	"Elevated", "At-grade", "Underground", "Other"	String (15 digits)
	Station Name	ex) Buendia	String (15 digits)
Safety facilities	Pedestrian Crossing (Y: Yes/ N: No)	ex) Y	String (1 digits)
	Pedestrian Bridge (Y: Yes/ N: No)	ex) N	String (1 digits)
	Underground Passage (Y: Yes/ N: No)	ex) N	String (1 digits)
	Traffic Sign (Number)	ex) 2	Integer (3 digits)
	Street Light (Number)	ex) 3	Integer (3 digits)
	Street Tree (Y: Yes/ N: No)	ex) N	String (1 digits)

		Data items	Data input	Data format
Dedicated traffic lane	Bus Lane (Numb	er)	ex) 1	Integer (2 digits)
	Bus Lane Width ((m)	ex) 5.00	Real (6 digits and the 2 nd decimal places)
	Motorcycle Lane	(Number)	ex) 1	Integer (2 digits)
	Motorcycle Lane	Width (m)	ex) 2.00	Real (6 digits and the 2 nd decimal places)
	Bicycle Lane (Nu	mber)	ex) 1	Integer (2 digits)
	Bicycle Lane Wid	ith (m)	ex) 2.00	Real (6 digits and the 2 nd decimal places)
	Number of Lane	of U-turn Slot (Number)	ex) 1	Integer (2 digits)
	Length of U-turn	Slot (m)	ex) 25.00	Real (6 digits and the 2 nd decimal places)
Public transport	PUJ Stop (Number)	On-street	ex) 1	Integer (2 digits)
		Off-street	ex) 1	Integer (2 digits)
	PUB Stop (Number)	On-street	ex) 1	Integer (2 digits)
		Off-street	ex) 1	Integer (2 digits)
Parking facilites	On-Street Parking Slot (Number)	Number of parking	ex) 1	Integer (4 digits)
		Number of parking	ex) 30	Integer (4 digits)
		Facility Type	"Residence", "Commercial Institution", "Office/Bank", "Factory/Warehouse", "School/University", "Park/Recreational", "Medical/Welfare", "Religious/Social", "Wholesale/Retail shop", "Restaurant/Entertainment", "Other"	String (25 digits)

		Data items	Data input	Data format
Traffic regulation (if	Speed Limit (km	n/ h)	ex) 40	Integer (3 digits)
yes, indicate the time)	One-Way (N: No	o, if Yes, AM/PM Hour should be described)	ex) 6AM–9PM	String (9 digits)
	Prohibition (N: N	No, if Yes, AM/PM Hour should be described)	ex) N	String (9 digits)
	Truck Ban (N: No, if Yes, AM/PM Hour should be described) Parking Prohibition (N: No, if Yes, AM/PM Hour should be described) Load/ Unload Prohibition (N: No, if Yes, AM/PM Hour should be described)		ex) 6AM–9PM	String (9 digits)
			ex) N	String (9 digits)
			ex) 6AM–9PM	String (9 digits)
Road maintenance	Sidewalk	Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground	String (1 digits)
		Condition	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
	Carriageway	Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground	String (10 digits)
		Condition	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
		Road Marking	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
Roadside land use	Commercial (roa	adside shop or small) (Y: Yes/ N: No)	ex) Y	String (1 digits)
	Commercial (me	edium or shopping mall) (Y: Yes/ N: No)	ex) N	String (1 digits)
	Industrial (Y: Ye	es/ N: No)	ex) Y	String (1 digits)
	Residential (Y	: Yes/ N: No)	ex) Y	String (1 digits)

APPENDIX B: Training Presentation Slides



The Project for Comprehensive Traffic Management Plan for Metro Manila



Road Inventory

CTMP Database Training

September 2022 JICA Project Team



IX. ROAD INVENTORY

OUTLINE

- 1. Project Objective
- 2. Workflow
- 3. Methodology
- 4. Visualizing Road Inventory Data using GIS
- 5. Visualizing Road Inventory Data using Google Street View/ Mapillary

The Project for Comprehensive Traffic Management Plan for Metro Manila

1. PROJECT OBJECTIVES

Project Objective

Collect the information on the current conditions of road infrastructure and facilities on the roads.



2. WORK FLOW

PREPARATORY WORKS



PREPARATORY WORKS

Assigning LINKCODES for each Road Segments

L	ED	1	001	001
Defined as " Link "	Abbreviation of road name, e.g. ËDSA became ED	Road Class 1=Class A 2=Class B 3=Class C	Road Direction 001 for Northbound *for two-lane roads, this will apply 002 for Southbound	Unique segment number

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3. LIST OF DATAITEMS

Basic Information: Link Code ex) LA001 String (10 digits • Link ID ************************************		Data items			Data input	Data format
 Link ID Administrative road class Functional road class (Functional) Functional road class (Functional) Class (Functional) Class (Functional) Class (Functional) LGU (Metro Manila)' Province Name LGU location LGU location Ownership Maintenance Coordinates of the start and end point of each link Cobservation Direction (1: Begin->End, 2: End->Begin) Start point End point Coverass/U: Underpass/B: Bridge/ Structure 	Basic Information:	Link Code			ex) LA001	String (10 digits)
 Functional road class Functional road class Functional road class Functional road class Class (Functional) Class A, B: Class A, B: Class C, D: Class String (1 digits) D, E: Class F, F: Other Manila", "Pasay", "Makati", "Taguig", "Mandaiuyong", "San Juan", "Quezon", "Calocation", "Valenzeude", "Mutiloha", "Dessit," Mainina", "Pasay", "Makati", "Taguig", "Mandaiuyong", "San Juan", "Quezon", "Calocation", "Valenzeude", "Mutiloha", "Dessit," "Mainina", "Pasay", "Makati", "Taguig", "Mandaiuyong", "San Juan", "Quezon", "Calocation", "Valenzeude", "Mutiloha", "Dessit,", "Mainina", "Pasay", "Other", "Baranague", "Mutiloha", "Dessit,", "Rizal", "Other", "Paranague", "Mutiloha", "Derwith, "LGU", "DOTr", "Private", "Provincial", "Barangay", "Other" Maintenance Coordinates of the start and end point of each link Observation Direction (1: Begin->End, 2: End->Begin) End point Coverpass/U: Underpass/B: Bridge/ Structure Coverpass/U: Underpass/B: Bridge/ String (1 digits) 	 Link ID Administrative road class 	Class (Administrative)			"National Primary", "National Secondary", "National Tertiary", "Provincial Roads", "Municipal and City Roads", "Barangay Roads", "Expressways", "Bypasses", "Provincial", "Other"	String (30 digits)
Location LGU (Metro Manila)/ Province Name TManila", "Pasay", "Makati", "Taguig", "Manila", "Pasay", "Makati", "Taguig", "Manilabor", "Nandaluyong", "San Juan", "Quezon", "Calocation, "Valerzuela", "Maliabor", "Navotas", "Marikina", "Pasay", "Makati", "Taguig", "Manilabor", "Navotas", "Marikina", "Pasay", "Makati", "Taguig", "Manilabor", "Navotas", "Marikina", "Pasay, "Rizai", "Other", "Paranague", "Muthingha", "Las Puntas", "Baringay,", "Other", "Paranague", "Muthingha", "Las Puntas", "Baringay,", "Other", "Provincial", "Barangay", "Other", "Provincial", "Barangay, "Other", "Provincial", "Barangay, "Other", "Provincial", "Bara	Functional road	Class (Functional)			ex) A: Class A, B: Class B, C: Class C. D: Class D, E: Class E, F: Other	String (1 digits)
Maintenance Ownership Ownership Maintenance Ownership Maintenance	 class LGU location Ownership 	Location LGU (Metro M	Manila)/ Province Na	ame	"Manila", "Pasay", "Makati", "Taguig", "Mandaluyong", "San Juan", "Quezon", "Calococan", "Valeruela", "Malabon", "Navotas", "Marikina", "Pasig", "Pateros", "Paranaque", "Muntinlupa", "Las Pinas", "Bulacan", "Cavie", "Lasuna", "Rizal", "Other",	String (15 digits)
Coordinates of the start and end point of each link Maintenance "MMDA", "DPWH", "LGU", "DOTF", "Private", "Province", "Barangay", "Other" String (10 digits) Observation Direction (1: Begin->End, 2: End->Begin) ex) 14.563837 ex) 14.563837 Observation Direction (1: Begin->End, 2: End->Begin) ex) 1 ex) 1 Integer (1 digits) Structure 0: Overpass/U: Underpass/B: Bridge/ T: Turneh/ V/Viduot/X: Others String (1 digits) String (1 digits)	Maintenance	Ownership			"MMDA", "DPWH", "LGU", DOTr", "Private", "Provincial", "Barangay", "Other"	String (10 digits)
Coordinates of the start and end point of each link Observation Direction (1: Begin->End, 2: End->Begin) Coservation Direction (1: Begin->		Maintenance			"MMDA*, "DPWH", "LGU", "DOTr", "Private", "Provincial", "Barangay", "Other"	String (10 digits)
Coordinates of the start and end point of each link Start point Longitude ex) 121.043057 End point End point Longitude ex) 14.563837 Observation Direction (1: Begin->End, 2: End->Begin) ex) 1 Observation Direction (1: Begin->End, 2: End->Begin) Structure O: Overpass/ U: Underpass/ B: Bridge/ T: Tunnel/ V: Viaduct/ X: Others String (1 digits) Length (m) ex) 500 Integer (10 digits)	Consulington of the			Longitude	ex) 14.562519	
Start and end point Longitude ex) 14,563837 of each link End point Latitude ex) 121.044271 Observation Direction (1: Begin->End, 2: End->Begin) ex) 1 Integer (1 digits) Structure O: Overpass/ U: Underpass/ B: Bridge/ T:Tunnel/ V:Viaduct/ X: Others String (1 digits) Length (m) ex) 500 Integer (10 digit)	Coordinates of the		Start point	Latitude	ex) 121.043057	
Of each link End point Latitude ex) 121.044271 Observation Direction (1: Begin->End, 2: End->Begin) ex) 1 Integer (1 digits) Structure O: Overpass/ U: Underpass/ B: Bridge/ T:Tunnel/ V:Viaduct/ X: Others String (1 digits) Length (m) ex) 500 Integer (10 digit)	stant and end point			Longitude	ex) 14.563837	
Observation Direction (1: Begin->End, 2: End->Begin) ex) 1 Integer (1 digits) Structure O: Overpass/ U: Underpass/ B: Bridge/ T:Tunnel/ V:Viaduct/ X: Others String (1 digits) Length (m) ex) 500 Integer (10 digit)	of each link		End point	Latitude	ex) 121.044271	
Structure O: Overpass/ U: Underpass/ B: Bridge/ T: Ummel/ V/Viaduct/ X: Others String (1 digits) Length (m) ex) 500 Integer (10 digit		Observation Direction (1: Begin->E	nd. 2: End->Begin)	1	ex) 1	Integer (1 digits)
Length (m) ex) 500 Integer (10 digit		Structure			O: Overpass/ U: Underpass/ B: Bridge/ T:Tunnel/ V:Viaduct/ X: Others	String (1 digits)
		Length (m)			ex) 500	Integer (10 digits)
Validate and lang ex) 30.00 Real (6 digits a decimal biotection)	Width and lang	Total Width (m)			ex) 30.00	Real (6 digits and the 2 nd decimal places)
VVIULII dTIU IdTIE information (d1) → Sidewalk Width (1 ^M direction) (m) ex) 2.50 Real (6 digits ar decimal places	information (d1)	Sidewalk Width (1st direction) (m)			ex) 2.50	Real (6 digits and the 2 nd decimal places)
Carriageway Width (1 st direction) (m) ex) 10.00 Real (6 digits and decimal places)	information (u1)	Carriageway	Width (1st direction)	(m)	ex) 10.00	Real (6 digits and the 2 nd decimal places)
Number of lane (1 st direction) ex) 2 Integer (2 digits		Number of la	ne (1st direction)		ex) 2	Integer (2 digits)

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3. LIST OF DATAITEMS

	Data items		Data input	Data format
Width and Jana		Median (m)	ex) 5.00	Real (6 digits and the 2 nd decimal places)
information (d2)		Carriageway Width (2 nd opposite direction) (m)	ex) 10	Real (the 2 nd decimal places)
mormation (uz)		Number of lane (2 nd opposite direction)	ex) 2	Integer (2 digits)
		Sidewalk Width (2 nd opposite direction) (m)	ex) 2.50	Real (6 digits and the 2 nd decimal places)
		Structure	01 Beam, 02 Truss, 03 Cantilever, 04 Arch, 05 Tied Arch, 06 Suspension, 07 Cable-stayed, 99 Other.	String (2 digits)
		Year constructed	ex) 2000	Integer (4 digits)
Dridge information		Length (m)	ex) 100	Integer (5 digits)
Bridge mormation-		Width (m)	ex) 3.50	Real (6 digits and the 2 nd decimal places)
		Weight Limit (ton)	ex) 20.5	Real (6 digits and the 1 nd decimal places)
		Maintenance Condition	ex) 1; poor 2; acceptable 3; good	Integer (1 digits)
		Line	"LRT 1", "LRT 2", "MRT 3", "PNR"	String (15 digits)
Railw av information 🚽		Structure	"Elevated", "At-grade", "Underground", "Other"	String (15 digits)
		Station Name	ex) Buendia	String (15 digits)
ſ	-	Pedestrian Crossing (Y: Yes/ N: No)	ex) Y	String (1 digits)
		Pedestrian Bridge (Y: Yes/ N: No)	ex) N	String (1 digits)
Dedectrion featilities		Underground Passage (Y: Yes/ N: No)	ex) N	String (1 digits)
Pedestrian raciilles		Traffic Sign (Number)	ex) 2	Integer (3 digits)
		Street Light (Number)	ex) 3	Integer (3 digits)
		Street Tree (Y: Yes/ N: No)	ex) N	String (1 digits)
ſ		Bus Lane (Number)	ex) 1	Integer (2 digits)
		Bus Lane Width (m)	ex) 5.00	Real (6 digits and the 2 nd decimal places)
		Motorcycle Lane (Number)	ex) 1	Integer (2 digits)
Dedicated lanes		Motorcycle Lane Width (m)	ex) 2.00	Real (6 digits and the 2 nd decimal places)
		Bicycle Lane (Number)	ex) 1	Integer (2 digits)
		Bicycle Lane Width (m)	constructed ex) 2000 Integer (4 digits) h (m) ex) 100 Integer (4 digits) h (m) ex) 3.50 Real (6 digits and th ht Limit (ton) ex) 2.5 Real (6 digits and th etamace Condition ex) 1: poor 2: acceptable 3: good Integer (1 digits) ture "LER1 1", "LRT 2", "MRT 3", "PNR" String (15 digits) ture "Elevated", "A-Lgrade", "Underground", "Other" String (15 digits) n Name ex) Buendia String (15 digits) strian Crossing (Y; Yes/ N: No) ex) N String (1 digits) er (1 digits) ex) 2 Integer (3 digits) strian Bridge (Y; Yes/ N: No) ex) N String (1 digits) rground Passage (Y; Yes/ N: No) ex) N String (1 digits) ex) 2 Integer (3 digits) Integer (3 digits) ane (Width (m) ex) 5.00 Real (6 digits and th decimal places) ex) 1 Integer (2 digits) rcycle Lane (Number) ex) 2 Integer (2 digits) ex) 2.00 Real (6 digits and th decimal places) decimal pla	Real (6 digits and the 2 nd decimal places)
ridge information- ailw ay information - edestrian facilities		Number of Lane of U-turn Slot (Number)	ex) 1	Integer (2 digits)

3. LIST OF DATAITEMS

	Data items			Data input	Data format
		Length of U-tu	im Slot (m)	ex) 25.00	Real (6 digits and the 2 nd decimal places)
		DULO	On-street	ex) 1	Integer (2 digits)
DT atoma		PUJ Stop	Off-street	ex) 1	Integer (2 digits)
PISIOPS	1	DUD Oter	On-street	ex) 1	Integer (2 digits)
and the properties of the set		PUB Stop	Off-street	ex) 1	Integer (2 digits)
Parking	~	On-Street Parking Slot (Number)	Number of parking	ex) 1	Integer (4 digits)
			Number of parking	ex) 30	Integer (4 digits)
			Facility Type	"Residence", "Commercial Institution", "Office/Bank", "Factory/Warehouse", "School/University", "Park/Recreational", "Medical/Weffare", "Religious/Social", "Wholesale/Retail shop", "Restaurant/Entertainment", "Other"	String (25 digits)
		Speed Limit (k	(m/ h)	ex) 40	Integer (3 digits)
		One-Way (N: No, if Yes, AM/PM Hour should be described)		ex) 6AM-9PM	String (9 digits)
Policies and		Prohibition (N: No, if Yes, AM/PM Hour should be described)		ex) N	String (9 digits)
regulations		Truck Ban (N: No, if Yes, AM/PM Hour should be described)		ex) 6AM-9PM	String (9 digits)
- 5		Parking Prohibition (N: No, if Yes, AM/PM Hour should be described)		ex) N	String (9 digits)
		Load/ Unload Prohibition (N: No, if Yes, AM/PM Hour should be describe)		ex) 6AM-9PM	String (9 digits)
		Cidewolk	Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground	String (1 digits)
		Sidewalk	Condition	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
Conditions			Pavement Type	A: Asphalt, C: Cement/Concrete, G: Ground	String (10 digits)
		Road	Condition	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
			Road Marking	ex) 1: poor 2: acceptable 3: good	Integer (1 digits)
		Commercial (r	oadside shop or small) (Y: Yes/ N: No)	ex) Y	String (1 digits)
		Commercial (r	medium or shopping mall) (Y: Yes/ N: No)	ex) N	String (1 digits)
		Industrial (Y: Y	(es/ N: No)	ex) Y	String (1 digits)
		Residential (Y	: Yes/ N: No)	ex) Y	String (1 digits)

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3. LIST OF DATAITEMS



List of Data Items



4. VISUALIZING ROAD INVENTORY DATAUSING GIS

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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

V: Viaduct

X: Others

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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY



Maintenance Condition:

ex) 1 - poor; 2 - acceptable; 3 - good



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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY





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Safety Facilities	Pedestrian Crossing (Y: Yes/N: No) Pedestrian Bridge (Y: Yes/N: No) Underground Passage (Y: Yes/N: No) Traffic Sign (Number) Streetlight (Number) Street Tree (Y: Yes/N: No)	ex) Y ex) N ex) N ex) 2 ex) 3 ex) N
	Street Tree (Y: Yes/N: No)	ex) N



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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

Safety Facilities	Pedestrian Crossing (Y: Yes/N: No)	ex) Y
	Pedestrian Bridge (Y: Yes/N: No)	ex) N
	Underground Passage (Y: Yes/N: No)	ex) N
	Traffic Sign (Number)	ex) 2
	Streetlight (Number)	ex) 3
	Street Tree (Y: Yes/N: No)	ex) N



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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

Safety Facilities	Pedestrian Crossing (Y: Yes/N: No) Pedestrian Bridge (Y: Yes/N: No) Underground Passage (Y: Yes/N: No) Traffic Sign (Number) Streetlight (Number)	ex) Y ex) N ex) N ex) 2 ex) 3
	Streetlight (Number) Street Tree (Y: Yes/N: No)	ex) 3 ex) N



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5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

Safety Facilities	Pedestrian Crossing (Y: Yes/N: No) Pedestrian Bridge (Y: Yes/N: No) Underground Passage (Y: Yes/N: No) Traffic Sign (Number) Streetlight (Number) Street Tree (Y: Yes/N: No)	ex) Y ex) N ex) N ex) 2 ex) 3 ex) N
	Street Tree (Y: Yes/N: No)	ex) N



Safety Facilities	Pedestrian Crossing (Y: Yes/N: No)	ex) Y
na dati kazar hake ta ta 🔎 Ukuuta di-kukuka keta berdaka keta keta k	Pedestrian Bridge (Y: Yes/N: No)	ex) N
	Underground Passage (Y: Yes/N: No)	ex) N
	Traffic Sign (Number)	ex) 2
	Streetlight (Number)	ex) 3
	Street Tree (Y: Yes/N: No)	ex) N



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Dedicated Traffic Lane	Bus Lane (Number) Bus Lane Width (m) Motorcycle Lane (Number) Motorcycle Lane Width (m) Bicycle Lane (Number) Bicycle Lane Width (m)	ex) 1 ex) 5.00 ex) 1 ex) 2.00 ex) 1	
	Bicycle Lane Width (m)	ex) 2.00	





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PUJ Stop (Number)	On-street Off-street	ex) 1 ex) 1
PUB Stop (Number)	On-street Off-street	ex) 1 ex) 1



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On-Street Parking Slot (Number) Off-Street parking Slot provided by Bldg. Number of parking Number of parking Facility Type ex) 1 ex) 30

"Residence", "Commercial Institution", "Office/Bank", "Factory/Warehouse", "School/University", "Park/Recreational", "Medical/Welfare", "Religious/Social", "Wholesale/Retail shop" "Restaurant/Entertainment", "Other"



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Traffic Regulation	Speed Limit (km/ h)	ex) 40
(if yes, please indicate time)	One-Way (N: No, if Yes, AM/PM Hour should be described)	ex) 6AM–9PM
	Prohibition (N: No, if Yes, AM/PM Hour should be described)	ex) N
	Truck Ban (N: No, if Yes, AM/PM Hour should be described)	ex) 6AM-9PM
	Parking Prohibition (N: No, if Yes, AM/PM Hour should be described)	ex) N
	Load/ Unload Prohibition (N: No, if Yes, AM/PM Hour should be describe)	ex) 6AM–9PM

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Road Maintenance	Sidewalk Carriageway	Pavement Type Condition Pavement Type Condition Road Marking	A: Asphalt, C: Cement/Concrete, G: Grou ex) 1: poor, 2: acceptable, 3: good A: Asphalt, C: Cement/Concrete, G: Grou ex) 1: poor, 2: acceptable, 3: good ex) 1: poor, 2: acceptable, 3: good	ind ind
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Road Maintenance	Sidewalk Carriageway	Pavement Type Condition Pavement Type Condition Road Marking	A: Asphalt, C: Cement/Concrete, G: Ground ex) 1: poor, 2: acceptable, 3: good A: Asphalt, C: Cement/Concrete, G: Ground ex) 1: poor, 2: acceptable, 3: good ex) 1: poor, 2: acceptable, 3: good
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- 5. VISUALIZING ROAD INVENTORY USING GOOGLE STREET VIEW / MAPILLARY

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NEXT STEPS

- Storing the inventory data
- Visualization and analysis using GIS
- Using the findings in formulating countermeasures

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE PROJECT FOR COMPREHENSIVE TRAFFIC MANAGEMENT PLAN FOR METRO MANILA

TECHNICAL REPORT NO. 7 MANUAL ON TRAFFIC BOTTLENECK DATABASE

November 2022

ALMEC CORPORATION ORIENTAL CONSULTANTS GLOBAL CO., LTD. TRANSPORTATION RESEARCH INSTITUTE CO., LTD.

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ABBREVIATIONS

CTMP	Comprehensive Traffic Management Plan
JICA	Japan International Cooperation Agency
JPT	JICA Project Team
LGU	local government unit
MMDA	Metropolitan Manila Development Authority
TBN	traffic bottleneck

Factor item	Checkpoint	Factor of Congestion
	Number of lance	Lack of lanes
	Number of lanes	Insufficient road width
Road infrastructure		Wronggeometriclayout
	Intersection layout	Inadequate corner cutting
	-	Improper location of road facilities (road markings)
		Inadequate traffic signal control (If No Signal)
	Signal timing	Inadequate traffic signal control (If With Signal)
		Bad visibility of traffic signal
	Left-turning or oncoming	No left-turn lane
Traffic regulation	vehicles	Insufficient left-turn lane length
		Conflict between left-turn and through movements
		Right-turning vehicles blocking vehicles proceeding straight ahead
	Right-turning vehicles	Improper stop line position
		Improper channelization
		Speed reduction due to large vehicle
Traffic situation	Large vehicle	Obstruction by motorcycles
frame situation	Luige venicie	Obstruction by bicycles
		Obstruction by pedestrians
	Railway Crossing	Stopped traffic at at-grade railway crossings
	Driveway from roadside shop	Traffic flow in/out from intersections and narrow streets
Environment of	billeway non roadside shop	Traffic flow in/out from ICs at expressways
Roadside and		Speed reduction due to PUV stops
intersection	PUJ, PUV	Speed reduction due to PUJ stops
		Lane reduction with dedicated bus and priority lanes
	On-street parking	Obstruction of travel by on-street parking
	Over capacity	Excess traffic capacity at intersections
	Over capacity	Excess traffic capacity at non-intersections
Traffic Demand		Concentration of traffic at specific times
	Concentrated traffic	Concentration of traffic on roadside facilities at specific times and periods
		Concentration of traffic at specific periods during events or incidents
Others	Construction	Lane blockage due to construction
	Clogging of downstream	Clogging with congestion downstream
		Pedestian is obstructed
Others		Bike is obstructed
		Motorcycle is obstructed
	Free Comment (if any)	
1 OVERVIEW

The corridor database contains information that can be used to check the physical characteristics of road sections, identify traffic management issues, and formulate necessary countermeasures. The information is collected from site surveys, road inventory survey, and street view data.

The database was developed based on the results of traffic demand analysis, traffic count survey, Waze data, and inventory data. Based on these, the database will be able to cover both the demand and the supply side to identify traffic management issues.

The demand side is based initially on the demand forecast and will, later on, be supplemented by traffic count surveys for accuracy.

The supply side is based on the inventory data. By inspecting the corridors, inconsistencies in the road widths, bike lanes, and pedestrians can be studied. For example, sections with inconsistent road width tend to generate bottlenecks. Knowing this, future bottlenecks may be prevented, and current chokepoints may be resolved.

In this report, "corridor" refers to the circumferential roads, C1 to C6, and radial roads, R1 to R10. However, the procedures in this manual is also applicable to other roads.

As shown in Figure 1.1, the corridor database is composed of the 1) corridor profile, and 2) corridor analysis sheets. The corridor profile covers longer road segments and was developed by following the flowchart in Figure. It contains information on the corridors' physical characteristics, traffic count, and travel speed. On the other hand, corridor analysis sheets are developed to identify the factor of Congestion (FOC) and countermeasures from road inventory data.



Figure 1.1 Corridor database

Table 1.1 shows the factor of congestion (FOC) which were developed for the corridor analysis sheets, wherein detailed issues can be identified at each location. Some FOC items were added for the corridor traffic issues from the bottleneck database.

Table 1.1: Factor of congestion (FOC)

2 CORRIDOR PROFILE

Data in the corridor profile data show each road's physical characteristics per segment. Based on this, traffic issues can be identified using the criteria in Table 2.1.

	Criteria and Issue
	ROW width is inconsistent
ROW	ROW has a narrow section
	Limited capacity (VCR>0.9)
	Carriageway width is inconsistent ¹
	Carriageway has a narrow section ²
Carriageway	Poor road marking (Poor length>0%)
	Poor road pavement (Poor length>0%)
Riko Lono	Unavailable/Low availability (% of length<50%)
DIKE Larie	Different width between direction (diff.= > 20%)
	Unavailable/Low availability (% of length<80%)
Sidewalk	Different width between direction (diff.= > 20%)
Sheewalk	Poor condition (Poor length>0%)
	Sidewalk has a narrow section 2
Traffic Light	Streetlight is not enough (no./km = < 20/km)

Table 2.1: Criteria and issues

Minimum width is less than 60% of average width. Maximum width is more than 140% of average width.
 Minimum width is less than 60% of average width.

The corridor profile was developed using the flowchart in Figure 2.1.



Figure 2.1: Workflow of development of corridor profile

2.1 Methodology

2.1.1 Preparation of Profile Sheet

The profile sheet is in PowerPoint format with columns and rows as shown 2.2. the profile sheets format should be prepared for each section. Adjust the number of columns and rows, if necessary.



Figure 2.2: Corridor profile sheet

Road inventory data was visualized using QGIS software, and then organized using corridor profile sheets. The details of the shape files used can be found in Table 2.3.



Table 2.2: Data items for corridor profile





2.1.2 Preparation of Profile Map

The Profile map should contain 5 layers: the road network files, railway station, pedestrian bridge, traffic signal category of TBNs data, and segment layers. The scale bar and North should also be displayed as shown from Figure 2.3 to Figure 2.7.



Figure 2.3: Preparation Profile Map (1)



Figure 2.4: Preparation Profile Map (2)





Figure 2.5: Preparation Profile Map (3)



Figure 2.6: Preparation Profile Map (4)



Figure 2.7: Preparation Profile Map (5)

For the final corridor map in the Corridor Database Profile Sheet, the extent of the road segments should reflect 1000m in the scale bar. The road segments should be in horizontal orientation.



Figure 2.8: Preparation Profile Map (6)

Unselect the OpenStreetMap layer and only select the road network map, railway station, pedestrian bridge, traffic signal category of TBNs, and segment layers. If the road segment reflects 1000m in scale bar and horizontal in orientation, screenshot the map. The north arrow and scale bar should be included.



Figure 2.9: Preparation Profile Map (7)

Paste the screenshot in the Corridor Database Profile Sheet. Divide the road segment into sections based on major intersections. Add/delete columns, if necessary.



2.1.3 Grouping of data

To summarize the data in each section, the group name should be input for each link based on the division of road segments. Firstly, a new field should be added to the attribute table of the inventory survey data. Set the data type as string and length at 10. The preparation for the grouping of data is described in Figures 2.10, 2.11, and 2.12. The basis for naming each group is described in Figure 2.13.

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Layers $\checkmark (\underline{a} \in \Sigma, \underline{c}_{n} \to [\underline{a}] \cong \underline{b}$ $\rightarrow ExtVol thp$ $\Rightarrow ExtVol$ $[\underline{p} RelinveyStation$ $\downarrow Pedestrian Bridge \nabla\Rightarrow \bigcup^{r} LOC Map : \mathcal{L}^{r-}$	3 4 5 6 7	LPT3001003 LAQ2001008 LAQ2001009 LAQ2001010 LAQ2001011	Pinatubo P. Aquino Avenue P. Aquino Avenue P. Aquino Avenue P. Aquino Avenue	National Tertiary C National Secon B National Secon B National Secon B National Secon B	Type Provid Length	Text er type string 10	(string)	Cancel	121.04667323 120.96184100 120.96175400 120.96033000 120.96019900	select "Text (string)". Length will depend on how long the group name will be but, 10 characters would be enough. Click "OK". Then, click "Save edits"
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Figure 2.10: Preparation of Grouping Data (1)



Figure 2.11: Preparation of Grouping Data (2)



Preparation of Grouping Data (3) Figure 2.12:



Figure 2.13: Preparation of Grouping Data (4)

2.1.4 **Exporting of data**

After grouping all required profile and speed data, export data in .csv format. The EstVol data are not to be grouped but need to be exported the same way as the profile and speed data. EstVol



data is generated from the demand forecast results.

Figure 2.14: Preparation of Exporting Data (1)



Figure 2.15: Preparation of Exporting Data (2)

If the .csv file is Read-Only, save it as an Excel file (.xlsx format).

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5	LSR500100 S	iantolan F	National	SB	Valenzu	ela DPWH	DPWH	120.9954	14.68902	120.9955	14.68915	1 X	14.27363	6	3	1.047	1	0	3	1.047	1 -		
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9	LSR500100 S	iantolan F	National	SB	Valenzu	ela DPWH	DPWH	120.9947	14.69034	120.9945	14.69039	1 X	25.55039	6	3	1.047	1	0) 3	1.047	1 -		
10	LSR500100 S	iantolan F	National	SB	Valenzu	ela DPWH	DPWH	120.9945	14.69039	120.9941	14.69049	1 X	41.64178	6 6	3	1.047	1	0) 3	1.047	1 -		
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20	LBU40010 F	Bllumen	t National	SB	Mandal	uyc DPWH	DPWH	121.027	14.57731	121.0273	14.57668	1 X	75.46517	6	0.5	3	1	0) 3	3 0.5	1 -		
21	LBU40010 F	Bllumen	t National	SB	Mandal	uyc DPWH	DPWH	121.0273	14.57668	121.0277	14.57574	1 X	112.124	6	0.5	3	1	0	3	3 0.5	1 -		
22	L1520010(1	5th Aven	National	SB	Quezon	DPWH	DPWH	121.0617	14.61516	121.0619	14.61496	2 X	25.64	6	1.479	6	2	0) C	1.479	0 -		
23	L1520010(1	5th Aven	National	SB	Quezon	DPWH	DPWH	121.0619	14.61496	121.0619	14.61487	2 X	10.74	6	1.479	6	2	0) 0	1.479	0 -		
24	L1520010(1	5th Aven	National	SB	Quezon	DPWH	DPWH	121.0619	14.61487	121.0622	14.61406	2 X	97.06	6 6	1.479	6	2	0) 0	1.479	0 -		
25	L1520010(1	5th Aven	National	SB	Quezon	DPWH	DPWH	121.0622	14.61406	121.0626	14.61321	2 X	101.31	6	1.479	6	2	C) 0	1.479	0 -		
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Figure 2.16: Preparation of Exporting Data (3)

2.1.5 Calculations for the compiled values

2.1.5.1 Preparation of data on infrastructure and facilities

1. Compile all profile, speed, and Estvol data in 1 Excel file. Separate speed and profile into "Sheets"

2. Move the group name of speed and profile data to the first column of each sheet in Excel file

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1791 C55	\$1_2		1	1	2 Y		0	0	1		3	1	1	0	0	0	0	0
1792 C55	32_1		0	1	2 N		0	0	1		3	1	1	0	0	0	0	0
1793 C55	32_1		0	2	2 Y		0	0	1		3	1	1	0	0	0	0	0
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Figure 2.17: Calculation works (1)

3. Create another 2 sheets in the same Excel file for Northbound and Southbound "Infrastructure and Facilities" data



Figure 2.18:	Calculation	works	(2)
1 igure 2.10.	Calculation	WUINS	(4)

3. In "NB" sheet, the following items should be calculated based on the exported profile data.

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A2	• × ~ fr f	Road Section Length	(m)									. *
1	A	В	с	D	E	F	G	н	1	J	к	L 🖻
1		C1NB1_1	C1NB1_2	C1NB1_3	C1NB1_4	C1NB2_1	C1NB2_2	C2NB1_1	C2NB1_2	C2NB1_3	C2NB2_1	C2NB2_2
2	Road Section Length (m)	878.9	1483.3	423.1	700.6	1836.0	717.7	1374.0	1320.8	759.8	647.4	1617.9
3	Road Width (m)	26.3	28.6	38.6	24.8	17.8	29.7	11.3	13.4	30.8	35.6	30.5
4	Carriageway width	6 - 9.2 - 12	6 - 9.2 - 12	6 - 8.1 - 9	9 - 9 - 9	6 - 6.5 - 12	9 - 10.9 - 12	3 - 4.8 - 6	6 - 6 - 6	6 - 8.4 - 12	9 - 9 - 9	6 - 9.2 - 12
5	No. of Lanes	2 - 3.1 - 4	2 - 3.1 - 4	2 - 2.6 - 3	3 - 3 - 3	2 - 2.2 - 4	3 - 3.6 - 4	1 - 1.6 - 2	2 - 2 - 2	2 - 2.8 - 4	3-3-3	2 - 3.1 - 4
6	Carriageway Pavement	0/100/0	0/100/0	0/100/0	0/100/0	0/64/36	0/46/54	0/100/0	0/100/0	6/94/0	0/98/2	0/100/0
7	Bike lane width	0-0-0	0 - 0.2 - 2	0 - 0 - 0	0 - 1.3 - 2	2 - 2 - 2	0 - 1.8 - 2	0-0-0	0-0-0	0-0-0	0-0-0	0 - 0 - 0
8	Bikability	0	12	0	66	100	89	0	0	0	0	0
9	Sidewalk Width	1.6 - 1.6 - 1.6	0 - 1.9 - 3.4	0 - 14.5 - 24.7	0 - 1.1 - 3.4	0 - 2.3 - 3.1	0 - 1.8 - 2.5	0 - 1.7 - 2	0 - 1.3 - 1.5	0 - 4.9 - 7.3	7.3 - 7.3 - 7.3	7.3 - 9.2 - 15
10	Sidewalk Pavement	0/100/0	0/100/0	0/100/0	0/100/0	0/92/8	0/40/60	0/100/0	0/100/0	0/100/0	0/100/0	0/100/0
11	Walkability	100	77	84	33	99	91	94	94	99	100	100
12	Road marking	46/54/0	0/100/0	0/100/0	0/100/0	0/64/36	0/76/24	51/47/2	0/100/0	6/94/0	0/100/0	0/100/0
13	Streetlight	56.9	41.1	47.3	50.0	38.7	39.0	61.1	50.7	55.3	68.0	53.2
14	Bus lane width	0	0	0	0	0	0	0	0	0	0	0
15	Bus Segregated	0	0	0	0	0	0	0	0	0	0	0
16	Median Availability	4.7	6.5	7.0	6.7	1.0	3.7	0.0	0.1	1.3	3.1	3.1
17	U-turn	0	0	0	0	0	0	0	0	0	0	0
18	Pedestrian Bridge	N	Y (partial)	N	N	Y (partial)	N	Y (partial)	Y (partial)	Y (partial)	N	Y (partial)
19	MRT/LRT	20 -	LRT 2	LRT 2	LRT 2	-	-		LRT-1	2 . .	0.00	
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Figure 2.19: Calculation works (3)

- 5. Each item in NB should be calculated using Profile data based on the following:
 - a Road Section Length: total length all road sections with same group name
 - b Road Width: average width of all road sections with same group name
 - c Carriageway width: minimum mean maximum carriageway width of all road sections with same group name
 - d **No. of Lanes:** minimum mean maximum number of lanes of all road sections with same group name
 - e **Carriageway Pavement:** % of poor / % of fair / % of good carriageway condition in road sections with same group name
 - $f~~\mbox{Bike lane width: minimum mean maximum bike lane width of all road sections with same group name$
 - g Bikeability: bikeability of all road sections with same group name
 - h **Sidewalk Width:** minimum mean maximum sidewalk width of all road sections with same group name
 - i **Sidewalk Pavement:** % of poor / % of fair / % of good sidewalk pavement condition in road sections with same group name
 - j Walkability: walkability of all road sections with same group name
 - k Road marking: % of poor / % of fair / % of good road marking condition in road sections with same group name
 - 1 Streetlights: number of streetlights per kilometer of road sections with same group name
 - $m\,$ Bus lane width: bus lane width of all road sections with same group name
 - n **Bus segregated:** presence of bus lane physical barrier of all road sections with same group name based on Google Streetview or Mapillary
 - o Median Availability: median width of all road sections with same group name
 - p U-turn: total number of U-turns in all road sections with same group name
 - q **Pedestrian Bridge:** presence of bus lane physical barrier of all road sections with same group name
 - r MRT/LRT: railway line in all road sections with same group name

6. In the "SB" sheet, the following items should be calculated based on the exported profile data.

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1		C1SB1_1	C1SB1_2	C1SB1_3	C1SB1_4	C1SB2_1	C1SB2_2	C2SB1_1	C2SB1_2	C2SB1_3	C2SB1_3	C2
2	Length (m)	874.80	1324.89	321.68	722.74	1286.48	796.96	1373.96	1320.79	763.96	763.96	6
3	Carriageway width	6 - 10.8 - 15	9 - 9 - 9	9-9-9	6 - 8 - 9	6-6-6) - 11.3 - 1	3 - 4.8 - 6	6 - 6 - 6	5 - 8.1 - 12	6 - 8.1 - 12	9
4	No. of Lanes	2 - 3.6 - 5	3 - 3 - 3	3 - 3 - 3	2 - 2.7 - 3	2 - 2 - 2	3 - 3.8 - 4	1 - 1.6 - 2	2 - 2 - 2	2 - 2.7 - 4	2 - 2.7 - 4	3
5	Carriageway Pavement	11/89/0	0/100/0	0/100/0	0/100/0	0/54/46	0/100/0	0/100/0	0/100/0	6/94/0	6/94/0	0/
6	Bike lane width	0 - 0 - 0	0.3 - 0 - 2	0 - 0 - 0	0 - 0 - 0	2 - 2 - 2	1.6 - 0 - 2	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0
7	Bikability	0	16	0	0	100	78	0	0	0	0	
8	Sidewalk Width	0 - 1.5 - 2) - 1.9 - 2.8	2 - 2.2 - 2	0 - 2 - 2.2	0 - 2 - 3.1) - 1.5 - 2.8) - 1.5 - 2.3) - 1.3 - 1.	0 - 2 - 2.5	0 - 2 - 2.5	.5 -
9	Sidewalk Pavement	0/100/0	0/100/0	0/100/0	0/100/0	0/89/11	0/100/0	0/100/0	0/100/0	0/100/0	0/100/0	0/
10	Walkability	80	97	100	99	99	93	94	94	94	94	
11	Road marking	37/63/0	0/100/0	0/100/0	0/100/0	0/54/46	0/100/0	51/47/2	0/100/0	6/94/0	6/94/0	0/
12	Streetlight	54.9	50.6	31.1	33.2	31.1	48.9	61.1	50.7	36.7	36.7	
13	Bus lane width	0	0	0	0	0	0	0	0	0	0	
14	Bus Segregated	0	0	0	0	0	0	0	0	0	0	
+	MMTM_IRE_2018v011002 Profile_E	Data Speed_Data S	peed_Calc Est. V	ol Data Grp	NB SB For m	inimum section	Est. Vol Summ	ary Calc 🕀	1			

Figure 2.20: Calculation works (4)

7. Each item in SB should be calculated using Profile data based on the following:

- a Road Section Length: total length all road sections with same group name
- b **Carriageway width:** minimum mean maximum carriageway width of all road sections with same group name
- c **No. of Lanes:** minimum mean maximum number of lanes of all road sections with same group name
- d **Carriageway Pavement:** % of poor / % of fair / % of good carriageway condition in road sections with same group name
- e **Bike lane width:** minimum mean maximum bike lane width of all road sections with same group name
- f Bikeability: bikeability of all road sections with same group name
- g **Sidewalk Width:** minimum mean maximum sidewalk width of all road sections with same group name
- h **Sidewalk Pavement:** % of poor / % of fair / % of good sidewalk pavement condition in road sections with same group name
- i Walkability: walkability of all road sections with same group name
- j Road marking: % of poor / % of fair / % of good road marking condition in road sections with same group name
- $k\$ Streetlights: number of streetlights per kilometer of road sections with same group name
- 1 Bus lane width: bus lane width of all road sections with same group name
- m **Bus segregated:** presence of bus lane physical barrier of all road sections with same group name based on Google Streetview or Mapillary

2.1.5.2 Preparation of data on traffic demand characteristics

For the Estimated Traffic Capacity, PCU, Persons, % of Truck, % of PUV, and % of MC, the data will be from the exported data of EstVol. Grouping of links is not necessary because these data are manually entered.

For the speed, the northbound and southbound data will be from the exported Waze data. Grouping of links is also necessary for all sets of data to correspond.

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6	28	Capacity (NB)	13.2	39.6	39.6	39.6					19.8	19.8	66	66	66	39.6	
/	31	Persons (NB)	10.231	21.47	56.042	43.196					27.474	72.207	57.912	34.753	33.376	42.462	
8	13	PCU (NB)	8.613	23.352	44.686	38.65					13.683	14.596	38.679	44.558	43.557	21.738	
9	20	% of PUV (NB)	52.3	32.1	60.7	16					19.6	21.1	17.5	23	17.8	15.8	
10	19	% of Truck (NB)	1.1	4.4	2.1	4.1					22.3	20.5	9.3	7.1	5.1	2.3	
11	21	% of MC (NB)	7.9	17.2	9.4	14					20.9	22.5	23.9	13	12.7	10	
12	28	Capacity (SB)					39.6	99	13.2	13.2							
13	31	Persons (SB)					27.126	35.922	12.085	28.038							
14	13	PCU (SB)					28.544	55.531	7.897	17.61							
15	20	% of PUV (SB)					41.4	30.4	8.9	18.5							
16	19	% of Truck (SB)					4.4	4.6	6.9	1.8							
17	21	% of MC (SB)					10.7	21.1	18.8	23.7							
18	Column	0	CINB1_1	CINB1_2	CINB1_3	C1NB1_4	C1NB2_1	C1NB2_2	C2NB1_1	C2NB1_2	C2NB1_3	C2NB2_1	C2NB2_2	C2NB2_3	C2NB3_1	C2NB3_2	
19		Capacity	13.2	39.6	39.6	39.6	39.6	99.0	13.2	13.2	19.8	19.8	66.0	66.0	66.0	39.6	
20		0	40.2	24.5	56.0	42.2	27.4	25.0	12.4	20.0	27.5	72.2	67.0	24.0	22.4	12.5	
21		Persons	10.2	21.5	56.0	43.2	27.1	35.9	12.1	28.0	27.5	12.2	57.9	34.8	33.4	42.5	
22		PCU	8.6	23.4	44.7	38.7	28.5	55.5	7.9	17.6	13.7	14.6	38.7	44.6	43.6	21.7	
23		Speed (Rightward)	15.3	18.1	17.6	17.9	20.0	21.0	15.2	12.6	13.3	13.3	11.9	22.3	21.7	11.8	
24		Speed (Leftward)	15.3	15.0	12.2	12.2	20.0	15.2	15.2	12.6	10.4	10.4	11.9	15.8	19.9	14.9	
25		% of PUV	52.3	32.1	00.7	16.0	41.4	30.4	8.9	18.5	19.6	21.1	17.5	23.0	17.8	15.8	
26		% of Iruck	1.1	4.4	2.1	4.1	4.4	4.6	0.9	1.8	22.3	20.5	9.3	/.1	5.1	2.3	
21		% OT MC	7.9	17.2	9.4	14.0	10.7	21.1	18.8	23.7	20.9	22.5	23.9	13.0	12.7	10.0	
18		MMTM_IRE_2018v011	002 Profile_D	ata Speed_I	Data Speed	Calc Est. V	ol Data Grp	NB SB	For minimu	n section Est	. Vol Sum	mary Calc	(+) ; [4]	1			F
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Figure 2.21: Calculation works (5)

1. For speed data, create another sheet for speed calculations. The data are calculated based on the exported data of Speed shp file.

- 2. The values for speed are calculated based on the following:
 - a Total Length: total length of all road sections with same group name
 - b Total Time: total time based on the speed and length of all road sections with same group name

$$Time_i = \frac{Length_i}{Speed_i}$$
$$Total Time = \sum Time_i$$

c Average Speed: average based on the total length and total time of all road sections with same group name

		1		d _ Tote	al Length		
		Aver	uye spee	$a = -\frac{1}{Tot}$	tal Time		
	А	В	С	D	E	F	G
1		C1NB1_1	C1NB1_2	C1NB1_3	C1NB1_4	C1NB2_1	C1NB2_2
2	Total Length (m)	1335.52317	1332.58008	327.07548	735.57617	1862.79954	1022.62336
3	Total Time (s)	0.087057779	0.07374737	0.018565764	0.041039931	0.093264665	0.048744622
4	Rightward	15.34065284	18.06952692	17.61712977	17.92342594	19.97326151	20.97920385
5							
6		C1SB1_1	C1SB1_2	C1SB1_3	C1SB1_4	C1SB2_1	C1SB2_2
7	Total Length (m)	1315.42957	1307.39714	328.53026	728.40759	1862.79954	1027.48445
8	Total Time (s)	0.086181574	0.087177861	0.027013484	0.059934348	0.093264665	0.06742523
9	Leftward	15.26346647	14.99689399	12.16171359	12.15342486	19.97326151	15.23887194
		Figure	2.22: Calc	ulation work	(S (6)		

3. Create another sheet for calculations of Traffic Capacity, PCU, Persons, % of Truck, % of PUV, and % of MC.

	Profile_Data Speed_	Data Speed_Calc	Est. Vol Data	Grp	NB	SB	For minimum section	Est. Vol	
--	---------------------	-----------------	---------------	-----	----	----	---------------------	----------	--

Figure 2.23: Calculation works (7)

3. Using QGIS, zoom to the road section being considered based on the corridor database profile map. Select a link (line feature) within its extent.

5. In the excel sheet, input the unique "LB" code for each NB and SB link in Rows 2 and 3. The cells below should be automatically filled out. If a road section has only 1 link both for NB and SB, check the arrowhead if it is going NB or SB and input the code in either NB or SB and leave the other as blank.



Figure 2.24: Calculation works (8)

6. The data are calculated to get the average values of Capacity, Persons, PCU, % of PUV, % of truck, % of MC for NB and SB.

7. For speed, the values are from the sheet where speed calculations were made.

	Α	В	С	D	E	F	G
1					C1		
19		Capacity	13.2	39.6	39.6	39.6	39.6
20							
21		Persons	10.2	21.5	56.0	43.2	27.1
22		PCU	8.6	23.4	44.7	38.7	28.5
23		Speed (Rightward)	15.3	18.1	17.6	17.9	20.0
24		Speed (Leftward)	15.3	15.0	12.2	12.2	20.0
25		% of PUV	52.3	32.1	60.7	16.0	41.4
26		% of Truck	1.1	4.4	2.1	4.1	4.4
27		% of MC	7.9	17.2	9.4	14.0	10.7

Figure 2.25: Calculation works (9)

MS Excel functions used for the calculations can be found in Table 9.3.

Table 2.3: Useful Excel functions using in the calculation of indicators

IF	Logical function that returns value if a condition is true or a condition is false
SUMIF	Calculates the sum of a range based on a condition

SUMPRODUCT	Sums the product of a range
CONCATENATE	Joins two or more text strings into one string
MAXIF	Returns the maximum value of a range based on a condition
MINIF	Returns the minimum value of a range based on a condition
AVERAGEIF	Returns the average value of a range based on a condition
VLOOKUP	Finds the value in a range by row
INDEX	Returns the value in a range by row and column
МАТСН	Locates the specified item in a range and returns the lookup value
IFERROR	Returns a specified value if the formula evaluates an error
LEFT	Returns the first character in a text string based on specified number of characters
OR	Logical function that returns true if any of the condition is true, and false if neither is true
AND	Logical function that returns true if both conditions are true, and false if any or none is true
ROUND	Rounds a number to a specified number of digits

2.1.5.3 Setting the equations of the excel function

1. Create another sheet for summary calculations.

2. Copy the format of the corridor database profile sheets. Align the sheets of each corridor by row.

3. On the left side, calculate the average, minimum, maximum, and total values per item. These values will be used in Summary.

- 1	A B	c	D	ε	F	G		1	,	ĸ	L	м	N	0		0	R	8	т	U	¥	¥	X	Y Z	
125	100 C3						Corrid	or Profile and A	nalysis (C3: M	el Lopez Blvd	l Sto. Domin	nga Ave.]		Corridor Profile and Analysis (C3: Sto. Domingo Ave N. Domingo St.)								Corridor Profile and Ana			
125	2.00 C3					Location an	d General							Location and General								Location and	General		
127	3.00 C3					Road Type				R10	RB	R8		Road Type					R7 R6		Road Type				
128	4.00 C3					Segment				C3NB1_1	C3NB1_2	C3NB1_3		Segment				C3NB2_1	C3NB2_2	C3N62_3		Segment			
125	5.00 C3					Segment				C3581_1	C3581_2	C3581_3		Segment			1	C35B2_1	C35B2_2	C3582_3		Segment			
120	6.00 C3	Average	Mo	Max	Sum	Infrastructur	e and Faciliti	es						Infrastructu	e and Faciliti	es						Infrastructur	and Faciliti	**	
121	7.00 C3	*0N/0	0.00	0.00	0.00	Road Section	No.							Road Section	4o.							Road Section N	lo.		
122	8 C3	1500	407	3207	15000	Road Section	Length (m)			3207	1106	1239		Road Section	.ength (m)			2137	2694	407		Road Section L	ength (m)		
122	9.00 C3	23.74	20.40	31.60	245.70	Road vidth (m)				22.6	21.8	22.8		Road width (m)				20.4	217	20.7		Road width (m)			
124	10.00 C3	0.00	0.00	0.00	0.00	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Carriagevay	Width(millMin+		6 - 10 - 12	6 - 7.8 - 15	9-9-9		1000	Carriage way	Width(m)Min-		6-7.6-9	9-9-9	9-9-9		11001	Carriageway	Width(m)[Min-	
125	11.00 C3	#DMID!	0.00	0.00	0.00			No. Lanes		2-3.3-4	2-28-5	3-3-3				No. Lanes		2-2.5-3	3-3-3	3-3-3				No. Lanes	
125	12.00.03	100.00	0.00	0.00	0.00			Pavement[%][0/84/16	0/100/0	0/100/0				Pavement[%][0/100/0	0/100/0	0/100/0				Pavement[%]	
117	17.00 C3	0.00	0.00	0.00	0.00		Bike lane	Width(millMin-		0-0-0	0-0-0	0-0-0			Bikelane	Widthim@Min-		0-0-0	0-0-0	0-0-0			Bikelane	Width(m)/Min-	
120	18.00.03	101/101	0.00	0.00	0.00			Bikability								Bkabéty								Bkability	
138	19.00 C3	0.00	0.00	0.00	0.00		Sidevalk	Width(milMn-		1-2.3-2.5	0-14-14	22-22-22			Sidevialk	Width(m)Min-		0-2-22	2-2-2	0-1-2			Sidewalk	Width(m)/Min-	
140	20.00 C3	101/101	0.00	0.00	0.00			Pavement[%]	avement[%]	0/100/0	0/100/0	0/100/0				Pavement[%](0/100/0	0/100/0	0/100/0				Pavement(%)(
	2100 C3	406.00	0.00	0.00	0.00			Wakability								Walkability								Wakability	
14.2	23.00 C3	400.00	0.00	0.00	0.00		Hoad			0/100/0	0/100/0	0/100/0			Hoad			0/100/0	0/100/0	0/100/0			Hoad		
	25.00 C3	24.45	9.68	42.46	264.45		No. of Streetlig	phis per km		13.41	28.03	3.68			No. of Streetly	ghts per km		16.38	11.18	19.67			No. of Streetlic	htsperkm	
	28.00 C3	0.00	0.00	0.00	0.00		Busyan	Middle		0.00	0.00	0.00			Buonau	Midth(m)		0.00	0.00	0.00			Butway	Width(m)	
147	27.00 C3	0.00	0.00	0.00	0.00			Segregated		0.00	0.00	0.00				Secrecated		0.00	0.00	0.00				Segregated	
	28.00 C3	2.00	0.00	4.07	22.07		Median	Middle		2.19	123	3.56		- 2 2	Madao	width(m)		184	172	138			Nedan	width(m)	
165	28.00 C3	2.13	0.07	4.07	22.07			Urturn		0.00	0.00	0.00				Lines		0.00	0.00	0.00				Utturn	
947 	23.00 C3	400.00	0.00	0.00	7.00		Pedestrian Bri	doe		N	Vinatial	N			Pedestrian Bri	dae		Vinatial	Vinatial	Vinatial			Pedestrian Bri	ice	
160	30.00 C3	401010	0.00	0.00	7.00		MRTART				LET1				MRTART					LBT2			METART		
14.9	3100 C3	101010	0.00	0.00	1.51	동 3 12 8 8	Carriegeneau	Width(mil/Min+		6-114-15	B=B=12	9-9-9		112351	Carianau au	Width(m)Min-		6-9-9	9-93-12	9-117-15		1 2 2 5 5 5 5	Carriagen au	Width(m)(Min-	
150	32.00 C3		0.00	0.00	0.00	5 = H = 1	. Camagevay	No. Lanes(Min-		2-28-5	2-27-4	3-3-3		8 3 H 3 Z	, canagera)	No. Lanes/Min-		2-2-2	3-31-4	3-29-5		Saker.	Canagevay	Ana -Maul No. Lanes@in-	
101	33.00 C3	•0/0/0	0.00	0.00	0.00		N P	Pavement[%]		0/1000	0/10010	0/10010				Pavement[%][0/100/0	0/10010	0/10000				Ana -Mart Pavement[%)(
152	34.00 C3	*UN/0	u.00	0.00	0.00		Blackson	Poolf air Soul		0.0.0	0.0.0	0.0.0			Distant	Midthim Min-		0-0-0	0-0-0	0-0-0			Distant	Proof all Coord Width(m)/Mn-	
153	39.00 C3	0.00	0.00	0.00	0.00		Dista rana	Ana -Maul		0-0-0	0-0-0	0-0-0			Bike lane dru	Ana -Mari		0-0-0	0-0-0	0-0-0			Dikelane	Ana -Maril Diskilar	
154	40.00 C3	71.08	0.00	100.00	284.30			Widdy/milMin+								Width(m)Mo-								Water(m)Min-	
165	41.00 C3	0.00	0.00	0.00	0.00		Sidevak	Anna -Maul		0-0.8-1.6	0-1-11	15-15-15			Circlevi alk	Ann -Maul		0-2-21	0-21-21	0-13-21			Sidevalk	Anne (March	

Table 2.4: Calculation works (1)

2.1.6 Summary of Data

1. Create another sheet to calculate the minimum, maximum, average, and total values per item on each corridor.

2. The table below shows the format for the Summary data.

1		Corridor	Corridor		C2	C3	C4	C5	C6	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
2	8	Length (kn	n)	6.0	11.2	15.0	28.3	36.1	16.2	10.2	17.0	24.4	14.0	8.6	13.6	28.0	22.7	15.3	6.2
3	9	Total Width	Fotal Width Ave (m)		23.8	23.7	32.9	37.1	28.4	43.0	21.7	21.3	18.5	14.4	19.3	27.5	24.0	20.7	17.0
4	9	Total Width	n Min (m)	17.8	11.3	20.4	16.7	24.7	27.3	34.8	11.6	16.1	10.6	13.1	13.4	15.4	10.5	9.8	16.3
5	9	Total Width	n Max (m)	38.6	35.6	31.6	45.7	43.5	29.1	58.5	29.2	30.7	25.1	17.0	27.0	47.9	34.0	30.2	17.9
6	10		Carriageway width (m)	8.5	8.0	9.6	13.2	10.0	6.0	13.9	7.1	6.2	5.1	6.7	8.7	13.0	5.9	6.9	14.0
7	10		Carriageway width Min (m)	6.0	3.0	6.0	6.0	3.0	6.0	6.0	3.0	3.0	3.0	6.0	6.0	3.0	3.0	6.0	9.0
8	10		Carriageway width Max (m)	12.0	12.0	15.0	21.0	18.0	9.0	30.0	15.0	12.0	12.0	9.0	15.0	27.0	15.0	18.0	18.0
9	15		No. of Lanes	2.8	2.6	3.2	4.4	3.4	2.0	2.9	2.6	3.1	3.0	2.5	2.9	4.3	2.0	2.3	4.7
10	13		No. of Lanes Min	2	1	2	2	2	2	2	1	1	1	2	2	1	1	2	3
11	14		No. of Lanes Max	4	4	5	7	9	3	5	6	6	9	6	5	9	5	6	6
12	16		Carriageway Pavement(%) (Poor/Fair/Good)	0/83/17	0/97/3	0/91/9	0/59/41	0/83/17	0/100/0	0/30/70	0/92/8	0/93/7	0/82/18	0/75/25	0/28/72	1/62/37	0/76/24	0/100/0	0/92/8
13	17		Bike lane width(m)	1.0	0.1	0.3	1.6	1.5	0.0	1.0	0.3	0.3	0.7	1.8	1.5	1.4	1.0	0.0	0.0
14	17		Bike lane width(m) Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	17	NB	Bike lane width(m) Max	2.0	2.0	2.0	2.0	2.0	0.0	2.0	2.0	1.5	2.0	2.0	2.0	2.0	2.0	0.0	0.0
16	17		Bike lane % of available length	51	4	19	81	90	-	49	28	20	37	91	100	81	49	-	-
17	19		Sidewalk Width (m)	2.8	4.8	2.0	2.3	0.6	0.0	1.2	1.4	2.1	1.5	1.7	0.1	0.4	1.2	0.0	0.0
18	19		Sidewalk Width (m) Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
19	19		Sidewalk Width (m)Max	24.7	27.1	3.9	18.0	12.0	1.2	5.4	2.1	3.4	2.6	2.8	1.8	4.0	2.7	0.0	0.0
20	22		Sidewalk condition(%) (Poor/Fair/Good)	0/91/9	1/97/3	0/100/0	0/96/4	0/77/23	0/100/0	0/51/49	0/97/3	0/90/10	1/94/5	0/92/8	0/77/23	0/82/18	0/77/23	0/97/3	0/93/7
21	19		Sidewalk % of available length	94	96	99	93	95	25	67	99	94	90	98	97	54	93	97	92
22	24		Road marking(%) (Poor/Fair/Good)	7/79/14	16/84/0	0/94/5	0/50/50	0/79/21	80/20/0	0/48/52	0/100/0	0/90/10	27/58/14	0/77/23	0/29/71	8/56/36	0/73/27	0/100/0	0/95/5
23	25		Streetlight(No./km)	43.9	44.3	21.1	26.4	23.2	16.3	54.4	59.2	25.0	35.7	38.3	29.9	38.8	37.6	34.3	29.6
24	26		Bus lane width(m)	0.0	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	27		Bus Segregated(%)	-	-	-	82	-	-	-	-	-	-	-	-	-	-	-	-
26	28		Median width(m)	4.30	1.61	2.19	1.97	3.37	2.71	2.10	3.17	1.21	0.92	0.49	4.71	6.93	0.39	5.28	2.94
27	29	Madian	U-tum	0.00	0.00	0.00	7.00	0.00	0.00	0.00	10.00	0.00	0.00	1.00	152.00	47.00	5.00	0.00	0.00

Figure 2.26: Summary data (1)

1		Corridor		C1	C2	C3	C4	C5	C6	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
28	30	Wedian	Pedestrian Bridge	2	5	7	15	15	1	0	0	0	0	0	7	13	9	4	0
29	31		MRT/LRT(%)	43%	12%	10%	83%	0%	0%	0%	0%	0%	0%	0%	100%	43%	0%	49%	0%
30	32		Carriageway width (m)	8.8	8.1	10.1	13.2	10.7	6.0	11.9	6.9	7.0	4.9	6.7	8.4	13.4	6.1	6.9	13.2
31	32		Carriageway width Min (m)	6.0	3.0	6.0	6.0	6.0	6.0	6.0	3.0	3.0	3.0	6.0	6.0	3.0	3.0	6.0	9.0
32	32		Carriageway width Max (m)	15.0	12.0	15.0	18.0	18.0	9.0	18.0	15.0	18.0	9.0	9.0	15.0	27.0	15.0	18.0	18.0
33	37		No. of Lanes	2.9	2.7	3.4	4.4	3.5	2.0	2.6	3.6	2.2	1.9	2.2	2.8	4.5	2.0	2.3	3.8
34	35		No. of Lanes Min	2.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	2.0	2.0	1.0	1.0	2.0	2.0
35	36		No. of Lanes Max	5.0	6.0	5.0	6.0	6.0	3.0	5.0	9.0	6.0	3.0	3.0	5.0	9.0	5.0	6.0	6.0
36	38		Carriageway Pavement(%) (Poor/Fair/Good)	2/87/11	1/98/1	0/81/19	0/78/22	0/75/25	0/100/0	0/65/35	0/100/0	0/78/22	0/87/13	0/64/36	0/33/67	1/43/55	0/77/23	0/85/15	0/97/3
37	39		Bike lane width(m)	0.8	0.2	0.4	1.6	1.6	0.0	1.5	0.3	0.6	0.6	1.8	1.4	1.4	0.9	0.0	0.0
38	39		Bike lane width(m) Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39	39	SB	Bike lane width(m) Max	2.0	2.0	2.0	3.0	2.0	0.0	2.0	2.0	3.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0
40	39	00	Bike lane % of available length	40	12	21	80	95	-	76	35	40	34	91	93	80	44	-	-
41	41		Sidewalk Width (m)	1.8	3.0	1.6	1.9	0.6	0.0	1.4	1.6	1.1	1.4	1.7	0.1	0.3	1.4	0.0	0.0
42	41		Sidewalk Width (m) Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
43	41		Sidewalk Width (m)Max	3.1	27.1	3.6	8.1	2.6	0.6	2.6	2.6	4.6	2.6	2.8	2.5	4.0	2.7	0.0	0.0
44	44		Sidewalk condition(%) (Poor/Fair/Good)	0/97/3	0/99/1	0/90/10	0/73/27	0/89/11	0/100/0	0/71/29	0/97/3	1/80/19	1/95/4	0/95/5	0/80/20	0/78/22	0/78/22	0/69/31	8/92/0
45	44		Sidewalk % of available length	94	93	99	94	98	99	65	99	100	96	98	95	83	94	99	90
46	46		Road marking(%) (Poor/Fair/Good)	6/83/11	12/88/0	12/71/17	0/78/22	11/66/22	80/20/0	0/70/30	0/100/0	3/76/21	27/64/9	0/68/32	1/30/69	5/37/58	7/66/26	1/89/10	0/98/2
47	47		Streetlight(No./km)	37.8	34.2	19.8	35.0	20.5	10.1	46.9	51.1	28.2	38.9	40.8	30.0	40.7	31.7	34.1	39.5
48	48		Bus lane width(m)	0.0	0.0	0.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
49	49		Bus Segregated(%)	-	-	-	75	-	-	-	-	-	-	-	-	-	-	-	-
50			VCR	0.70	0.68	0.90	1.72	0.60	0.70	0.50	0.50	0.76	1.11	0.67	1.00	0.70	0.91	0.82	1.35
51	54		Ave. Capacity(000)	42.8	40.8	26.1	145.2	108.5	30.8	89.5	38.9	60.1	12.3	46.7	51.2	110.5	36.1	28.5	23.7
52	54		Min Capacity(000)	13.2	13.2	13.2	13.2	15.4	30.8	15.4	33.0	16.5	8.8	16.5	26.4	15.4	13.2	16.5	19.8
53	54		Max Capacity(000)	99.0	66.0	39.6	180.0	165.0	30.8	132.0	49.5	132.0	24.8	66.0	132.0	165.0	66.0	39.6	26.4
1		Corridor		C1	C2	C3	C4	C5	C6	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
54	56		Ave. Pax(000)	28.2	36.7	28.2	114.1	79.6	42.1	80.8	67.7	100.8	17.2	23.8	79.6	71.2	52.1	34.3	40.2
55	56		Min Pax(000)	10.2	12.1	2.7	12.5	10.0	21.2	12.8	4.3	13.8	1.5	8.2	13.8	6.6	4.0	16.3	14.9
56	56		Max Pax(000)	56.0	72.2	49.9	171.1	196.7	47.8	129.7	107.4	210.3	90.4	39.0	204.3	228.9	132.2	50.1	70.2
57	57		Ave. PCU(000)	29.9	27.7	23.6	250.0	65.4	21.6	44.5	19.6	45.9	13.6	31.1	51.2	77.1	32.9	23.4	32.0
58	57		Min PCU(000)	8.6	7.9	7.7	15.4	10.8	21.6	12.2	7.5	8.3	2.7	18.9	15.5	14.2	13.7	16.0	15.9
59	57	Demand	Max PCU(000)	55.5	44.6	35.8	393.4	150.1	21.6	80.2	29.0	126.3	38.3	60.6	115.4	150.2	61.3	35.1	46.8
60	60		% of PUV	39	18	33	18	20	21	17	39	21	32	26	25	19	21	16	13
61	60		% of PUV Min	16	9	1	8	0	19	14	20	7	12	20	8	10	9	7	10
62	60		% of PUV Max	61	23	96	29	63	24	20	65	31	67	35	54	44	35	31	16
63	61		% of truck	4	9	11	8	6	3	8	1	8	0	5	10	10	10	11	30
64	61		% of truck Min	1	2	0	1	0	0	0	0	3	0	3	2	5	1	2	23
65	61		% of truck Max	5	22	29	16	15	4	21	8	24	1	8	21	21	23	27	39
66	62		% of MC	13	19	15	16	13	55	13	28	33	6	15	10	19	18	27	18
67	62		% of MC Min	8	13	2	9	0	29	0	9	6	0	9	4	9	8	9	14
68	62		% of MC Max	21	24	25	39	27	62	25	49	65	28	21	15	32	31	48	22

Figure 2.27: Summary data (1)

		C1	C2	C3	C4	C5	C6	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
	ROW is inconsistency		√											√	√	√	
ROW	ROW has narrowing section		√		✓				✓		✓			√	√	√	
	Low capacity(VCR>0.9)			√	✓						✓		✓		✓		✓
	Carriageway is inconsistency		√	✓	✓	~		✓	✓	~	~			✓	✓		
Corriogowo	Carriageway has narrowing section		✓	✓	✓	~		✓	✓	~	~			✓	~		
Lamagewa	Poor road marking (length>0)	√	✓	✓		~	✓			~	✓		✓	✓	~	✓	
	Poor road pavement (length>0)	√	√											✓			
Piko lono	Unavailable/Low availability (% of length<50%)	√	√	✓			✓	✓	✓	~	✓				✓	✓	✓
Dike lane	Different width between direction (difference more		√	✓			✓	✓	✓	~	✓					✓	✓
	Unavailable/Low availability (% of length<80%)						✓	✓						√			
Sidowolk	Different width between direction (difference more	√	√	✓	✓	~	✓			~			✓	√		✓	✓
Sidewaik	Poor condition (length>0)		√							~	~						✓
	Sidewalk has narrowing section	√	√	✓	✓	~		✓	✓	~	~	✓	✓	√	~		
Traffic light	Streetlight is not enough (No/km is lower than 20			✓			✓										

3. In the same sheet as the summary data, the table below reflects the problems that need to be addressed per corridor. The check marks are based on the values of the summary data.

Figure 2.28: Summary data (1)

2.1.7 Final Output

The final output for the corridor profile is compiled in a PPT file, a sample of which is Figure 2.29. There will be a sheet for each segment of each corridor, showing the physical characteristics for each road section. The following steps were taken for the compilation and analysis:

1. Copy and paste the values from the Summary Calculations to the corridor database profile sheet.

2. To efficiently copy and paste, arrange the cells in Summary Calculations in a way that follows the order of the items in corridor database profile sheet.

3. The corridor profile sheet is in .ppt format.

The Corridor Profile should be used to identify the reason for congestion to formulate traffic management measures. Examples of identifying and solving problems using physical characteristics followings:

- $\checkmark\,$ Low speed and narrow width \rightarrow consider widening the road
- \checkmark Narrow sidewalk width and many pedestrians \rightarrow widen and improve sidewalks
- \checkmark Not enough streetlights \rightarrow installation of additional lights
- ✓ Inconsistencies in upstream and downstream side → widening of road, carriageway, and sidewalk or increase in no. of lanes
- ✓ Few road markings → install additional
- ✓ Poor sidewalk conditions \rightarrow improve or smoothen the sidewalk
- $\checkmark\,$ No bike lane and no sidewalk \rightarrow consider installing
- ✓ Inconsistencies in each corridor (large gap) \rightarrow sections should be uniform

	(Corridor F	Profile and	l Analysis (C1: Mel Lopez Blvd	- Lega	rda St.)	
1	ocation and Ge	eneral						
R	oad Type			R10		R9	R	
	egend Road Class Expressway RailwayStation Pedestrian Brid Segment Bottl TBN Signal Cate	A — C B — D,E ge geory						
L	No Signal	With Signal						
Ir	nfrastructure a	nd Facilities						
Ro	ad Section No.			1	2	3	4	
Ro: (m	ad Section Length			879	1483	423	701	
Roi	ad width (m)			24.7	24.7	24.1	23.7	
	Carriageway	Width(m)(Min-		6 - 9.2 - 12	6 - 9.2 - 12	6 - 8.1 - 9	9 - 9 - 9	
		No. Lanes		2 - 3.1 - 4	2 - 3.1 - 4	2 - 2.6 - 3	3 - 3 - 3	
		Pavement(%)(Poor		0/100/0	0/100/0	0/100/0	0/100/0	
_	Bike lane	Width(m)(Min-		0 - 0 - 0	0 - 0.2 - 2	0 - 0 - 0	0 - 1.3 - 2	
Direc		Bikability						
tion1	Sidewalk	Width(m)(Min-		1.6 - 1.6 - 1.6	0-1.9-3.4	0 - 14.5 -	0 - 1.1 - 3.4	
(Righ	Sidewalk	AveMax) Pavement(%)(Poor		1.0 1.0 1.0		24.7		
itwar		/Fair/Good)		0/100/0	0/100/0	0/100/0	0/100/0	
đ		Walkability						
	Road marking(%)(P	oor/Fair/Good)		46/54/0	0/100/0	0/100/0	0/100/0	
	No. of Streetlights	per km		56.89	41.13	47.27	49.96	
	Busway	Width(m)		0.00	0.00	0.00	0.00	
		Segregated		0.00	0.00	0.00	0.00	
_	Median	Availability		4.73	6.48	7.00	6.65	
Media		U-turn		0.00	0.00	0.00	0.00	
ä	Pedestrian Bridge			N	Y (partial)	N	N	
	WIRT/LRT	Width(m)(Min-		-	LRT 2	LRT 2	LKI Z	
	Carriageway	AveMax)		6 - 10.8 - 15	9 - 9 - 9	9 - 9 - 9	6 - 8 - 9	
		AveMax)		2 - 3.6 - 5	3 - 3 - 3	3 - 3 - 3	2 - 2.7 - 3	
		/Fair/Good)		11/89/0	0/100/0	0/100/0	0/100/0	
D	Bike lane	Width(m)(Min- AveMax)		0 - 0 - 0	0.3 - 0 - 2	0 - 0 - 0	0 - 0 - 0	
irecti		Bikability		0.00	15.80	0.00	0.00	
on2(L	Sidewalk	Width(m)(Min- AveMax)		0 - 1.5 - 2	0 - 1.9 - 2.8	2.2 - 2.2 - 2.2	0 - 2 - 2.2	
eftw		Pavement(%)(Poor		0/100/0	0/100/0	0/100/0	0/100/0	
ard)		Walkability		80.00	96.60	100.00	98 70	
	Road marking(%)/P	oor/Fair/Good		37/63/0	0/100/0	0/100/0	0/100/0	
	No. of Streetlights	per km		54.87	50.57	31.09	33.21	
	Busway	Width(m)		0.00	0.00	0.00	0.00	
		Segregated		0.00	0.00	0.00	0.00	
Par	lestrian Crossing	Total						
(At	-grade)	With Signal						
		Total						
No	. of Intersections	T-junction						
Est	imated Traffic Capa	city (000PCU/day)		13.20	39.60	39.60	39.60	
Tra	ffic Demand Chara	cteristics						
		No.(000)		10.23	21.47	56.04	43.20	
AA	UI	PCU(000)		8.61	23.35	44.69	38.65	
Tra	vel speed (kph/6hr-	Rightward		15.34	18.07	17.62	17.92	
201	hr)	Leftward		15.26	15.00	12.16	12.15	
		% of PUV		52.30	32.10	60.70	16.00	
Tra	fic characteristics	% of truck		1.10	4.40	2.10	4.10	
		% of MC		7.90	17.20	9.40	14.00	

Figure 2.29: Corridor profile sheet

3 CORRIDOR ANALYSIS SHEETS

The corridor analysis sheets can be used to identify bottlenecks and countermeasures using the corridor database. In addition, the information can be used to justify the budget for proposed countermeasures. The contents are based on the results of the inventory survey.



Figure 3.1: Workflow of the development of corridor analysis sheets

Throughout the preparation of the corridor analysis sheets, the following files will be used:

a 01_Longlist of Potential TBN

Excel file. Input 1 on the applicable traffic problems for all corridors.

The file will generate the check marks, which corresponds with the PPT file.

b 20220721_PP3_All

PPT Format

This will be the final output. The input will come from the Excel file.

c GIS Files

For checking of the accuracy of the road inventory items



Figure 3.2: Corridor analysis sheets

The Factor of Congestion (FOC) is applicable to an intersection or segment if it contributes to the traffic congestion. The staff of developing the database to check section data whether it is applied or not, and if the criteria is applied, the checkmark should be marked in each section in the row of the FOC.

Factor item	Checkpoint	Factor of Congestion
	Number of	Lack of lanes
	lanes	Insufficient road width
Road		Wrong geometric layout
initastructure	Intersection	Inadequate corner cutting
	ayour	Improper location of road facilities (road markings)
		Inadequate traffic signal control (If no Signal)
	Signal timing	Inadequate traffic signal control (If with Signal)
		Bad visibility of traffic signal
Traffic	Left-turning or	No left-turn lane
regulation	oncoming	Insufficient left-turn lane length
	venicies	Conflict between left-turn and through movements
		Right-turning vehicles blocking vehicles proceeding straight ahead
	Right-turning vehicles	Improper stop line position
	Volitoloo	Improper channelization
		Speed reduction due to large vehicle
Traffic	Lorgo vobiolo	Obstruction by motorcycles
situation	Large venicie	Obstruction by bicycles
		Obstruction by pedestrians
Environment of Roadside and intersection	Railway Crossing	Stopped traffic at at-grade railway crossings
	Driveway	Traffic flow in/out from intersections and narrow streets
	trom roadside shop	Traffic flow in/out from ICs at expressways

Table 3.1:	Factor	of Cond	destion	(FOC))
	1 40101	0.00.0	goodon	·· ••,	1

Checkpoint	Factor of Congestion
	Speed reduction due to PUV stops
PUJ, PUV	Speed reduction due to PUJ stops
	Lane reduction with dedicated bus and priority lanes
On-street parking	Obstruction of travel by on-street parking
	Excess traffic capacity at intersections
Over capacity	Excess traffic capacity at non-intersections
	Concentration of traffic at specific times
Concentrated	Concentration of traffic on roadside facilities at specific times and periods
lianic	Concentration of traffic at specific periods during events or incidents
Construction	Lane blockage due to construction
Clogging of downstream	Clogging with congestion downstream
	Pedestrian is obstructed
Other	Bike is obstructed
	Motorcycle is obstructed
Free Comment (if	
	Checkpoint PUJ, PUV On-street parking Over capacity Concentrated traffic Construction Clogging of downstream Other Free Comment (if any)

3.1 Parts of the Corridor Analysis Sheet

The corridor analysis sheets were compiled in a PPT file and were developed using the format shown in Figures 3.3 and 3.4.



Figure 3.3: Parts of the Corridor Analysis Sheet



3.2 Preparation of the Maps

The map for each corridor analysis was developed by loading the pre-set style files and formulated using the layout manager in QGIS.

3.2.1 Loading of Style Files





Figure 3.6: Preparation of the Map (2)







Figure 3.8: Preparation of the Map (4)



3.2.2 Layout Manager

After loading the corresponding style files, the layout manager can be used to create the map part of corridor analysis sheets as follows:



Figure 3.10: Layout Manager (1)



Figure 3.11: Layout Manager (2)



Figure 3.12: Layout Manager (3)



Figure 3.13: Layout Manager (4)



Figure 3.14: Layout Manager (5)



Figure 3.15: Layout Manager (6)



Figure 3.16: Layout Manager (7)



Figure 3.17: Layout Manager (8)



Figure 3.18: Layout Manager (9)



Figure 3.20: Layout Manager (11)

3.3 Identifying the factors of congestion

The factors of congestion (FOC) are enumerated in Table 3.2. To identify the FOC for each segment, MMDA should input a check mark " \checkmark " if the said factor is applicable to the road segment or intersection. This will be based on actual site surveys and/or knowledge of field personnel,

especially traffic enforcers.

Factor item	Checkpoint	Factor of Congestion
	Number of lands	Lack of lanes
	Number of lanes	Insufficient road width
Road infrastructure		Wronggeometric layout
	Intersection layout	Inadequate corner cutting
		Improper location of road facilities (road markings)
		Inadequate traffic signal control (If No Signal)
	Signal timing	Inadequate traffic signal control (If With Signal)
		Bad visibility of traffic signal
	Left-turning or oncoming	No left-turn lane
Traffic regulation	vehicles	Insufficient left-turn lane length
		Conflict between left-turn and through movements
	Right-turning vehicles	Right-turning vehicles blocking vehicles proceeding straight ahead
		Improper stop line position
		Improper channelization
		Speed reduction due to large vehicle
Traffic situation	Large vehicle	Obstruction by motorcycles
frame situation	Large verneie	Obstruction by bicycles
		Obstruction by pedestrians
	Railway Crossing	Stopped traffic at at-grade railway crossings
	Driveway from roadside shop	Traffic flow in/out from intersections and narrow streets
Environment of	briveway non roadside shop	Traffic flow in/out from ICs at expressways
Roadside and		Speed reduction due to PUV stops
intersection	PUJ, PUV	Speed reduction due to PUJ stops
		Lane reduction with dedicated bus and priority lanes
	On-street parking	Obstruction of travel by on-street parking
	Over capacity	Excess traffic capacity at intersections
	Over capacity	Excess traffic capacity at non-intersections
Traffic Demand		Concentration of traffic at specific times
	Concentrated traffic	Concentration of traffic on roadside facilities at specific times and periods
		Concentration of traffic at specific periods during events or incidents
	Construction	Lane blockage due to construction
	Clogging of downstream	Clogging with congestion downstream
Othors		Pedestian is obstructed
Others		Bike is obstructed
		Motorcycle is obstructed
	Free Comment (if any)	

Table 3.2: Factor of congestion (FOC)

3.4 Compiling into a PPT File

After identifying applicable FOCs for each road segment, the information should be reflected on the MS Excel file by indicating "1" as described in Figures 3.21 and 3.22.



Figure 3.21: Compiling into a PPT File (1)



Figure 3.23: Compiling into a PPT File (3)

Figure 3.23 shows the final format and contents of the corridor analysis sheets in PPT format.

3.5 Next steps for the Corridor Analysis Sheets

Moving forward, the following steps must be taken to ensure the accuracy and timeliness of the database information:

1. Verify the situation along the corridor using Mapillary and/or Google Street view by checking the following information:

✓ Inventory Survey Data: Carriageway Width, PUB and PUJ stops, U-turn slots, Malls, Railway Stations, Onstreet Parking, and Bike Lanes ✓ Traffic Issues

2. As needed, apply the correct and updated information using QGIS if there are inconsistencies.a

3.6 Applications of the Corridor Analysis Sheets

Using the corridor analysis sheet, MMDA can identify traffic management issues based on the FOC. With this site surveys, will only be necessary if further investigation is needed. In addition, it is a useful tool to complement the corridor profile. The following are examples of information that may be analyzed using the corridor database:

- a Exact location and factor of congestion of traffic facilities
- b Effects of various traffic regulations
- c Possible traffic management countermeasure for each factor of congestion

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE PROJECT FOR COMPREHENSIVE TRAFFIC MANAGEMENT PLAN FOR METRO MANILA

TECHNICAL REPORT NO. 8 MANUAL ON TRAFFIC BOTTLENECK DATABASE

November 2022

ALMEC CORPORATION ORIENTAL CONSULTANTS GLOBAL CO., LTD. TRANSPORTATION RESEARCH INSTITUTE CO., LTD.
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ABBREVIATIONS

CTMP	Comprehensive Traffic Management Plan
JICA	Japan International Cooperation Agency
JPT	JICA Project Team
LGU	local government unit
MMDA	Metropolitan Manila Development Authority
TBN	traffic bottleneck

1 **Objectives**

In this project, 209 potential traffic bottlenecks (TBNs) were identified by travel speed data and based on the opinion of MMDA and the LGUs. Related data, such as traffic volume, inventory, and factors of congestion for each bottleneck, were collected and compiled into datasheets, to support an evidence-based approach when analyzing traffic congestion and considering appropriate countermeasures for bottlenecks. These data can also be used to prioritize and manage the progress of implementation. To this end, the JICA Project Team developed a "Database on Intersection Bottlenecks" to store and allow a search of collected data on intersections and to visualize these locations for better appreciation. Moreover, MMDA can update the database on demand.

Specifically, the objectives of the database are as follows:

- (i) To store an inventory of bottleneck data such as traffic volume, speed data from Waze, road geometry, degree, and congestion factors, among others.
- (ii) To integrate and be able to search the different data types from various sources in a cloud-based server; and
- (iii)To serve as a guide in the analysis of congestion, its factors, and proper interventions for the bottlenecks.

As a prerequisite to understand and appreciate the use of this database program, said Program includes this instruction manual for reference before using it. The filename of this Database program is called "MMDA Traffic Bottleneck Database."

2 Function of Database

To handle data management easily, this database was developed by Microsoft Access. Microsoft Access is a DBMS (also known as Database Management System) from Microsoft that combines the relational database engine with a graphical user interface and software-development tools. It is a member of the Microsoft Office suite of applications, included in the Professional and higher editions or sold separately. Microsoft Access stores data in its own format based on the database engine. It can also import or link directly to data stored in other applications and databases.

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Figure 2.1: Example of Microsoft Excel Interface (Left) and Access Interface (Right)

This database does not deal with tables alone. It has other components that it can do, namely:

(a) Table: the key objects in the Access file, as they contain the data that is stored in the database. Tables are made up of rows and columns and allow for direct data entry into their grids. The row is the record that contains the individual data pieces making up an individual record.

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Source: JPT

Figure 2.2: Tables in Traffic Bottlenecks Database

(b) **Query/Queries** are a way of searching for and compiling data from one or more tables. Running a query is like asking a detailed question of your database. When you build a query in Access, you are defining specific search conditions to find exactly the data you want.



Figure 2.3: Query/Queries in Traffic Bottlenecks Database

(c) **Forms:** A form in Access is a database object that you can use to create a user interface for a database application. A "bound" form is one that is directly connected to a data source such as a table or query, and can be used to enter, edit, or display data from that data source.

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Figure 2.4: Forms in Traffic Bottlenecks Database

3 Traffic Bottleneck Database System

The TBN database should be able to integrate data of different types from various sources to analyze TBNs in Metro Manila. Given this requirement, the concept of the database is that of a relational database designed for query and analysis. The relational database consists of tables of relevant data collected from various sources and consolidated. The user, MMDA, will use these queried and visualized data to analyze traffic bottleneck improvement. In addition to functioning as a relational data warehouse, the database includes hyperlinked indexes to categorize data correctly and optimize queries. The database was developed using Microsoft Access to allow easy updating of data and upgrading of functions.

Figure 3.1 shows the database framework in integrating data from various sources such as Datasheet 1 (standard data/information such as intersection drawings, traffic volume, travel speed data, etc.) and Datasheet 2 (congestion situation, factors of congestion).



Source: JPT

Figure 3.1: Database Framework for Data Integration

In the development of the database, the design of the data model for optimal performance is essential in queries and in establishing data integrity. The data were gathered from various sources. Travel speed data came from the Travel Speed Dashboard developed using Waze data (*refer to TR4 Identification of Traffic Bottlenecks and Monitoring*) as was the basis of LOC calculation. Second, traffic volume counts were obtained from MMDA's traffic survey stations. Forty-nine (49) of the identified TBNs have traffic volume data. Then, the road geometry (no. of lanes, road widths, etc.) were investigated by using the DPWH Atlas, Google Earth, and Google Maps. The information from these sources were collated in Datasheet 1 for each bottleneck. On the other hand, Datasheet 2 contains information on the congestion situation and congestion factors, as observed by MMDA enforcers in 2021.



Source: JPT



Table 3.1: Sample of Datasheet 1 on Basic Information/ Data about Potential TBNs

	Common Information																
CODE	PY04										Sheet N	lo.					
REGION	14 NCR		CITY		Pasay												
Name o Intersec	f EDS	SA-Taft	Ave.				Administrator MMDA (Main Road)										
Latitude (Center of	Latitude / Longitude (Center of Intersection)							14.5375177, 121.0007001									
Intersec	Intersection Type A x B						Structu	re							01 At-grade		
Signaliz	ation		0	1 Signaliz	zed		Pedestr	ian Signa	I						00 No		
Station			01 Yes		Name of	Station								٦	Faft		
Exist	ing Layout (0	CAD)		U	RL		https://	/drive.goo;	gle.com/dr	ive/folde	ers/10G20	ptZZAfXli	<u>ENqtE</u>	CyVFY	ztzfYY5Z1?usp=sharing		
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Google	Map (URL)							https://	www.goog	le.com/r	maps/@1	4.5378334	,121.0	005801	l,19.03z?hl=ja		
							Layo	out (Inven	tory)								
	Approa	ch			No. of	Lane				F	Road Wid	th(m)					
	(towar	d)	Dedicated Left	Throug	Through	Dedicat ed Right	Throug	Total	Dedicated Left	Throug	Through	Dedicated Right	-	Total	Data Source		
D1	EDSA West		1	0	4	0	1	6	3.5	0.0	14.0	0.0	3.5	21	03 DPWH Atlas		
D2	EDSA East		0	0	4	1	0	5	0.0	0.0	13.6	3.4	0.0	17	03 DPWH Atlas		
D3	Taft North				3			3						7	03 DPWH Atlas		
D4	Taft South				3			3						6.8	03 DPWH Atlas		
D5															03 DPWH Atlas		
							Tra	affic Volur	ne								
Date of	Traffic Volun	ne Surv	vey						Wedn	nesday, N	larch 06,	2019					
	Pe	ak Tim	e		Fro	om		08:00	:00 AM		-	To			09:00:00 AM		
	•		Class	Peal	Hour Traffic Volumes			Tetal									
	Approach (toward)				(FCUS)		1	Volume	PUB	PUJ	PUV	PUT%					
	••••			Left	Through	Right	Total	1.000									
D1	EDSA West		A	255	3,840	13	4,108	4,096	135	471	299	22.1%					
D2	EDSA East		A	0	3,163	332	3,495	3,627	81	527	279	24.5%					
D3	Taft North		A	345	30	456	831	917	0	176	56	25.3%					
D4	Taft South		А	12	25	134	171	203	0	44	6	24.6%					
D5										16.1.1	(1	#DIV/0!			D 10141000 1 1		
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Source							avei Spe	ed from v	2019/ We	ekdav /	Dailv(6-20)/ Inflow					
	Approa (towar	ch d)	Class	In/Out		Km/h	LOC					,					
D1	EDSA West		A	Inflow		13.7	4										
D2	EDSA East		A	Inflow		15.1	3										
D3	Taft North		A	Inflow		13.4	3										
D4	Taft South		A	Inflow		0.0	0	No Data									
D5				Inflow													
D1_0	EDSA West		A	Outflow		17.6	3										
D2_0	EDSA East		A	Outflow		22.5	22.5 2										
D3_0	Taft North		A	Outflow		0.0	0	No Data									
D4_0	Taft South		A	Outflow		19.8	2										
D5_0				Outflow													
							5	Signal Dat	a								
Signal F	hase Data						URL										
CCTV D	ata						<u>URL</u>										

Source: JPT

				Congestion Situation						
	Appro (tow	oach ard)		Vehicle Queue Length	Spill over from downstream intersection	Spill	ove inte	r to u rsec	ipstre tion	ear
D1	Taft South		02 Moderate : ove	er 300m to 500m	Yes			No		
D2	Taft North		02 Moderate : ove	er 300m to 500m	No	No				
D3	A. Arnaiz We	est	None		Yes			No		
D4	A. Arnaiz Ea	st	02 Moderate : ove	er 300m to 500m	Yes			No		
D5										
			С	hecklist for Factor of Congestion (intersec	tion)					
1:STR	ONGLY AGE	REE, 2:AGF	REE, 3:DISAGRE	E		1				
Fa	ctor item	Ch	eckpoint	Factor of Congestion	ิท	D1	D2	D3	D4	D
		Num	per of lanes	Lack of number of lanes		1	3	1	1	
Deed		NUTTR	ber of laries	Insufficient road width		2	3	2	2	
infra	astructure			Wrong geometric intersection layout		3	1	3	3	
		Interse	ection layout	Inadequate corner cutting	1	2	1	1		
				Improper location of road facilities (road m	arkings)	2	3	2	2	
		0.1	L timeire	Inadequate of traffic signal control		1	1	1	1	
		Sigi	nai timing	Bad visibility of traffic signal	1	2	1	1		
		Right-turning or oncoming		No left-turn lane	1	1	1	1		
				Insufficient left-turn lane length		1	2	1	1	
Traffic regulation		v	ehicles				0		_	
Traine	cregulation			Conflict between a left-turning car and an	oncoming straight car	1	3	1	1	
		Left-turning vehicles		Right-turning vehicles blocking vehicles p ahead	roceeding straight	1	1	1	1	
				Improper stop line position		1	2	1	1	
				Improper channelization		1	3	1	1	
				Speed reduction due to large vehicle		1	1	1	1	
				Obstruction by motorcycles	1	2	1	1		
I raff	ic situation	Lar	ge vehicle	Obstruction by bicycles	1	1	1	1		
				Obstruction by pedestrian	1	2	1	1		
		Railwa	ay Crossing	Stopping traffic at railway crossing		1	3	1	1	
		Driveway	from roadside	Traffic flow in/out from intersections and n	arrow streets	1	1	1	1	
Envir	ronmont of	,	shop	Traffic flow in/out from IC at expressway	1	2	1	1		
Roa	dside and			Speed reduction due to PUV stop		1	3	1	1	
inte	ersection	Pl	JJ, PUV	Speed reduction due to PUJ stop		1	1	1	1	
			,	Lane reduction with dedicated bus and pr	1	2	2	1		
		On-st	reet parking	Obstruction of travel by on-street parking	,	1	1	3	1	
			5	Excess traffic capacity at intersections		1	1	1	1	
		Ove	r capacity	Excess traffic capacity at non-intersection	s	1	2	2	1	
				Concentration of traffic at specific time	•	1	-	-	1	
Traff	ic Demand	Conce	ntrated traffic	Concentration of traffic on roadside faciliti	es at specific times and	. 1	1	1	1	
		Concentrated traffic		Concentration of traffic during specific per incidents	1	2	1	1		
		Cor	nstruction	Lane blockage due to construction	1	1	1	1		
.	24	Clogging	of downstream	Clogging with congestion of downstream		1	2	1	1	
	Jthers	Free	Comment							
			(if any)	Due to traffic accident, tenporaly congesti	on occurs					

Table 3.2: Sample of Datasheet 2 on Results of Site Observation

Source: JPT

4 User Manual

The database structure is straightforward since the functions are presented in a querybased warehouse structure. Figure 4.1 shows the main menu in the database. The user will select the TBNs, or intersection of interest, and the database performs a query to call the data on the TBNs. The Main Menu form has five (5) buttons. The uppermost button can view the data for the intersection that the user searched. The second button gives the user the function to add a bottleneck to the database. Next, the middle button opens the database manual, which serves as a guide for users to maximize the use of the program. After that, the fourth button closes the program. The last button allows users to debug codes and sequences that the program uses for queries.

wainmenur 2		
	MMDA Bottleneck Database	
	Main Menu	
	View/Edit Data	
	Add/Delete Data	
	Manual	
	Exit	
	Debug	

Figure 4.1: Main Menu Interface of the Database

The View / Edit Data window is shown in Figure 4.2. It serves as the main interface of the database. It shows the basic information on the selected bottleneck such as the intersection structure (at-grade or elevated), LGU to which the intersection belongs, coordinates (latitude, longitude), queue length, spillover from downstream and upstream with date of survey, and the location map to help users visualize the approach from each leg. Moreover, the interface includes checkboxes to determine whether the intersection has traffic signals for vehicles and pedestrians. Last, the signal ID information (from MMDA) is also provided.

Users will type the intersection name in the combo box provided in the interface. A combo box is an object or control that the user places on a form. It displays a list of values that a user can quickly choose from. The combo box in the TBN database is populated by the intersection code, LGU it belongs to, and the intersection name so that the user can locate the bottleneck quickly. The intersections are alphabetically arranged, and the list below the box automatically changes once the user types any character.

The buttons on the bottom part of the interface connect the data that the database integrated into the cloud server or MS Access file. The following buttons are (i) Congestion, (ii) Traffic Data, (iii) Geometry, (iv) Drawing (PDF), (v) Drawing (CAD), (vi) Google Map, (vii) Open Datasheet 1, (viii) Open Datasheet 2.

<u>BN E</u>	Basic Information and C	ongestion Situation	1			
ENTER CODE HERE	Select Bottleneck: MD02	~				
BN_Ba: Structure Seg Survey Date: Epifanio Delos Santo Approach 1 Epifan Approach 3 Epifan Approach 3 Epifan Approach 5 Congestic Traffic Da	MDQP Region 14 NCR regated LatitudeLongit 6/11/2021 Survey T as Avenue (EDSA)-Ortigas Avenue tio Delos Santos Avenue (EDSA) is Avenue Signal Pedestrian Signal Drawing (PDF) ta Drawing (CAD) y Google Map	LGU Mandaluyong ude 14.59318404,121.058478 ime: 6:35AM Queue Length 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m 03 Light : Over 100m to 300m Exit DB	Spill over from downstream Yes Yes Yes Open Datash Open Datash	Spill over to upstream No No No eet 1 eet 2 s?	D3 MD02 MD02	

Figure 4.2: View / Edit Data Window of the Database

The Congestion button leads to the Congestion Factor window, which shows the congestion situation in the intersection and the factors of congestion, as shown in Figure 4.3. There is also a combo box in the Congestion Form where the users can search for the bottleneck, and then the database will show the queue length, upstream and downstream spillover, and the factors of congestion based on the results of the site observation for each leg shown.

	Con	gestion W	indow					
	Select Bottleneck:							
ENTER CODE HERE	CC13			×				
				Road Infrastructure	D1	D2	D3	D4
				Number of Lanes				
				Lack of number of Lanes	2	3	3	3
BN_Co	CC13			Insufficient Road Width	2	3	3	3
C	Data:	lana Suman T		Intersection Layout				
Surve	2y Date: 3/23	/2021 Survey I	4:52PM	Wrong geometric intersection layout	3	3	3	3
				Inadequate corner cutting	3	3	3	3
		Spill over from	Spill over to	Improper location of road facilities (road	3	3	3	3
	Queue Length	downstream	upstream	markings)				
Approach 1	02 Moderate : c	Yes	No	Traffic Regulation				
Approach 2	02 Light Lover 1	Voc	No	Signal timing				
Approactiz	03 Light : Over 1	Tes	NO	Inadequate of traffic signal control	3	3	3	3
Approach 3	03 Light : over 1	No	No	Bad visibility of traffic signal	3	3	3	3
Approach 4	03 Light : over 1	Yes	No	Left-turning or oncoming vehicles				
Approach 5				No left-turn lane	3	3	3	3
				Insufficient left-turn lane length	3	3	3	3
				Conflict between a left-turning car and an	3	3	3	3
G	o Back		Main Menu	Right-turning or oncoming vehicles				
				Right-turning vehicles blocking vehicles	3	2	2	3
				proceeding straight ahead				5
				Improper stop line position	3	3	3	3
				Improper channelization	3	3	3	3
				Traffic Situation	-			
	LEGEND			Obstruction due to vehicle types				
				Speed reduction due to trucks	2	3	3	3
	1-STRONGLY	AGREE		Obstruction by motorcycles	2	3	2	3
	2-AGREE			Obstruction by bicycles	3	2	3	3
	3-DISAGREE			Obstruction by pedestrian	1	1	1	1
	0-NO LANE							

Source: JPT

Figure 4.3: Congestion Factor Window

The Traffic Data button leads to the Traffic Data window, which shows the traffic volume of the intersection. The data were from a traffic count survey by MMDA. There is also a four-

legged intersection map for the user to know the volume on each lane per leg of the intersection. For three-legged intersections, one leg is left blank. Figure 4.4 shows a sample of the window.



Source: JPT



The Road Geometry button leads to the Road Geometry window, which shows the road inventory of the intersection. The data were studied from the DPWH Atlas and other websites. Figure 4.5 shows a sample of the window.





5 Data Management and Operations

5.1 Data Management

Individual data, such as Excel files (Datasheet 1 and 2), traffic count data, CAD drawing data, etc., for each bottleneck are stored in the cloud server (Google Drive) and are linked by TBN database file. The cloud server serves as an online warehouse and allows users to create, edit, store, and share documents and other relevant data. If MMDA wants to update survey data, they can upload the latest data in the cloud server, and the table in MS Access is automatically revised. Figure 5.1 shows the conceptual diagram of the intersection bottlenecks database, and Figure 5.2 shows the warehouse structure of the cloud server.



Source: JPT

Figure 5.1: Conceptual Diagram of the Database on Intersection Bottlenecks



Source: JPT

Figure 5.2: Structure of Cloud Server Data Storage

Much is still needed to be done for the Access to be user-friendly and convenient for a beginning user to function. However, the basics and fundamental functions of the database management system is present, and the prototype can fully integrate multiple data sources, and visualize information for the users to analyze, and appreciate.

5.2 Data update

Adding TBN points require adding a data item in each of the tables (Congestion, Geometry, Signal, etc.) Every table should have the new TBN except the BaseData Table. The BaseData Table would be the last Table where users would add the new TBN. After finally adding it to the BaseData Table, a TBN would be encoded to the database. Then, the user can add the necessary information in each of the forms where the TBN was added.

Figure 5.3 shows the process on adding a data in the database. First, add a data item on the Congestion Table. A new TBN labeled PYXX was added in the Congestion Table. Add a record to a table or form. Open the table in Datasheet View or the form in Form View. On the Home tab, in the Records group, click New, or click New (blank) record, or press Ctrl+Plus Sign (+). Find the record with an asterisk in the record selector, and enter your new information.

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Tables		~		2021/06/18 0.277777	77778 03 Light : over	103 Light : over :	02 Moderate :	c		Yes	Yes	Yes	
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BN_C	Congestion		. TG24	2021/06/16 0.388888	88889 03 Light : over	103 Light : over 1	03 Light : over 1	1		Yes	Yes	Yes	
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Forms		^	1 VL08	2021/03/25 5:27PM	03 Light : over	1 None	None			No	No	No	
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Con	gestionF			2021/06/22 5:29PM	02 Moderate :	02 Moderate :	02 Moderate :	c		No	No	No	
				2021/06/22 4:32PM	03 Light : over	102 Moderate :	03 Light : over 1	1 02 Moderate : c		No	No	No	No
Geor	metryr		PYXX E PYXX	2021/06/22 6:00PM									
Mair	nMenuF		*	1		1					1		
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Figure 5.3: New TBN Data Input in BN_Congestion Sheet

After adding the necessary and available information on the new bottleneck, add the corresponding code on other Tables such as Geometry, Signal ID, and Traffic. User can now see that inserting a new data and updating the existing data is very simple in Datasheet View as working in spreadsheet. But if the user wants to delete any data, it is necessary to need to select the entire row first as shown in Figure 5.4.

		BaseDataF2 ×	BN_Geometry	×					
		CODE -	D1DataSourc -	D2DataSourc •	D3DataSourc •	D4DataSourc -	D5DataSourc •	D1NumLanel •	D1N
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	Đ	VL04	02 Assumption	0)				
	+	VL06	02 Assumption	0)				
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	ŧ	VL08	02 Assumption	0)				
	Ð	VL11	02 Assumption	0)				
	Ŧ	VL13	02 Assumption	0)				
	+	VL16	02 Assumption	0)				
	Ŧ	PYXX	02 Assumption						
*									

Source: JPT

Figure 5.4: Adding bottleneck in Geometry Table

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			CODE		Signal ID	w	Click to	Add	*		
		+	TG24								
		+	TG35								
		+	VL04								
		÷	VL06								
		+	VL07								
		÷	VL08								
		+	VL11								
		+	VL13								
		+	VL16								
\$	9	÷	PYXX			0					
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Source: JPT

Figure 5.5: Adding bottleneck in Signal Table

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All Ad	cess O.	. 🕤 <	8	BaseDataF2	×	BN_Tra	ffic	× 🔳	BN_Bas	eData	×														
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EN BN	Concestion			TG24	1	4 NCR		Taguig		Kalay	aan Ave	1 14.5	56053279	121.05	567203	1	1th Ave				Kalayaan Ave	Kalayaan Ave			
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After these steps, add the potential traffic bottleneck PYXX to the BaseData Table

Figure 5.6: Adding bottleneck in BaseData Table

After adding to the code PYXX to all the tables, with the Base Data Table last, users can now access/view the bottleneck in the View Data Form. The information can now be shown By design, you cannot edit data from some types of queries. For example, you cannot edit the data returned by a crosstab query, and you cannot edit or remove calculated fields — values that a formula calculates as you use your database, but that do not reside in a table.

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	Geometry Google Map Exit DB Open JPEG?

Source: JPT

Figure 5.7: Viewing new bottleneck in ViewData Form