

The 19th ITS Asia Pacific Forum

*Transformation Towards a Sustainable and
Intelligent Urban Mobility*

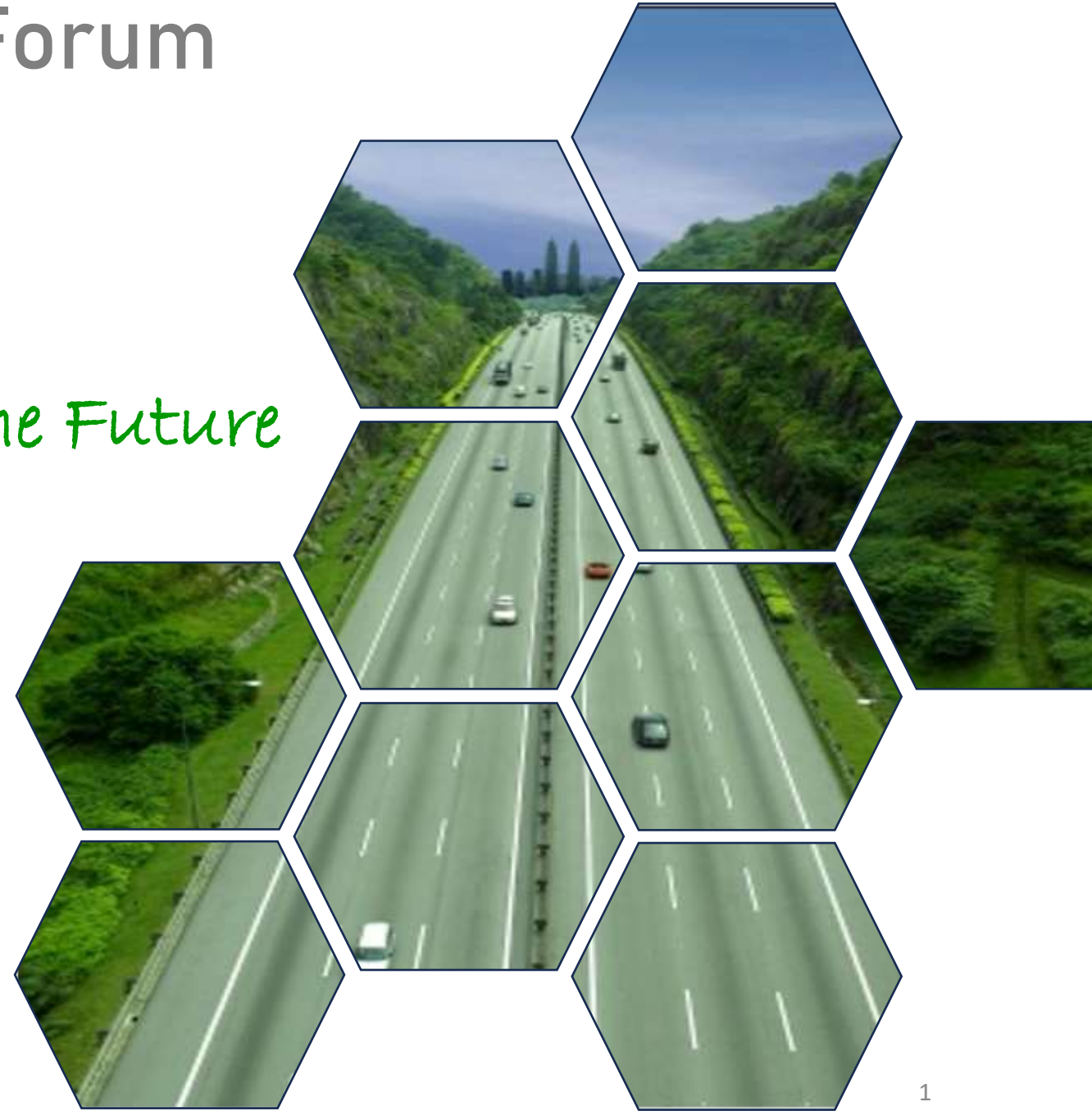
Leaders Forum 2

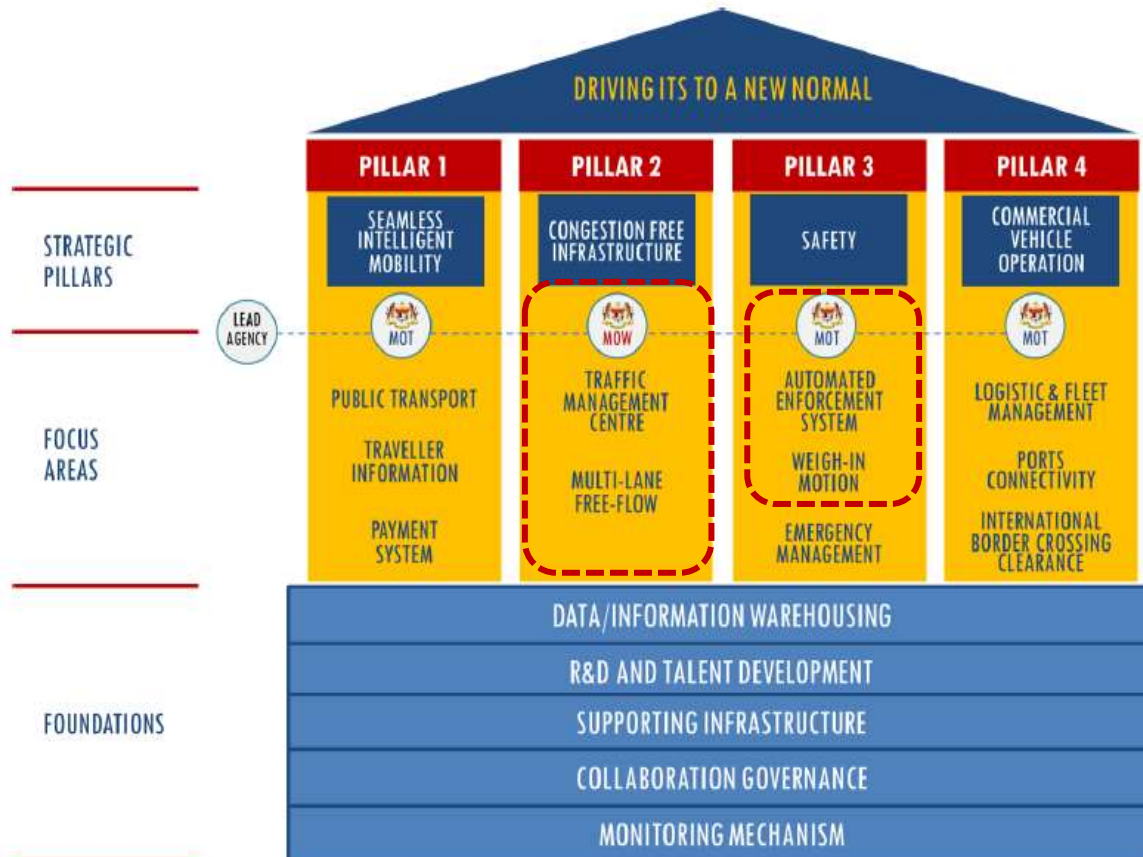
Building The Highway of the Future

Jointly Prepared by

Datuk Ir Zakaria Ahmad Zabidi
Chief Operating Officer
PLUS Malaysia Berhad

En Azalan Sulaiman
Head, Mechanical, Electrical & Electronic Dept.
PLUS Malaysia Berhad





Since the early days of ITS implementation in Malaysia, the most common ITS application that is currently being practiced are as below:

- Area Traffic Control System (ATCS)
- Electronic Tolling Collection
- Traffic Control and Surveillance Systems (TCSS) for Toll Highways
- Integrated Transport Information System (ITIS) DBKL
- PLUS Traffic Monitoring Centre
- MHA Traffic Management Centre
- Bandar Tasik Selatan Integrated Transport Terminal
- Storm Water Management & Road Tunnel (SMART)
- Automatic Awareness Safety System (AwAS)
- Performance Monitoring Hub System (PMHS), APAD
- Rapid KL Public Transport Information System
- Automated Passenger Fare System
- Integrated Common Payment System (ICPS)



Mission Statement

"We connect communities to shape a safe and sustainable future"



Aspirations

"We care and support each other to positively impact PLUS and our communities"



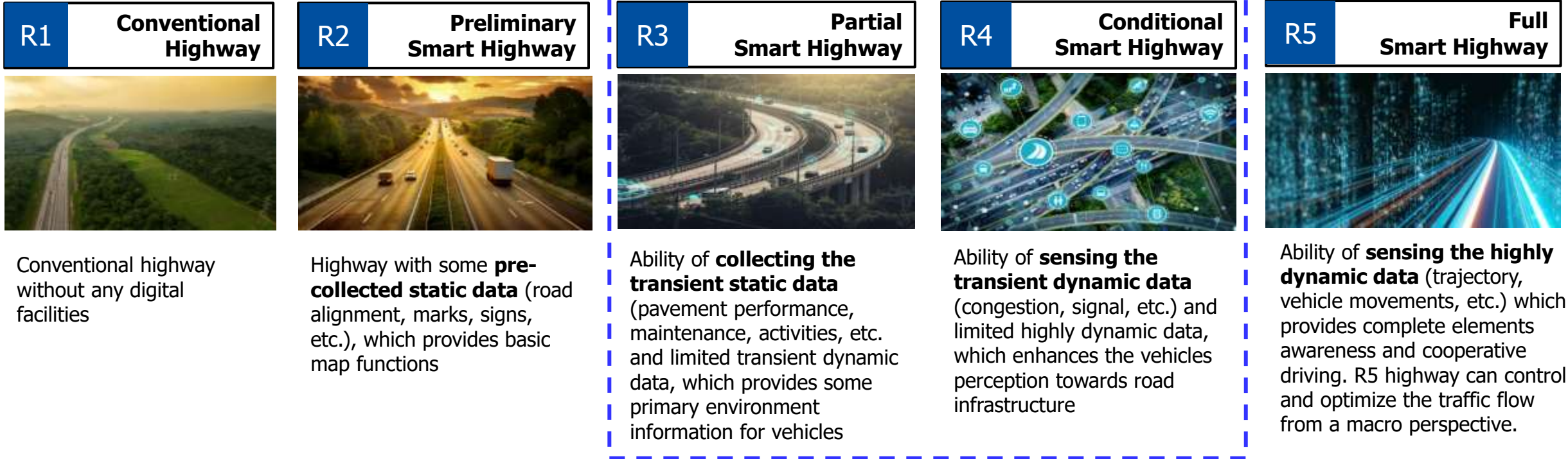
Projek Lebuhraya Usahasama Berhad

- 1 North-South Expressway (NSE)
Length: 805.8km
Concession Period: 1988 – 2058 (70 years)
- 2 New Klang Valley Expressway (NKVE)
Length: 47km
Concession Period: 1993 – 2058 (65 years)
- 3 Seremban Port-Dickson Highway (SPDH)
Length: 17km
Concession Period: 1994 – 2058 (64 years)
- 4 Malaysia Singapore Second Crossing
Length: 13.5km
Concession Period: 1993 – 2058 (65 years)
- 5 Penang Bridge
Length: 63km
Concession Period: 1994 – 2058 (64 years)
- 6 NSE Central Link (ELITE)
Length: 17km
Concession Period: 1994 – 2058 (64 years)
- 7 Butterworth Kulim Expressway (BKE)
Length: 184km
Concession Period: 2016 – 2034 (18 years)
- 8 Kuala Terengganu – Jabor (LPT2)
Length: 184km
Concession Period: 2016 – 2034 (18 years)

Lebuhraya Pantai Timur 2 Sdn Bhd

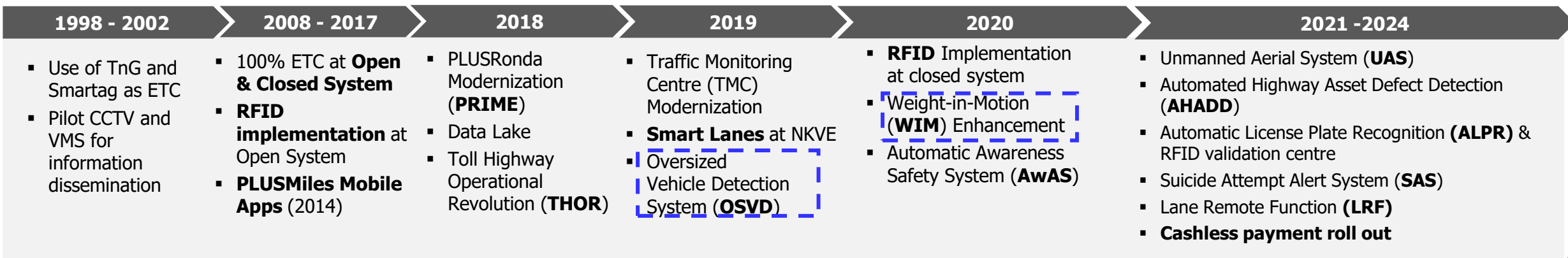
- 8 Kuala Terengganu – Jabor (LPT2)
Length: 184km
Concession Period: 2016 – 2034 (18 years)

Total Length: 1,130.3km



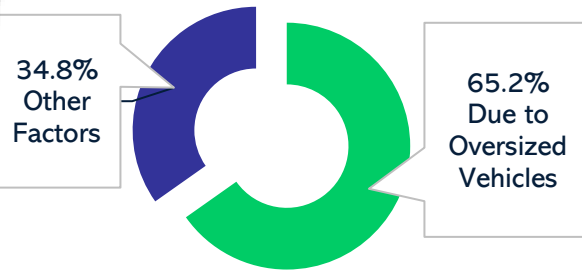
PLUS JOURNEY

From the Hindawi Journal of Advanced Transportation - <https://doi.org/10.1155/2021/9445070>

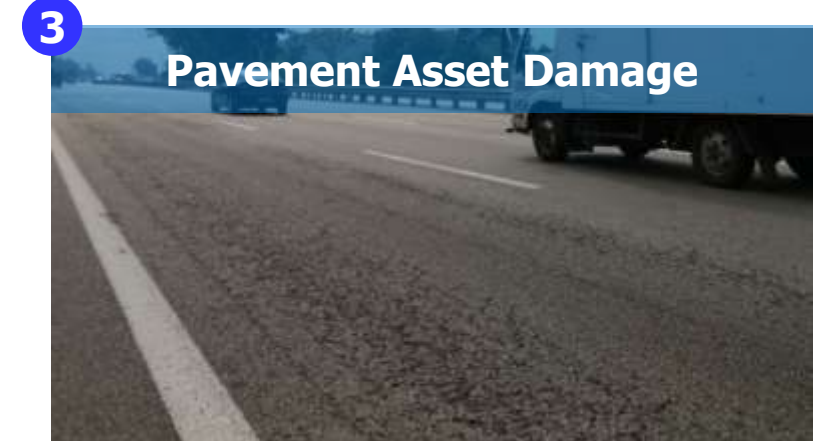




Tunnel Meru-Menora Accidents
Year 2017 - 2019



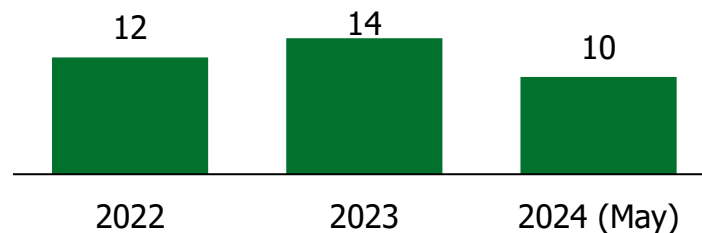
- Enforcement officers will identify through **visual assessment** whether a truck is suspected to be overloaded and direct the truck to come into the **static weighing facility** to be confirmed whether it is overloaded or otherwise
- The **long waiting time** in the long queue during inspection procedure may end up to be a **waste of time and resources**



- **Overloaded heavy vehicles** are a **major cause of the growing number of accidents** on the roads
- For year 2022 and 2023, accidents involving heavy vehicles has increased by 16.0% (2,554 vs 2,955 accidents).
- Out of total heavy vehicles accidents, accidents attributed to overloading/overheight has increased by 46.8% (62 vs 91 accidents)

- Overloaded vehicles risk mechanical failures and accidents due to **additional strain on critical components like brakes, tires, and suspension.**
- Additionally, **clearing the scene of an overloaded vehicle accident** often takes longer

Bound Closures due to Heavy Vehicle Accidents

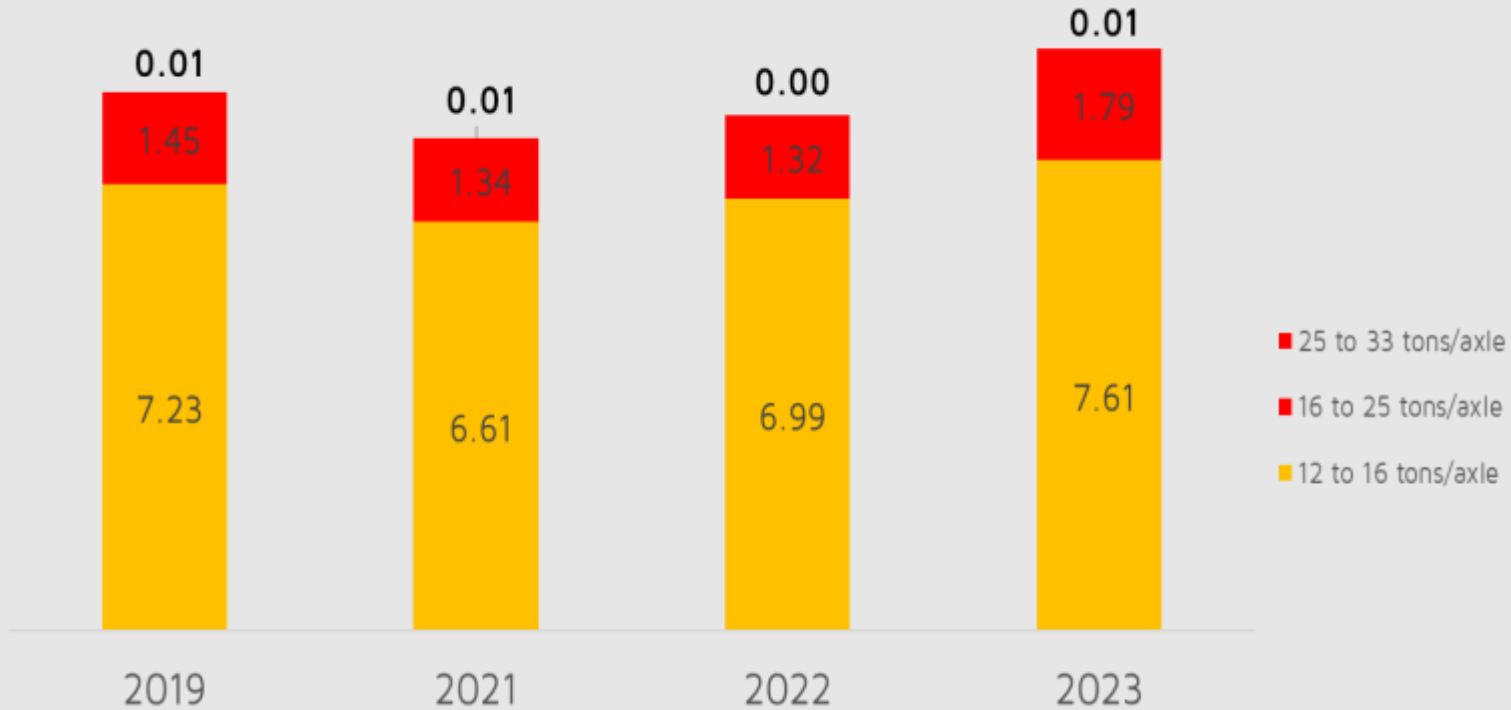


- Overloaded commercial vehicles **exert significantly more pressure** on road surfaces. Excess weight stresses the pavement and causes **accelerated wear, leading to potholes, rutting, cracks, and pre-mature failures.**



When a commercial vehicle's axle(s) **exceeds 12 tons per axle**, it is considered **overloaded**

Average Percentage of Axle Overloading along PLUS Expressways 2019-2023



*Excluding data from Year 2020 due to MCO. Data is not representative of the typical traffic pattern

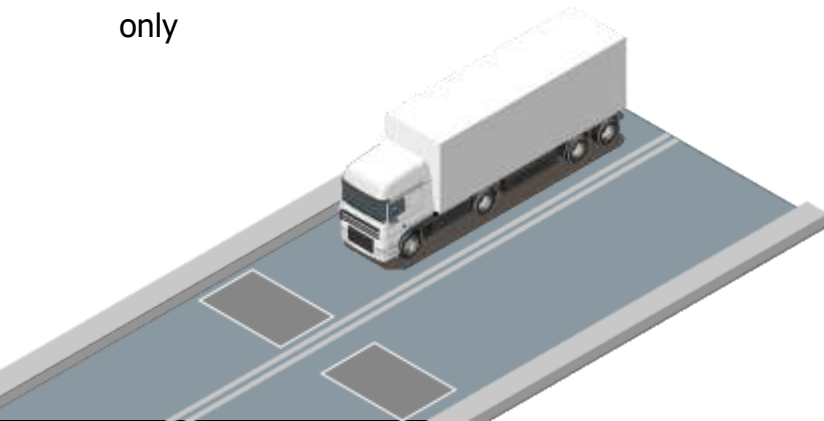
Increasing trend of an average 9% every year for Overloading Vehicle more than 12 tons/axle



- **Weigh-in-Motion (WiM)** is a system to capture the weight of vehicles passing through sensors embedded in pavement without interruption to traffic flow.
- There are **19 WiM locations** along PLUS highway as data collection devices for pavement design purposes and 1 location was enhanced as an effort to deter overweight vehicle on our highway.

PREVIOUS

- Standalone implementation
- Manual data collection through GSM
- Information collected:
 - Date
 - Time
 - Location
 - Number of Overloaded Vehicles Detected
 - Traffic Volume
- Data used for pavement design in repair works only



ENHANCEMENT

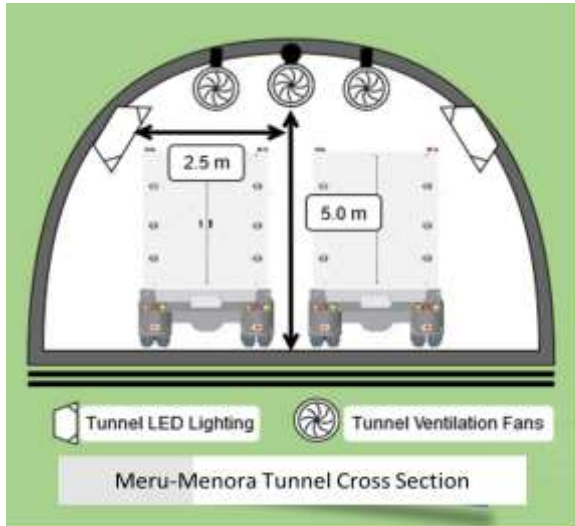
- WiM integration with Automatic Number Plate Recognition (ANPR) and Variable Message System (VMS)
- Data collection and integration through fiber optic network for real-time information update
- Information collected:
 - Date
 - Time
 - Location
 - Number of Overloaded Vehicles Detected
 - Traffic Volume
 - Number plate of the overloaded vehicle
- In addition to using the data for pavement design, information on overweight vehicles automatically disseminate to relevant personnel and authority
- Providing automated warning (**ADVOCACY**) to the driver of the overweight vehicle through Variable Message System (VMS) to exit the highway at the next interchange



- Oversized vehicles are **causing damages to our tunnel equipment** which may endanger highway users.
- An **early detection system** are used to provide early detection that will provide enough time to response team to intervene.

PREVIOUS

- Height sensor at mainline and toll plaza **providing alert to toll plaza supervisor** when detecting over height vehicle
- Supervisor to **disseminate the alert** to tunnel personnel for the personnel to coordinate the effort in preventing the over height vehicle from entering the tunnel



ENHANCEMENT

- Developing Over Sized Detection System (OSVD) System to provide **automated alert** to relevant personnel when detecting over sized vehicles at mainline and to capture the vehicles details
- Providing automated warning to the driver of the **oversized vehicle through Variable Message System (VMS)** to exit the highway at the next interchange
- If the oversized vehicles did not exit the highway, **an automated system shall alert** the relevant personnel/authority (**ENFORCEMENT**) to prevent the vehicle from entering the tunnel



WEIGH-IN-MOTION DETECTION DATA

2/15/2024 3/14/2024

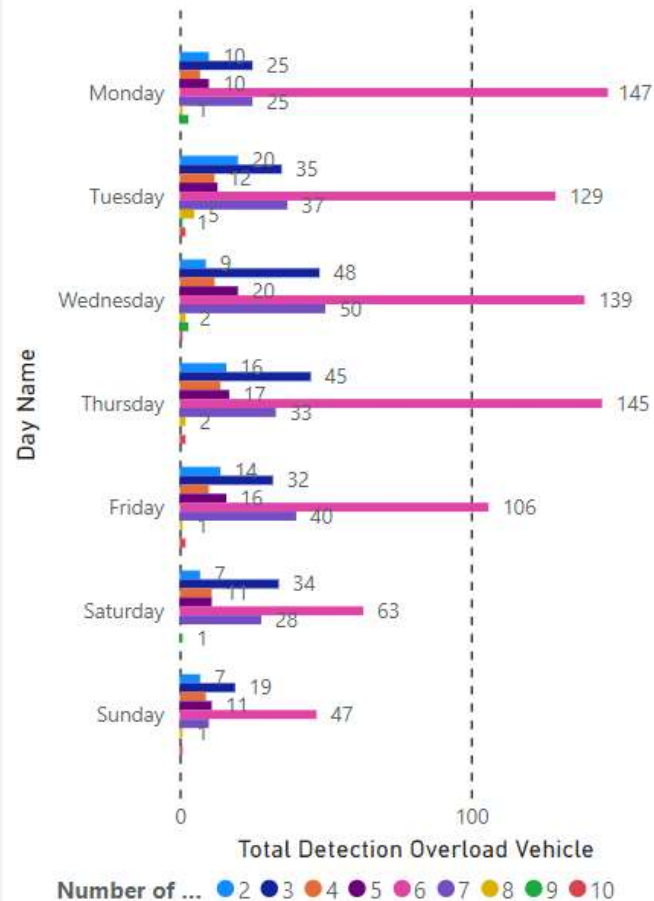
Gross Weight Threshold
 2 axle = 19000 kg
 3 axle = 31000kg
 4 axle = 39000kg
 5 axle = 45000kg
 6 axle = 50000kg

Indicator Overweight
 1kg -5000kg = Overweight A
 5001 kg -10000 kg = Overweight B
 10001kg -15000kg = Overweight C
 >15001kg = Overweight D

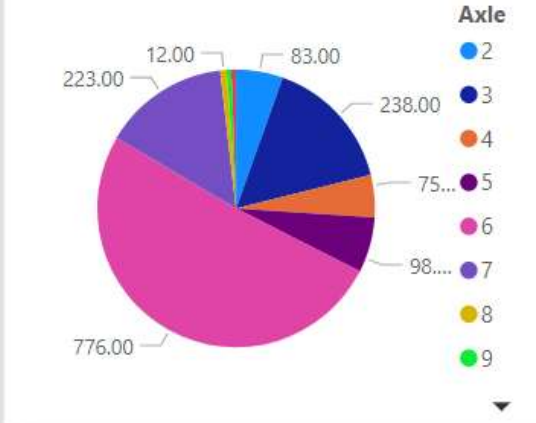
1521
 Total Detection

KKS
 First Location

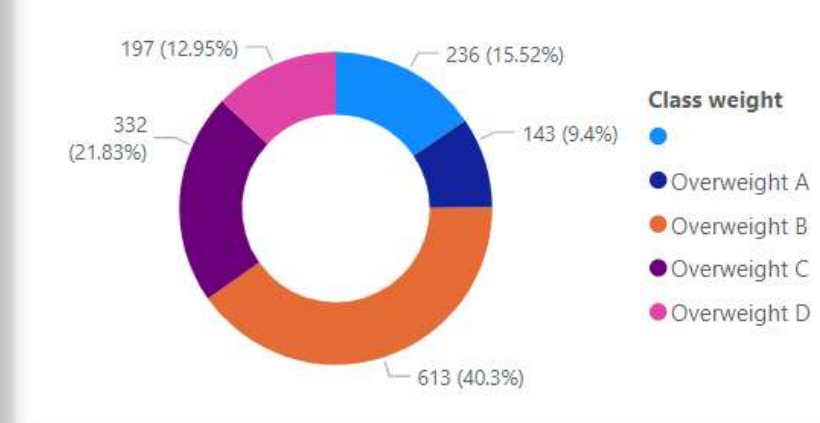
Total Detection by Axle In Day



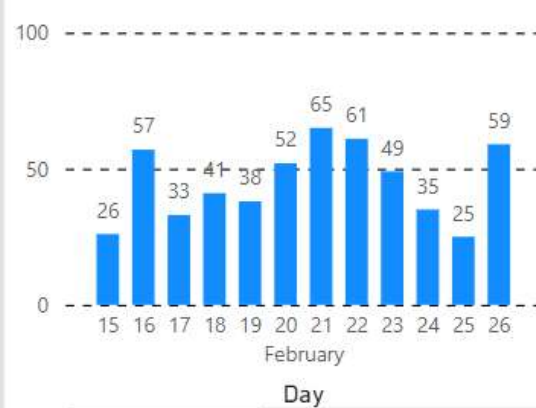
Total Detection By Number of Axle



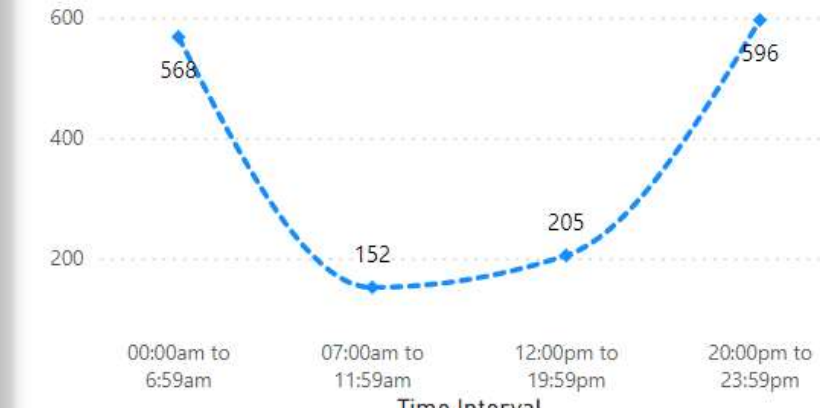
Number of Overweight Range By Category



Total Detection by Date



Total Detection by Time Period



Enforcement on Heavy Vehicles : WiM System 1st Detection: Overweight Vehicle Detected (Sample)

Alerts via WiM User Interface (GUI)
& Telegram Messaging Platform

WIM GUI

Latest WiM Alerts

Recent Alerts

- License Plate : VGP2349**
Site: WIM KM267.5SB
Oct 2, 2023, 9:57:14 PM
- License Plate : JUT278**
Site: WIM KM267.5SB
Oct 2, 2023, 9:54:17 PM
- License Plate : RAD8328**
Site: WIM KM267.5SB
Oct 2, 2023, 9:49:36 PM

Picture	PlateNumber	WimTimestamp	GrossWeight	TotalAxe	AxeWeight1	AxeWeight2	AxeWeight3	AxeWeight4	AxeWeight5	AxeWeight6	AxeWeight7	AxeWeight8
	RAD8328	Oct 2, 2023 - 9:49:36 PM	55,645 kg	6	1345	7205	12170	11088	9178	9000	0	0

Telegram message

Overweight Alert WIM KM237.7SB for vehicle no RAD8328 & weight 55,645 kg has been acknowledged by user Plus2020 at 2023/10/02 21:49:36

No. Seri 012784

**JABATAN PENGANGKUTAN JALAN
MALAYSIA**
NOTIS ARAH TIMBANG

Kepada: RENILIK BERNIMATAR

Tuan/Puan,
Pada menjalankan kuasa di bawah Seksyen 63(1) Akta _____ saya
Pegawai Pengangkutan Jalan, dengan ini memerintahkan kamu membawa serta merta:
No. Pendaftaran Kenderaan : KPL 3100 / 7K 2473
Jenis Muatan Dibawa : BERAS
Pada tarikh 09.10.23 dan jam 10.00PM untuk tujuan penimbangan di Stesen Penguatkuasa
Pejabat JPJ lokasi penimbangan mudah alih di JPJ IPCH (TIMBANG NIKFA)

2. Mana-mana orang yang gagal mematuhi arahan ini atau mengabaikan muatannya atau mana-mana bahagiannya, adalah melakukan suatu kesalahan di bawah Seksyen _____ dan boleh dihukum di bawah Akta yang sama.

Nafiah
Pegawai Pengangkutan Jalan

Dianahkan kepada:
Nama Pemandu/Pemilik : RENILIK BERNIMATAR
No. KP Pemandu/Pemilik : 800906-01-6175
Lokasi Serahan Notis : KM 257 LRU/RS
Tarikh : 05.10.2023
Masa : 11.50 PM

Summon From JPJ –
Manual Intervention

NOTIS ARAH TIMBANG

Kepada: RENILIK BERNIMATAR

Tuan/Puan,
Pada menjalankan kuasa di bawah Seksyen 63(1) Akta _____ saya
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Pejabat JPJ lokasi penimbangan mudah alih di JPJ IPCH (TIMBANG NIKFA)

VMS @ KM239.9 SB Kuala Kangsar - Display WiM Message
VMS @ KM260.4 SB Menora - Display WiM Message

WIM Message

ALM9108
SISTEM SEDANG DIUJI

Display WiM Message

NOTE: Image taken from CCTV located at the VMS location.



THANK YOU



*Please feel free to reach out
zakaria.zabidi@plus.com.my*

36 years in services as the largest highway operators in Malaysia, 1,130 km in total length accommodating 1.7mil average daily traffic



1988

2018

2024 and beyond



PLUS SMART HIGHWAY

Building the highway of the future by incorporating technology and digital solutions to provide a seamless mobility experience to the Rakyat

SMART OPERATIONS

Expanding the capacity of the highway by embarking on the intelligent highway concept and **managing congestion**

1



Smart Lane

2



Weigh-In-Motion (WiM)

3



Oversized Vehicle Detection System (OSVD)

4



Suicide Detection System (SDS)

5



PLUSRONDA Intelligent Management System (PRIME)

SMART MOBILITY

Establishing the **highway infrastructure for electrified mobility and digital building blocks** for the community

1



EV Charging Stations

2



PLUS App

3



PUTRI Chatbot

4



Cashless Payment

SMART ASSET MANAGEMENT

An innovative way of towards optimum asset management leveraging on **IoT Solutions**

1



PLUSGeospatial

2



Real Time Management System (RTMS)

3



Unmanned Aerial Surveillance (UAS)

4



Predictive Modelling - dTIMS

SMART TOLL MANAGEMENT

Strong foundation for Multi Lane Fast Flow leveraging **technology and digital payment**

1



Automatic License Plate Recognition (ALPR)

2

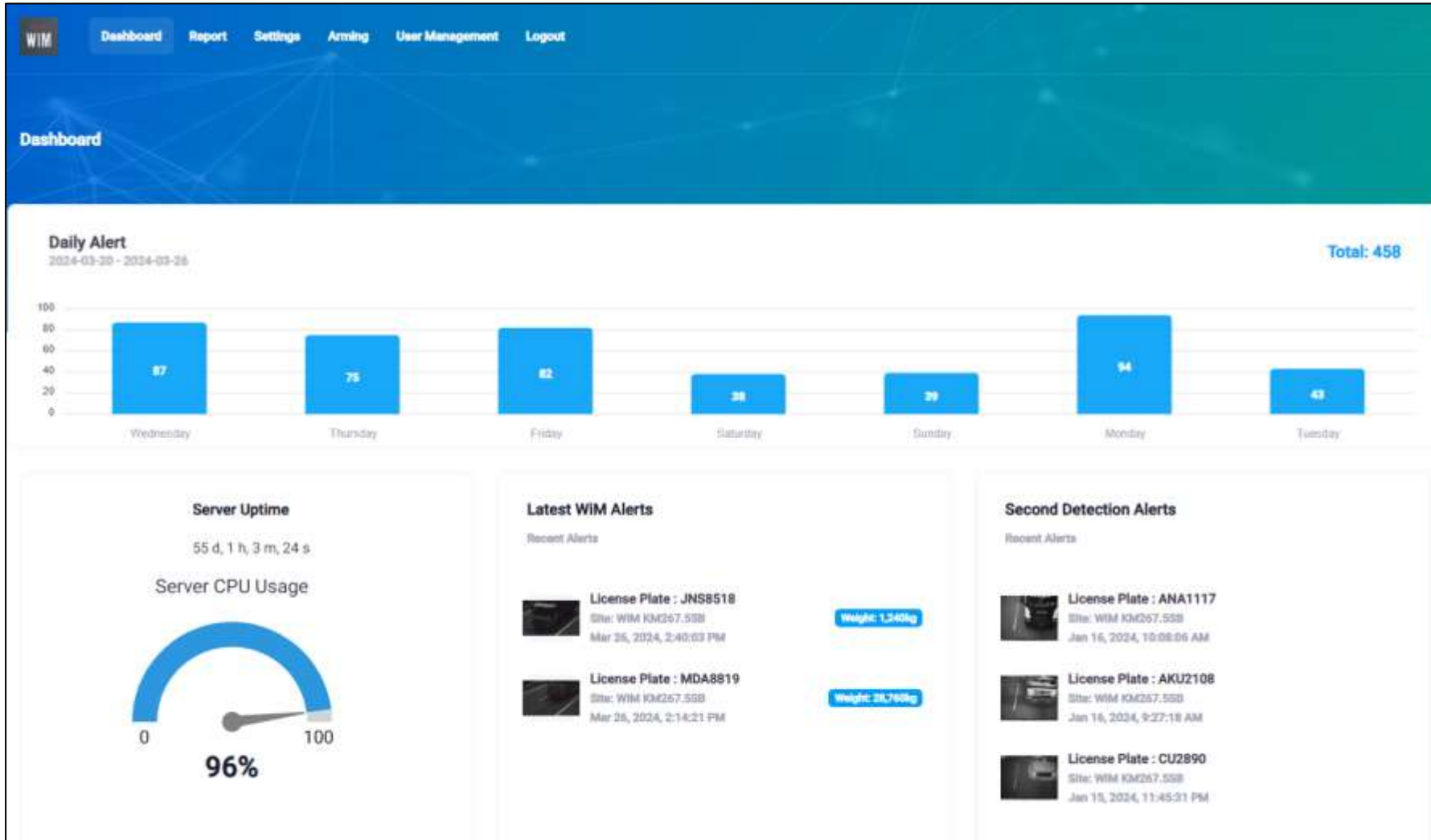


Video Analytics - Vehicle Classification (VAVC)

3



Lane Remote Function (LRF)



WIM Detection Summary

Data Collected :-
20 Mac 24 – 26 Mac 24

Average Detection :-
458 / Week

Highest Day Detection :-
Monday

Strategic Imperative: Crafting a Comprehensive Smart Highway Roadmap Masterplan to Drive Sustainable Smart Highways and Beyond over the Next 5 Years

PLUS is embracing a journey into a Smart Highway of the future, integrating cutting-edge technologies for enhanced safety, efficiency, and sustainability. Through real-time data analytics and interconnected systems, we aim to optimize traffic flow, provide predictive maintenance and enable smart vehicle communication, ensuring a seamless and intelligent journey for all customers

True North Initiatives

Sustainable Smart Highway and Beyond

- A Delivering PMB Group's EBITDA**
 - Annual 60% EBITDA
- B Meeting Regulatory and Stakeholders' Expectations**
 - Annual 4-star (90%) EPI score by PLUS/LPT2
 - Annual 85% Customers Satisfaction Index (CSI)
- C Environmental, Social and Governance (ESG)**
 - Net 35% reduction of carbon emissions by 2030
 - Social Development: 25,000 beneficiaries by 2028

Strategy Pillars	Leader in Asset Management	Operational Excellence	Enhancing Toll Revenue & Non-Toll Income	Efficiency and Sustainability	Growing Beyond Concession
	1 Strategic Asset Mgmt. Optimal, Timely, and Data-Driven Intervention	4 Safety Leadership Minimising incidents and road accidents	8 Enhance Highway Capacity Lane widening and enhancing interchanges' level of service	12 Optimising Organisational Structure Nexus Efficiency Review and ECTOS	15 TERAS Business Growth Core business, participate in MLFF, and diversify business
	2 Extending Highway Asset Lifespan, Sustainably Pavement and Safety Furniture e.g., guardrail and road-signs	5 Enhancing Toll Infrastructure Optimal utilisation of existing toll assets (Project Swipe)	9 Demand Management Dynamic Tolling	13 Green, Energy Saving, and Renewable Energy Initiatives	16 New Commercial Development - Terra PLUS New Commercial Joint Development, EVCS and Premium Outlets
	3 Expertise and Capacity-Building	6 Congestion Management SMARTLane and Reducing Lane Closure Downtime	10 Diversion Mitigation via Strategic Marketing	14 Procurement Transformation Optimal procurement structure and process efficiency	17 Mobility-as-a-Service (MaaS) - Zoom Interactive Big Data
	7 Rejuvenating Facilities Upgrading of RSAs and Lay-bys	11 Maximising Commercial Potentials of RSAs, Laybys & Land Banks New Commercial Facilities Masterplan & Capitalising Land Banks	13 Green, Energy Saving, and Renewable Energy Initiatives	14 Procurement Transformation Optimal procurement structure and process efficiency	17 Mobility-as-a-Service (MaaS) - Zoom Interactive Big Data
Technology	Robust Network and Applications Minimal downtime. efficient operations, secure network, value-add applications				
Good Governance	Upholding Governance Inculcating integrity, compliance, and risk management.				
Our People	MyPLUS Becoming the Preferred Employer, Fostering MyPLUS and Wellbeing Culture				