Ministry of Public Works and Housing

REPUBLIC OF INDONESIA
PROJECT FOR STRENGTHENING MANAGEMENT CAPACITY OF TOLL ROAD DEVELOPMENT

Japan International Cooperation Agency

KNOWLEDGE-SHARING SEMINAR ON
TOLL ROAD ASSET MANAGEMENT IN INDONESIA

New Concept of Toll Road Asset Management

September 2024

AOKI Kazuya

JICA Expert Team / INFRONEER Holdings Inc.

INFRONEER Holdings Inc.

Discussion purpose only
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Infroneer Holdings, as the Japan's first “Comprehensive Infrastructure Management Company,“ is continuing to take on the social challenges behind infrastructure management.

INFRONEER Holdings Inc.

Our beliefs behind the logo

【INFRONEER ARROW】

Toward a new future of infrastructure management,

we take on the challenges behind conventional ways of infrastructure management, and

toward flexibility in the ways, we create innovation.

Our beliefs behind the company name

【Infrastructure/Innovative/ Pioneer/Engineer/Frontier】

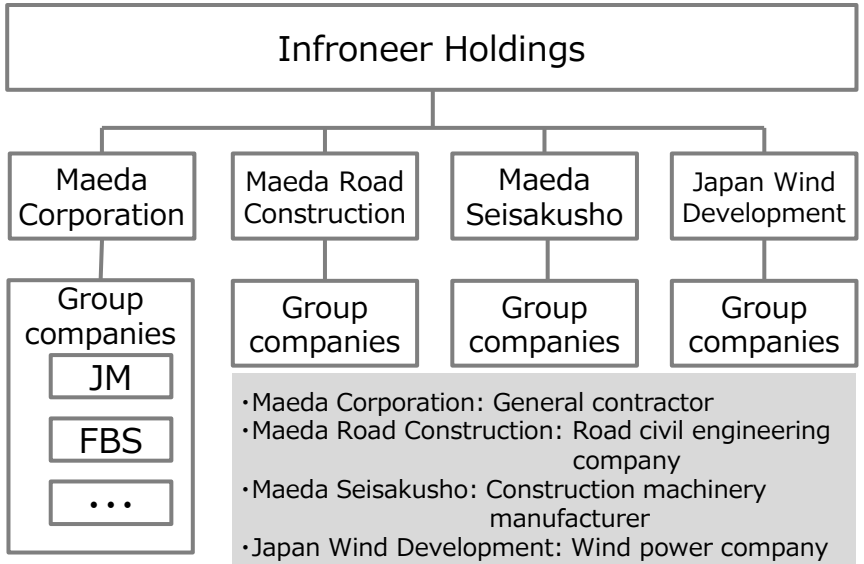
INFRONEER is the name coined, expressing our thoughts as infrastructure innovators, pioneers, engineers, and frontiers.

Consolidated operating results

March 2024
Billion Yen

Net sales	Profit attributable to owners of parent	No. of employees	Total assets
793.3	32.6	7,546	1,410.6

Trade Name	INFRONEER Holdings Inc.
Date of establishment	October 1, 2021
Capital	20,000 million JPY
Institutional design	Corporation with Nominating Committee, Etc.



・Maeda Corporation: General contractor
・Maeda Road Construction: Road civil engineering company
・Maeda Seisakusho: Construction machinery manufacturer
・Japan Wind Development: Wind power company
・JM: Facility maintenance company
・FBS: Building maintenance company



Building Construction



Civil Engineering



Infrastructure Management



Machinery

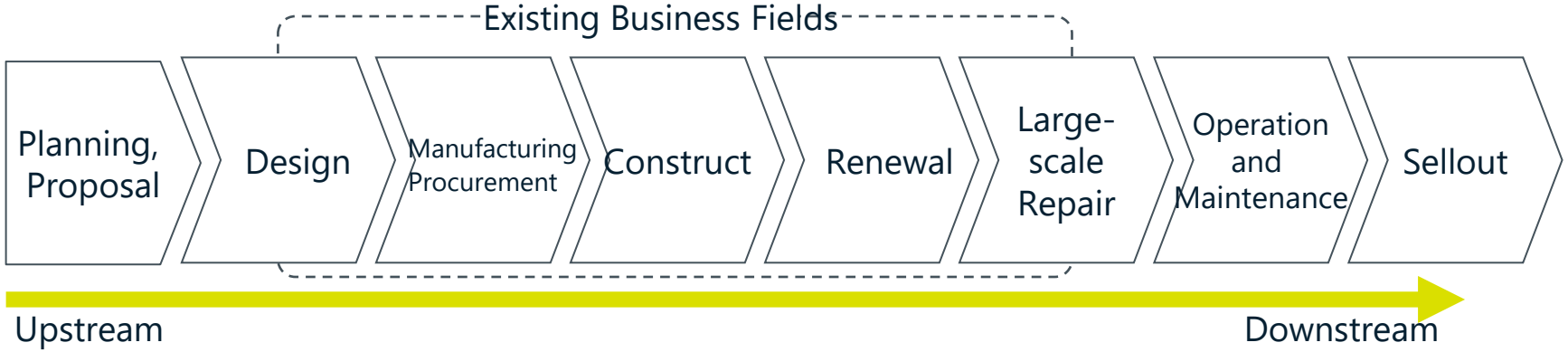
Infroneer is aiming for

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“Integrated Infrastructure Management Company”

providing a one-stop service for managing any types of infrastructures, widely from upstream to downstream

We take on the challenges behind conventional ways of infrastructure management and provide optimal infrastructure services around the world with innovative ideas

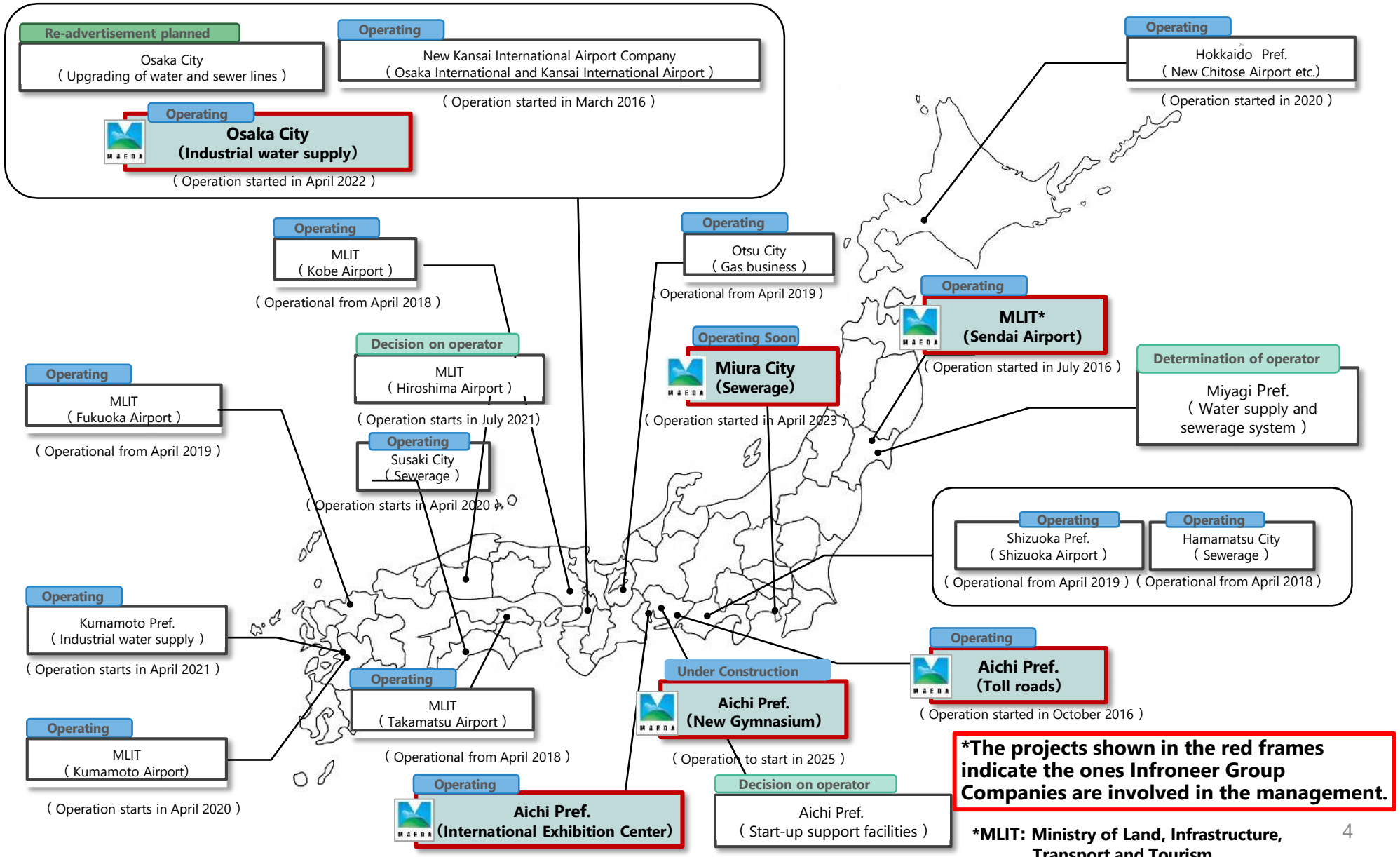


Engineering capabilities gained through our long history × Leading track record of infrastructure management projects × Financial analysis based on appropriate methods × Regional networks established among group companies

Solid Management Base established through Incorporation of Holding Company

Main Concession Projects in Japan

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***The projects shown in the red frames indicate the ones Infroneer Group Companies are involved in the management.**

***MLIT: Ministry of Land, Infrastructure, Transport and Tourism**

Achievements in the concession Business

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Aichi Prefecture Toll Road Operation Project

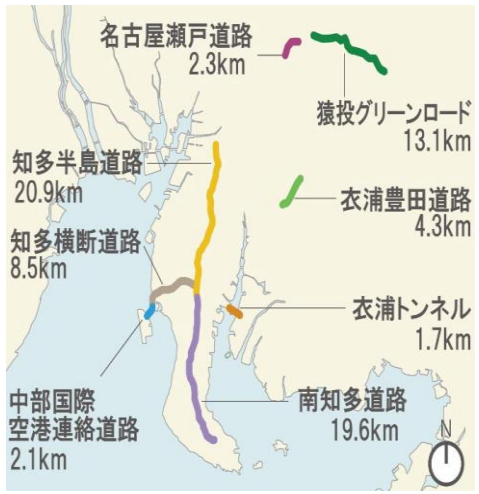
POINT ✓ **First toll road concession project in Japan in a national strategic special zone**

Operators	Aichi Road Concession Ltd.
Member companies	**Maeda Corp (50%)** Mori Trust (30%) Daiwa Lease (10%) Central Highway (8%) Daiwa House Industry (2%)
Type of business	Maintenance and operation of 8 routes totaling 72.5km operated by Aichi Prefectural Road Public Corporation
Period	For approximately 30 years since October 2016





▼Design
Obu Parking Area designed by Kengo Kuma



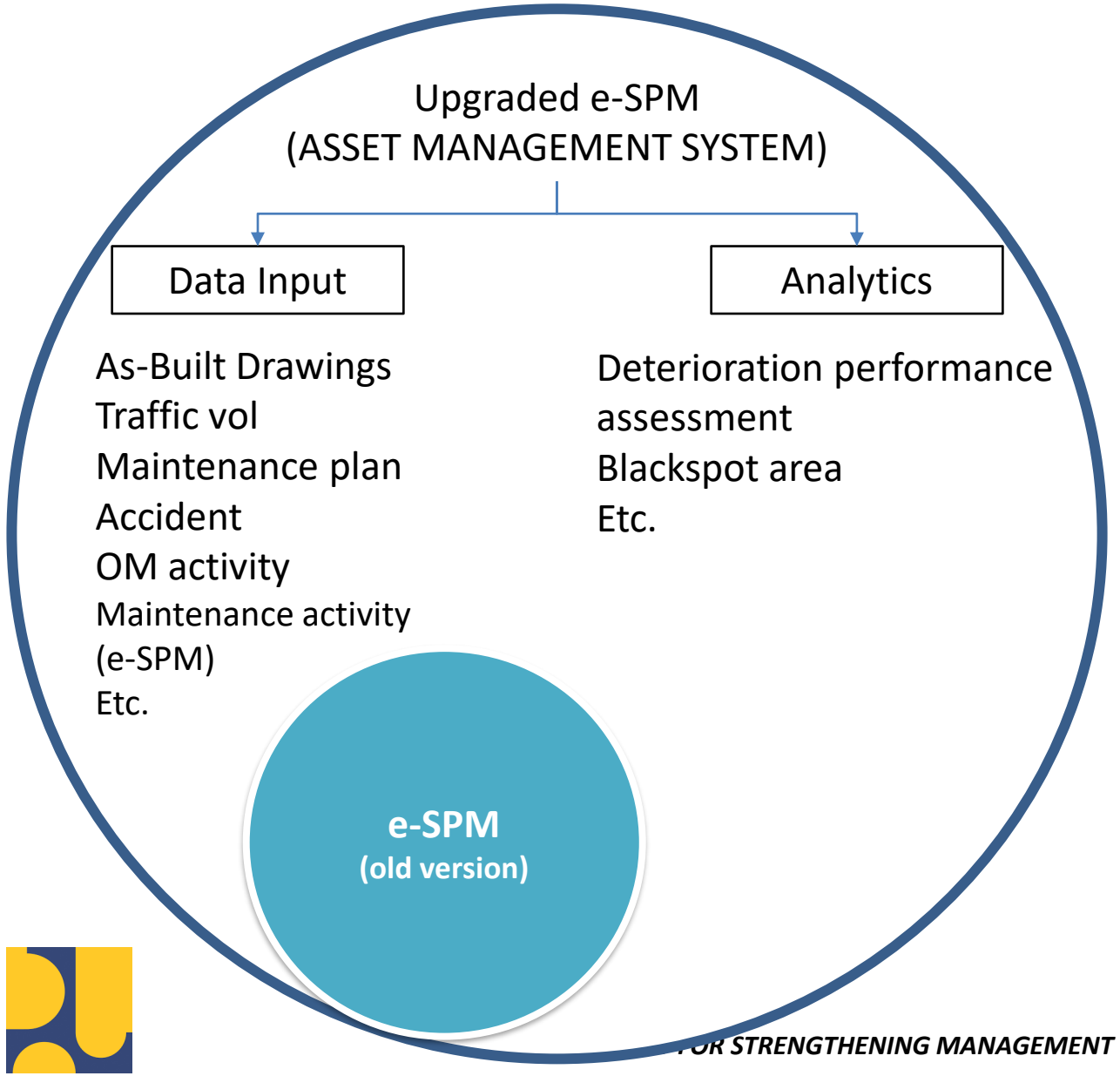


▼Handa IC Tollbooth

Outline of the Project

1. Project Title	Project for Strengthening Management Capacity of Toll Road Development
3. Duration	December 2020 – November 2024
4. Counterparts	Ministry of Public Works and Housing ・Indonesia Toll Road Authority: ITRA(BPJT) ・Directorate General of Highways: DGH ・Directorate General of Infrastructure Financing: DGIF
5. Project Purpose	Comprehensive management capacity to implement efficient PPP toll road project is enhanced.
6. Output	1. Institutional and organizational basis of Road PPP project implementation are strengthened. 2. Capacity of road PPP projects formulation is improved. 3. Capacity of road PPP project procurement is improved. 4. Capacity of road PPP project management and monitoring at construction stage is improved. **5. Capacity of road PPP project management monitoring at O&M stage is improved.**

Challengers for e-SPM upgrading



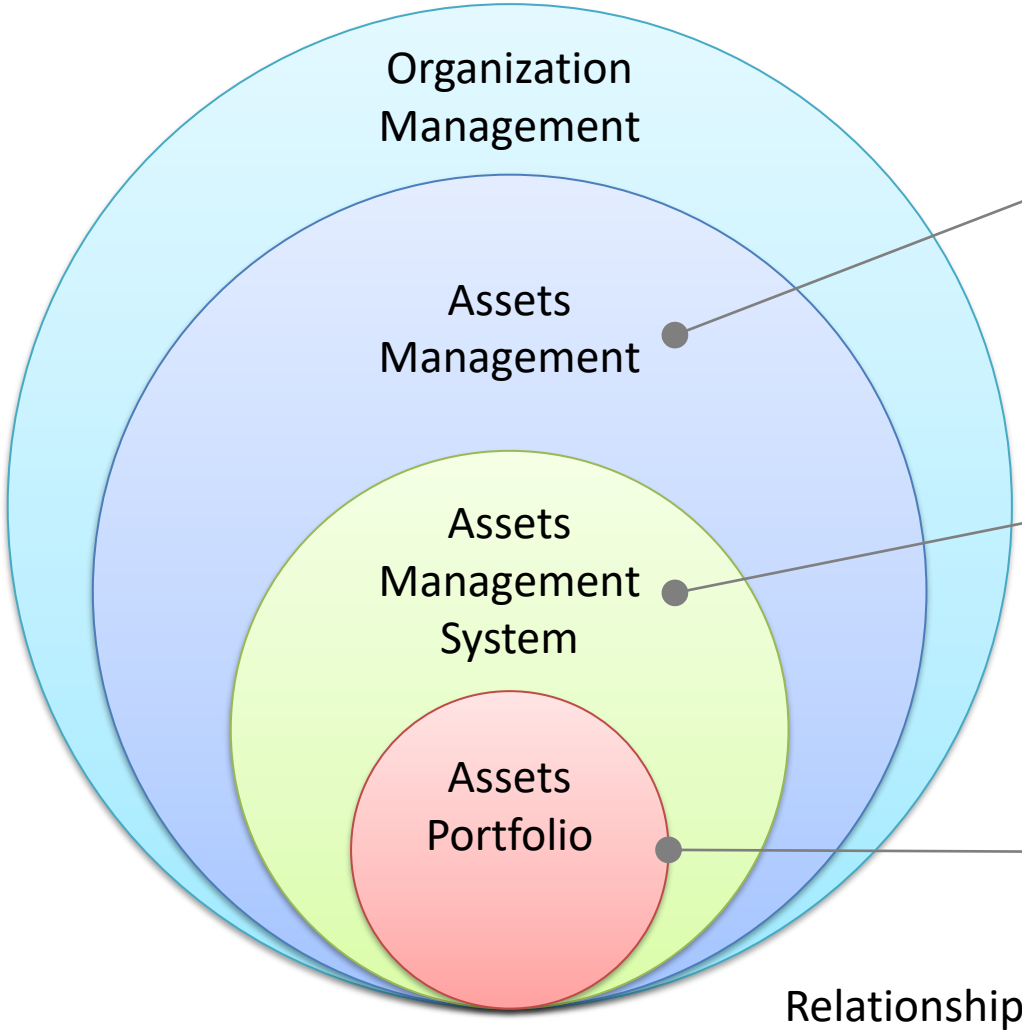
- e-SPM would be part of Asset Management System (AMS)
- AMS content:
  - Technical Information about toll road
  - Performance data
  - Other information
  - Analytics
- AMS will used for general estimation about road performance, not for budget optimalization, so that government could evaluate TRO's activities
- AMS shall feedback provide useful information for better Asset management to TROs
- AMS will be used by ITRA for monitoring all activities

Definition of Infrastructure Asset Management

Definition: Transportation Asset Management

- Transportation asset management (TAM) is a strategic and systematic process of operating, maintaining, upgrading, and expanding physical assets effectively throughout their lifecycle. It focuses on business and engineering practices for resource allocation and utilization, with the objective of better decision-making based upon quality information and well defined objectives

Definition of Infrastructure Asset Management



Coordinated activity by the organization to assess the value of assets

Set of interrelated or interacting elements to establish asset management policies, goals and processes to achieve those goals

Assets within the reach of the management system

Relationship between key words in asset management
Source: ISO55000:2014

Basic Procedure of Asset Management Planning

What are the goals of asset management?

– The goal of any asset management process is to use a **system-wide approach** in order to improve operation and make the organization more effective by considering the full investment and life cycle assets

Overview of Asset Management Strategy Development Process

1. Review the organization's structure
2. Conduct an asset management assessment
3. Identify the asset management policies and goals to be achieved
4. Prepare and implement an asset management action plan
5. Review and monitor progress

Do you mean Asset Management or Managing Assets?

Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

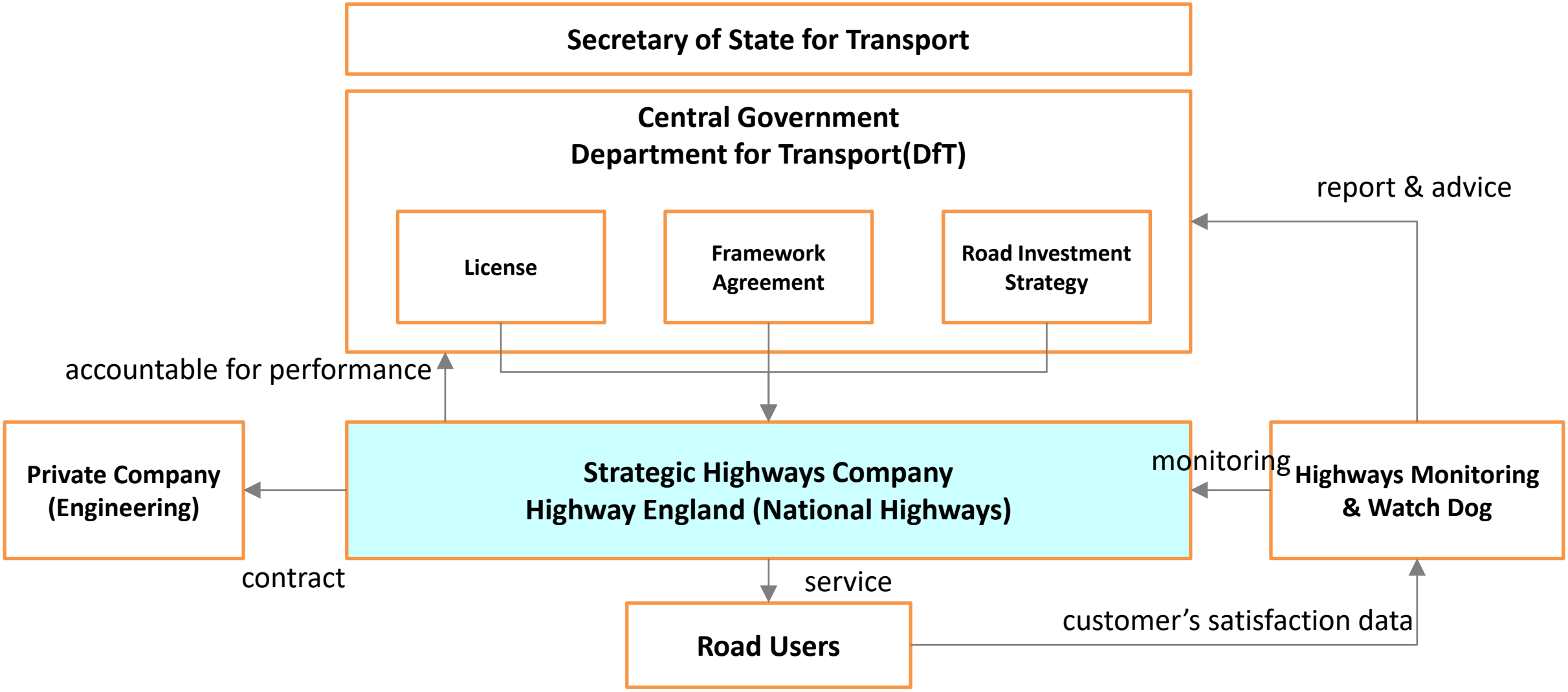
- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performance

Source : https://committee.iso.org/home/tc251

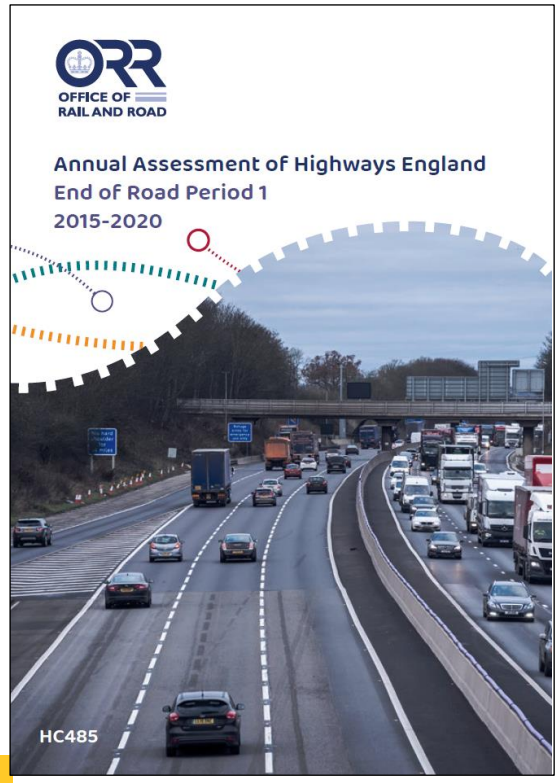
Asset Management Scheme in UK



Source : Department for Transport: Consultation on Transforming the Highways Agency into a Government-Owned Company, 2013.

Asset Management Scheme in UK

- Central government concentrates on achieving outcomes in road services
- Strategic Highways Company is responsible for technical support
- Establish a system to link outcomes and outputs, evaluate achievement status, and visualize them, while complying with international standards.



Source：Highways England's Five-Year (2015-2020) Outcome Report

Policy Objectives ： Better Roads for Users

↓

Outcome

Making the network safer ／ Improving user satisfaction
Supporting the smooth flow of traffic ／ Encouraging economic growth
Delivering better environmental outcomes ／
Helping cyclists, walkers and other vulnerable users ／
Achieving real efficiency ／ Keeping the network in good condition

↓

KPI : Paving Condition ／ PI : Structure Condition, 他

↓

Status of achievement evaluation

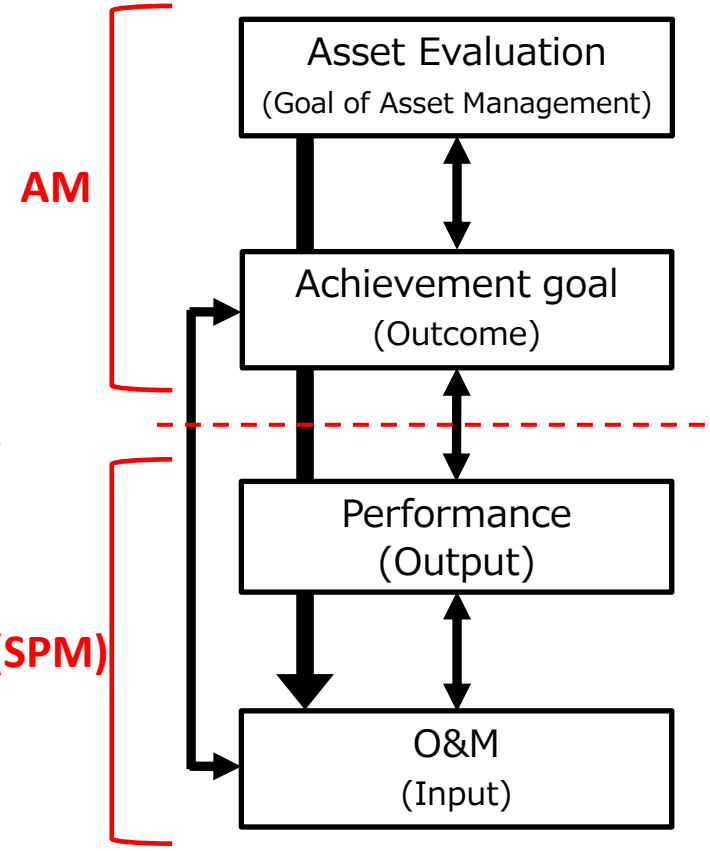
Source：ORR「Annual Assessment of Highways England End of Road Period 1 2015-2020」

Concept of Asset Management in BPJT for Toll Road Management

- Why should governments manage asset management data in PPP schemes?
  - To allow the government to see the history of the asset when the concession period ends, and the asset is handed over to the government.
  - Governments need to always manage all data about asset performance.

- In O&M stage
  - The Government (MPWH) is always responsible for the contractor's failure (responsibility for outcomes achievement), even if the risk is transferred to the contractor (TROs).

- Government takes risks and is accountable to the public
  - **Quality assurance of assets**
  - Road and facility malfunctions
  - Road accident and safety
  - Road surrounding environment, etc.



Hierarchical Management Cycle for Toll Road Operation

ASSET MANAGEMENT

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

MANAGING ASSET

New action based on the direction from TOP Management



Report and data accumulation from O&M work



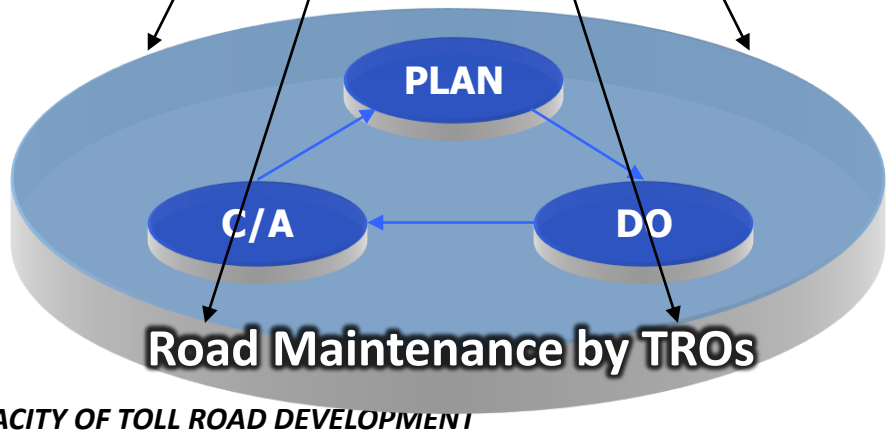


Monitoring/Assessment/Technical Guidance

Governance by BPJT



E-SPM (Monitoring System)

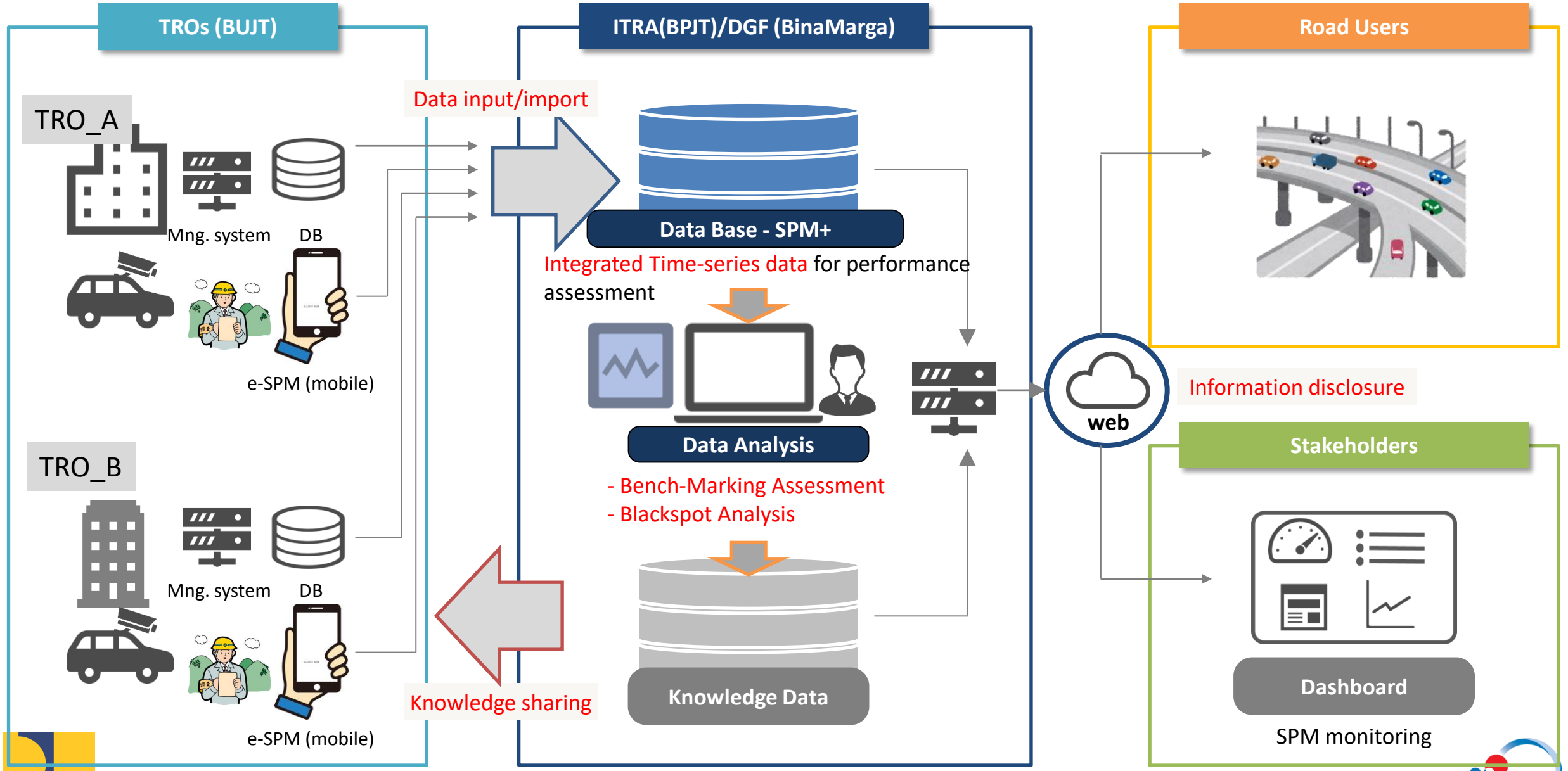


This seminar is aiming for

“KNOWLEDGE-SHARING” SEMINAR ON TOLL ROAD ASSET MANAGEMENT IN INDONESIA

- To understand future development plans for BPJT
- To study new initiatives and challenges by TROs
- To share knowledge of new initiatives in each TOR

Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading



Terima kasih



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OUTLINE OF UPGRADED E-SPM

SPM: Standar Pelayanan Minimum (Bahasha), Minimum Service Level (English)

Dr. BHOJ RAJ PANTHA
JICA EXPERT

The Project for Strengthening Management Capacity of Toll Road Development

September 24, 2024
Jakarta

SPM Regulations

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Toll Road Asset Management in Indonesia

Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

Article 1, Section 2

Toll Road Minimum Service Standards are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

Article 4, Section 1

Procedures for Measuring Minimum Service Standards for Toll Roads is a guide to measurement methods in achieving Minimum Service Standards for Toll Roads that must be carried out by each Toll Road Business Entity

Article 5

Toll Road Minimum Service Standards **must be fulfilled (mandatory)** by Toll Road Business Entities in order to provide services to toll road users

Article 6, Section 1 and 2

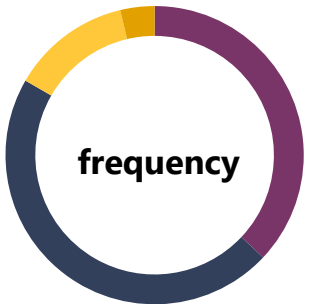
Toll Road Minimum Service Standards are **evaluated periodically** based on the results of monitoring functions and benefits

Toll Road Conditions	15 indicators
Average Travel Speed	1 indicators
Accessibility	2 indicators
Mobility	5 indicators
Safety	12 indicators
Rescue Unit and Services Ass ..	7 indicators
Environment	4 indicators
Rest Area	8 indicators

8 substances, 54 indicators



- Fulfillment tolerance is not regulated/at any time (25 indicators) **46%**
- Fulfillment tolerance are regulated (29 indicators) **54%**



- Daily (20 indicators) **37%**
- Monthly (25 indicators) **46%**
- Quarterly annually (7 indicators) **13%**
- Annually (2 indicators) **4%**



- Operation (22 indicators) **41%**
- Maintenance (32 indicators) **59%**

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Knowledge Sharing Seminar on

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Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

8 substances, 54 indicators

Minimum Service Standards (SPM)

are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

1 Toll Road Conditions
(15 indicators)

Skid resistance, road roughness (IRI), potholes, rutting, cracks, sediment, drainage, kerb, MCB, guardrail, wire rope, potholes (shoulder), rutting (shoulder), cracks (shoulder), rounding

2 Average Travel Speed
(1 Indicators)

Travel speed at normal condition

3 Accessibility
(2 Indicators)

Average transaction speed (toll gate), amount of vehicle queues

4 Mobility
(5 Indicators)

Patrol observation area, from the information received to incident location, problem vehicles handling, police handling speed, tow handling speed

5 Safety
(12 Indicators)

Traffic sign, road marking, guide post, KM sign, HM sign, street lighting, anti glare, ROW fence, safety fence, accident handling, security and law enforcement

6 Rescue Unit and Service Assistance
(7 Indicators)

ambulance, tow (truck), police, toll road patrol (operator), rescue, information system

7 Environment
(4 Indicators)

Right of Way (ROW) cleanness, operation office and toll gates cleanness, plants in ROW, grass in ROW

8 Rest Area
(8 Indicators)

Road condition, on/off ramp, toilet, parking, lighting, gas station, garage, restaurants

SPM Regulations

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Toll Road Condition

1	Skid Resistance (Main Road)	Annually
2	Road Roughness (Main Road)	Annually
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Drainage	Daily
7	Sediment	Daily
8	Kerb (Median)	Daily
9	Median Concrete Barrier	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

Mobility

1	Patrol Observation Area	Monthly
2	From Information Received ...	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

Accessibility

1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly

Average Travel Speed

1	Travel Speed (Normal Condition)	Monthly

Safety

1	Traffic Sign	3 Months
2	Road Marking	3 Months
3	Guide Post / Reflector	3 Months
4	Kilometer Sign	3 Months
5	Hectometer Sign	3 Months
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims	Monthly
11	Accident Vehicles	Monthly
12	Security and Law Enforcement	Monthly

Rescue Unit, Service Assistance

1	Ambulance	Monthly
2	Tow Truck	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Info and Communication	Monthly
7	Phone Number for Toll Info	Monthly

Environment

1	ROW Cleanness	Daily
2	Office and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Months
4	ROW Grass	3 Months

Rest Area

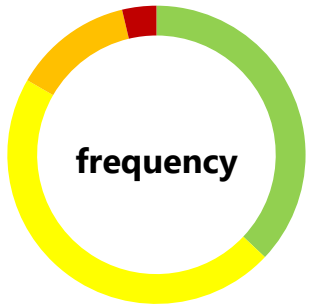
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

Daily
(20 indicators) **37%**

Monthly
(25 indicators) **46%**

Quarterly annually
(7 indicators) **13%**

Annually
(2 indicators) **4%**



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Why has been E-SPM developed and need for upgrading?

As stipulated in the regulations, Toll Road Operators (TROs) are obliged to report activities carried out and their fulfillment to BPJT, and BPJT also shall monitor the SPM fulfillment at field as well as through activity/asset report submitted by TROs. In order to perform above tasks effectively, efficiently, and systematically, web-based system and android apps are developed for management of SPM electronically (E-SPM).



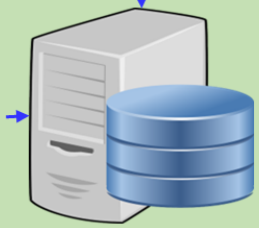
Android Application (e-SPM Mobile) (Applicable at Site)

- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Application Server (e-SPM Web)







E-SPM Database



API

- Other Systems integrated to E-SPM

Existing E-SPM	Expanded by JICA Project
1. Dashboard	**1. Data Inputting** • Asset Inventory Data • Maintenance Plan • Traffic Volume
2. Data Inputting • SPM Monitoring Data ❖ Road Condition (Partially) ❖ Mobility ❖ Safety (Partially) ❖ Rescue and Service (Partially)	**2. Analysis Module** • SPM Monitoring • Performance Evaluation (TRO) • Black Listing Evaluation (TRO) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation
3. Analytics Module • Statistical Analysis of Various Indicators	**3. Reporting Module**
	4. Document Module

Key Objective

- **Enhanced data input function**
- **Enhanced data analysis function**
- **Strengthening data utilization methods**



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Previous Version of e-SPM	Expanded by JICA Project
Master Data	
▪ Toll Roads	▪ Asset Master
▪ Toll Road Operators (TRO) and Holding	▪ Asset Category
▪ Toll Road Groups	▪ Asset Distress
▪ Toll Road Segments	▪ Document Category (Regulation, Technical Guidelines, etc)
▪ Toll Gates	
▪ Substance and Indicators of Minimum Service Standard	
Data Inputting	
▪ Services Vehicles	▪ Asset Inventory - Rescue Station and Services Vehicles
▪ Traffic Volume (Segment and Gate)	▪ Asset Inventory - Rest Area
▪ Traffic Accident	▪ Asset Inventory - Bridges
▪ Maintenance Activity	▪ Maintenance Plan
▪ Operation Activity	▪ Document
Analysis	
▪ Minimum Service Standard (SPM) Summary	▪ Performance Evaluation of SPM Fulfilment by ITRA and TRO's
▪ Self Assessment by TRO's Summary	▪ Blacklisting Evaluation
▪ SPM Competition	▪ Blackspot Location (Traffic Accident Analysis)
▪ Traffic Accident Summary	▪ Deterioration Trend Analysis
	▪ Detailed Investigation
Reporting	
▪ Minutes of SPM Fulfilment and Repair	▪ Report of SPM Fulfilment

Upgraded E-SPM System Architecture

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Website

Web-based application developed to manage SPM fulfillment activities comprehensively. Intended for data processing, analysis and reporting.

User: ITRA/BM, TRO and TRO's Holding

Mobile App

Mobile-based application (currently Android) developed to collect data on the site.

User: Consultant or ITRA/BM Team, TRO Operation/Maintenance Team

Server

The e-SPM server is managed by PUSDATIN PUPR.

User: ITRA

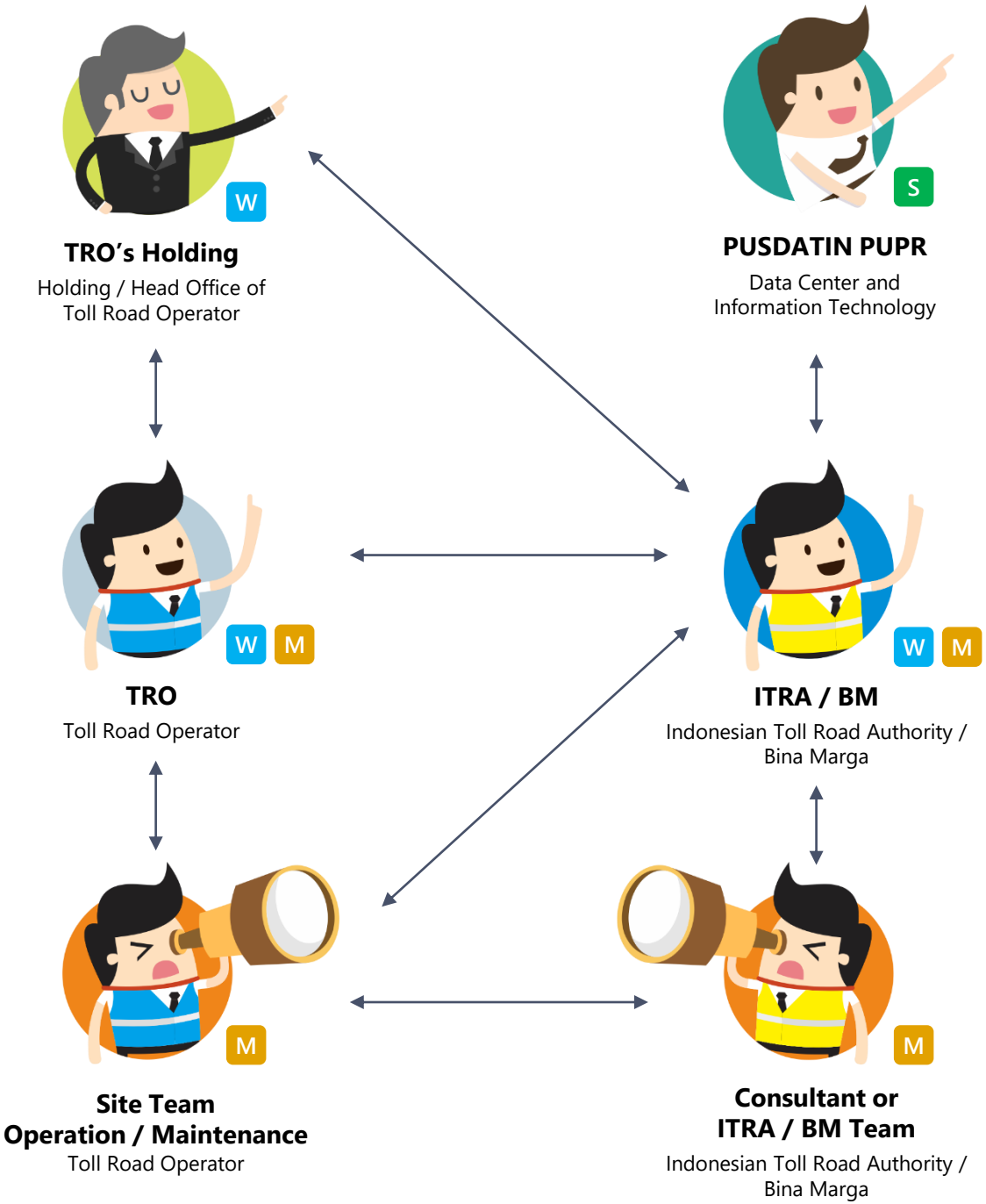


PUSDATIN PUPR
E-SPM Server

DATABASE

E-SPM ITRA/TRO
Mobile Application (Android)

https://espm.bpjt.pu.go.id
Web Application



Conventional Vs Using E-SPM

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Conventional SPM Fulfillment

SPM Fulfillment Monitoring

- Issues were recorded manually using a survey form
- Recording of issues includes: issues indicators, location of issues (stationary, direction, lane), documentation / photo number, notes / description

Minutes / Reports of Monitoring Results

- Minutes / Monitoring Result Reports are created manually after site monitoring are completed

Repair by TRO

- The Minutes/reports are used as a reference by TRO in order to repair activities, repair duration is calculated after the Minutes are published
- Repair reports are prepared manually by TRO, and sent to ITRA when repairs have been completed
- Opportunities for manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- After the repair report by TRO was received by ITRA
- Repairs by TRO can only be rejected at this stage, if site review is not carried out
- Analysis is carried out as requirement by manually and separately

SPM Fulfillment Using e-SPM

SPM Fulfillment Monitoring

- Issues were recorded using the e-SPM application (Android based)
- Recording of issues includes everything in conventional methods and is equipped with automatic location coordinates and accuracy features
- On site mode and driving mode are available

Minutes / Reports of Monitoring Results

- Minutes / Fulfillment Reports can be generated automatically using the e-SPM application

Repair by TRO

- Every Issue is recorded in real time by e-SPM application, the repair duration is calculated automatically based on the time the issues data was collected
- Repairs can be reported using e-SPM and can be accessed by TRO and ITRA at any time without having to wait for repairs to be completed
- Minimize manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- Can be generated at any time according to requirement
- Repairs by TRO can be immediately rejected by ITRA. Review and comment features are available
- Several analysis features are available

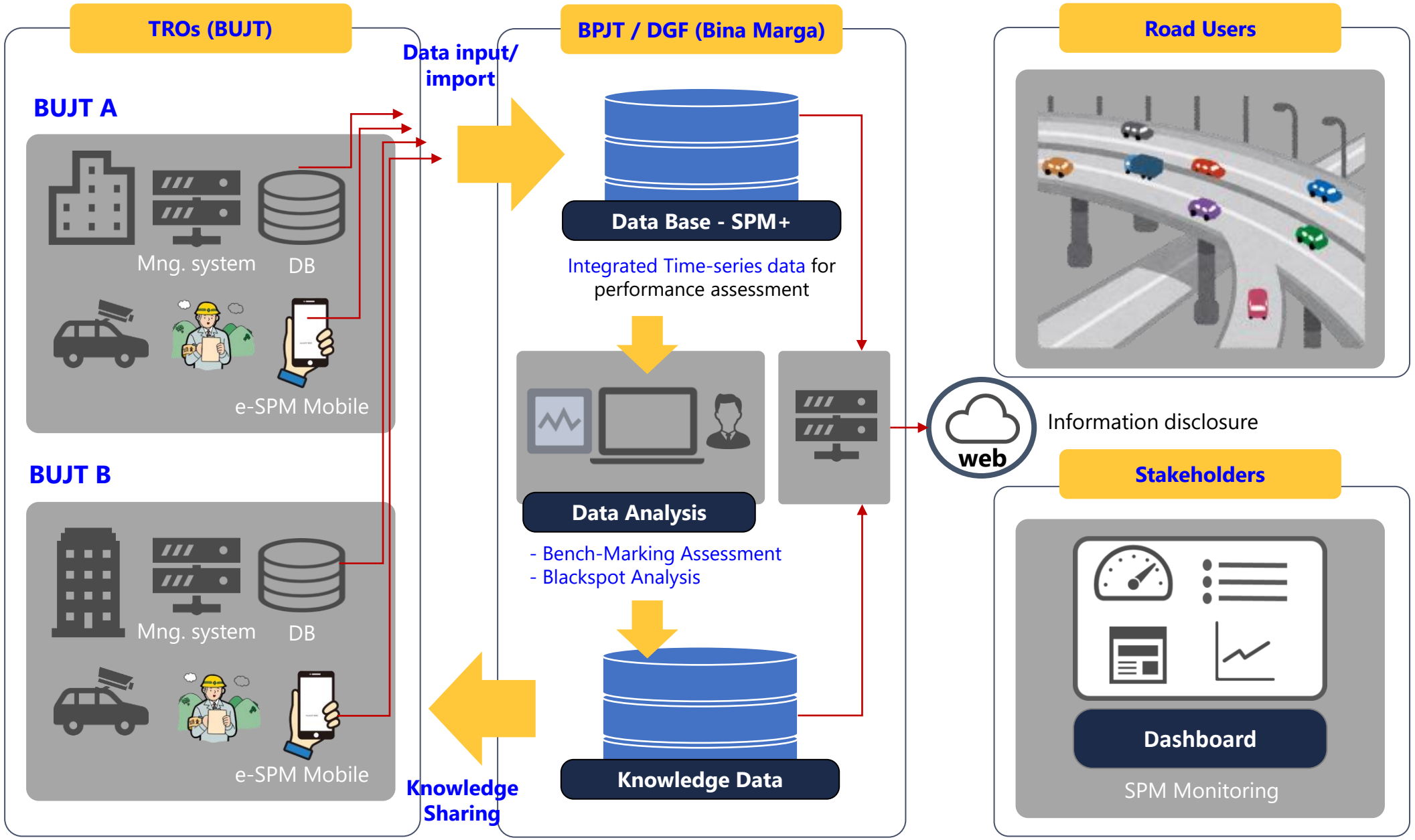
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Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading



Website and Mobile Apps of E-SPM

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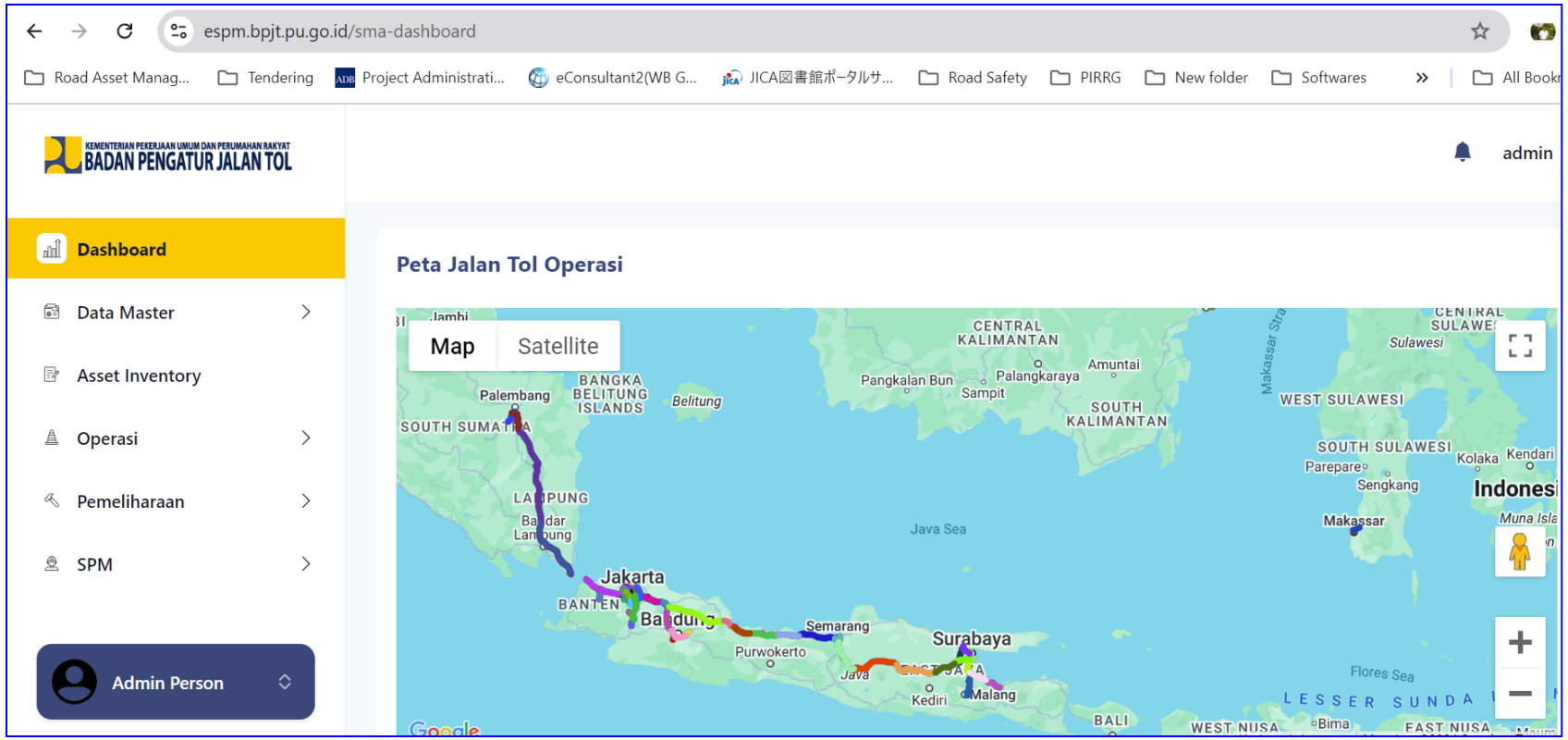
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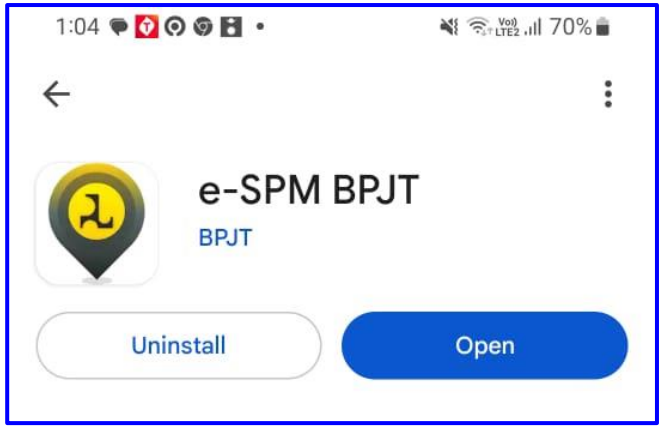
Website

https://espm.bpjt.pu.go.id/



Mobile App

Google Play





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E-SPM Infrastructure Development

Category	Component	e-SPM 2019	e-SPM 2021	e-SPM 2023/2024
Network	Server	Cloud Server (Google)	Server PUSDATIN PUPR	Server PUSDATIN PUPR
Network	Domain	www.espmweb.varianglobal.tech	www.espmbpjt.pu.go.id	www.espm.bpjt.pu.go.id
Network	IP Server	auth-db364.hostinger.com	103.211.50.23	103.8.238.226
Network	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	VCPU 2 Core	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) Gold 6330H
Hardware	RAM	4 GB	8 GB	8 GB
Hardware	Storage	200 GB	500 GB	1.500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS	Ubuntu Server 21.04 LTS
Software	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29	Apache 2 versi 2.4.46
Software	PHP	PHP 7.2	PHP 7.2	PHP 7.4
Software	DBMS	MySQL 5.7	MySQL 5.7	MySQL 8
Web Application	Framework	Laravel	Laravel	Laravel
Web Application	CMS	October CMS	October CMS	October CMS
Mobile Application	Framework	Native Android	Flutter 2.5	Flutter 3.7.9
Mobile Application	Backend Service	-	Firebase	Firebase
UI / UX Design	Tools	Corel Draw GraphicSuite 2020	Figma	Figma

Toll Roads Summary

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Length	+31%
Toll Roads	+35%

in the last 5 years, starting from 2020 - 2024

History of developments in the number and length of operational toll roads in Indonesia in the last 5 years :

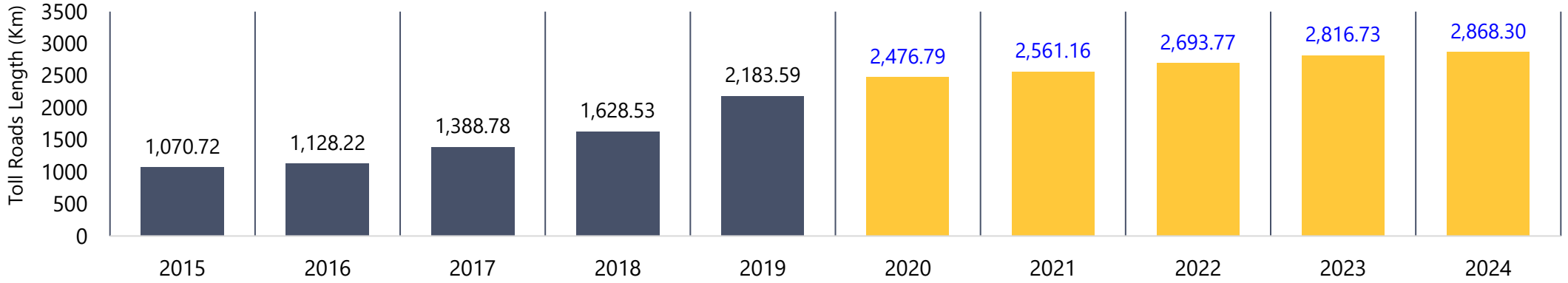
1978 - 2019

Number of Operational Toll Roads	:	54 toll roads
Length of Operational Toll Roads	:	2.183,59 km

2020 - 2024

Number of Operational Toll Roads	:	73 toll roads
Additions in The Last 5 Years	:	**+ 19 toll roads**
Length of Operational Toll Roads	:	2.868,30 km
Additions in The Last 5 Years	:	**+ 684,71 km**

Operational Toll Roads	Length	new toll roads
33		
34	+5%	57,50 km
42	+23%	260,56 km
47	+17%	239,75 km
54	+34%	555,06 km
60	+13%	293,20 km
64	+3%	84,37 km
69	+5%	132,61 km
73	+4%	122,96 km
73	+2%	51,57 km



E-SPM Utilization Summary

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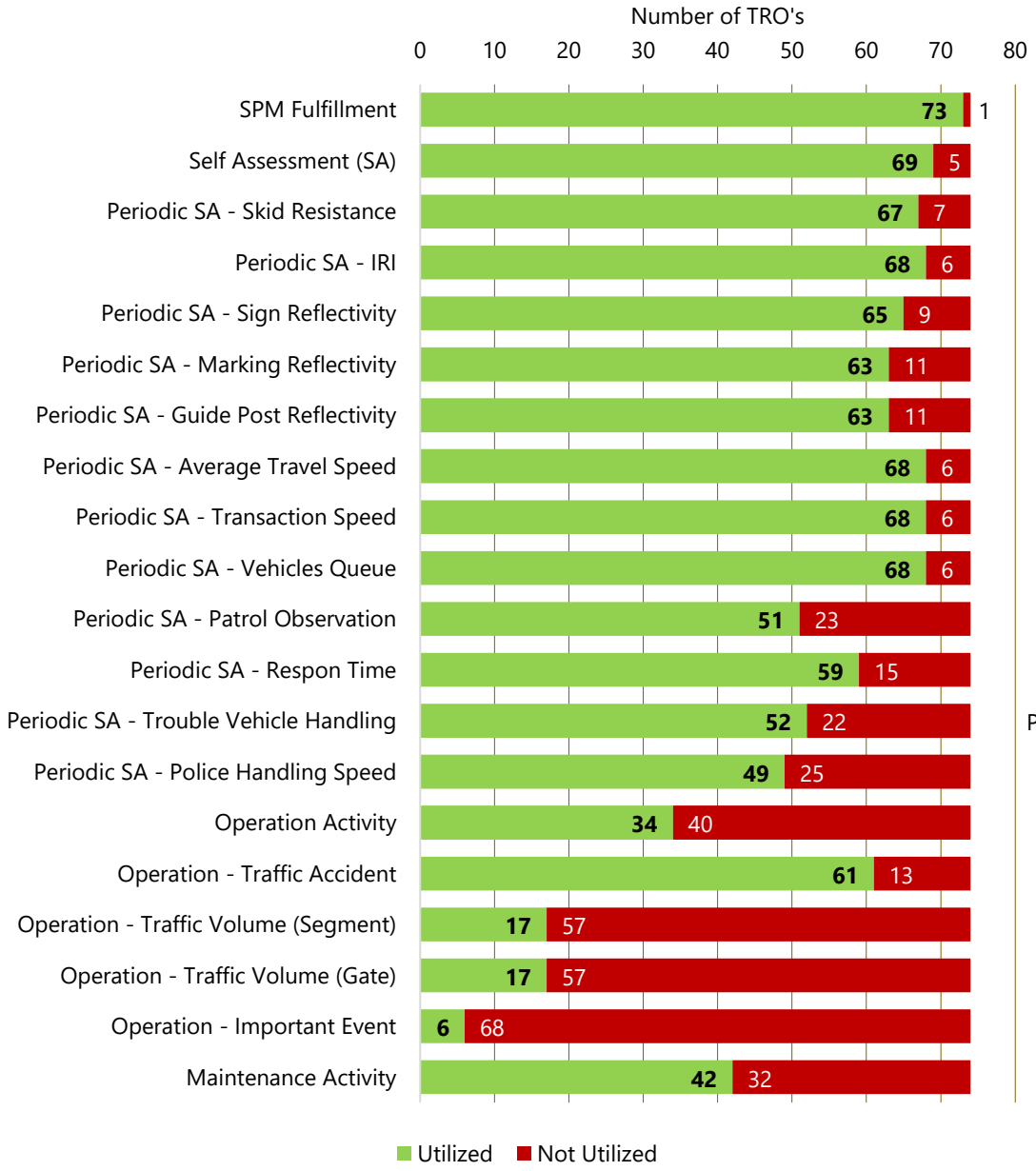
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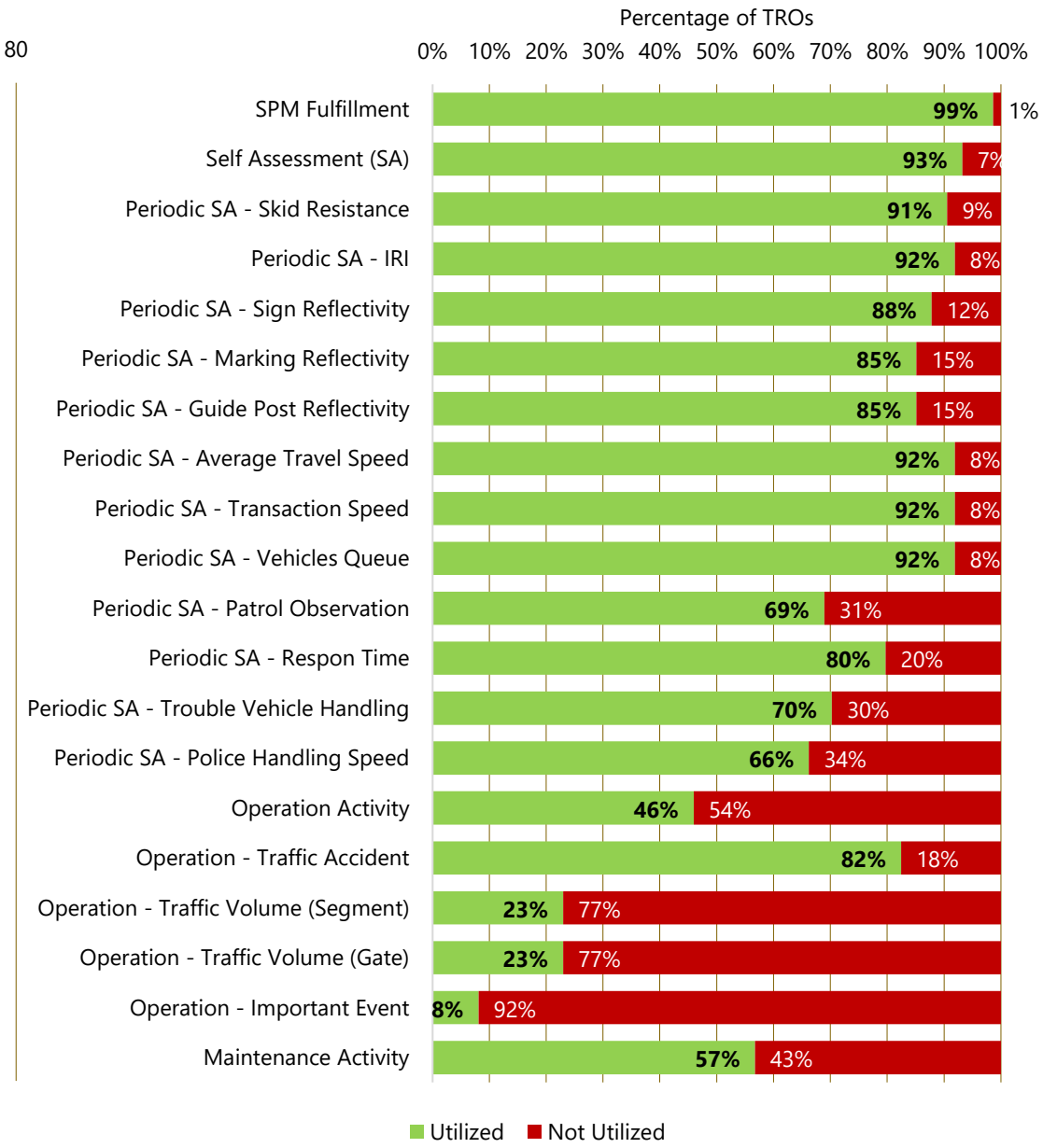
e-SPM Utilization by TRO's

Last 3 Years (2021 - 2023)



Percentage of e-SPM Utilization by TRO's

Last 3 Years (2021 - 2023)



Optimal Asset Information

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No	Inventory Data/ Data Inputting	Module Link	Data Attributes
1	Highway Segments	https://espm.bpjt.pu.go.id/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp ▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude ▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year ▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*) *(*) Details for each lane (shoulder, main lane and motorcycle lane)*
2	Toll Gates	https://espm.bpjt.pu.go.id/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name ▪ Gate Type ▪ Transaction Type ▪ Entrance Booth ▪ Exit Booth ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Stations	https://espm.bpjt.pu.go.id/inventory-servicevehicle-dashboard	▪ ID ▪ Highway ID ▪ Station Name ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
4	Services Vehicle	https://espm.bpjt.pu.go.id/inventory-servicevehicle-dashboard	▪ ID ▪ Highway ID ▪ Rescue Station ID ▪ Vehicle Code ▪ Vehicle Type ▪ Police Number ▪ Vehicle Number ▪ Description
5	Bridges	https://espm.bpjt.pu.go.id/inventory-bridge-dashboard	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position ▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure Configuration ▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.bpjt.pu.go.id/inventory-restarea-dashboard	▪ ID ▪ Highway ID ▪ Rest Area Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Direction ▪ Rest Area Type ▪ Pavement Type

Traffic Volume

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KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

admin

- Dashboard
- Master Data
- Asset Inventory
- Operation
  - Operation Activity
  - Traffic Volume
  - Traffic Accident

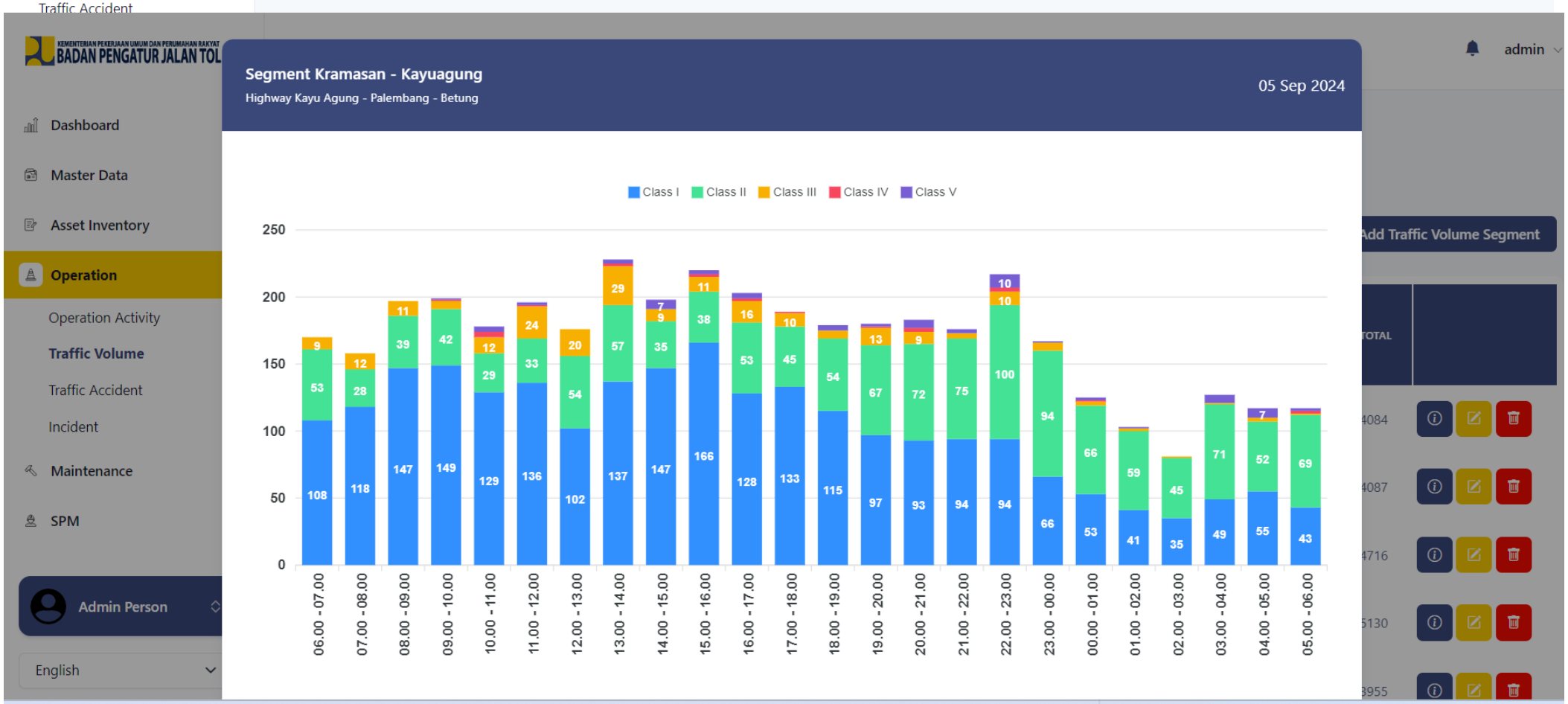
Traffic Volume Gate | Traffic Volume Segment | Volume Capacity Ratio (VCR) | Revenue

Traffic Volume data by time at
- **Toll gate,**
- **Toll Road Segment,**
- **Volume Capacity Ratio,**
- **Tarif Collected**

Traffic Volume Segment

Number of Traffic Volume Segment
6111 data

Search Traffic Volume Segr | Upload Data | Add Traffic Volume Segment



Asset Maintenance Plan

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Entity	Process	Document	Description
	Start		Maintenance plan must be reported by TRO's **annually**
 TRO	Preparation of maintenance plan Submit to BPJT	Maintenance plan submission letter	▪ Maintenance plan prepared only for **periodic maintenance** and **upgrading maintenance** ▪ Maintenance plan are classified in 3 categories, including: **Toll Road**; **Bridges**; **Services Area** (each category has several indicators) ▪ Each category is reported in the form of **damage details**, **repair plan**, **repair schedule**, and **strip map** (certain indicators)
 ITRA	Evaluation by BPJT No appropriate ? Yes	▪ Maintenance detail checklist ▪ Minutes of meeting	▪ The maintenance plan applies an **approval** system by BPJT ▪ The details of the maintenance plan will be reviewed by BPJT, BPJT will approve or reject **one by one the detailed data** that has been reported by the TRO
 ITRA	Synchronization of maintenance schedules for each toll road No appropriate schedule ? Yes	Maintenance plan schedule	Schedule synchronization by BPJT on the consideration of several programs such as: SPM fulfillment, rate adjustment, prohibition of work on holidays and new year, etc.
 Head of ITRA	Maintenance plan approved	Maintenance plan approval letter	The maintenance plan report that has been evaluated will be approved by the head of BPJT
	Finish		The approved maintenance plan will be used as a reference for BPJT to monitor and evaluate repair results (**repair activity must also be reported by TRO**)

Maintenance Plan

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Maintenance Plan List

Toll Road	Period		Total Cost	Submitted Status	Approval Status
Akses Tanjung Priok	2024	IDR.	100.000.000.000,-	Submitted	Approved
Bakauheni - Terbanggi Besar	2024	IDR.	375.000.000.000,-	Submitted	Partial Approved
Balikpapan - Samarinda	2024	IDR.	150.000.000.000,-	Submitted	Waiting Approval
Bekasi - Cawang - Kampung Melayu	2024	IDR.	0,-	Not Submitted	-

Maintenance Plan Details

Toll Road	Period	Road Pavement	Drainage	Rounding	Road Sign	Guardrail	Landscape	Others
Akses Tanjung Priok	2024	9	2	2	7	2	5	3
Bakauheni - Terbanggi Besar	2024	4 1 1	2		4 1	2 4	2	1 5
Balikpapan - Samarinda	2024	8	4	9	7	7		4
Bekasi - Cawang - Kampung Melayu	2024							

Has been reviewed and approved by ITRA Not yet reviewed by ITRA Rejected by ITRA

Convert to Schedule / Calendar

Jan Feb Mar Apr **May** Jun Jul Aug Sep Oct Nov Dec

All Toll Road | 2024

Toll Road	Category	Asset Name	Distress Type	Location (Km)	Direction	Lajur	Jadwal	
Akses Tanjung Priok	Toll Road	Pavement	Rutting	10.000 - 11.200	A	Lane 1	May 2024, 22	View Details
Akses Tanjung Priok	Toll Road	Pavement	Rutting	08.400 - 09.800	B	Lane 1	May 2024, 10	View Details
Akses Tanjung Priok	Toll Road	Guardrail	Beam Damage	11.200 - 11.250	A	Non Lane	May 2024, 11	View Details
Bakauheni - Terbanggi Besar	Toll Road	Pavement	Divided Slab	03.100 - 03.110	A	Lane 1	May 2024, 20	View Details
Bakauheni - Terbanggi Besar	Toll Road	Rounding	Drop Off	24.100 - 24.150	B	Non Lane	May 2024, 25	View Details

Performance Evaluation and Comparison

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ITRA Verification

Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5
01/05/2022	06/05/2022	5
01/05/2022	09/05/2022	8
01/05/2022	09/05/2022	8
02/05/2022	09/05/2022	7
02/05/2022	10/05/2022	8
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	12/05/2022	8
04/05/2022	12/05/2022	8

TRO Reporting

Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	07/05/2022	6
02/05/2022	07/05/2022	5
03/05/2022	07/05/2022	4
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
05/05/2022	09/05/2022	4
07/05/2022	10/05/2022	3
10/05/2022	11/05/2022	1
11/05/2022	13/05/2022	2
11/05/2022	13/05/2022	2

The analysis feature is to find out the comparison of SPM fulfilment by TRO, ITRA and Regulatory Provision.

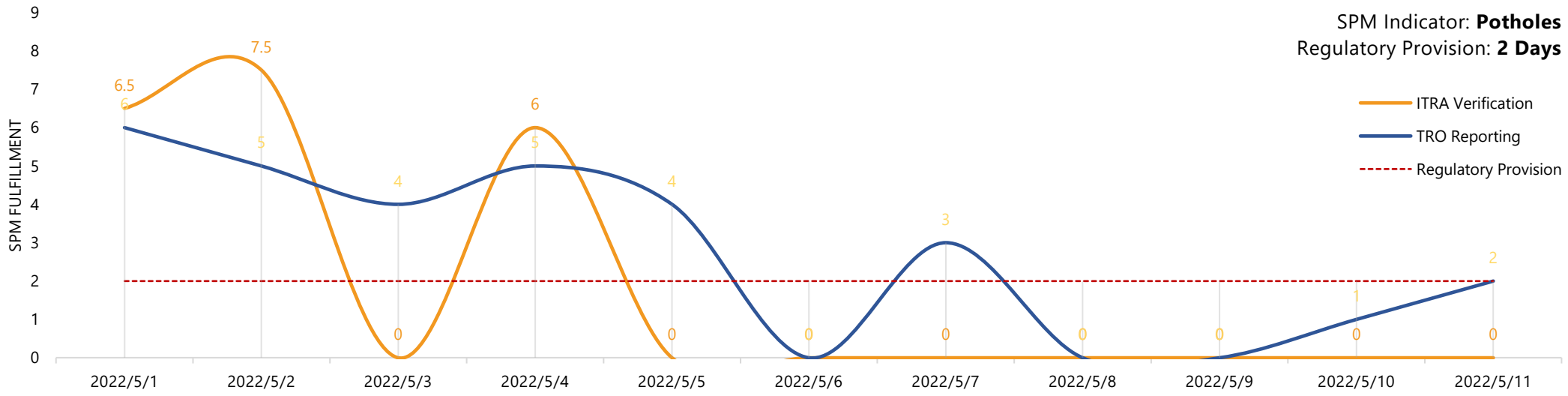
The technical approach will be described through this equation:

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfilment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Issue Date/ Damage Found (datetime format)

Comparison Results

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



Performance Evaluation by TROs

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SPM Fulfillment

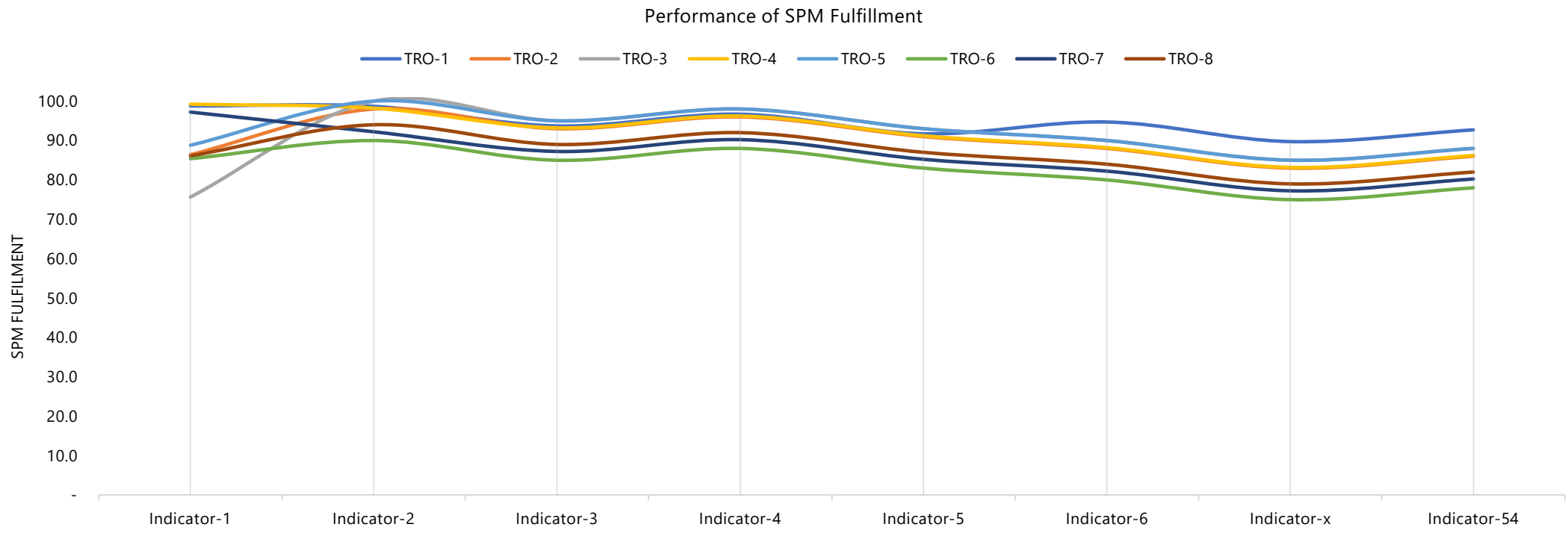
Indicators	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road.

The technical approach will be described through this equation:

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators
n_{finish} : Amount of damage that has been repaired
n : Amount of damage/issue



Hint for Detailed Investigation

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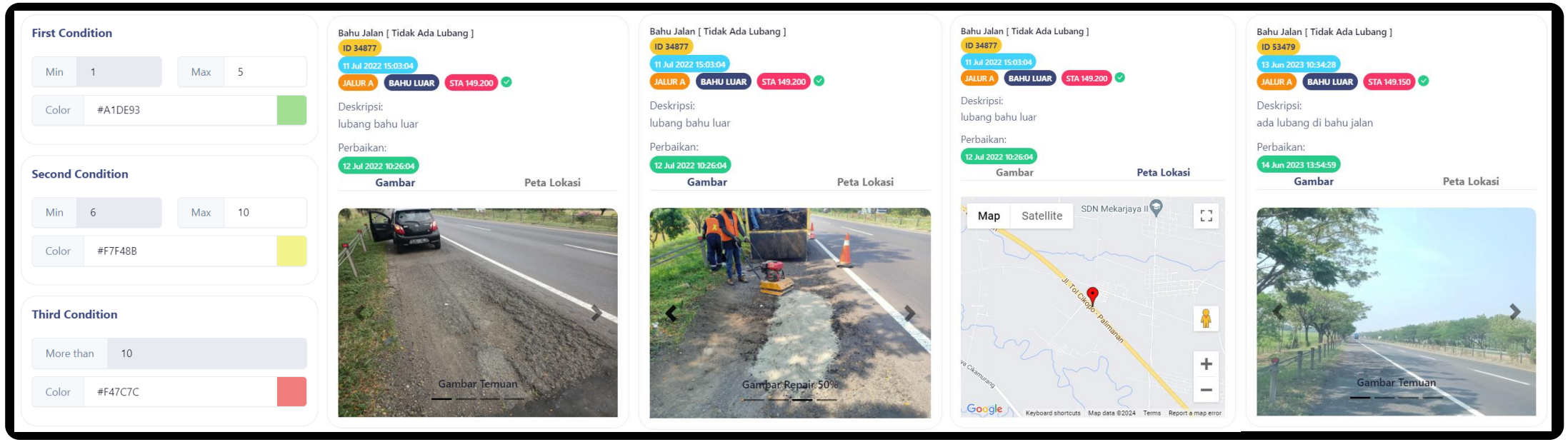
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Detailed Investigation

Providing **hint for the detailed investigation if damages occur in the same location in a short period of time**. System analyse location of spotted damages and recommend for the detailed investigation accordingly as shown. Also, upon double click of damage location point, a pop-up window will appears to show details of damages including damage photos.

Chainage	0.000	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800	2.000	2.200	2.400	2.600	2.800	3.000	3.200	3.400	...
Direction →	ROW Fence																		
	Drainage		2																
	Safety Fence																		
	Outer Shoulder																		
	Lane 1																		
	Lane 2																		
	Lane 3				3														
	Inner Shoulder																		
Median																			
	Inner Shoulder																		
	Lane 3																		
	Lane 2																		
	Lane 1					12													
	Outer Shoulder	8																	
	Safety Fence																		
← Direction	Drainage																		
	ROW Fence																		
Chainage	0.000	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800	2.000	2.200	2.400	2.600	2.800	3.000	3.200	3.400	...



Ranking / Black Listing of TROs

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SPM fulfillment scores are computed for each TRO **based on their actual performance** and list **top 10 best performing TROs** and TROs failing to get the minimum score (**black listed TROs**). Each indicator and substance are also given a calculation weight as a multiplier, was obtained from previous ITRA studies.

Weighting of Substances

No	Substances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Ass	10.47
7	Environment	3.40
8	Rest Area	4.67
	Total	100.00

iv : Indicator Value
a : Indicator-a
n : Amount of issue in 1 indicator
$jptw$: Number of repairs on time
iw : Indicator Weight
ipv : Indicator Percentage Value (%)
sv : Substance Value
54 : Total amount of indicators
b : Substance-b
sw : Substance Weight

Quantitative Calculations

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

Final Score of SPM Fulfillment (Example)

No	TRO	Fulfilment Percentage by Substances Minimum Score: 75 (Range 0 – 100)								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

Road Safety / Black Spot Analysis

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Source: Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

↓

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

↓

Determining the Upper Control Limit (BKA)

$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

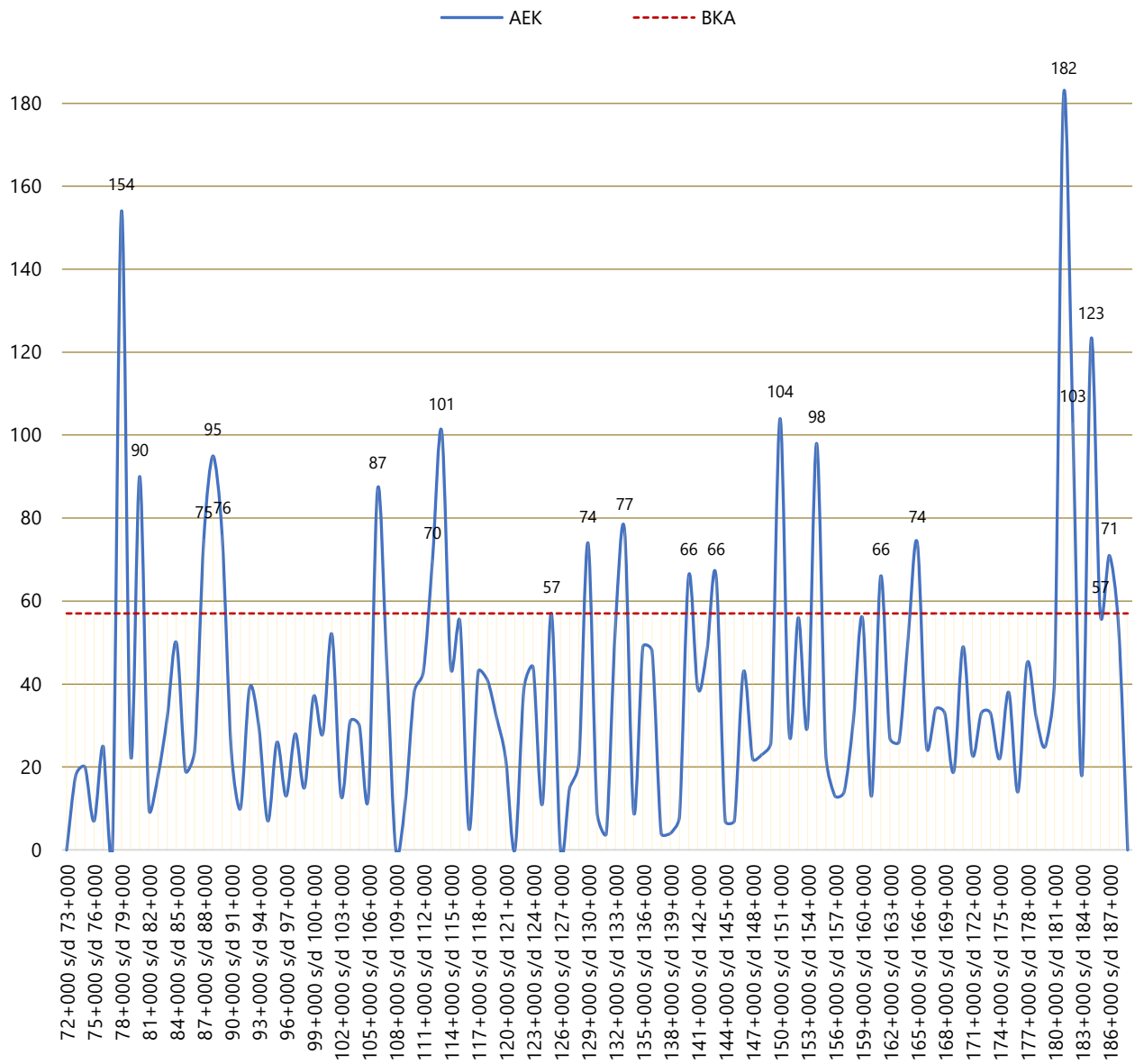
BKA : Upper Control Limit C : AEK Accident Rate

↓

Determining Blackspot Location

$$AEK > BKA$$

Blackspot Location on the ABC Toll Road



Road Safety / Black Spot Map

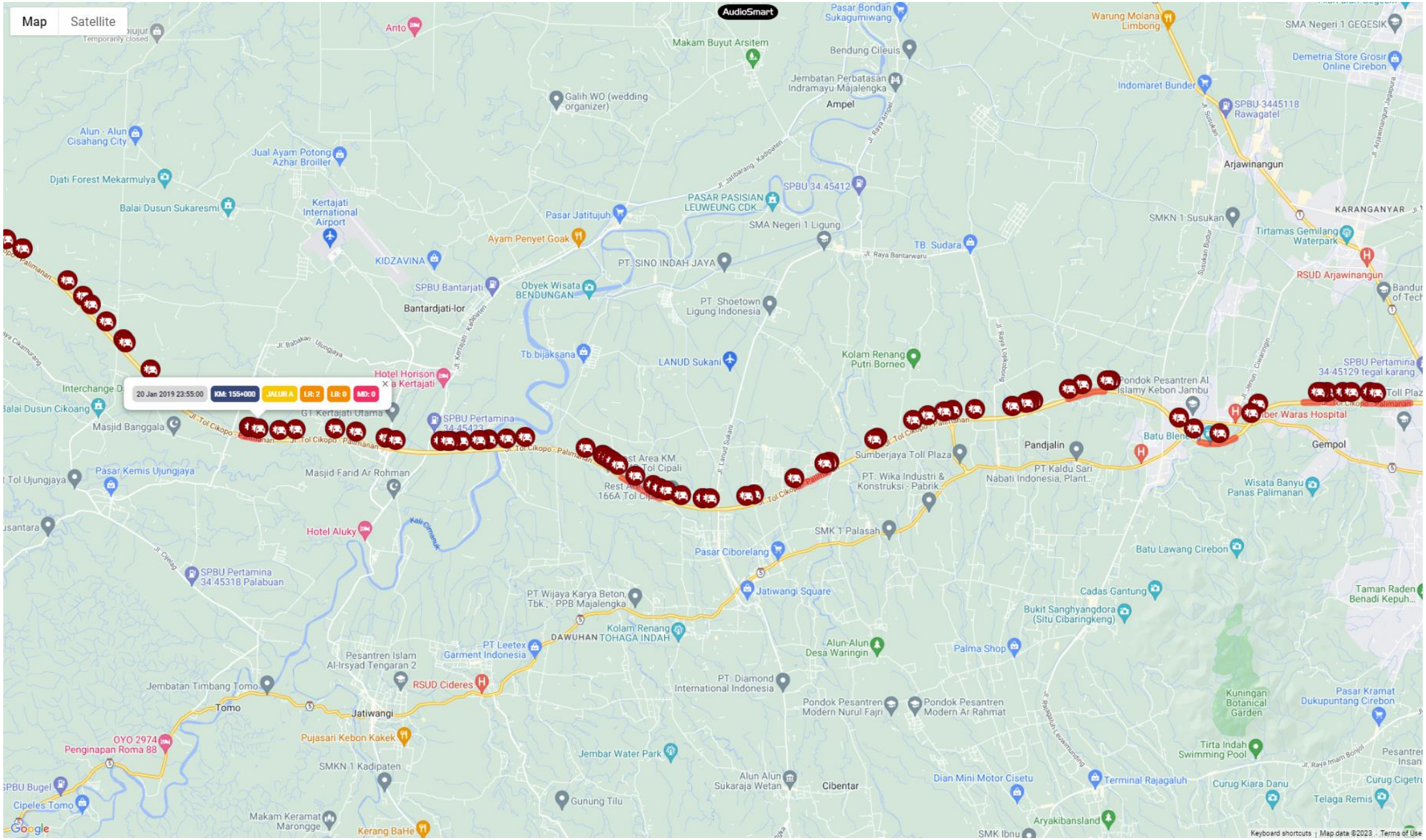
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Map of Blackspot Locations and Traffic Accident Locations



Pavement Deterioration Trend Analysis

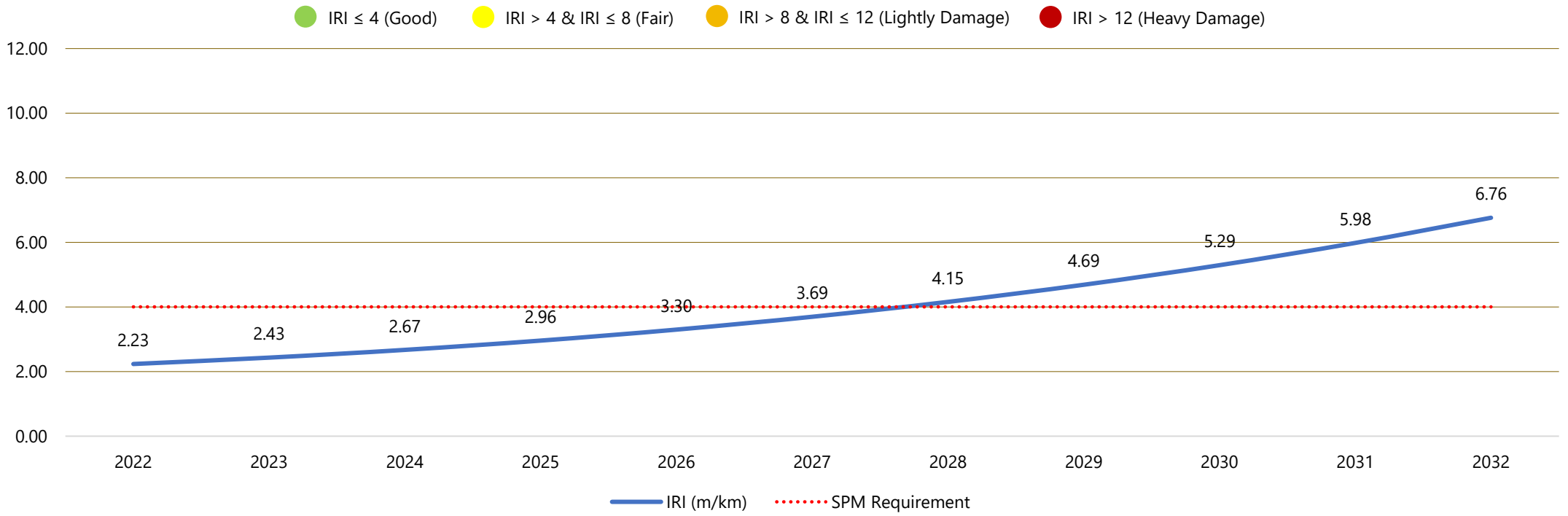
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IRI Deterioration



Stationary		Section	Pavement Type	CBR rep. (%)	SNsg	SNC	IRI (m/km)										
Start	Finish						2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
7,400	7,500	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,33	2,53	2,78	3,08	3,42	3,83	4,30	4,84	5,46	6,16	6,95
7,500	7,600	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,51	1,66	1,85	2,09	2,37	2,71	3,11	3,57	4,11	4,72	5,42
7,600	7,700	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,24	1,37	1,55	1,76	2,03	2,34	2,72	3,15	3,66	4,25	4,92
7,700	7,800	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,95	2,13	2,35	2,62	2,94	3,31	3,75	4,25	4,83	5,49	6,24
7,800	7,900	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,61	1,77	1,97	2,21	2,50	2,85	3,25	3,73	4,27	4,90	5,61
7,900	8,000	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	7,22	7,74	8,32	8,97	9,70	10,50	11,40	12,40	13,50	14,72	16,06
8,000	8,100	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	8,16	8,74	9,38	10,10	10,90	11,79	12,77	13,85	15,05	16,36	17,81

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

Japan International Cooperation Agency.

THANK YOU

Jakarta, 24 September 2024



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Toll Road Asset Management in Indonesia

SHARING KNOWLEDGE TATA KELOLA MANAJEMEN ASET JALAN TOL

PT JASA MARGA (PERSERO) TBK

Jakarta, 24 September 2024



PUPR
SIGAP MEMBANGUN NEGERI

BUMN UNTUK INDONESIA

JASAMARGA
Indonesia Highway Corp.

COMPANY PROFILE



www.jasamarga.com

Mobile Apps TRAVOY

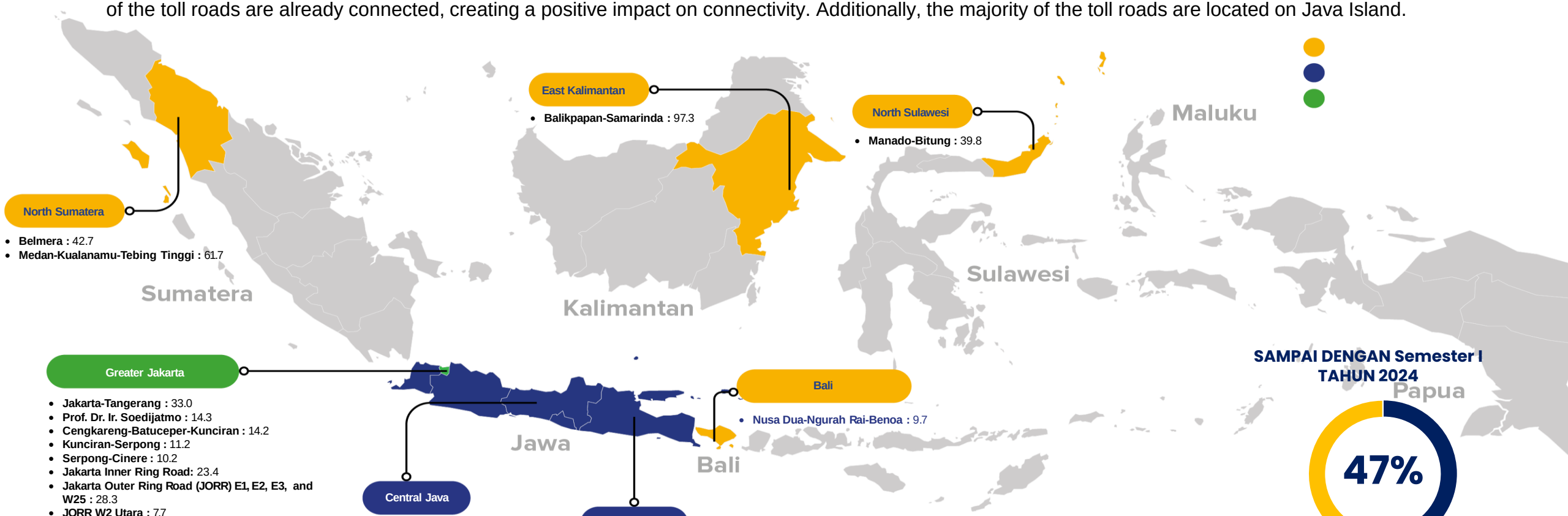
One Call Center 14080

Jasa Marga
Connecting Indonesia

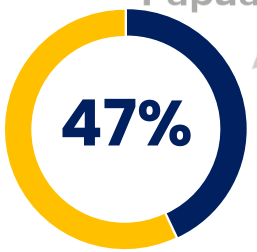
Company Profile

PT Jasa Marga (Persero) Tbk

Jasa Marga has 36 toll road concessions covering 1,736 km and operates 1,264 km of toll roads. Jasa Marga's business spans across Indonesia, where most of the toll roads are already connected, creating a positive impact on connectivity. Additionally, the majority of the toll roads are located on Java Island.



SAMPAI DENGAN Semester I TAHUN 2024

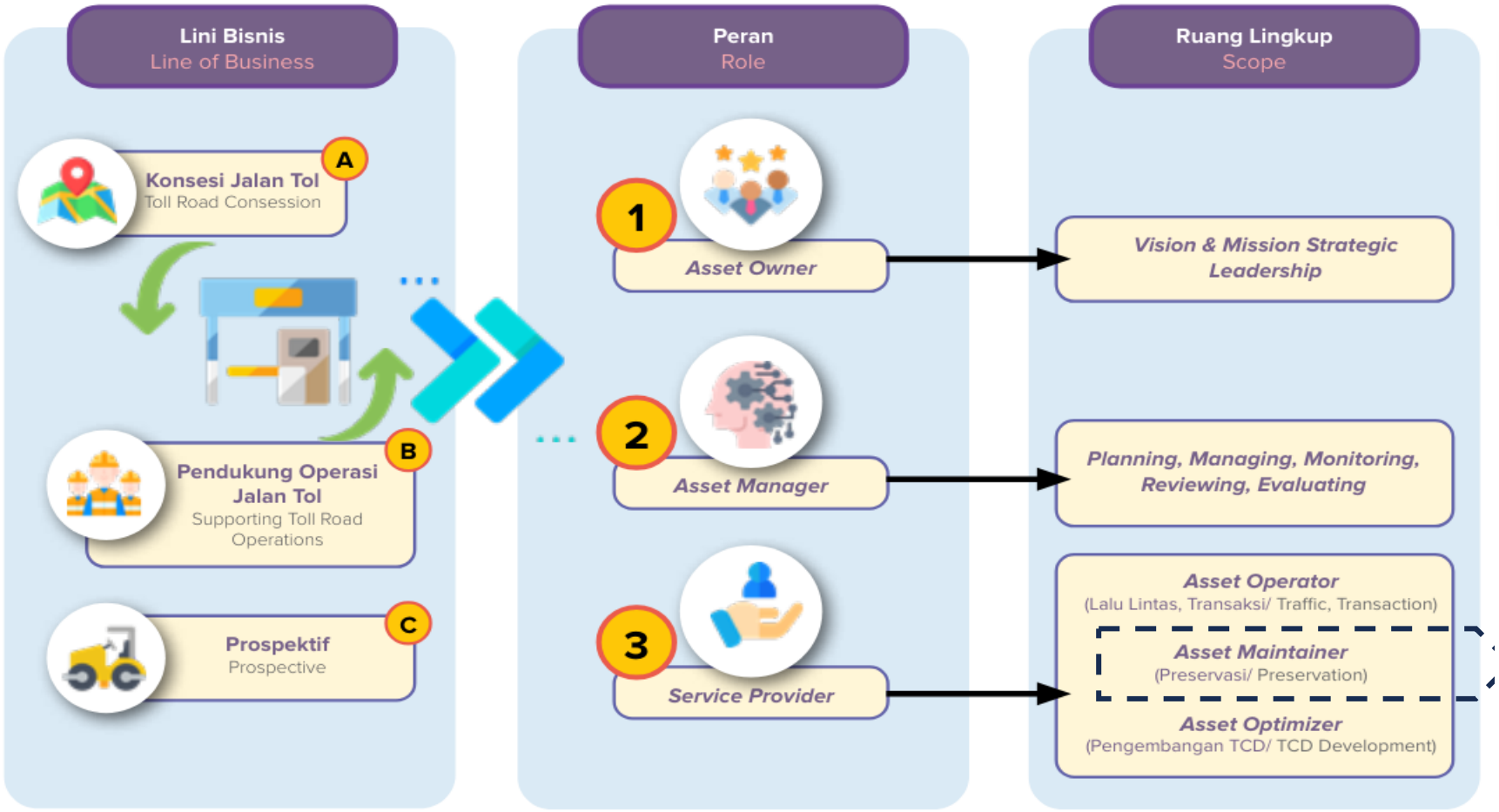


Market share

Sampai dengan Semester I Tahun 2024, Market share Perusahaan **47%** dari total jalan tol beroperasi di Indonesia

Business Lines, Role and Cope

Bagan Lini Bisnis, Peran, dan Ruang Lingkup Pekerjaan
Chart of Business Lines, Role and Scope of Work



ASSET MAINTAINER

JASAMARGA TOLLROAD MAINTENANCE

- Layanan Pemeliharaan (Pemeliharaan Preventif, Rutin dan Periodik)
- Teknologi pemeliharaan
- Kontrak Manajemen
- Program Pemeliharaan
- *Disaster Recovery*

Bisinis Konsesi Jalant Tol masih menjadi bisnis utama PT Jasa Marga (Persero) Tbk berdasarkan visi dan misi Perseroan
The Toll Road Consession is still the main business of PT Jasa Marga (Persero) Tbk based on the Company's vission and mission

Sumber: Laporan Tahunan 2023
PT Jasa Marga (Persero) Tbk

Company Profile
PT Jasamarga Tollroad Maintenance

JMTM merupakan salah satu anak perusahaan Jasa Marga yang bergerak dalam bidang jasa manajemen pemeliharaan, yang meliputi kegiatan perencanaan, pelaksanaan pemeliharaan, dan pembangunan jalan tol guna mencapai pemenuhan Standar Pelayanan Minimal (SPM) jalan tol.

Visi
Menjadi kontraktor pemeliharaan jalan tol yang profesional, terpercaya. dan terkemuka.

Misi
1. Konsisten mewujudkan proyek yang tepat mutu, tepat waktu, tepat biaya dan peduli keselamatan kerja dan lingkungan;
2. Menjaga perusahaan tetap sehat dan menciptakan laba yang memadai untuk kelangsungan hidup dan pertumbuhan perusahaan;
3. Mengembangkan profesionalisme (SDM dan organisasi) serta memberikan iklim kerja yang nyaman dan menghargai kontribusi;
4. Membangun sistem manajemen pemeliharaan jalan tol untuk efektivitas pencapaian SPM jalan tol

1988 — Pendirian
Didirikan pada tahun 1988 dengan Nama **PT Rezekibhakti Sejahtera** yang kegiatan usahanya sewa menyewa kendaraan, perbengkelan, jasa konstruksi, dan jasa umum lainnya

1997
Pada tahun 1997, **PT Rezekibhakti Sejahtera** berubah nama menjadi **PT Sarana Margabhakti Utama**

2010 — Akuisisi
PT Sarana Margabhakti Utama diakuisisi oleh PT Jasa Marga (Persero) Tbk., BUMN penyelenggara jalan tol di Indonesia

2011
Setelah diakuisisi oleh PT Jasa Marga (Persero) Tbk., **PT Sarana Margabhakti Utama** berubah nama menjadi **PT Sarana Marga Utama**

2013 — Pengoperasian AMP
PT SMU mulai bisnis hotmix dengan mengoperasikan pabrik **Asphalt Mixing Plant (AMP)** dan **alat berat** untuk mendukung pemeliharaan jalan tol

2014
PT Sarana Marga Utama berubah nama menjadi **PT Jasa Layanan Pemeliharaan** dengan fokus kegiatan usaha pada pemeliharaan jalan tol

2017 — Transformasi
Seiring dengan transformasi proses bisnis Jasa Marga sebagai induk perusahaan, maka **PT JLP** berubah nama menjadi **PT Jasamarga Tollroad Maintenance** untuk mengukuhkan eksistensi sebagai anak usaha PT Jasa Marga (Persero) Tbk. dan fokus usaha sebagai kontraktor pemeliharaan jalan tol

PEMEGANG SAHAM

99.82%	0.18%
Jasa Marga	Inkopkar JM

BUDAYA & NILAI PERUSAHAAN

AKHLAK


Amanah
Memegang teguh kepercayaan yang diberikan


Kompeten
Terus belajar dan mengembangkan kapabilitas

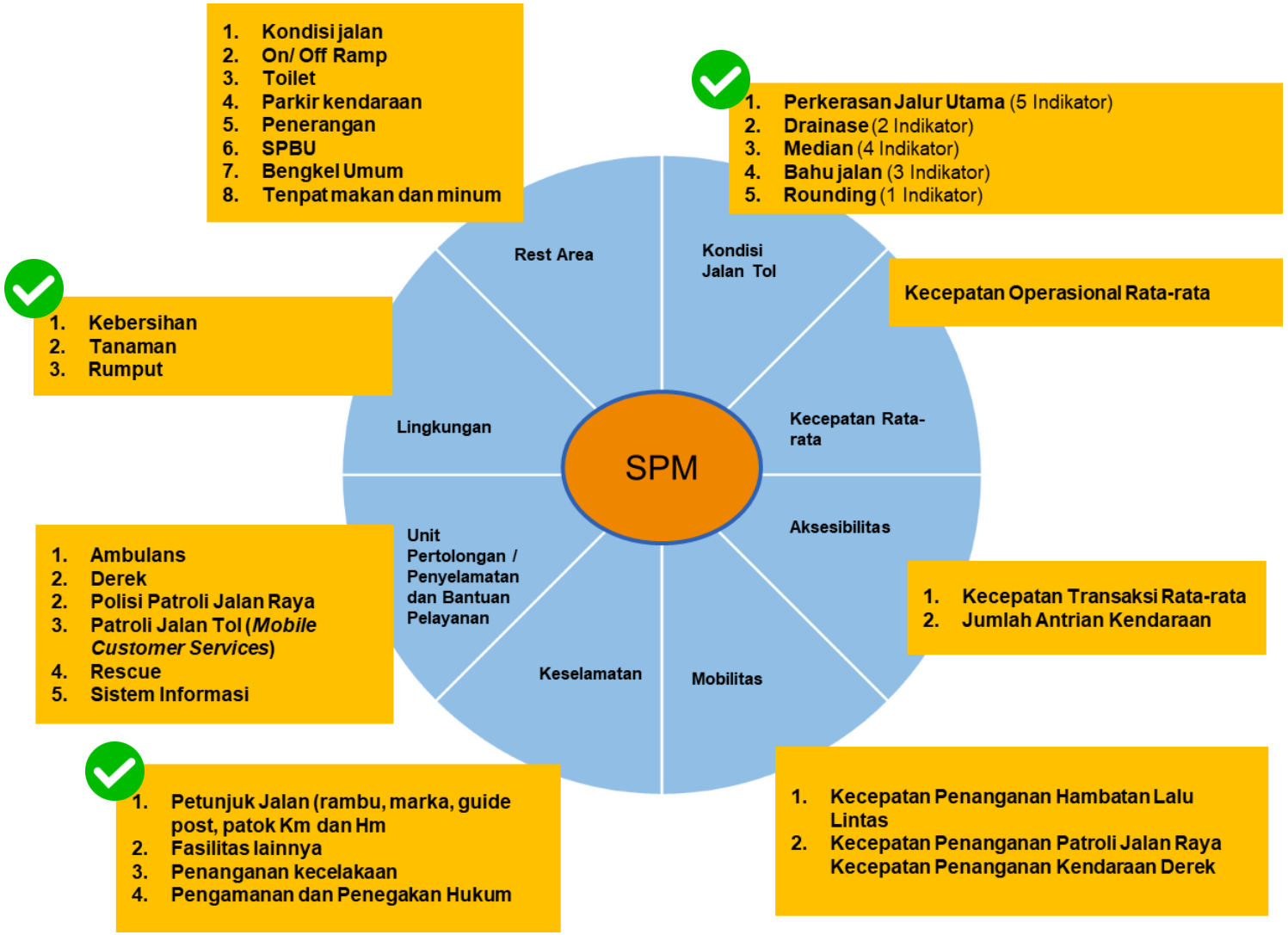

Harmonis
Saling peduli dan menghargai perbedaan


Loyal
Berdedikasi dan mengutamakan kepentingan bangsa dan negara


Adaptif
Terus berinovasi dan antusias dalam menggerakkan ataupun menghadapi perubahan


Kolaboratif
Membangun kerjasama yang sinergis

Sasaran Pemeliharaan Jalan Tol



MENGACU KEPADA PERATURAN MENTERI PEKERJAAN UMUM NOMOR : 16/PRT/M/2014

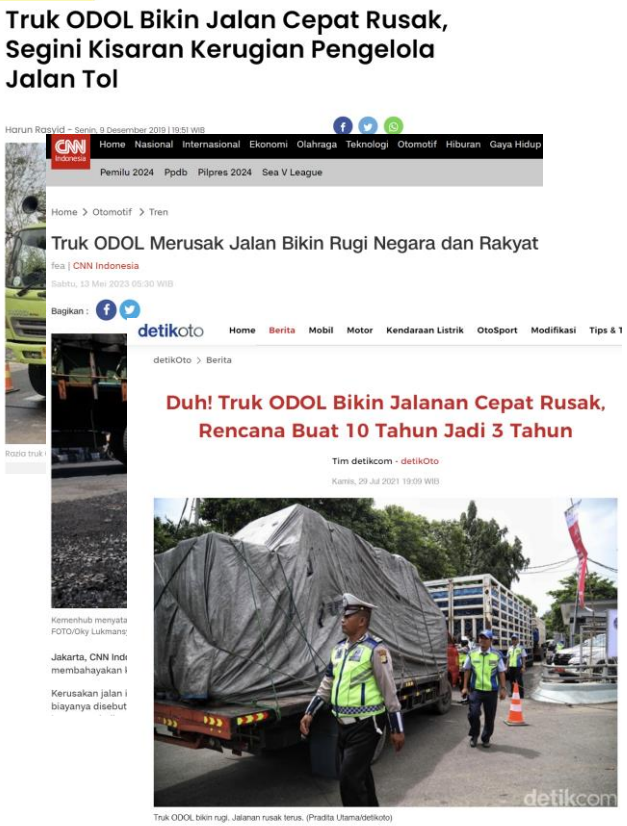
Standar Pelayanan Minimal adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Pemeriksaan SPM dilakukan pada 8 substansi dan 42 indikator.

8 Substansi Pemeriksaan SPM:

1. Kondisi Jalan Tol
2. Kecepatan Rata Rata
3. Aksesibilitas
4. Mobilitas
5. Keselamatan
6. Unit Pertolongan/Penyelamatan
7. Lingkungan
8. Rest Area

Tantangan dalam Pemeliharaan Jalan Tol





Tabel 2 Matriks Hubungan Kendaraan ODOL dengan Keselamatan Lalu Lintas, Kondisi Jalan, dan Kondisi Kendaraan Angkutan

Parameter	Keselamatan Lalu Lintas	Jalan	Kendaraan Angkutan
Kondisi Ideal	Aman	Mantap	Baik
Dampak ketika volume lalu lintas dan kendaraan ODOL meningkat	Gangguan kelancaran lalu lintas dan potensi kecelakaan lalu lintas meningkat	Percepatan laju kerusakan perkerasan jalan mengakibatkan jalan rusak sebelum umur layan rencana	Terjadinya kerusakan dini pada kendaraan dan berpotensi terjadi kerusakan parah apabila dilakukan terus menerus
Biaya Pemeliharaan dan Perbaikan	Tinggi	Tinggi	Tinggi

Sumber : Makalah Isu Over Dimension Over Loading Angkutan Logistik Dan Konsep Solusi Strategis (Arya Bagus Kevin Rajendra; Herry Vaza)

Kendaraan *Over Dimension Over Load*

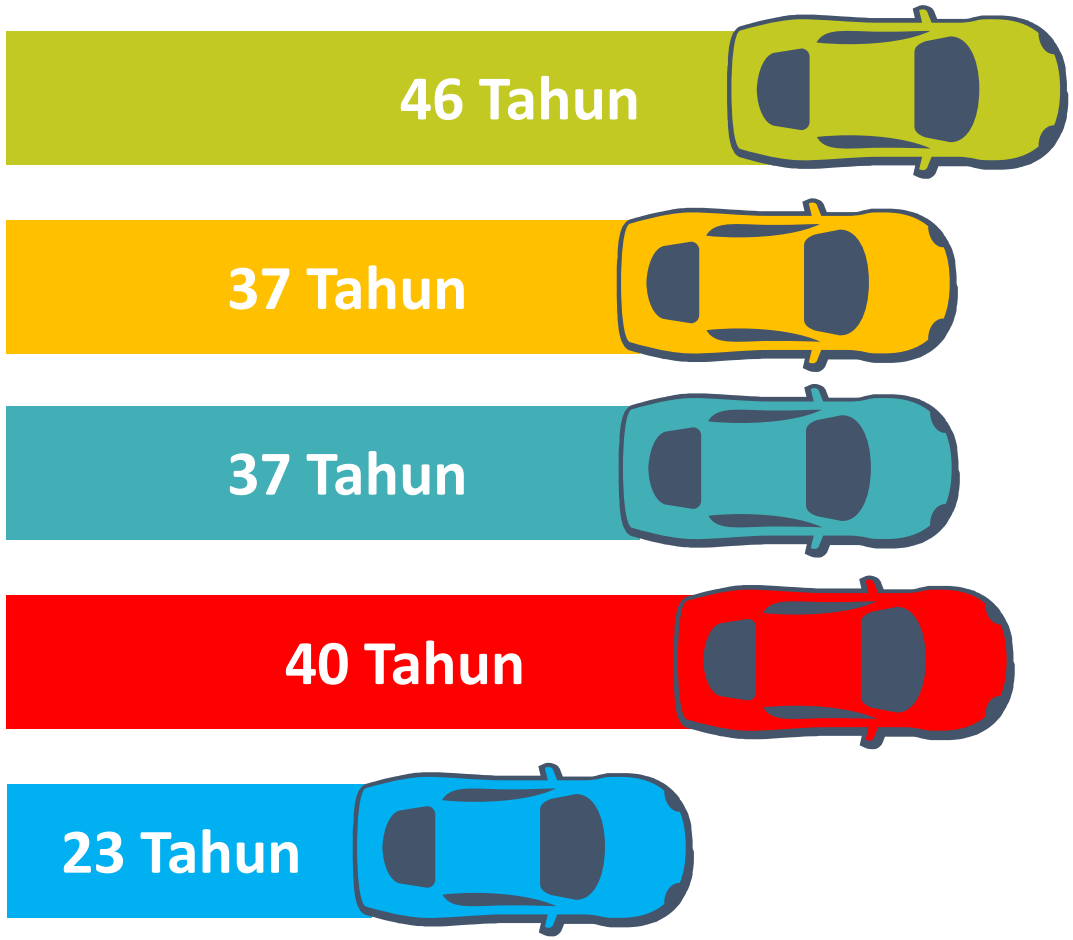
Kendaraan *Over Dimension Over Load* (ODOL) yang tinggi akan mempengaruhi nilai *Vehicle Damage Factor* (VDF) yang meningkat, dan beban *Cumulative Equivalent Single Axle Load* (CESAL) semakin cepat tercapai, sehingga umur layan tercapai sebelum umur layan rencana yang berpengaruh pada kondisi jalan

Peningkatan Volume Lalu Lintas

Volume lalu lintas yang terus bertambah dapat mempengaruhi beban Cumulative Equivalent Single Axle Load (CESAL) semakin tercapai dari CESAL rencana, sehingga umur layan semakin cepat tercapai dari umur layan rencana dan mempengaruhi kondisi jalan.

Tantangan yang Dihadapi

USIA JALAN TOL



Jakarta-Bogor-Ciawi

Merupakan Jalan Tol pertama yang dioperasikan oleh Jasa Marga pada tahun **1978**.

Cawang-Tomang-Pluit

Mulai dioperasikan oleh Jasa Marga secara bertahap semenjak tahun **1987**.

Prof. Dr. Ir. Sedyatmo

Mulai dioperasikan oleh Jasa Marga semenjak tahun **1987**.

Jakarta-Tangerang

Mulai dioperasikan oleh Jasa Marga semenjak tahun **1984**.

Jakarta Outer Ring Road

Mulai dioperasikan oleh PT JLJ pada tahun **2001**.

Sistem Manajemen Aset



www.jasamarga.com
Mobile Apps TRAVOY
One Call Center 14080
Jasa Marga Connecting Indonesia

Asset Management Background

1983

Technical Assistant and Training in Toll Road Management

The New Jersey Turnpike Authority and Louis Beger

Laporan teknis yang berisi tentag kajian terhadap pengoperasian jalan tol yang dilaksanakan oleh PT Jasa Marga (Persero)

1989

Study Management Service for The Tollway System

IEC - EHRF - OPMAC

Pembahasan mengenai Manajemen Pemeliharaan Jalan Tol dengan fokus pada 2 pokok bahasan yaitu : Manual Inspeksi Pekerjaan Pemeliharaan dan Evaluasi Kondisi Perkerasan

1991

Toll Road Design, Maintenance Management System Tahap - 1(MMS-1)

Noadtec Resources (NZ) LTD/PT Virama Karya/Disiplan Consult

Kajian standar desain jalan tol, kendali mutu pembangunan dan pemeliharaan jalan tol serta menyusun suatu Sistem Pemeliharaan Jalan Tol

2015

SISINFO (I) JIMMS

PT Jasa Marga (Persero) Tbk

Mendigitalisasi formulir inspeksi dan megintegrasikan dengan program pemeliharaan dan penganggaran biaya

2019

Toll Asset Management System

PT LAPI ITB

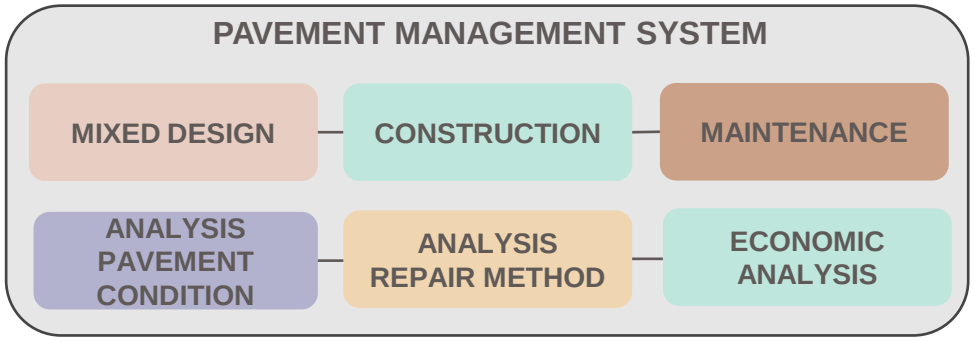
Pengembangan Aplikasi Basus Data Inspeksi dan Inventarisasi Aset Perkerasan, Lereng, Jembatan, Drainase, Safety, Aset Sekunder dan Lingkungan

2022

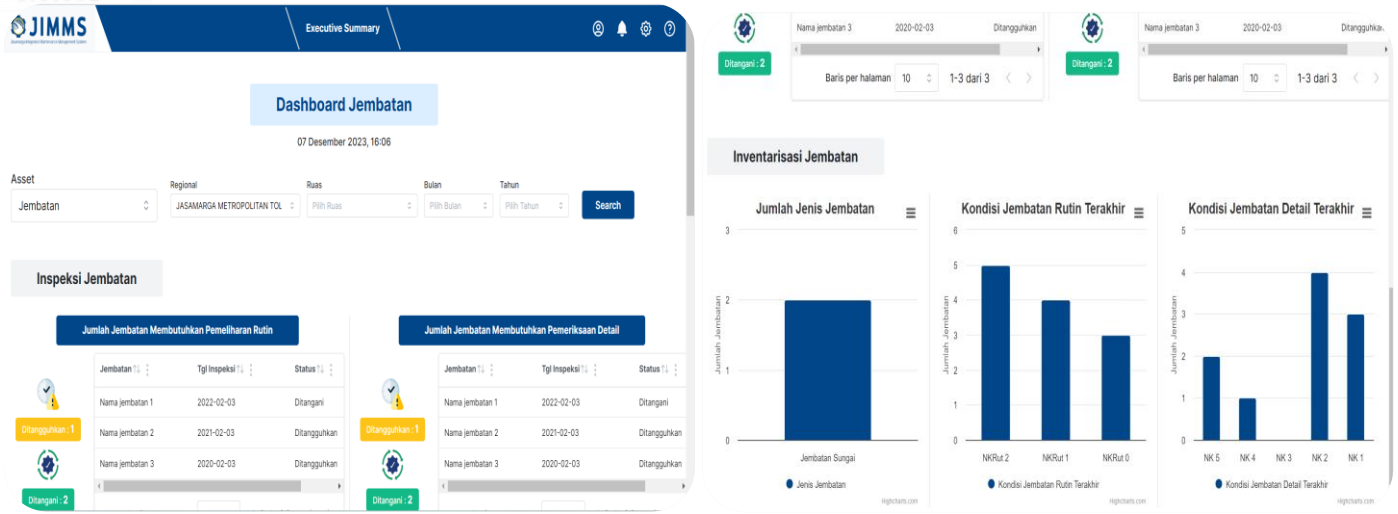
Pengembangan Aplikasi Aset Manajemen JIMMS-TAMS

Implementasi Manajemen Aset secara bertahap mulai dari Penyiapan Datawarehouse dan Pengisiannya, dumulai dengan Aset Jembatan dalam SK 159 Tahun 2022

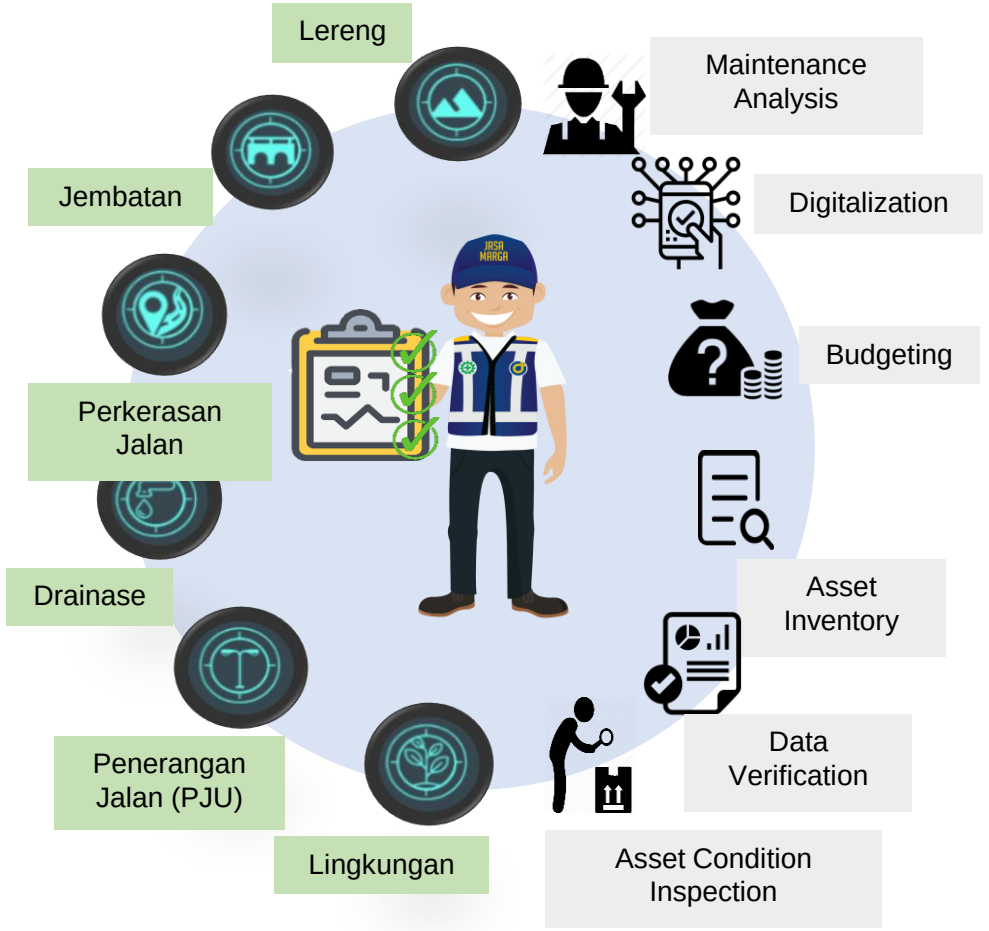
Jasamarga Integrated Maintenance System (JIMMS)



Jasamarga Integrated Maintenance Management System **(JIMMS)**
Aplikasi Database Digital Layanan Pemeliharaan yang memuat seluruh data-data terkait pemeliharaan secara terintegrasi untuk tercapainya penyampaian informasi laporan layanan Real-Time



PENGGUNAAN TEKNOLOGI APLIKASI JIMMS



Sistem Manajemen Aset Pemeliharaan

Manajemen Aset adalah rangkaian kegiatan jangka panjang yang terkoordinir pada suatu organisasi dalam mengelola aset dengan menerapkan keseimbangan antara kinerja, biaya, dan risiko.

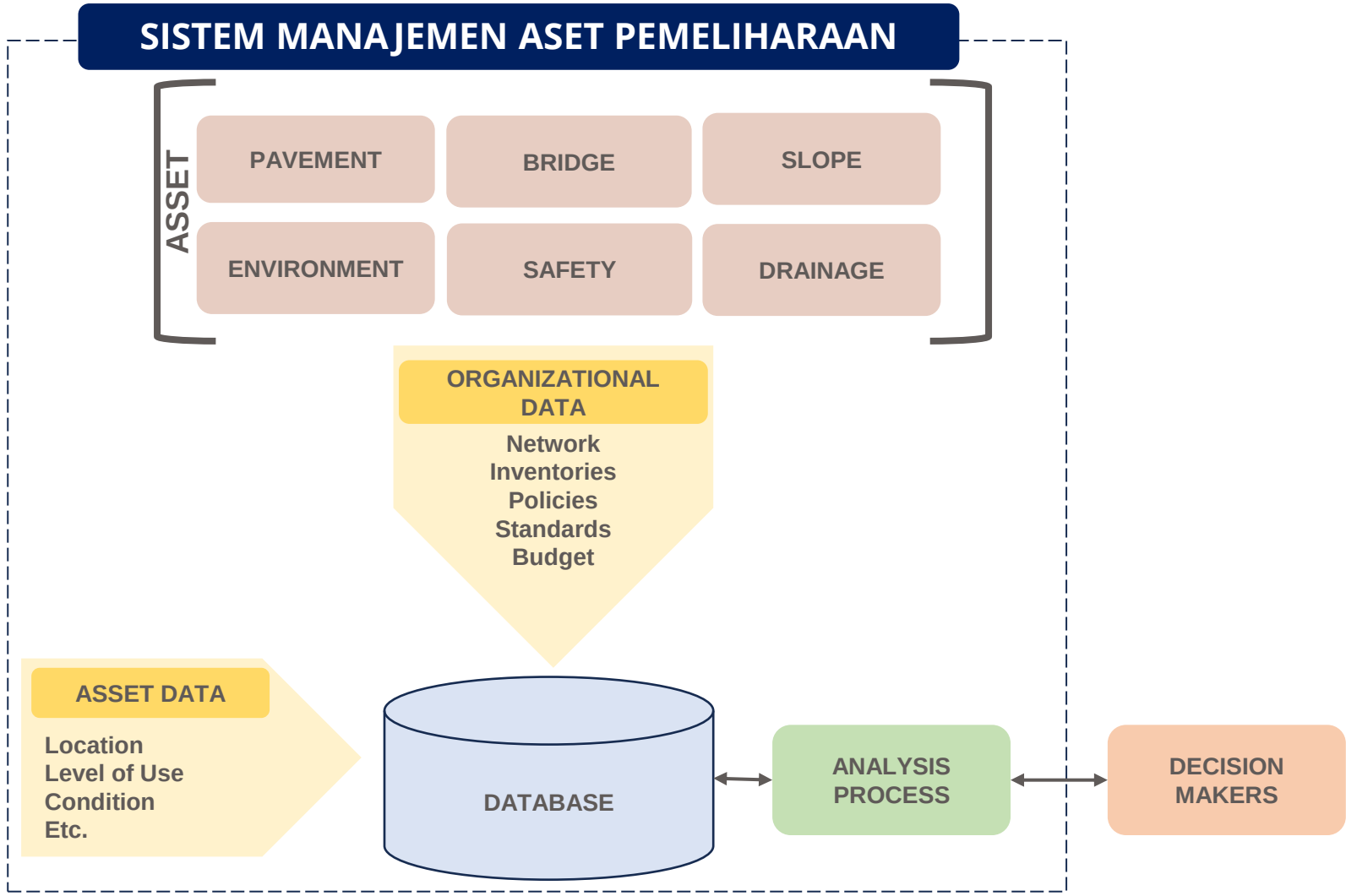
Pedoman Bidang Jalan dan Jembatan – Perencanaan dan Pemrograman Pekerjaan Preservasi Jaringan Jalan No. 07/P/BM/2021)

- Proses strategis dan sistematis dari operasi, menjaga, dan meningkatkan aset fisik.
- Fokus pada analisis teknis dan ekonomis, berdasarkan kualitas Informasi. Hal ini digunakan untuk mengidentifikasi rangkaian dari kegiatan maintenance, preservasi, Perbaikan dan penggantian yang akan mencapai SPM dari siklus hidup aset.

Federal Highway Administration - FHWA

Sistem Manajemen Pemeliharaan adalah sistem yang mengatur kegiatan untuk **mempertahankan kondisi aset jalan tol** dengan layanan pemeliharaan yang mantap, optimal dan berwawasan lingkungan sehingga dapat tercapai umur layanan aset jalan tol yang telah direncanakan.

SK Direksi No. 104/KPTS/2021 tentang Sistem Manajemen Layanan Pemeliharaan di Lingkungan JM



Keuntungan Sistem Manajemen Aset Pemeliharaan



- ***Lower Cost***
  Optimalisasi pekerjaan pemeliharaan dan perawatan Aset dan mitigasi adanya kerusakan yang tidak terduga



- ***Improve Communication***
  Kemudahan dalam memantau kinerja aset dan dapat memberikan informasi yang *real-time* terkait kondisi aset kepada *stakeholder*



- ***Accountability***
  Pengelolaan asset yang dapat dipertanggungjawabkan untuk mencapai performa yang diharapkan oleh para *stakeholder* secara efektif



- ***Decision Making***
  Data dan informasi yang lengkap dan berkualitas membantu user untuk dapat mengambil keputusan lebih baik

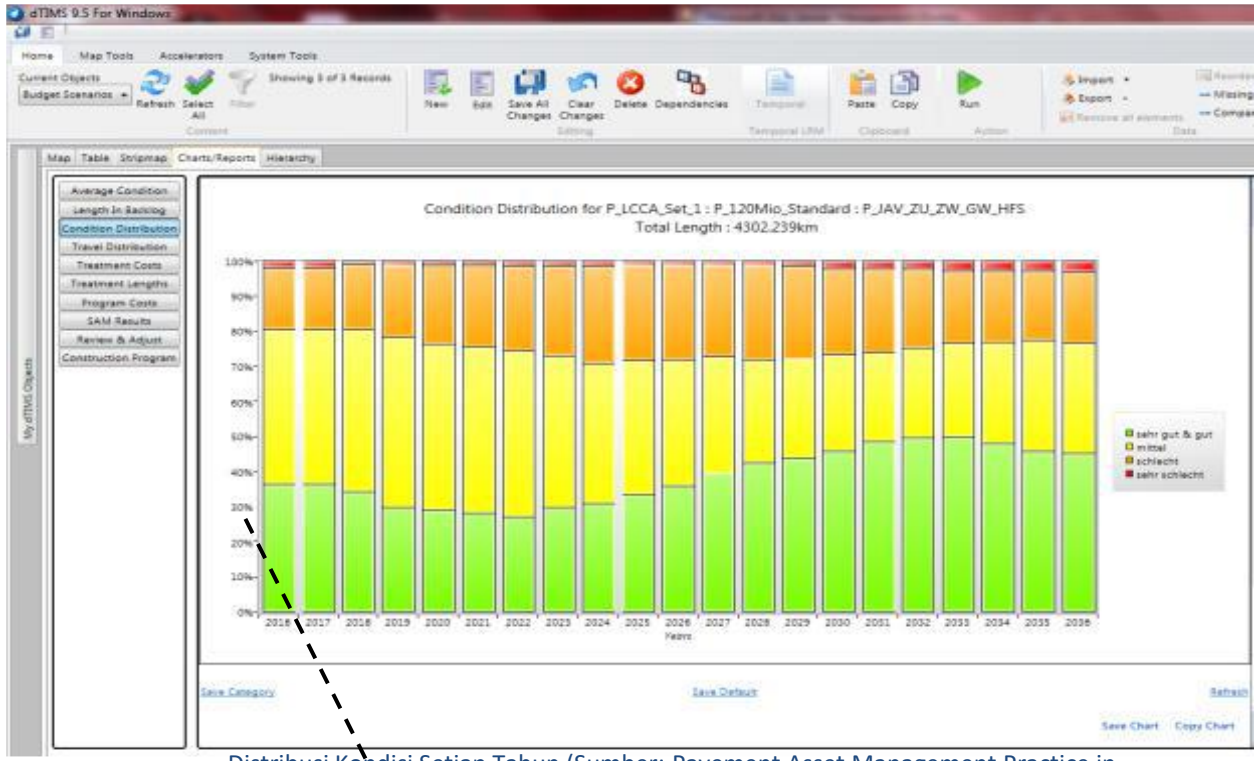


- ***Longer Asset Lifecycles***
  Dengan data berkualitas dan pemeliharaan yang tepat sebelum mencapai masa kritis, umur asset dapat diperpanjang



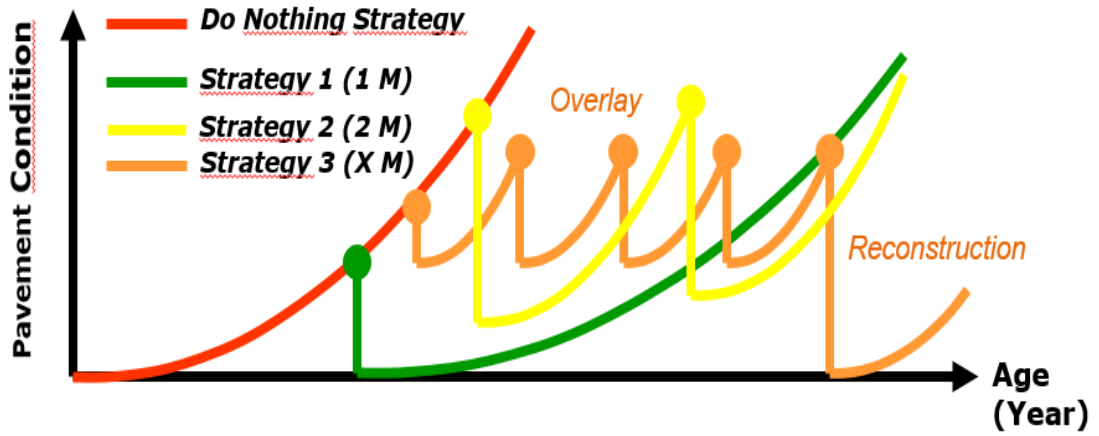
- ***Improve Risk Management***
  Mengurangi probabilitas terjadinya kegagalan pada asset, memastikan keberfungsian asset

Indikator pada Sistem Manajemen Aset



Distribusi Kondisi Setiap Tahun (Sumber: Pavement Asset Management Practice in Austria Toll Road Network; Honeger; 2016)

Dalam melakukan valuasi aset-aset yang ada, **diperkirakan akan menggunakan Index**. Sebagai contoh indeks yang dapat digunakan dapat dilihat pada gambar di atas.



- Pemeliharaan jalan sangat terkait dengan manajemen aset karena **alternatif-alternatif pemeliharaan mempengaruhi bagaimana kondisi jalan di masa depan**.
- Alternatif-alternatif tersebut dipillih salah satu dengan cara mencari alternatif terbaik **setelah melalui *life cycle cost analysis***.

PUPR
SIGAP MEMBANGUN NEGERI

BUMN UNTUK INDONESIA

JASAMARGA
Indonesia Highway Corp.

Sistem Manajemen Aset
Aset Perkerasan



Sistem Manajemen Aset Perkerasan

Sistem Manajemen Aset Perkerasan

1 Inventarisasi Data Aset

Outputs :
1. Ruas
2. Arah dan Lajur
3. STA/ Kilometer
4. Tipe Perkerasaan (Fleksibel/ Kaku/ Komposit)
5. Jeni Jalan
6. Longitude dan Altitude
7. Tebal Perkerasan
8. Tata Guna Lahan
9. Tanggal Inventarisasi

2 Inspeksi Rutin

Lingkup :
1. Pemeriksaan berdasarkan indikator teknis yang menuntut jaminan waktu (*timing*) pemeliharaan yang tepat
2. Pemeriksaan dilakukan secara rutin berdasarkan SPM Jalan Tol
3. Nilai Kondisi

Pemeliharaan Rutin Pemenuhan SPM

3 Inspeksi Periodik

Lingkup :
1. Pemeriksaan untuk mengetahui Kondisi Fungsional
2. Dilakukan satu tahun sekali
3. Metode survei dengan menggunakan **Hawkeye 2000** dan Alat Ukur Kekesatan

Output :
1. *International Roughness Index* (IRI)
2. *Skid Resistance*
3. *Surface Distress Index* (SDI)
4. *Pavement Condition Index* (PCI)
5. Umur Sisa

Final review

4 Inspeksi Khusus

Lingkup :
1. Pemeriksaan untuk mengetahui Kondisi Struktural
2. Metode survei dengan menggunakan **Hawkeye 2000** dan FWD

Output :
1. Lendutan (FWD)
2. *Layering System (Test Pit, Core Drill)*
3. Daya Dukung Tanah Dasar
4. Karakteristik Material

5 Analisis Kondisi Jalan

Berdasarkan :
1. Maintenance Standards
2. Deterioration Model
3. Decision Trees
4. Maintenance History
5. Technology and Cost

Network Analysis

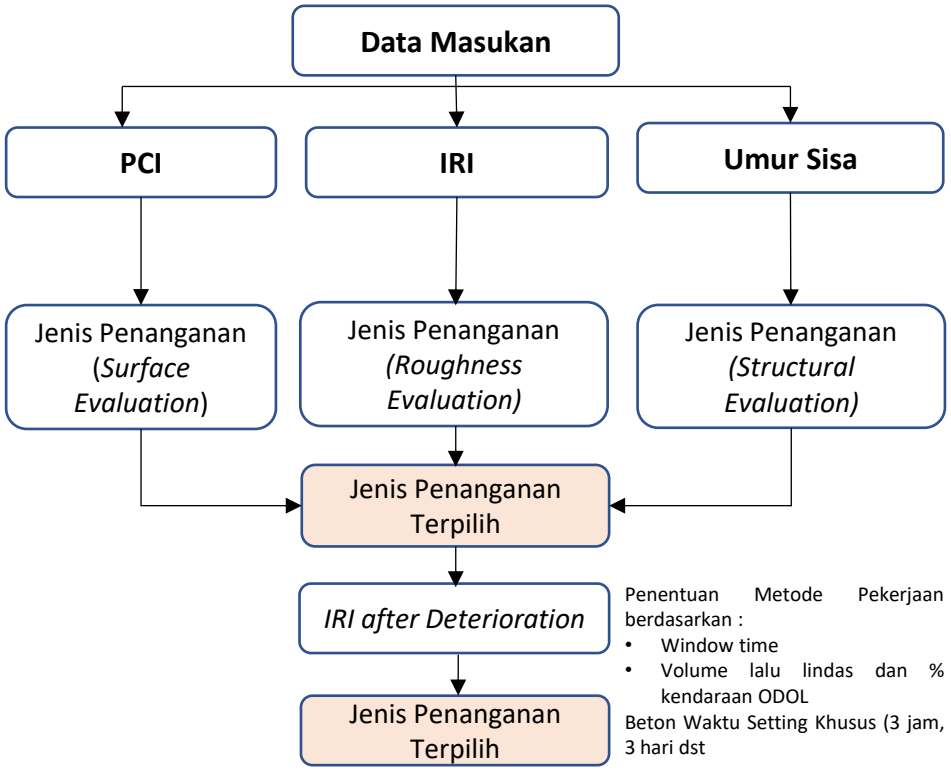
6 Program Pemeliharaan Jejaring

Dasar Penyusunan Program
1. RJPP Bidang Pemeliharaan
2. Kebijakan Umum dan Strategis
3. Arahan Strategis

7 Program Pemeliharaan Ruas

Back-Up Programs
1. Metoda dan Peralatan
2. Volume dan Harga Satuan
3. Rencana Anggaran Biaya

Standar Pemeliharaan



Penentuan Metode Pekerjaan berdasarkan :
- Window time
- Volume lalu lindas dan % kendaraan ODOL

Beton Waktu Setting Khusus (3 jam, 3 hari dst

Inspeksi Rutin Aset Perkerasan

INSPEKSI RUTIN - MANUAL

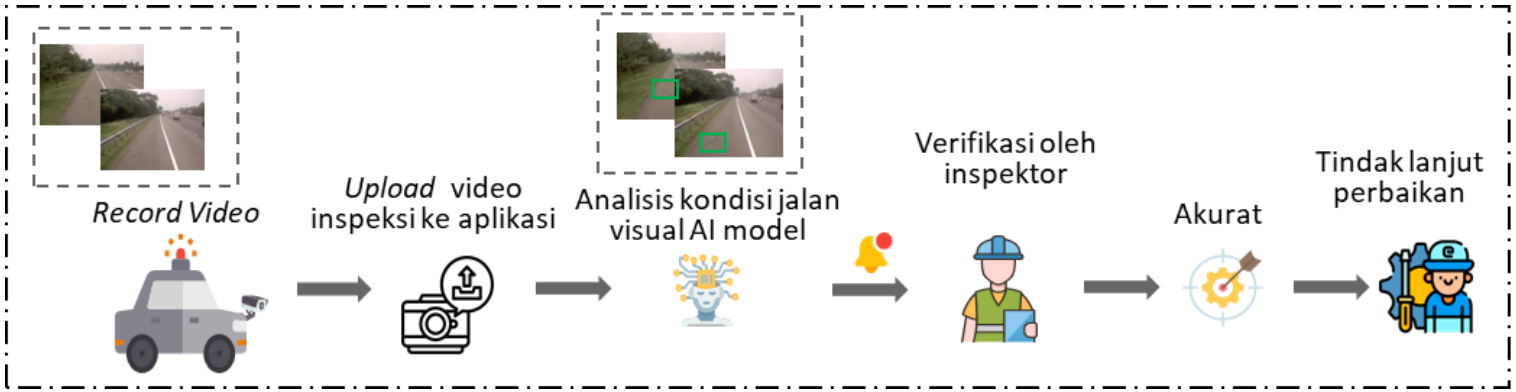






INSPEKSI RUTIN – ARTIFICIAL INTELLIGENT

InoVision









Inspeksi Periodik Hawkeye 2000

INSPEKSI JALAN DENGAN HAWKEYE 2020

Kendaraan Pintar untuk Survei Kondisi Jalan guna mendapatkan keakuratan data perkerasan jalan untuk perencanaan Program Pemeliharaan Jalan Tol

Jenis data yang diperoleh dari Hawkeye 2000, yaitu:

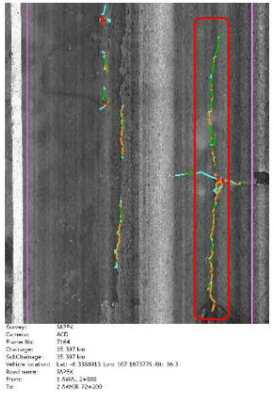
1) International Roughness Index **(IRI)** yang menggambarkan ketidakrataan jalan;
2) Kerusakan permukaan jalan seperti Rutting, Retak, dan Lubang yang didefinisikan dalam nilai Surface Distress Index **(SDI)**;
3) **Variabel Geometrik Jalan** seperti Potongan Melintang, lengkung Vertikal, lengkung Horizontal, Superelevasi, tanjakan, turunan, dll; dan
4) **Video Aset Jalan** yang dapat menangkap data visual aset jalan seperti Sarkapja, Rambu, dan aset lainnya

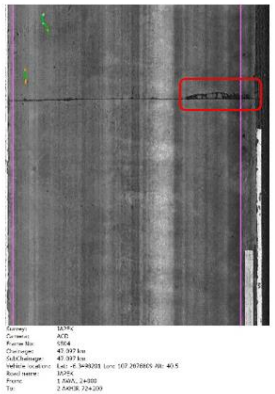


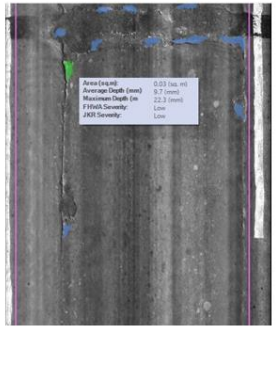


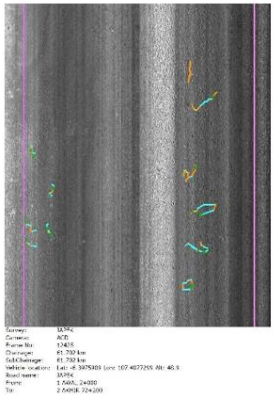


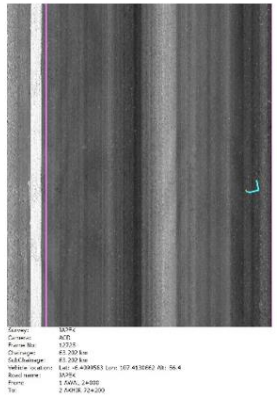



Retak Memanjang

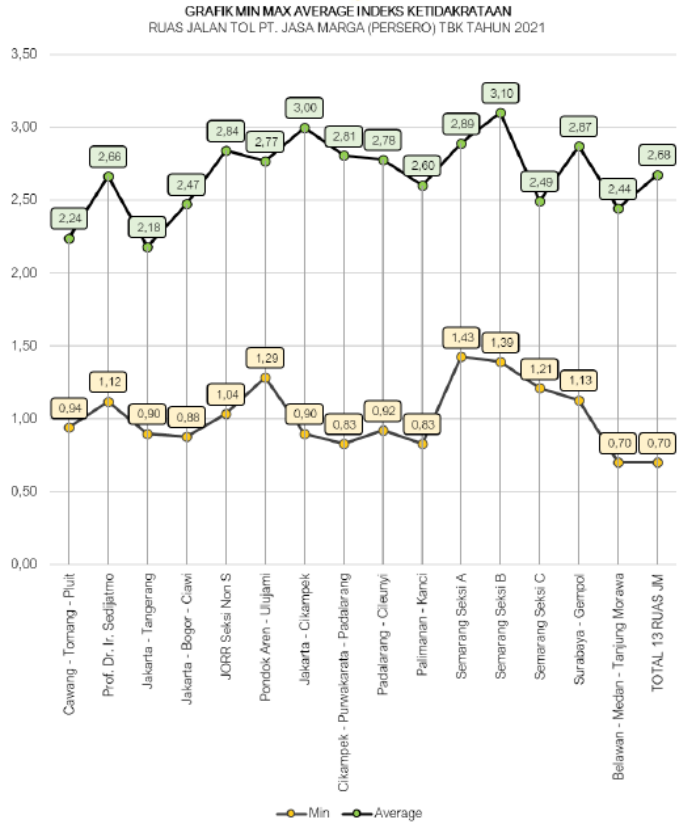

Spalling Joint

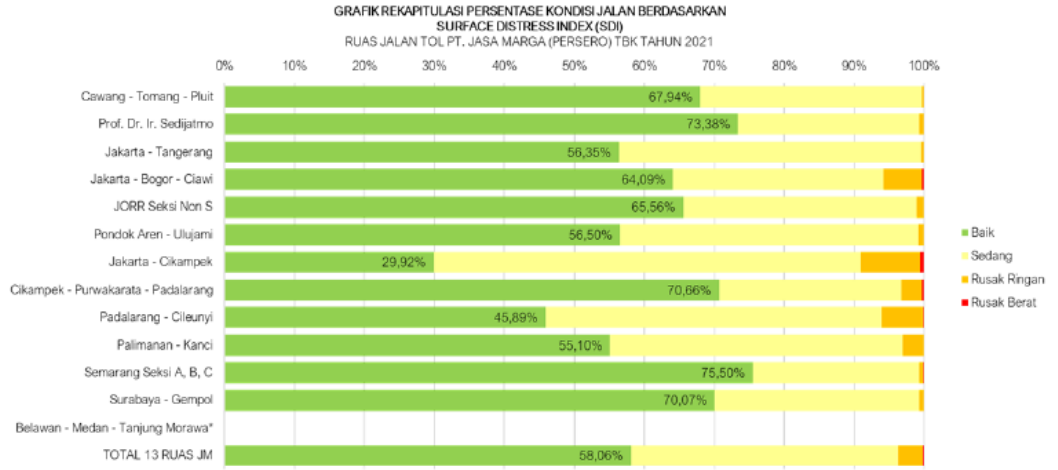

Lubang

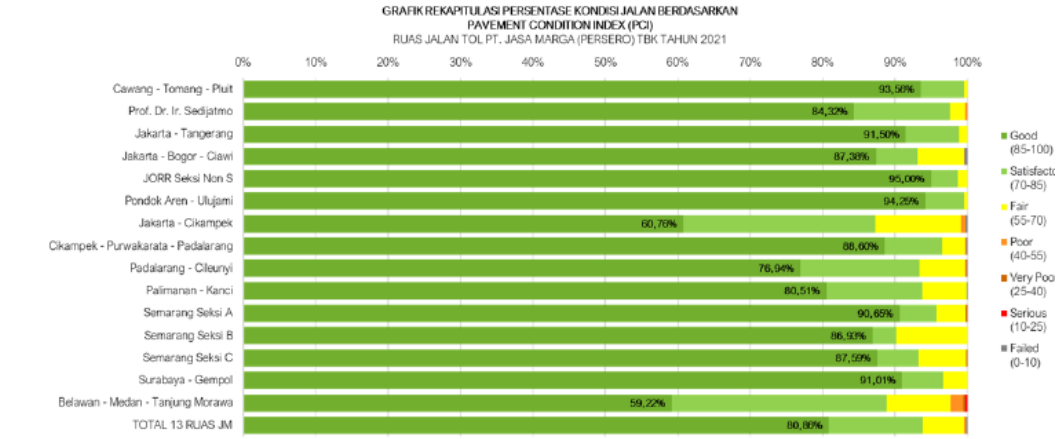

Lepas Agregat


Rutting

Indikator Aset Perkerasan





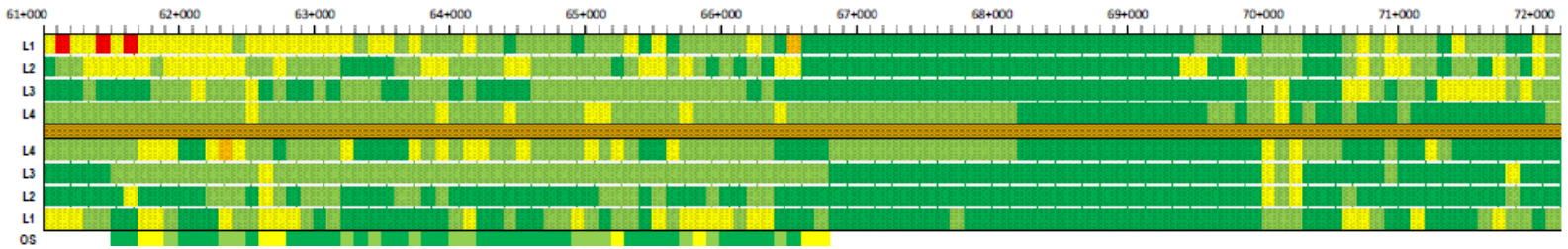








Contoh Strip Map Pemeliharaan Jalan





Asphalt Mixing Plant PT Jasamarga Tollroad Maintenance

ASPHALT MIXING PLANT (AMP)

Berlokasi di Karawang, Jawa Barat

Merek & Tipe : Almix ALB1500 – 120/50 Hz
Batch Mix Asphalt Plant
Dibuat di Singapore
Lisensi dari US

Tahun Produksi : 2012

Kapasitas : 100 – 120 ton/jam

Produk yang Dihasilkan:

- AC-WC
- AC-BC
- AC-Base
- Super Cold Mix Asphalt (SCMA - 1)
- Cold Patch JMTM - 31
- JMTM Emulsi 17

Proses Produksi

Persiapan & Inspeksi
↓
Produksi Hot Mix
↓
Pengtimbangan Hot Mix
↓
Pengeluaran Produksi











KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
DIREKTORAT JENDERAL BINA MARGA
BALAI BESAR PELAKSANAAN JALAN NASIONAL DKI JAKARTA - JAWA BARAT

Sertifikat
KELAIKAN OPERASI



Dengan memiliki AMP sendiri, JMTM dapat menawarkan harga yang kompetitif dan menjaga kualitas pekerjaan aspal dalam lingkungan JM Group.

*Produk Aspal Keras/Semen yang digunakan **PEN 60/70, PG 70, dan PG 76**

Heavy Equipment PT Jasamarga Tollroad Maintenance

POOL HEAVY EQUIPMENT

Berlokasi di Sentul, Jawa Barat

JMTM telah menyewakan peralatan beratnya untuk **berbagai proyek di luar JM Group**, seperti Mandalika International Street Circuit (NTB), Jalan & Jembatan Betung – Palembang (Sumatera Selatan), Kawasan Industri Kendal (Jawa Tengah), Sirkuit Jakarta International E-Prix (DKI Jakarta), Kereta Cepat Jakarta - Bandung (DKI Jakarta), dll.



JMTM memiliki **6 armada alat berat pengaspalan**, yang terdiri dari cold milling, asphalt finisher, tandem roller, tire roller, asphalt sprayer, dan power broom

JMTM juga memiliki **alat berat lainnya**, seperti excavator, skid steer loader, tractor head, crane, dump truck, self-loader truck, vibrating roller, wheel loader, compactor, jack hammer, dll.















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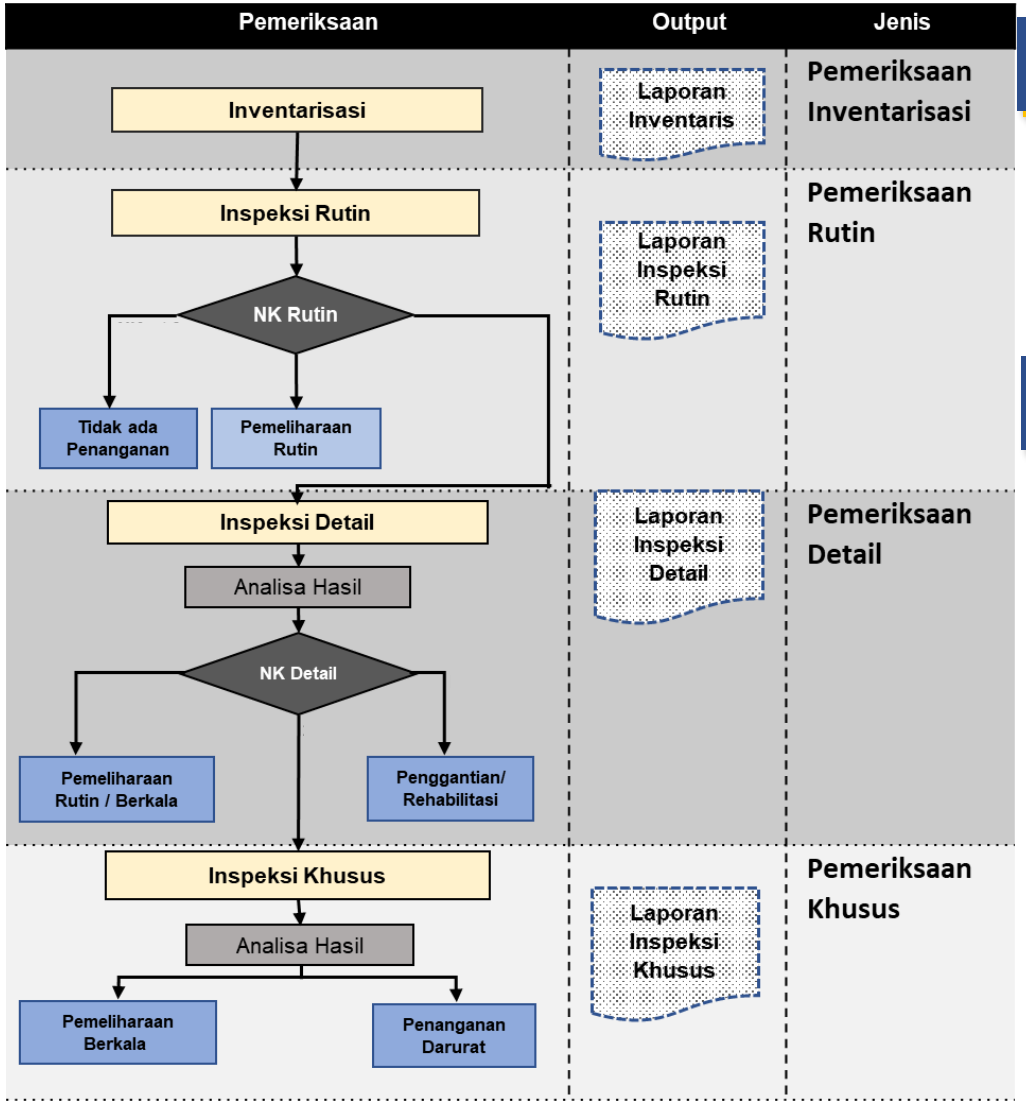
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Sistem Manajemen Aset Jembatan



Pemeriksaan Inventarisasi

Pemeriksaan Inventarisasi adalah pengumpulan data dasar administrasi, geometri, material dan data-data tambahan lainnya pada setiap jembatan, termasuk lokasi jembatan, panjang bentang dan jenis konstruksi untuk setiap jembatan. Pemeriksaan Inventarisasi dilakukan pada saat awal untuk mendaftarkan setiap jembatan ke dalam data base

Pemeriksaan Rutin

Pemeriksaan yang dilakukan untuk memastikan bahwa perubahan-perubahan tiba-tiba atau yang tidak terduga dari kondisi jembatan secara keseluruhan di antara dua periode pemeriksaan detail dapat terdeteksi dan dilaporkan agar tindakan yang tepat dapat diambil.

Pemeriksaan Khusus

Pemeriksaan Detail adalah pemeriksaan yang dilakukan untuk menilai secara akurat kondisi suatu jembatan. Semua komponen dan elemen jembatan diperiksa, dikenali dan didata setiap kerusakan-kerusakannya

Pemeriksaan Khusus

Pemeriksaan Khusus adalah pemeriksaan yang dilaksanakan apabila dari Pemeriksaan Detail Jembatan belum dapat diperoleh informasi yang memadai untuk membuat evaluasi/usulan perbaikan, Pemeriksaan menggunakan alat khusus

Pemeriksaan

Pemeliharaan Rutin

Pemeliharaan Berkala

Penggantian/ Rehabilitasi

Penanganan Darurat

Pemeliharaan

Sumber: Pedoman Pemeriksaan Jembatan Tahun 2022, Kementerian PUPR. (dengan Penyesuaian)

Bridge Inspection Vehicle

INSPEKSI JEMBATAN DENGAN
MOBILE BRIDGE INSPECTION TRUCK

1. Melakukan pemeriksaan kondisi fisik elemen jembatan;
2. Platform untuk kegiatan perbaikan dan penggantian *bearing pad, grouting, strengthening*;
3. Platform untuk melakukan pemeliharaan jembatan (pembersihan sekitar *pierhead*, *coating*, pengencangan baut, pembersihan tanaman, dll);
4. Platform untuk pemasangan instrumen pemantau kesehatan jembatan dan pelaksanaan inspeksi khusus.







Spesifikasi MBI 140-1,4/S Trailed Mountain

- Max. Horizontal Range 14 meter
- Max. Lowering Depth 9,6 meter
- Max. Load on Platform 600 Kg
- Rotation on Platform 180^0

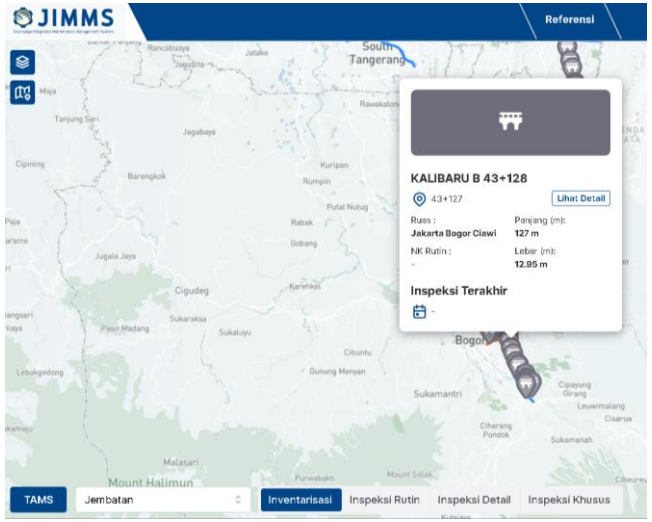


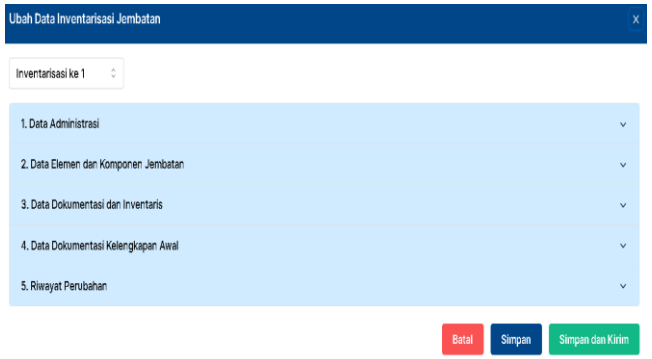


Indikator Aset Manajemen Jembatan

INVENTARISASI

Pencatatan aset struktur meliputi data administrasi aset hingga elemen dan komponen serta dokumentasinya.





INSPEKSI RUTIN

Kegiatan memeriksa dan mencatat kerusakan yang dilakukan secara visual pada lingkup level komponen dan elemen utama jembatan dengan menghasilkan Nilai Kondisi Rutin

Elemen	Aspek Pemeriksaan
Kepala Abutment	Tumpukan sampah
Gelagar Tipe Beton/ Gelagar Tipe Baja	*Honeycomb*/delaminasi/*bulging*
Pelat Lantai	Adanya deformasi
Pilar	Adanya Korosi
	Adanya Beton *Spalling/Crushing*
	Baut Longgar pada Jembatan Baja
	Penurunan Pier Jembatan

→ NK





INSPEKSI DETAIL

Kegiatan memeriksa dan mencatat kerusakan yang dilakukan secara visual pada lingkup level elemen dan sub-elemen jembatan dan menghasilkan Nilai Kondisi. Inspeksi Detail berdasarkan :

1. *Bridge Management System* Tahun 1992
2. Pedoman Pemeriksaan Jembatan Nomor 01/P/BM/2022 Bulan Januari Tahun 2022
3. Keputusan Direksi PT Jasa Marga (Persero) Tbk Nomor 159/KPTS/2022 tanggal 13 Desember 2022





Metoda Pemeliharaan Aset Jembatan

INSPEKSI KHUSUS

Kegiatan memeriksa dan mencatat kerusakan yang dilakukan dengan metode/alat khusus pada lingkup level elemen dan sub-elemen jembatan

Pengujian Elemen Beton

- *Hammer test*
- *Coredrill*
- *UPV (Ultrasonic Pulse Velocity)*
- *Cover Meter*
- *Half Cell Potential*
- Pengujian Kedalaman Karbonasi
- *Pull out test*
- Uji Klorida
- *Resistivity Test*
- *Ground Penetrating Radar*
- *Infrared Thermography Camera*
- Pendeteksian Potensi ASR (*Alkali Silica Reaction*)
- Uji Sinar X untuk Beton

Pengujian Elemen Baja

- *Hardness Test*
- Kunci Torsi Momen
- *Ultrasonic Thicnkness Gauge*
- *Coating Thickness Gauge*
- *Dye Penetration Test*
- *Ultrasonic Flaw Detector*





PEMELIHARAAN JEMBATAN



Penggantian *Rubber Bearing*



Jacketing



Pemasangan FRP



Grouting

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iRAP

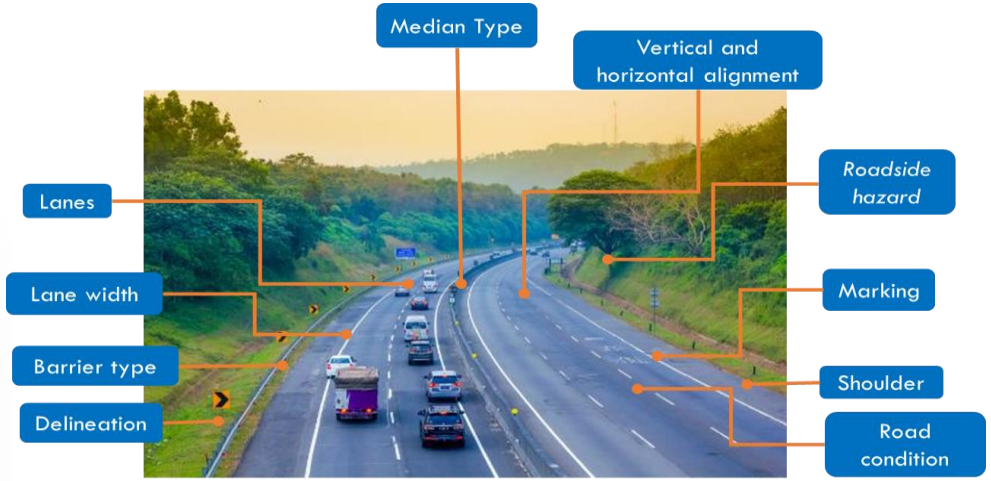
PENINGKATAN PENILAIAN KESELAMATAN melalui
IRAP STAR RATING Certification

Untuk mencapai target dari *United Nation's Sustainable Development Goals* dan *Global Road Safety Performance Target*, Jasa Marga berkolaborasi dengan International Road Assessment Program (iRAP) melakukan *Road Assessment Program* untuk memperoleh nilai *Star Rating* dan *Safer Road Investment Plan*

3 GOOD HEALTH AND WELL-BEING

TARGET 3 2030
Target 3: By 2030, all new roads achieve technical standards for all road users that take into account road safety, or meet a three star rating or better.

TARGET 4 2030 75%
Target 4: By 2030, more than 75% of travel on existing roads is on roads that meet technical standards for all road users that take into account road safety.



01 Menilai ±78 atribut jalan (geometric, sarkapja, kondisi jalan, lingkungan sisi jalan, manajemen kecepatan, dsb)

02 Survei menggunakan **Hawkeye 2000** (*Smart Survey Vehicle*) oleh PT JMTM yang telah memiliki sertifikasi *accredited supplier*

03 Safer Road Investment Plan dari pihak iRAP untuk rekomendasi perbaikan

***Pencapaian ruas tol pertama untuk 4-star rating**



Jagorawi

Nov 2020



Cipularang

Nov 2020



Soedijatmo

Dec 2021



Dalam Kota

Jan 2023



JORR Pd Aren - Ulujami*

Dec 2023

iRAP

01 Road Survei

Menggunakan sistem yang sudah diakreditasi oleh iRAP seperti Perangkat Hawkeye 2000 Maintenance



02 Collect Data

Pemenuhan data lainnya yang dibutuhkan dalam proses Analisa



03 Coding

Agar kode-kode yang dapat diproses oleh aplikasi komputer dengan algoritma yang dikembangkan oleh iRAP



04 Analyse

Hasil coding akan dimasukkan ke aplikasi ViDA dan akan menghasilkan Star Rating Score (SRS).



05 Results

Mendapatkan Star Rating Certificate dari iRAP Internasional



iRAP

Tabel Penggolongan *Star Rating Band* berdasarkan *Star Rating Score*. *Sumber : irap.org.*

Star Rating	Star Rating Score				
	Vehicle occupants and motorcyclists	Bicyclists	Pedestrians		
			Total	Along	Crossing
5	0 to < 2.5	0 to < 5	0 to < 5	0 to < 0.2	0 to < 4.8
4	2.5 to < 5	5 to < 10	5 to < 15	0.2 to < 1	4.8 to < 14
3	5 to < 12.5	10 to < 30	15 to < 40	1 to < 7.5	14 to < 32.5
2	12.5 to < 22.5	30 to < 60	40 to < 90	7.5 to < 15	32.5 to < 75
1	22.5 +	60+	90 +	15 +	75 +

Output **dari Analisa iRAP** ***Star Rating*** adalah penggolongan keselamatan jalan dari **Bintang 1 (paling rendah)** sampai dengan **Bintang 5 (paling tinggi).**

Proses analisa dibantu dengan **aplikasi perangkat lunak** dari Organisasi iRAP, yaitu **ViDA. Pada Aplikasi ViDA,** kita dapat melihat persebaran titik lokasi yang memiliki keselamatan jalan yang kurang baik (Bintang 1 dan Bintang 2) dan melakukan perencanaan perbaikan pada titik lokasi tersebut.

Street Map Data



	Vehicle Occupant	
Star Ratings	Length (km)	Percent
3 star or better	22.00	99.10%
5 Stars	12.80	57.66%
4 Stars	5.40	24.32%
3 Stars	3.80	17.12%
2 Stars	0.20	0.90%
1 Star	0.00	0.00%
Not applicable	0.00	0.00%
Totals	22.20	100.00%

Implementasi iRAP

Sebelum Implementasi iRAP Ruas Dalam Kota

	Vehicle Occupant	
Star Ratings	Length (km)	Percent
3 star or better	22.00	99.10%
5 Stars	12.80	57.66%
4 Stars	5.40	24.32%
3 Stars	3.80	17.12%
2 Stars	0.20	0.90%
1 Star	0.00	0.00%
Not applicable	0.00	0.00%
Totals	22.20	100.00%

	Vehicle Occupant	
Star Ratings	Length (km)	Percent
3 star or better	22.00	99.10%
5 Stars	12.90	58.11%
4 Stars	6.70	30.18%
3 Stars	2.40	10.81%
2 Stars	0.20	0.90%
1 Star	0.00	0.00%
Not applicable	0.00	0.00%
Totals	22.20	100.00%

Mendapatkan **Bintang 2**

Sesudah Implementasi iRAP Ruas Dalam Kota

	Vehicle Occupant	
Star Ratings	Length (km)	Percent
3 star or better	22.20	99.99%
5 Stars	3.00	13.51%
4 Stars	18.20	81.98%
3 Stars	1.00	4.50%
2 Stars	0.00	0.00%
1 Star	0.00	0.00%
Not applicable	0.00	0.00%
Totals	22.20	100.00%

	Vehicle Occupant	
Star Ratings	Length (km)	Percent
3 star or better	22.20	99.99%
5 Stars	3.00	13.51%
4 Stars	18.20	81.98%
3 Stars	1.00	4.50%
2 Stars	0.00	0.00%
1 Star	0.00	0.00%
Not applicable	0.00	0.00%
Totals	22.20	100.00%

Mendapatkan **Bintang 3**

Rekomendasi Perbaikan Ruas Dalam Kota



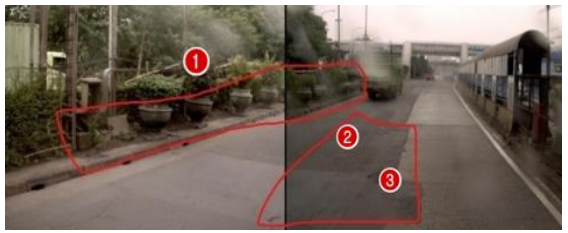
Safety Barrier

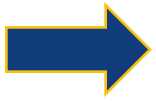


Road Delination



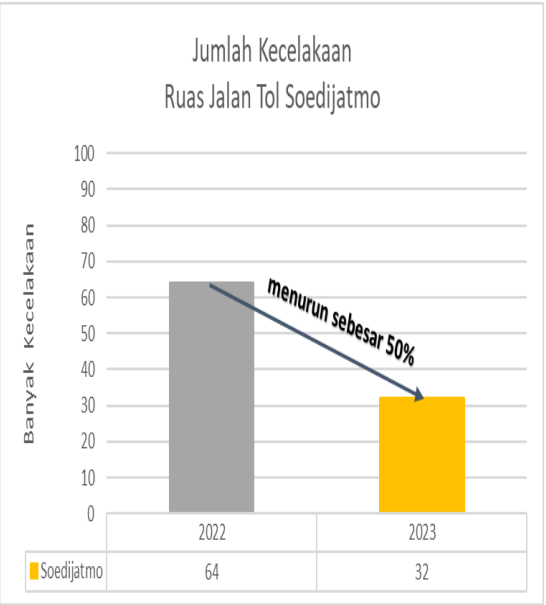
Road Condition







1. Pemasangan *Safety Barrier*
2. Perbaikan Perkerasan Jalan
3. Perbaikan Marka Jalan



Jumlah Kecelakaan pada Ruas Tol Soedijatmo pada tahun 2022-2023 mengalami **penurunan** sebanyak **32 (50%) kecelakaan.**

Sistem Manajemen Aset
Aset Lainnya



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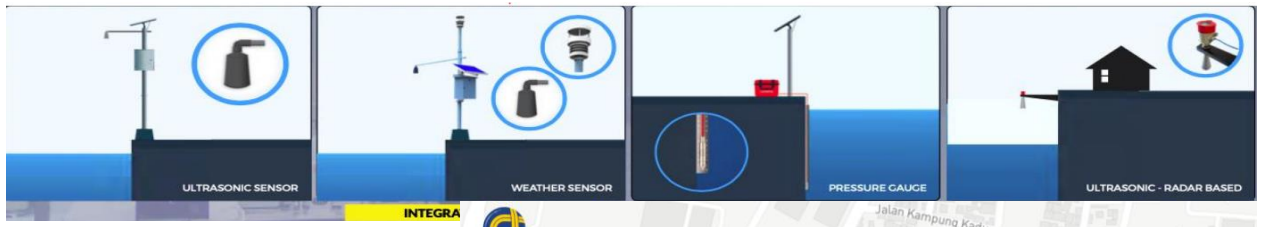
Early Warning System

PENGGUNAAN TEKNOLOGI *EWS*
Dalam Peningkatan Pemantauan Kondisi Tol dari Potensi Rawan genangan dan Banjir

Water Level Monitoring System adalah suatu sistem pemantauan ketinggian permukaan air pada suatu wilayah bertujuan untuk memberikan informasi dini untuk dapat dilakukan suatu tindak lanjut. Direncanakan untuk terkoneksi dengan Sistem JID serta

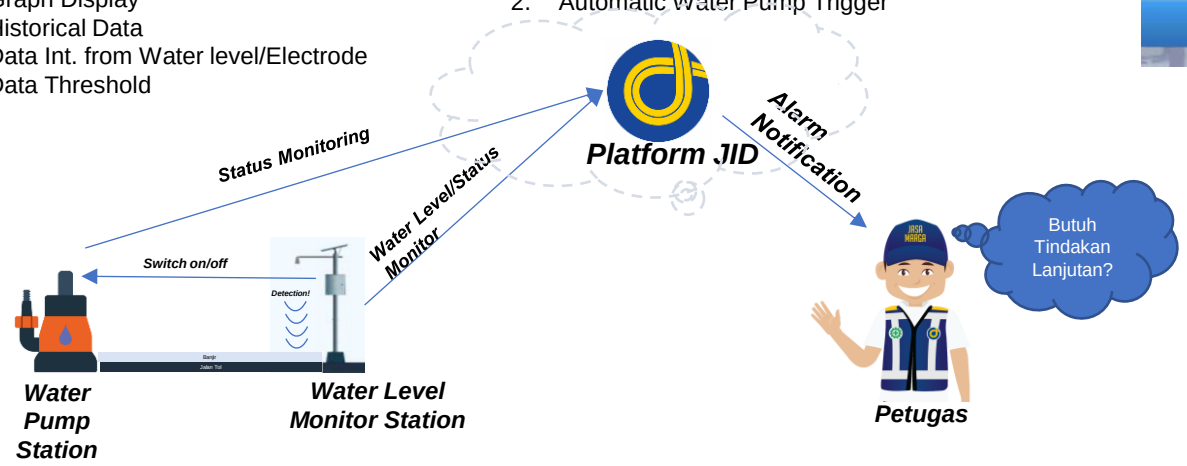
Data ditampilkan secara online dan bisa diakses oleh pengguna dari berbagai jenis device, seperti PC, laptop, android, dan smartphone sehingga memudahkan dalam monitoring data bagi pengguna.
Pengiriman data ke website menggunakan jaringan internet, namun jika lokasi pemasangan alat tidak dapat mengakses jaringan internet dapat menggunakan opsi jaringan radio atau LoRa

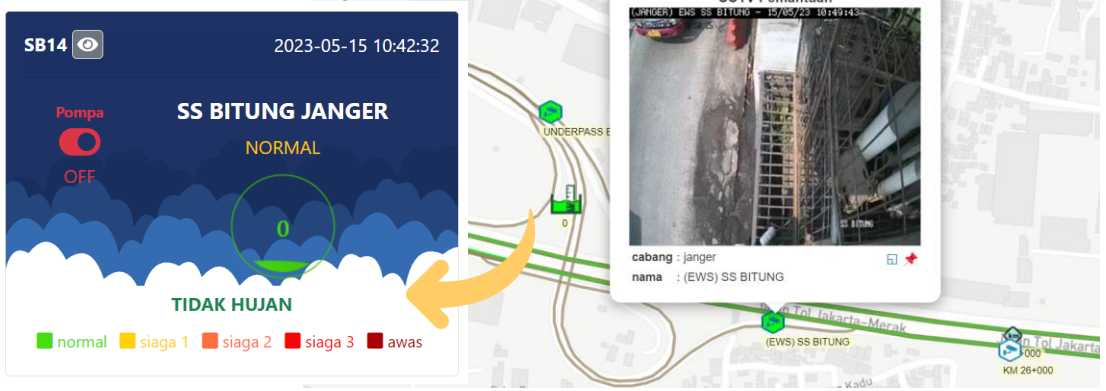
Water Level Monitoring terdapat 4 Tipe sensor :
1. **Ultra-sonic Sensor**
2. **Weather Sensor**
3. **Pressure Gauge**
4. **Ultrasonic – Radar Based**



DATA MONITORING
1. Realtime Data Display
2. Graph Display
3. Historical Data
4. Data Int. from Water level/Electrode
5. Data Threshold

EARLY WARNING
1. Alarm Notification
2. Automatic Water Pump Trigger





Smart PJU
Jasamarga Tollroad Maintenance

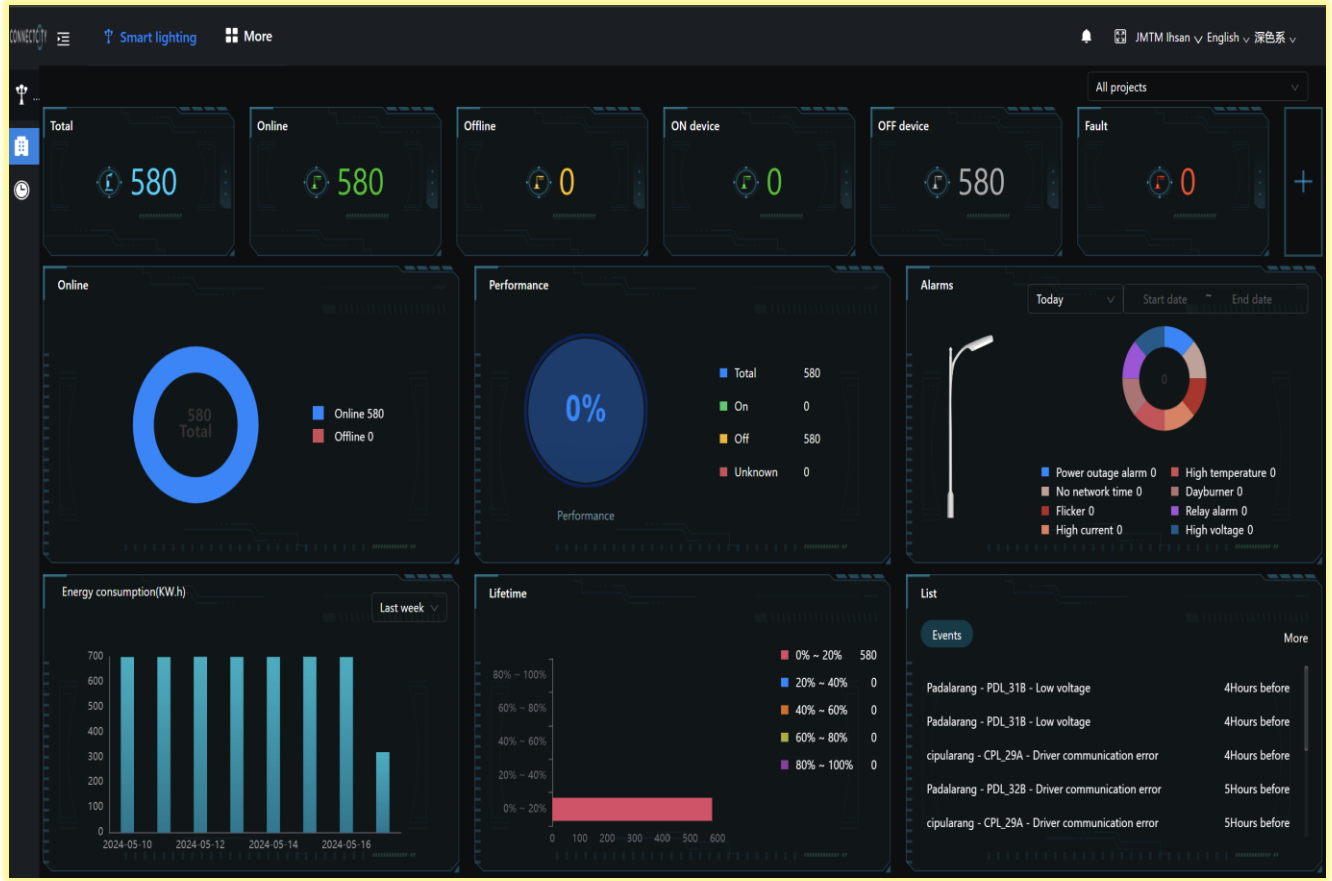
***Smart* PJU** adalah sistem penerangan jalan yang terhubung dalam jaringan, dilengkapi dengan **sensor dan perangkat lunak** untuk **mengoptimalkan penggunaan energi** dan **mengatasi permasalahan seputar penerangan jalan.**

Dalam pemanfaatannya, Smart PJU memiliki fungsi dan keuntungan bagi PT JMTM sebagai berikut:

a. Mempermudah operasional, meningkatkan akurasi, serta meminimalkan risiko melalui penggunaan Smart PJU;
b. Meningkatkan efisiensi biaya, waktu, serta sumber daya manusia dalam hal operasional dan pemeliharaan PJU dengan otomatisasi proses inspeksi rutin PJU;
c. Meningkatkan efisiensi energi dengan adanya mode dimming yang dapat menyesuaikan intensitas cahaya dengan kebutuhan peserta lalu lintas; dan
d. Membantu PT JMTM dalam pemenuhan Standar Pelayanan Minimal (SPM) jalan tol, dimana indikatornya yaitu lampu penerangan jalan umum harus menyala 100% dengan waktu toleransi response time perbaikan < 2x24 jam.

No.	Ruas	Jumlah *Smart* PJU Terpasang
1.	Jagorawi	110 buah
2.	Cipularang dan Padaleunyi	580 buah





Terima Kasih

PT Jasamarga Tollroad Maintenance
Plaza Tol Taman Mini Indonesia Indah
Jakarta 13550 – Indonesia
www.jasamarga.com



ASTRA Infra | Toll Road
CIKOPO-PALIMANAN

Asset Management

ASTRA Toll Road Cikopo - Palimanan





ASTRA Infra | Toll Road CIKOPO-PALIMANAN

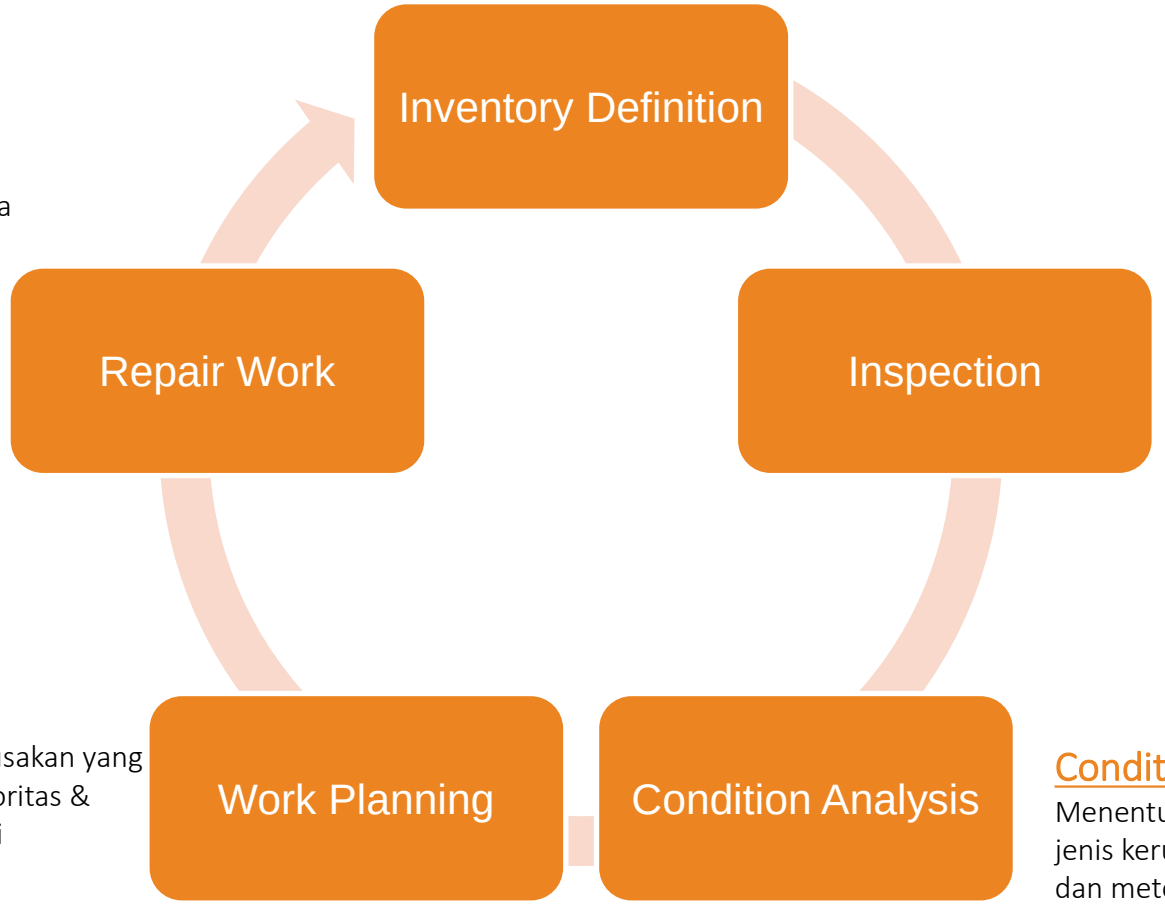
ASTRA Infra
Advancing the Nation's Infrastructure

CPP INVESTMENT BOARD

- ASTRA Tol Cipali adalah pemegang konsesi Jalan Tol Cikopo – Palimanan (Cipali).
- Jalan Tol Cipali menghubungkan Jabodetabek dan Karawang dengan area lain di Jawa Tengah dan Jawa Timur, dan Jalan Tol Cipali ini beroperasi penuh sejak Juni 2015
- Panjang Jalan 116 KM, bagian dari Tol Trans Jawa
- Terdiri dari 6 Seksi (Terpisah Berdasarkan Gerbang Tol)
- Memiliki 2 Tipe *Rest Area* yaitu 4 Tipe A dan 4 Tipe B

Inventory Definition

Membuat dan mengupdate data inventory untuk setiap aset dengan mengumpulkan properties data awal dan histori pekerjaan perbaikan untuk kemudian dijadikan sarana untuk menyimpan data kondisi aset



Repair Work

Melakukan perbaikan kerusakan pada aset yang dikategorikan menjadi :

1. Routine Maintenance
2. Repair and Replacement
3. Heavy Repair Project

Inspection

Melakukan pemeriksaan kondisi aset sesuai inventory ID dan berdasarkan jenis kerusakan & tingkat keparahannya

Work Planning

Merencanakan perbaikan kerusakan yang paling efisien berdasarkan prioritas & metode perbaikan yang sesuai

Condition Analysis

Menentukan prioritas berdasarkan jenis kerusakan, tingkat keparahan dan metode perbaikan yang sesuai

ASTRA Infra | Toll Road
CIKOPO-PALIMANAN

Asset Management

1. Inventory Definition

BIG 4 ASSETS



Pavement (GIS-Based)



Drainage (GIS-Based)



Bridge (GIS-Based)



Slope (GIS-Based)

Other Assets



Wirerope



Street Lighting/PJU



Warning Light/Lampu Flip-Flop



Guardrail



Concrete Barrier



Signboard



RoW Fencing



Guidepost

BIG 4 ASSETS ID			
Asset Type	**Mainlane ID**	**Access & Interchange ID**	**Total ID**
Pavement Asset			
Flexible Pavement	108.608	70	108.678
Rigid Pavement	75.768	108	75.876
Slope Asset			
Cut Slope	11.809	25	11.834
Embankment Slope	15.803	113	15.916
Bridge Asset			
Overbridge	84	1	85
Underbridge	54	4	58
Drainage Asset			
Crossing Drain	486	70	556
Side Drain	649	702	1.351
Median Drain	139	-	139

Pavement Asset (

A. Mainlane/Jalur Utama
   - 1 ID setiap 5 Meter
   - Terbagi per-Jalur & per-Lajur

B. Access & Interchange
   - 1 ID setiap 200 meter

Slope Asset

A. Mainlane/Jalur Utama
   - 1 ID setiap 10 Meter
   - Terbagi per-Trap/Undakan

B. Access & Interchange
   - 1 ID per transisi aset (Cut-Embankment atau Struktur)

Bridge Asset

- Overbridge adalah Jembatan Atas (Melintang Jalur Utama)
- Underbridge adalah Jembatan bawah (Memanjang Jalur Utama)
- 1 ID adalah 1 Buah Jembatan

Drainage Asset

- Crossing Drain adalah Saluran yang melintang dibawah Jalur Utama
- Side Drain adalah Saluran memanjang yang ada di sisi kanan-kiri lereng Jalur Utama
- Median Drain adalah Saluran yang berada pada Median Jalan

OTHER ASSETS ID			
Asset Type	**Mainlane ID**	**Access & Interchange ID**	**Total ID**
Guardrail			
Left (L)	702	142	844
Right (R)	304	93	397
Guidepost			
Left (L)	9342	-	9342
Right (R)	9342	-	9342
Signboard			
Warning	1827	448	2275
Guide - Direction	62	53	115
Guide – Non Direction	1151	16	1167
Regulatory	305	133	438
Ordered	122	41	163
Wirerope			
Left (L)	35	-	35
Right (R)	58	-	58

Guardrail Asset

- 1 ID adalah mewakilli 1 bentang guardrail

Guidepost Asset

- 1 ID adalah 1 buah Guidepost (dipasang di sisi kiri dan kanan setiap 25 Meter)

Signboard Asset

- 1 ID adalah 1 buah aset Signboard/Perambuan
- Terbagi menjadi 5 jenis, yaitu: Warning, Guide-Direction, Guide-Non Direction, Regulatory & Ordered

Wirerope Asset

- 1 ID adalah mewakili 1 bentang Wirerope

OTHER ASSETS ID				
Asset Type	**Mainlane ID**	**Access & Interchange ID**	**Rest Area**	**Total ID**
RoW Fencing				
Type A	70	0	-	70
Type B	239	30	-	269
Type C	0	1	-	1
Type D	4	0	-	4
Street Lighting/PJU				
Jalur A	584	-	-	584
Jalur B	677	-	-	677
Kantor Gerbang	-	56	-	56
Rest Area	-	-	170	170
Kantor Operasional	-	26	-	26
Warning Light/Lampu Flip-Flop				
Flip-Flop	24	11	0	35
Concrete Barrier				
Concrete Barrier	89	0	0	89

RoW Fencing Asset

- 1 ID adalah mewakili 1 bentang pagar RoW dengan Tipe yang sama
- Terbagi menjadi 4 tipe, yaitu: Tipe A (Pagar Panel), Tipe B (Pagar Kawat), Tipe C (Pagar BRC/British Reinforced Concrete) dan Tipe D (Pagar Pasangan Batu)

Street Lighting/PJU Asset

- 1 ID adalah mewakili 1 Buah Tiang Street Lighting
- Terbagi pada Lokasi Jalur A, Jalur B, Kantor Gerbang, Rest Area dan Kantor Operasional

Warning Light/Lampu Flip-Flop Asset

- 1 ID adalah mewakili 1 Buah Aset Warning Light/Flip-Flop
- Terdapat pada persimpangan Mainlane-Ramp & Access-Ramp

Concrete Barrier Asset

- 1 ID adalah mewakii 50 meter Panjang aset Concrete Barrier

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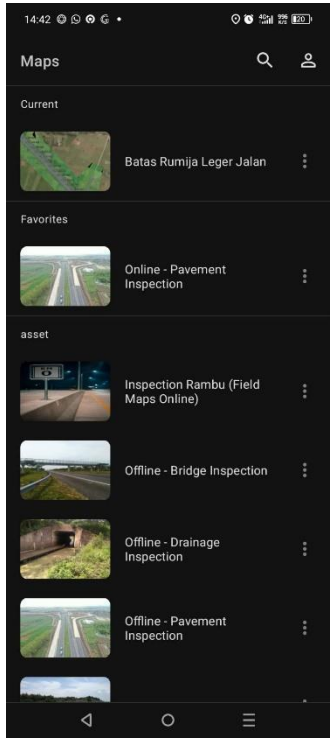
Asset Management

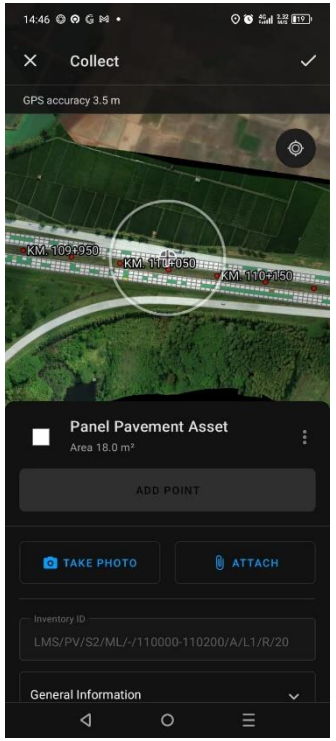
2. Inspection

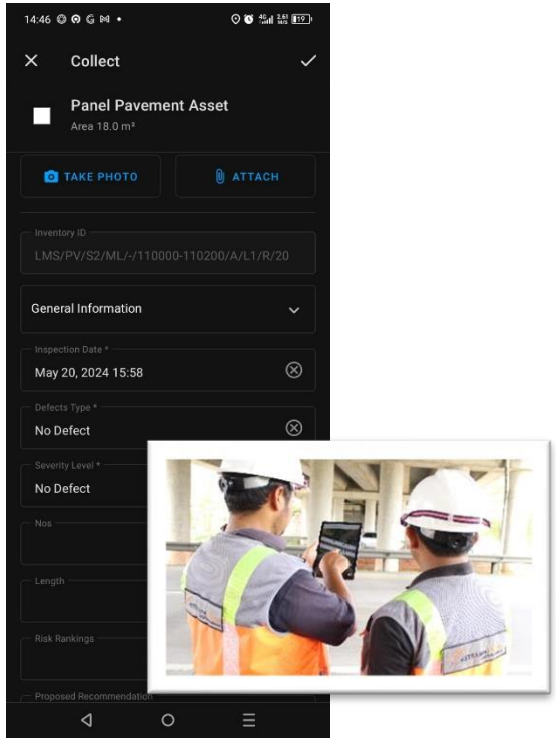
BIG 4 ASSETS ID			
Asset Type		**Risk Ranking**	**Inspection Frequency per Year**
Pavement Asset	Flexible Pavement	-	1
	Rigid Pavement	-	1
Slope Asset	Cut & Embankment Slope	AA	3
		A	2
		B	1
		C	1
Bridge Asset	Overbridge	-	1
	Underbridge	-	1
Drainage Asset	Crossing Drain	-	1
	Side Drain	-	1
	Median Drain	-	1

1. Asset Management Inspection

- Dilakukan untuk perencanaan tahunan
- Inspeksi lebih mendetil untuk setiap ID aset
- Inspeksi dilakukan berdasarkan interval tertentu, sesuai dengan *Risk Ranking* aset tersebut
- Inspeksi dilakukan menggunakan Smartphone menggunakan aplikasi yang terintegrasi dengan Database dan Dashboard





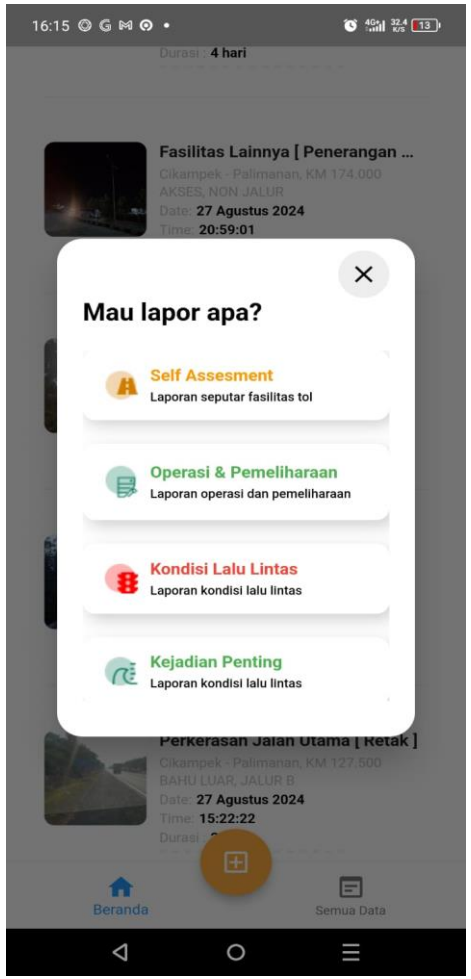


| Task of Inspection | Nos.of Assets | 2022 | | |

BPJT SPM's ASSETS		
Substansi Pelayanan	**Indikator**	**Sub-Indikator**
Kondisi Jalan Tol	Perkerasan Jalur Utama	3
	Drainase	2
	Median	4
	Bahu Jalan	3
	Rounding	1
Keselamatan	Petunjuk Jalan	5
	Fasilitas Lainnya	4
Lingkungan	Kebersihan	1
	Tanaman	1
	Rumput	1
Tempat Istirahat (TI) & Tempat Istirahat dan Pelayanan (TIP)	Kondisi Jalan	1
	On/Off Ramp	1
	Toilet	1
	Parkir Kendaraan	1
	Penerangan	1
	SPBU	1
	Bengkel Umum	1
	Tempat Makan & Minum	1

2. BPJT SPM's Inspection

- Inspeksi menggunakan aplikasi E-SPM dari BPJT





Tim Inspektor	Aset SPM	SLA SPM	Hari/Tanggal																																	
			K	J	S	M	S	S	R	K	J	S	M	S	S	R	K	J	S	M	S	S	R	K	J	S	M	S	S	R	K	J	S
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Barat	Jadwal Inspektor Barat		AB	AB	B	B	A	A	AB	AB	AB	A	A	B	B	AB	AB	AB	B	B	A	A	AB	AB	AB	A	A	B	B	AB	AB	AB	B
Timur	Jadwal Inspektor Timur		CD	CD	D	D	C	C	CD	CD	CD	C	C	D	D	CD	CD	CD	D	D	C	C	CD	CD	CD	C	C	D	D	CD	CD	CD	D
Barat 72+109 s/d IC Cikedung	Pavement Barat	2 x 24 Jam	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B
	Rest Area 86A, 86B, 102A & 101B	2 x 24 Jam	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B
	Fencing	2 x 24 Jam	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B
	Kebersihan, Tanaman & Rounding/Rumput	2 x 24 Jam	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B	B	A	A	B	B	B	A	A	B	B	A	A	A	B
	Penerangan Jalan Umum (PJU)	2 x 24 Jam	A							B							A							B							A		
	Guardrail & Wirerope	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Rounding	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Signboard & Patok KM-HM	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Median Concrete Barrier (MCB)	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Kerb	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Drainase	7 x 24 jam	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B	B	A	A	A	A	A	A	A	B	B	B	B	B	B
	Marka Jalan	14 x 24 Jam					A																					B					
Timur IC Cikedung s/d 188+863	Pavement Timur	2 x 24 Jam	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D
	Rest Area 130A, 130B, 166A & 164B	2 x 24 Jam	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D
	Fencing	2 x 24 Jam	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D
	Kebersihan, Tanaman & Rounding/Rumput	2 x 24 Jam	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D	D	C	C	D	D	D	C	C	D	D	C	C	C	D
	Penerangan Jalan Umum (PJU)	2 x 24 Jam	C							D							C							D							C		
	Guardrail & Wirerope	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Rounding	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Signboard & Patok KM-HM	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Median Concrete Barrier (MCB)	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Kerb	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Drainase	7 x 24 jam	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D	D	C	C	C	C	C	C	C	D	D	D	D	D	D
	Marka Jalan	14 x 24 Jam					C																					D					

Jadwal Inspeksi SA SPM

- Dibuat setiap bulan
- Membagi rencana kerja harian inspektor
- Tim Inspektor tetap masuk di Akhir Pekan & Hari Libur (Sesuai Regulasi)

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CIKOPO-PALIMANAN

Asset Management

3. Condition Analysis

Pada tahap Asset Condition Analysis akan dilakukan Analisa terhadap data kondisi aset yang terinput di lapangan dan ditampilkan pada Dashboard serta data dari hasil Pengujian IRI tahunan dan uji FWD (Falling Weight Deflectometer) untuk mengetahui kondisi perkerasan jalan per lapisan. Dalam menentukan prioritas perbaikan akan ditentukan berdasarkan **Jenis Kerusakan (Defect Types), Tingkat Keparahan (Severity Level), Nilai IRI dan Nilai Lendutan FWD.**



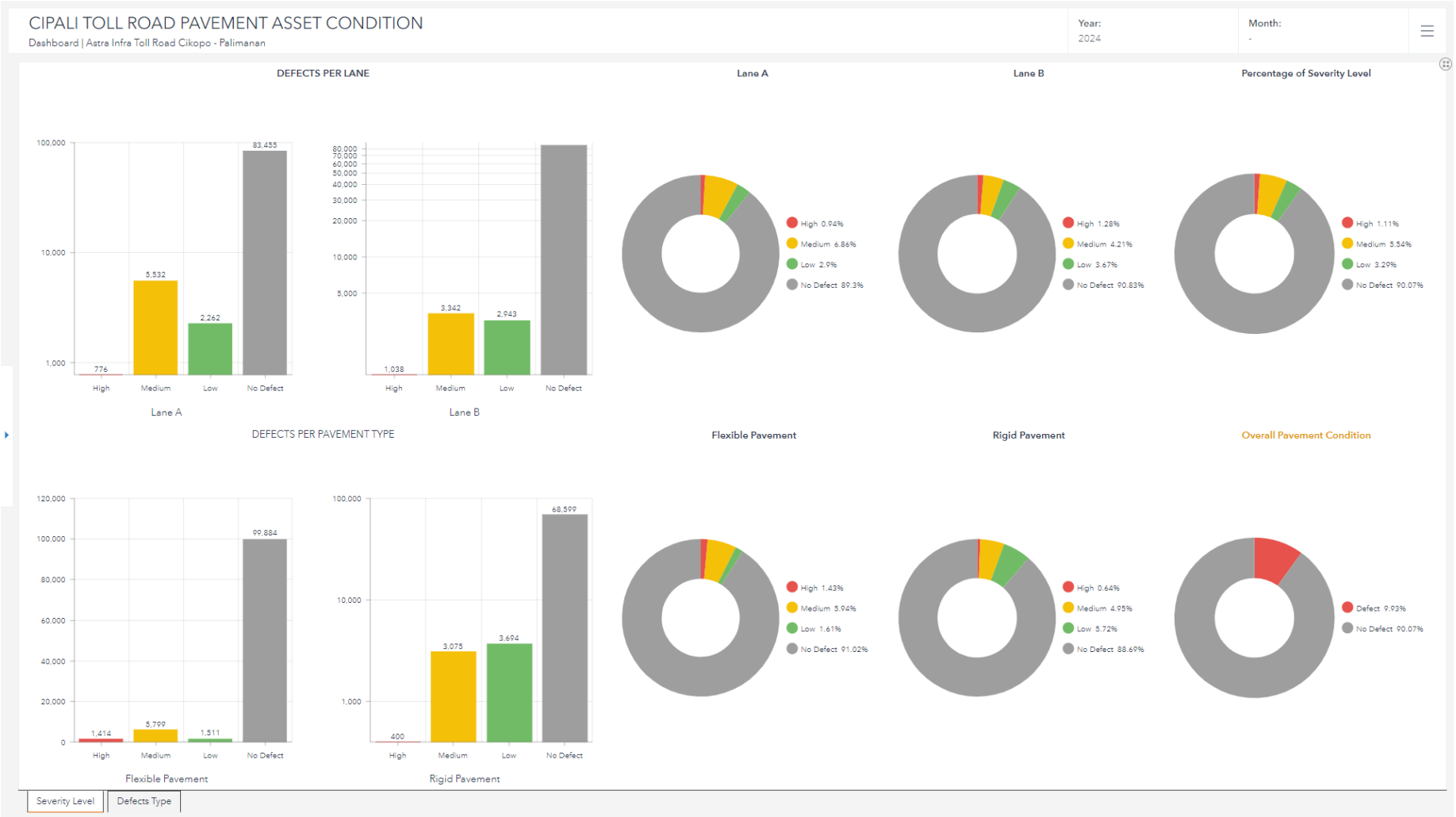
No	Defect Type	Kodefikasi
1	Crocodile Cracks	CRC
2	Reflective Cracks	RC
3	Transverse Cracks	TC
4	Longitudinal Cracks	LC
5	Blocking Cracks	BC
6	Corner Cracks	CC
7	Raveling	RV
8	Shoving	SH
9	Bleeding	BL
10	Rutting	RU
11	Settlement/Undulation	UN
12	Patching	PA
13	Pothole	PO
14	Depression	DE
15	Spalling	SPL
16	No Defect	ND

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Asset Management

4. Work Planning

Pada tahap Asset Work Planning akan dilakukan perencanaan untuk pekerjaan perbaikan, yang mana ditentukan oleh parameter Tingkat Keparahan (Severity Level) yaitu: “High”, “Medium” & “Low” serta mempertimbangkan pula Lokasi yang kerap terjadi pengulangan kerusakan pada inspeksi SPM.



Tingkat Keparahan (Severity Level)

1. High – Tahun Berikutnya
2. Medium – 2 Tahun Kedepan
3. Low – 3 Tahun Kedepan

Catatan:

Pada pelaksanaannya dapat menyesuaikan ketersediaan budget, misalnya: Sebagian kondisi “Medium” dikerjakan Tahun depan, tidak 2 tahun kedepan

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Asset Management

5. Repair Works

Setelah dilakukan Analisa dan perencanaan, pada tahap Aset Repair Works akan dilakukan penanganan kondisi aset berdasarkan hasil temuan di lapangan dan Selanjutnya hasil perbaikan akan ditambahkan kedalam database kondisi aset (pemutihan kondisi). Adapan repair works yang dilakukan diantaranya:

1. Heavy Repair (Perbaikan Perkerasan Jalan dengan Alat Berat, Perbaikan Permanen)
2. Repair & Replacement (Pekerjaan Perbaikan dan/atau Penggantian aset, contohnya: Patching, perbaikan guardrail, perbaikan rambu, dll)

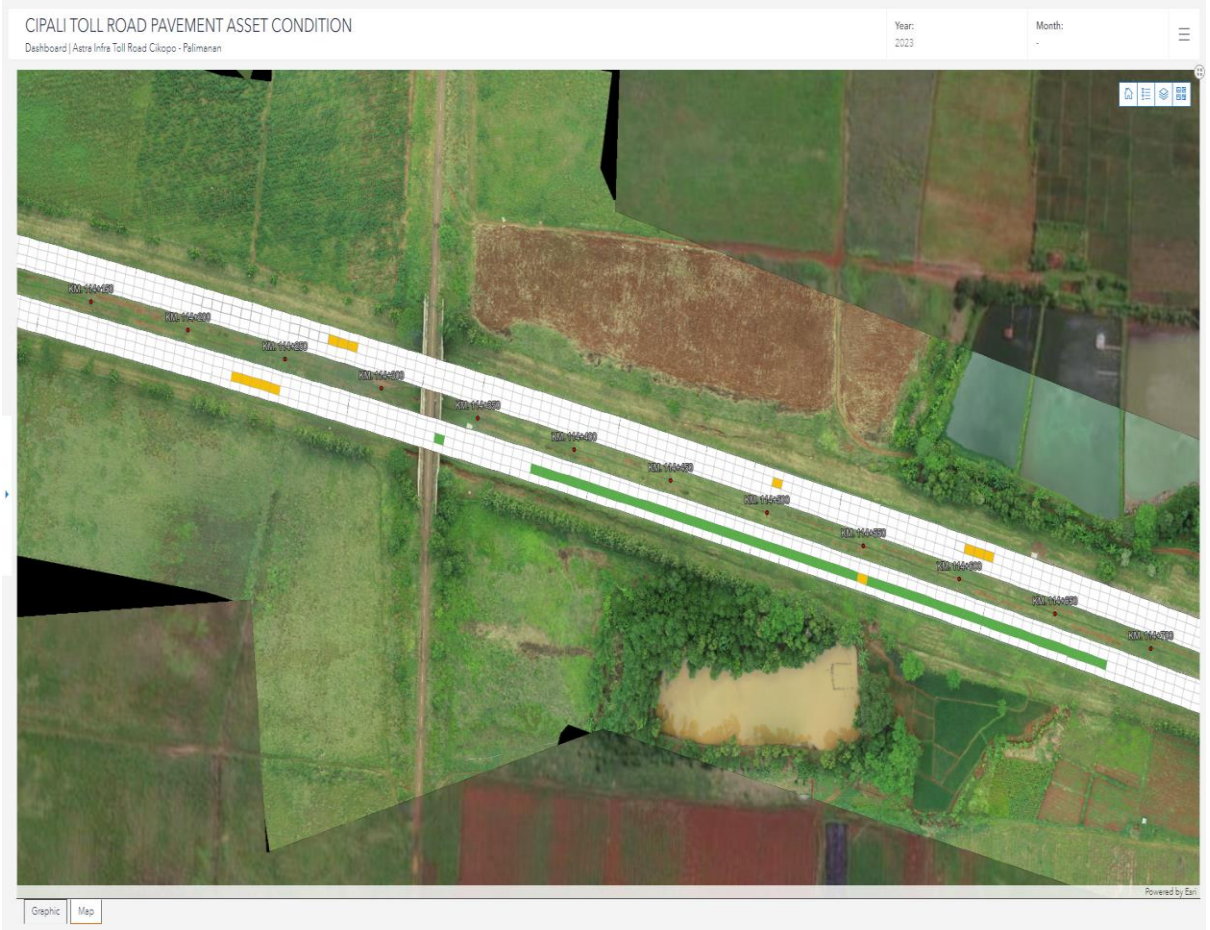


Pekerjaan Heavy Repair



Pekerjaan Repair & Replacement

Setelah perbaikan di lapangan dilakukan, selanjutnya akan dilakukan update kondisi aset pada ID yang sama setelah dilakukan perbaikan. Dapat dilihat pada gambar dibawah ini bahwa pada KM 114+150 – 114+700 pada tahun 2023 terdapat beberapa ID yang memiliki kondisi "Medium" dan "Low", setelah dilakukan perbaikan kondisinya menjadi "No Defect" (Putih) pada tahun 2024.



Kondisi Aset Pavement KM 114+150 – 114+700 Tahun 2023



Kondisi Aset Pavement KM 114+150 – 114+700 Tahun 2024

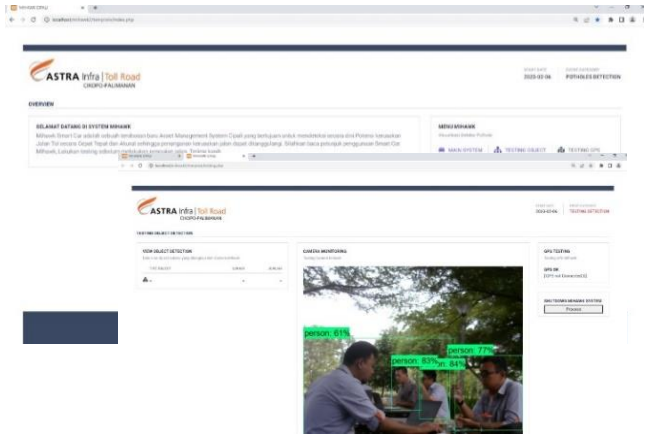
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Asset Management

Future Improvement

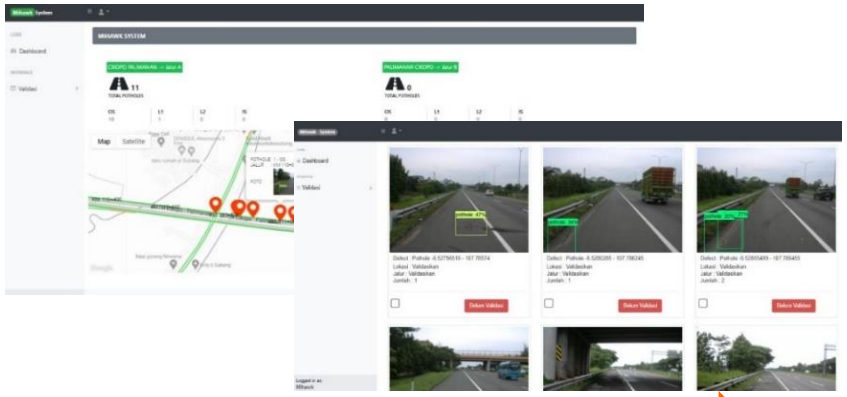
Smart Car digunakan sebagai alat untuk koleksi data primer di lapangan, kemudian data primer tersebut akan dikirim ke Server Database. Untuk saat ini kerusakan yang sudah terbaca oleh system AI (*Artificial Intelligent*) adalah Lubang (*pothole*) dan Retak (*crack*) dari total 17 jenis kerusakan.





Preparation

Scanning Defect



Verifikasi dan Validasi



Future Improvement – GeoBIM Database

PT. Lintas Marga Sedaya telah mengambil fotogrametri seluruh ruas Tol Cipali dengan menggunakan drone. LMS juga akan mengubah format 2D as built ruas Tol Cipali menjadi BIM (Civil 3D untuk Jalan dan Revit Structures untuk Bangunan Struktur). Konsep dashboard Geo-BIM adalah menggunakan fotogrametri sebagai basemap dan BIM sebagai visualisasi aset.

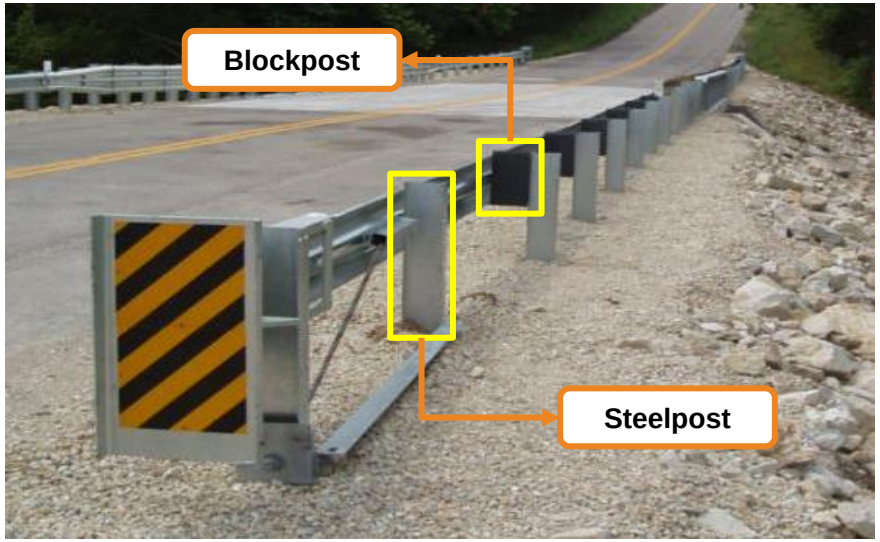
Benefit Dashboard Geo-BIM: Kemudahan melihat kondisi terbangun aset, Kondisi terbangun aset tersimpan secara historical, Deteksi awal pergerakan lereng. Lebih jauhnya GeoBIM akan digunakan untuk pengembangan aset mulai dari tahap konstruksi

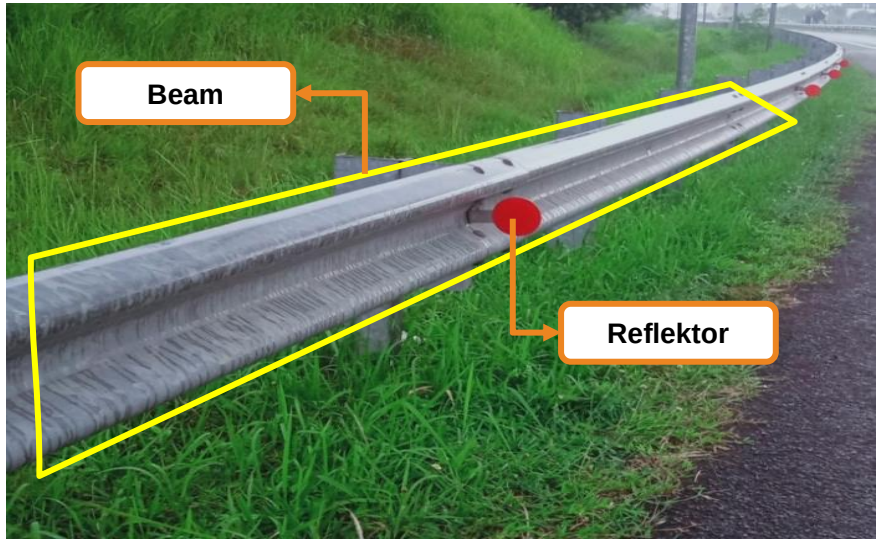




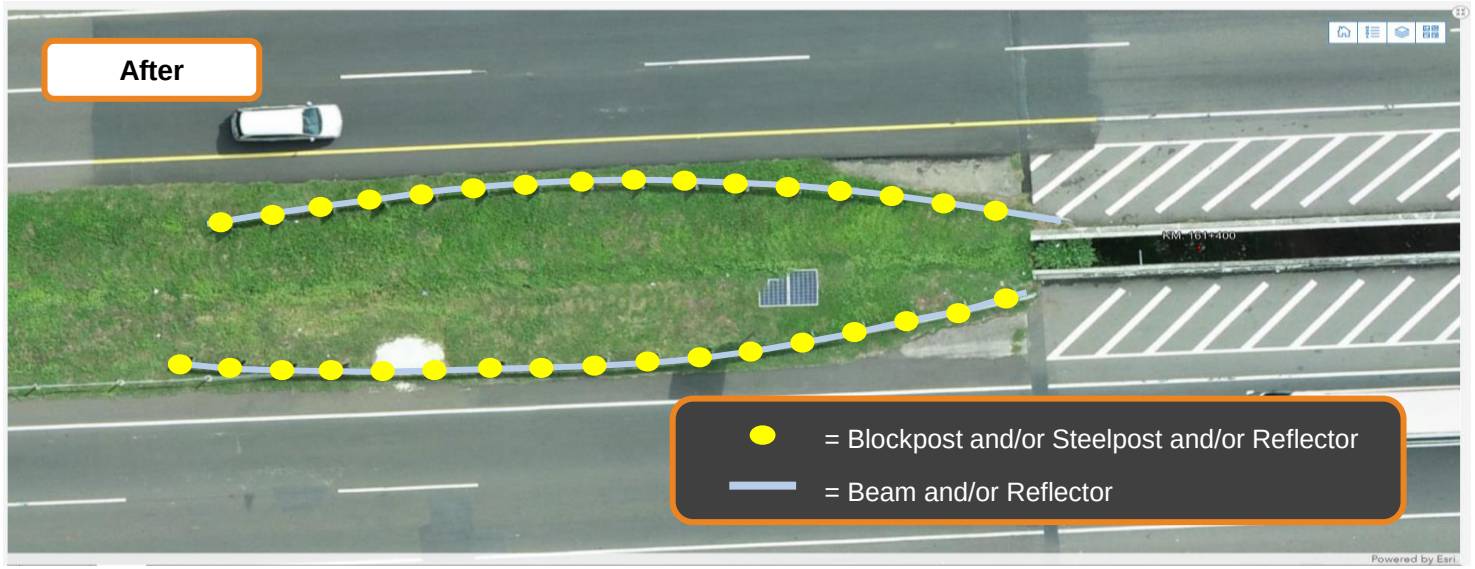


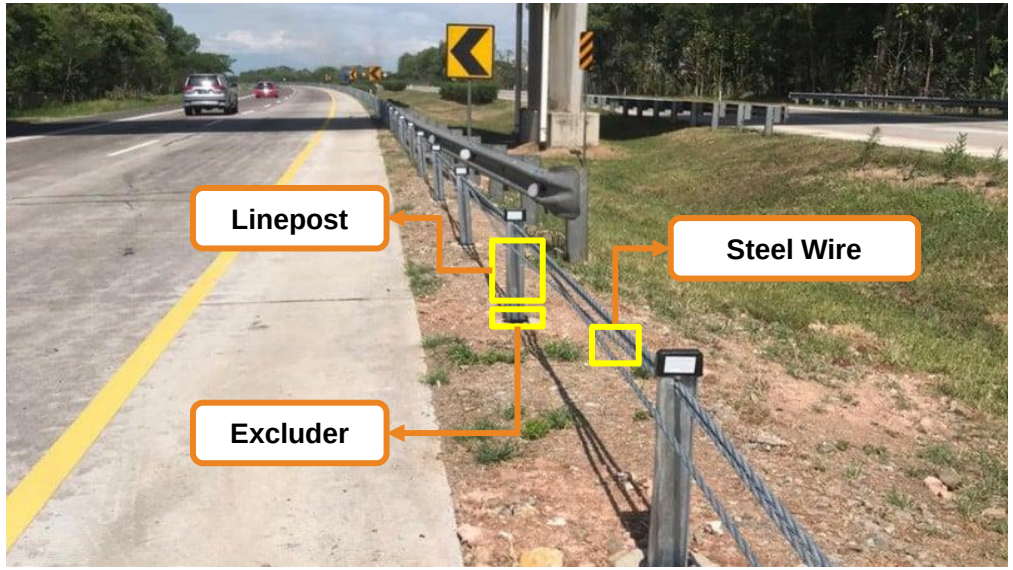



Blockpost
Steelpost

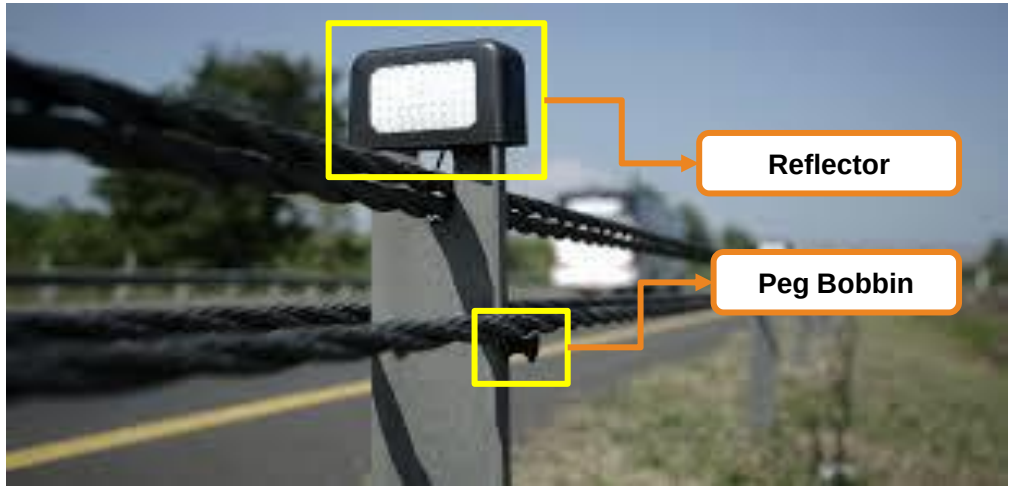

Beam
Reflektor

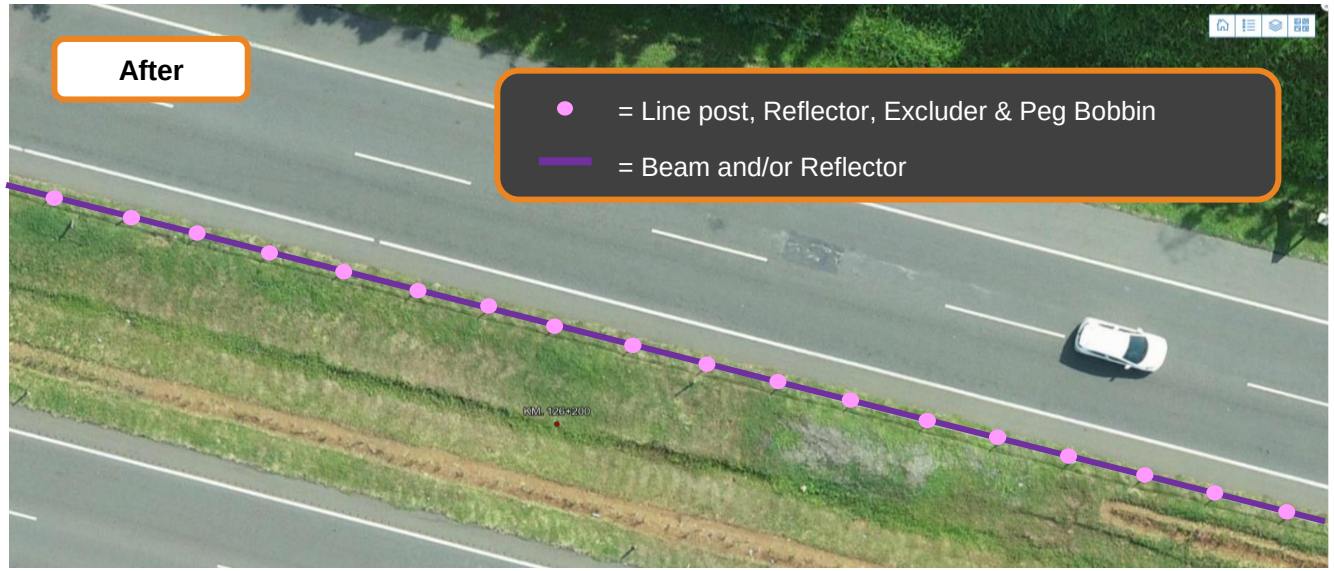

Before

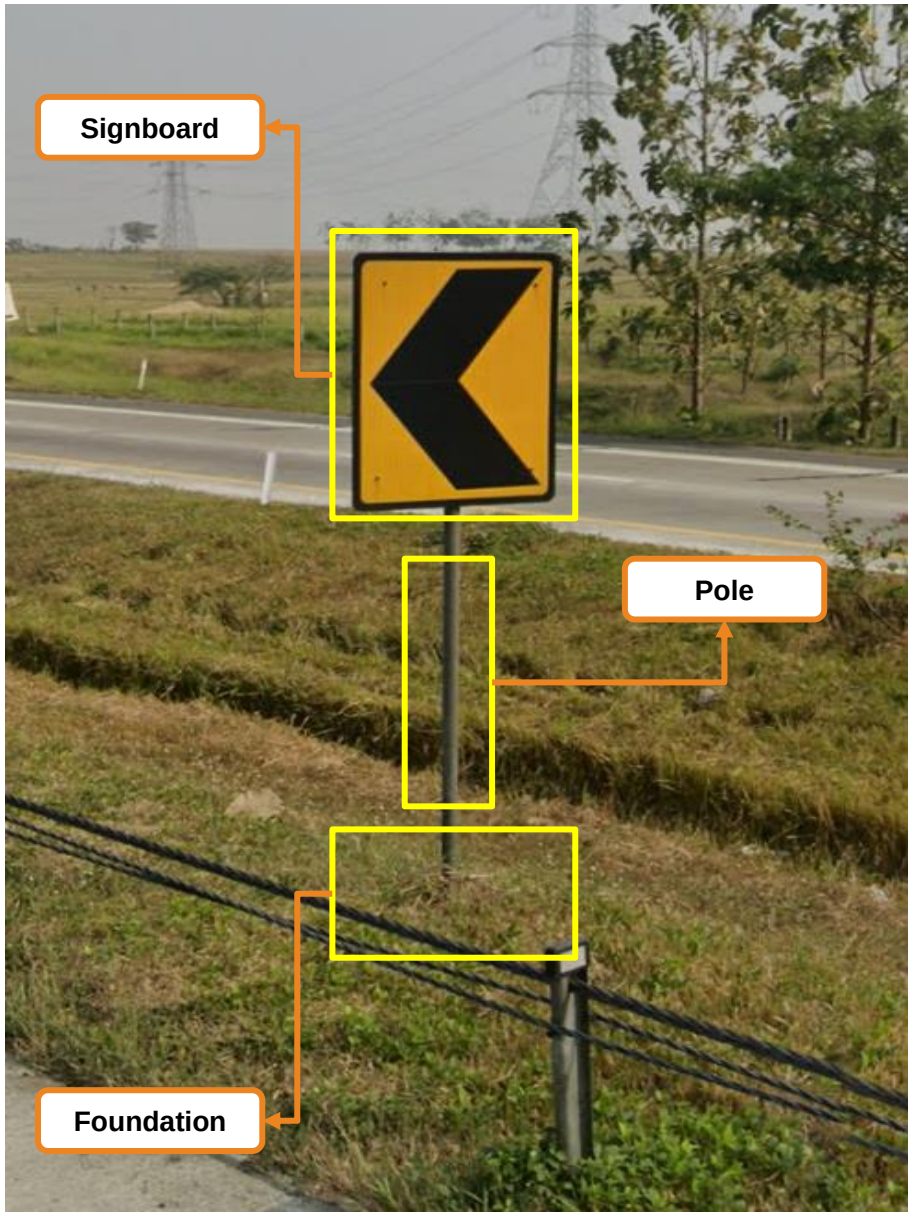

After
= Blockpost and/or Steelpost and/or Reflector
= Beam and/or Reflector


Linepost
Steel Wire
Excluder


Before

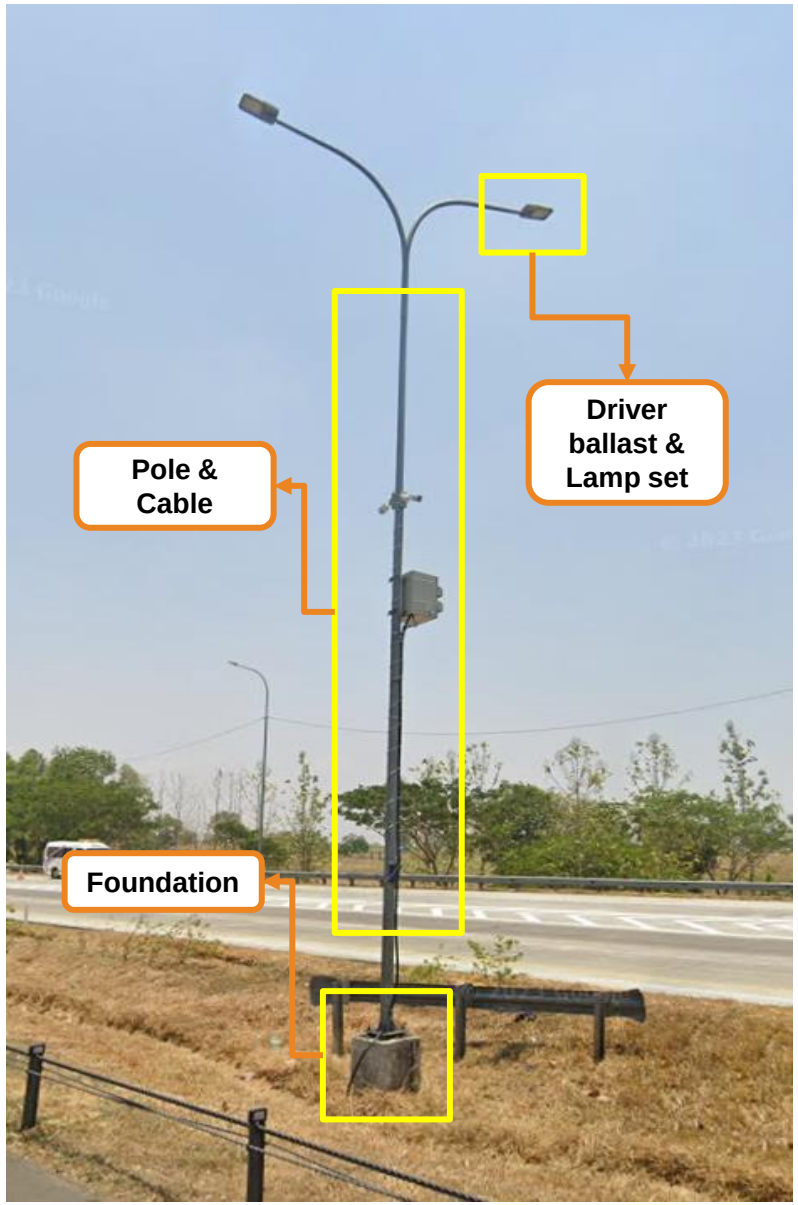

Reflector
Peg Bobbin


After
= Line post, Reflector, Excluder & Peg Bobbin
= Beam and/or Reflector


Signboard
Pole
Foundation


Before


After


Driver ballast & Lamp set
Pole & Cable
Foundation


Before
KM. 109+600


After
KM. 109+600

Future Improvement – Other Asset Digitalization (6)











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Thank You



Nusantara Infrastructure

Asset Management

and It's Application

in Toll Road Operations



PT Nusantara Infrastructure Tbk

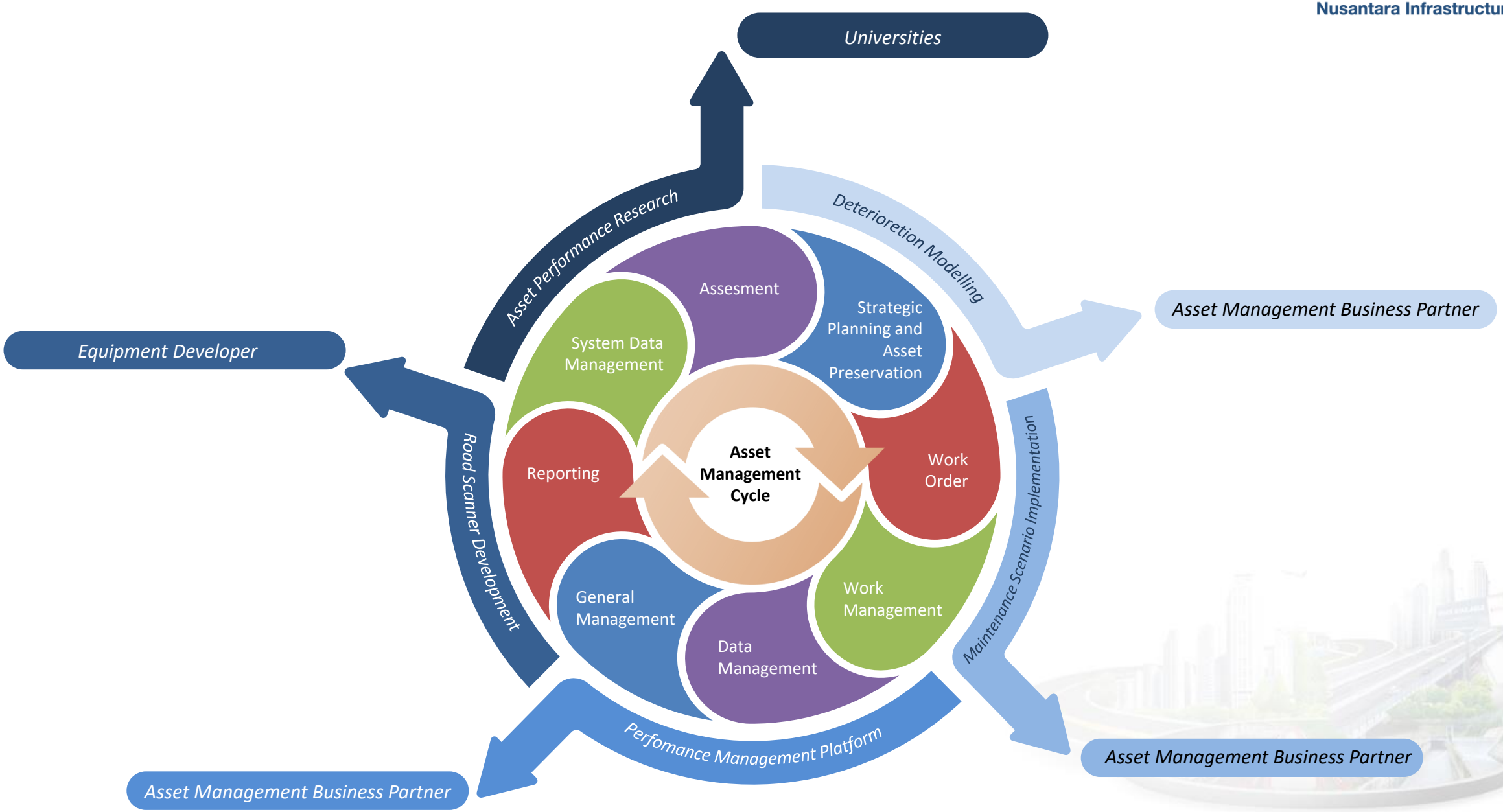
Department of Commercial | Planning | Research | Data Science | Operation

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Asset Management Process & Ecosystem

Nusantara Infrastructure



Why Do We Need Asset Management..?

Nusantara Infrastructure

1. Large corporations managing multiple toll road segments must implement asset management **to guarantee operational efficiency, enhance user safety, and facilitate effective planning.**

2. Asset management **optimizes resource utilization, ensures user safety through systematic monitoring and maintenance, and guarantees compliance with applicable regulations.**

3. The urgency of asset management lies in **effective risk management and the promotion of sustainable infrastructure development.**

4. To implement asset management, companies can adopt digital systems, standardize processes, provide staff training, conduct routine data analysis, and perform regular audits. **This approach enhances overall performance and effectively meets user needs.**









The Essential Role of Toll Road Asset Management

Nusantara Infrastructure

Resource Optimization

Efficient asset management maximizes resource use and minimizes operational costs

Enhanced Safety

Proper monitoring and maintenance ensure the safety of toll road users, reducing accident risks

Strategic Planning

Accurate data on asset conditions allows for precise planning of repairs and infrastructure development

Regulatory Compliance

Ensures all assets meet established standards and regulations, reducing the risk of fines or penalties

Improved Customer Service

Effective management contributes to a better user experience, enhancing customer satisfaction and loyalty

Implementation Of Asset Management

Nusantara Infrastructure

Existing Condition



Manual inspection of pavement and toll road asset conditions



Send information of inspection result

Data collection, send purchasing request

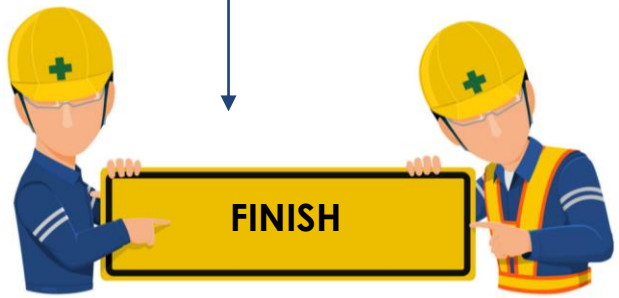


Request Approval

$



Repair and Maintenance Action



Reporting and activity record (archived)

Report Request

Send Report

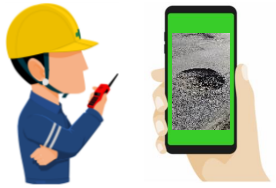


Monitoring and Evaluation Result

Implementation Of Asset Management

Nusantara Infrastructure

ASSET Management Implementation



Toll road asset conditions inspection using Mobile Application

1. Inspection result saved to database

2. Inspection Notification (real time)

4. Approval by Application

7. Repair Notification (real time)

8. Data, Analysis, Reporting

Conditions monitoring

Approval





Purchasing request

5. Approval Status

3. Send PR (Automatic by Application)

Asset Management Cycle



6. Upload to database (real time)

Repair and Maintenance Action, progress using Mobile Application

Monitoring and Evaluation Result

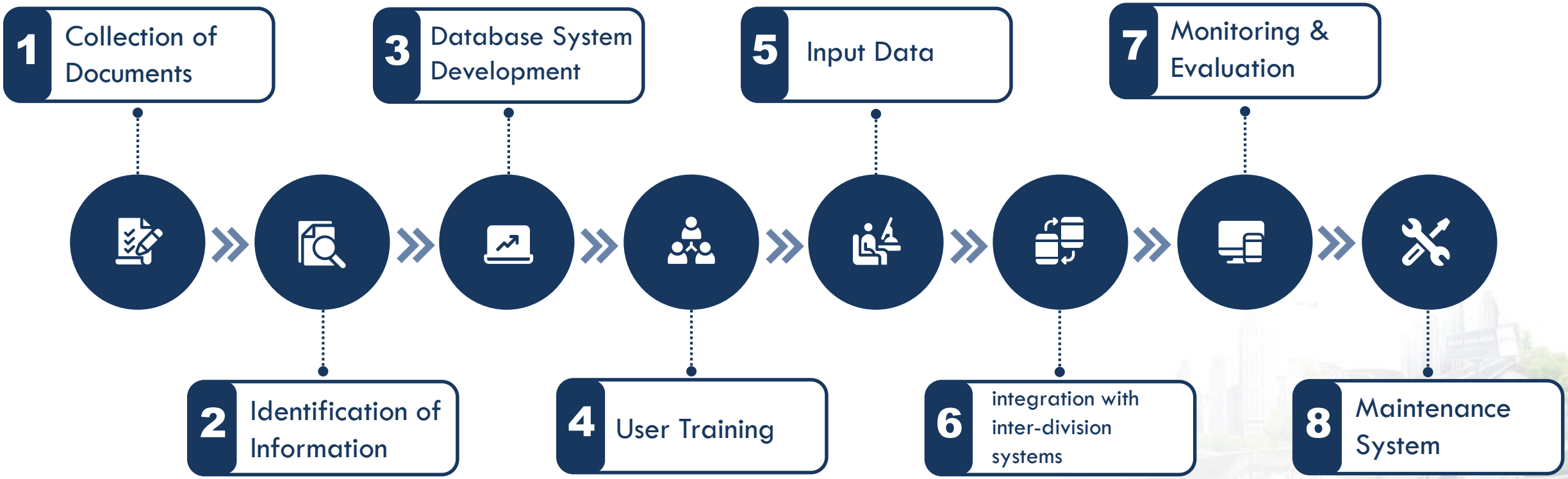
Analysis and Reporting

Asset Management Development Milestone

Nusantara Infrastructure

The Importance of Effective Toll Road Asset Management

Digitalization of toll road asset management is essential to improve operational efficiency and effectiveness. By switching to a digital system, **companies can ensure accurate and real-time data recording, minimize human error, and speed up the reporting and analysis process.** In addition, better data accessibility allows teams to **collaborate effectively and make more timely decisions**. Digitalization also improves **data transparency and security, which ultimately contributes to improved safety and convenience for toll road users.**



NISA

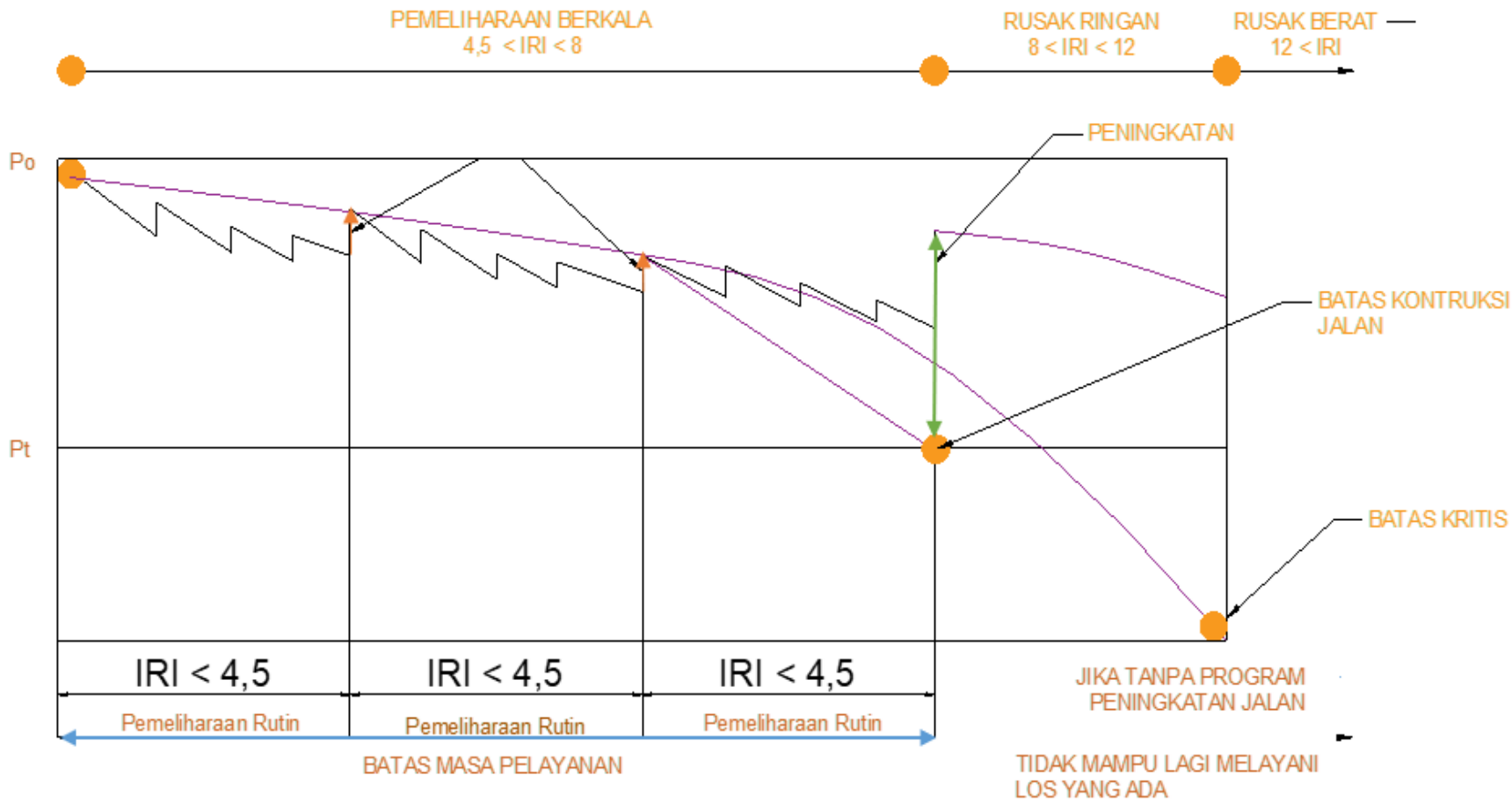
GET IT ON Google play

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Powered by
Nusantara Infrastructure

Road Handling Based on International Roughness Index (IRI)



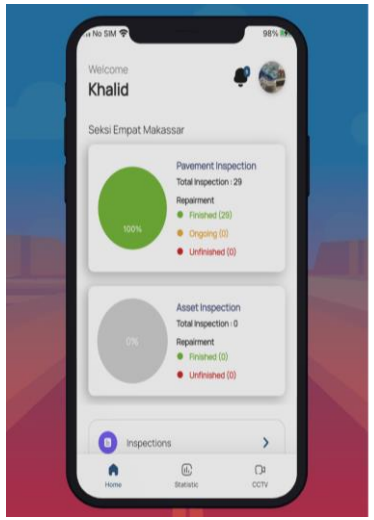
Notes :

Po = Service Ability Indeks Awal (PHO)

Pt = Service Ability Indeks Akhir (Batas Umur Pelayanan)

NISA (Nusantara Infrastructure Self Assessment)

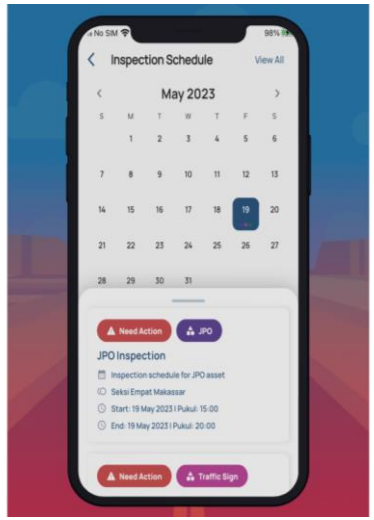
Nusantara Infrastructure



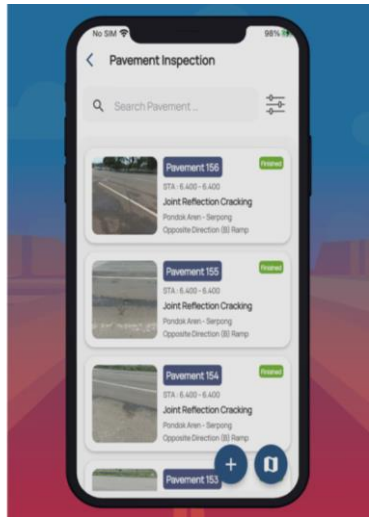
Access real-time inspection data reports and diagrams easily with our powerful software for better decision-making



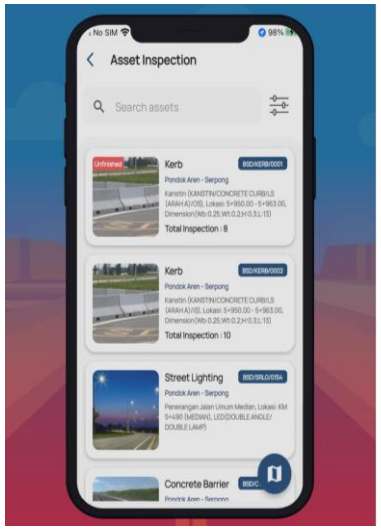
Provide you with real-time statistics and cumulative statistics



Easily manage asset maintenance schedule with our software



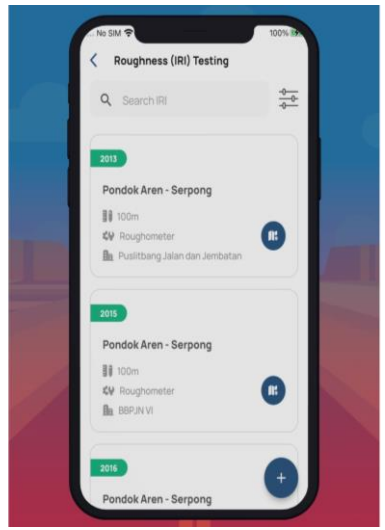
Effortlessly document and track pavement inspection data with our software



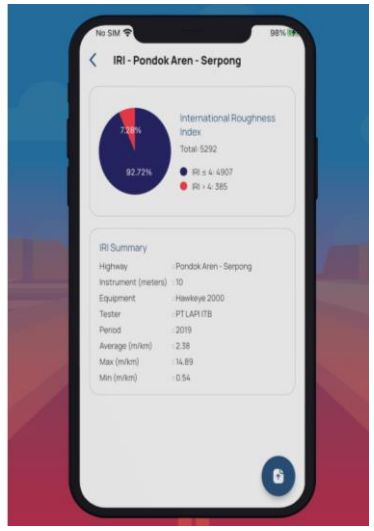
Efficiently manage highway assets with out software that allows you to easily track and access asset information



Optimize your inspection activities with our software that provide easy access to highway asset location information



Enhance road quality and ensure smooth journeys with our cutting-edge roughness testing (IRI) solutions



Discover the ultimate solution for precise roughness testing, ensuring optimal road quality

NISA (Nusantara Infrastructure Self Assessment)

Nusantara Infrastructure

NISA

DASHBOARD
- Chart
- Live CCTV
- Data Master
- Asset
- Download

TECHNIC
- Inspection
- Periodic Testing
- Analisys
- Approval

OPERATIONAL
- Minimum Requirement Standard
- Corrective Maintenance
- Preventive Maintenance
- SAM Data

Live CCTV
Home / Streaming /

New Live CCTV | Show Map

Live CCTV
0 item

Search Order

NAME	URL	ACTION
KM 5+500		Actions
KM 6+100		Actions
KM 6+200		Actions
KM 6+600		Actions
KM 7+200		Actions
KM 7+600		Actions
KM 8+075		Actions
KM 8+200		Actions
KM 8+700	Pondok Aren - Serpong	Actions

Live CCTV

Streaming Location: KM 8+700



Close

NISA | Inspection Schedule

Nusantara Infrastructure

NISA

DASHBOARD

- Chart
- Live CCTV
- Data Master
- Asset
- Download

TECHNIC

- Inspection
  - Inspection Schedule
  - Pavement
  - Pavement Latest Inspection
  - Asset
  - Asset Latest Inspection
- Map
- Periodic Testing
- Analisys
- Approval

Inspection Schedule

Technic / Inspection Schedule

Filter Schedule

+ Add Schedule

Active Filter :

All Assets | All Highways

today | September 2024 | month week day list

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
7a Ujung Pandang Tahap I,I	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Asphalt Roa	12 Ujung Pandang Tahap I,II dar	12a Seksi Empat Makassar - Box Culvert Inspection			
7a Seksi Empat Makassar -	7a Seksi Empat Makassar - Asphalt Roads Inspection	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Box Culvert Inspection				
	7a Pondok Aren - Serpong -	7a Seksi Empat Makassar - Pagar Damija Inspection	7a Pondok Aren - Serpong -			
	+3 more	+4 more	+4 more	+2 more		
8	9	10	11	12	13	14
7a Ujung Pandang Tahap I,I	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Asphalt Roa	12 Ujung Pandang Tahap I,II dar	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Box Culvert			
7a Seksi Empat Makassar -	7a Seksi Empat Makassar - Asphalt Roads Inspection		7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Drainase In:			
	7a Pondok Aren - Serpong -	7a Seksi Empat Makassar - Pagar Damija Inspection	7a Pondok Aren - Serpong -	7a Seksi Empat Makassar - Street Lighting Inspection		
	+3 more	+5 more	+4 more	+2 more	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Street Lighti	
15	16	17	18	19	20	21
7a Ujung Pandang Tahap I,I	7a Ujung Pandang Tahap I,II dan III (A.P. Pettarani) - Asphalt Roa	12 Ujung Pandang Tahap I,II dar	Pondok Aren - Serpong - JPO Inspection			
7a Seksi Empat Makassar -	7a Seksi Empat Makassar - Asphalt Roads Inspection	12 Seksi Empat Makassar - Clea	7a Pondok Aren - Serpong -	12: Seksi Empat Makassar - Toll		
		7a Seksi Empat Makassar - Pagar Damija Inspection	7a Pondok Aren - Serpong -	12 Ujung Pandang Tahap I,II dar		
	+6 more	+5 more	+4 more			

NISA | Pavement Inspection

Nusantara Infrastructure

NISA

DASHBOARD

- Chart
- Live CCTV
- Data Master
- Asset
- Download

TECHNIC

- Inspection
  - Inspection Schedule
  - Pavement
  - Pavement Latest Inspection
  - Asset
  - Asset Latest Inspection
  - Map
- Periodic Testing
- Analisys
- Approval

Pavement Inspection

Technic / Inspection / Pavement

Pavement Inspection

570 item

All Highway | All Distress | All Status | Inspection date time | Sta start - Sta end | Search | Apply

ID	IMAGE	HIGHWAY	DATE	DISTRESS	REPAIR STATUS	ACTION
674		Ujung Pandang Tahap I,II dan III (A.P. Pettarani) Normal Direction (A) Lane 1 KM 4.610 - 4.630	17 Sep 2024 11:20:33	Edge Cracking Length: 20.000m Width: 0.020m Depth: 0.050m	NEED INSPECTION APPROVAL (SPV)	Actions
673		Ujung Pandang Tahap I,II dan III (A.P. Pettarani) Normal Direction (A) Outer Shoulder KM 4.570 - 4.600	17 Sep 2024 11:15:17	Edge Cracking Length: 30.000m Width: 0.020m Depth: 0.050m	NEED INSPECTION APPROVAL (SPV)	Actions
672		Ujung Pandang Tahap I,II dan III (A.P. Pettarani) Normal Direction (A) Lane 1 KM 4.570 - 4.590	17 Sep 2024 11:10:23	Block Cracking Length: 20.000m Width: 2.000m Depth: 0.020m	NEED INSPECTION APPROVAL (SPV)	Actions

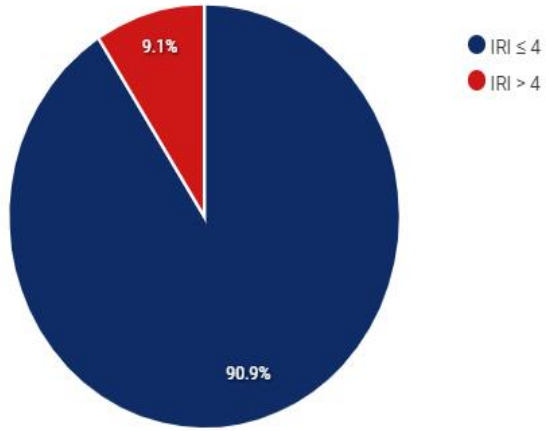
NISA | IRI Testing

Nusantara Infrastructure



IRI Summary

Period:	2021
Measurement Instrument (m):	10
Testing Equipment:	Hawkeye 2000
Tester:	Varian
IRI Average (m/km):	2.48
IRI Max (m/km):	23.14
IRI Min (m/km):	0.53
IRI ≤ 4 m/km (points):	6754
IRI > 4 m/km (points):	676
IRI ≤ 4 m/km (%):	90.9
IRI > 4 m/km (%):	9.1



NISA | Pavement Strip Map

Nusantara Infrastructure

NISA

- Asset Latest Inspection
- Map
  - Asset Inspection
  - Pavement Inspection
  - Pavement Inspection Strip Map
- Periodic Testing
- Analisys
- Approval

OPERATIONAL

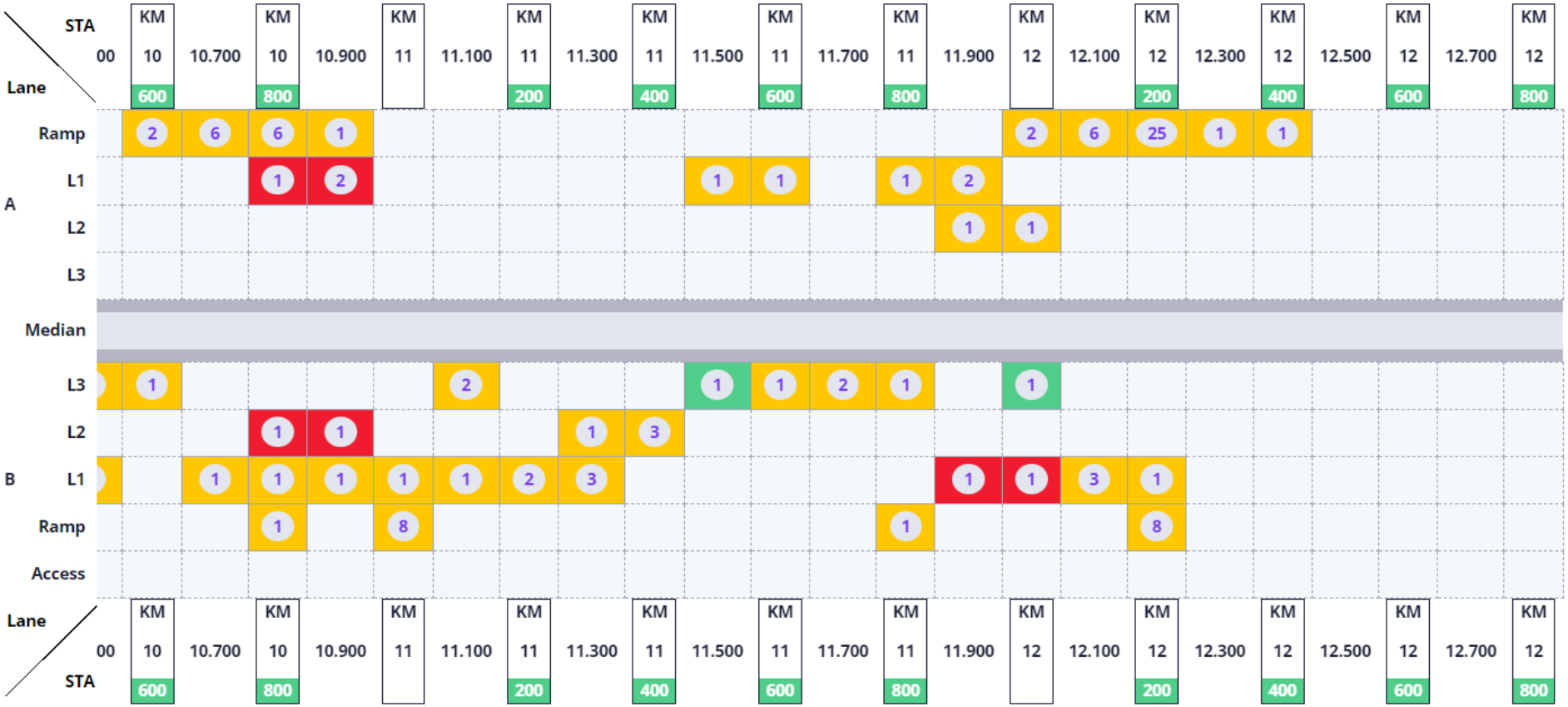
- Minimum Requirement Standard
- Corrective Maintenance
- Preventive Maintenance
- SAM Data
- Data

GENERAL

- Data Master

Strip Map Pavement (per 100 meter)

Pondok Aren - Serpong | 100 | FINISHED | Select Date Range | IRI | SR | Apply



CONCLUSION

Nusantara Infrastructure

In conclusion, digitalizing Asset Management processes offers numerous benefits for companies. It leads to significant **cost savings** through enhanced control over maintenance and operational spending. Additionally, the analysis and necessary interventions become **more precise**, allowing for proactive measures to prevent disruptions in toll road assets. This approach not only improves overall efficiency but also provides a much **better service experience for toll road users** compared to reactive solutions.







Thank you



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PUPR
SIGAP MEMBANGUN NEGERI

PT CIMANGGIS CIBITUNG TOLLWAYS
Badan Usaha Jalan Tol Cimanggis - Cibitung

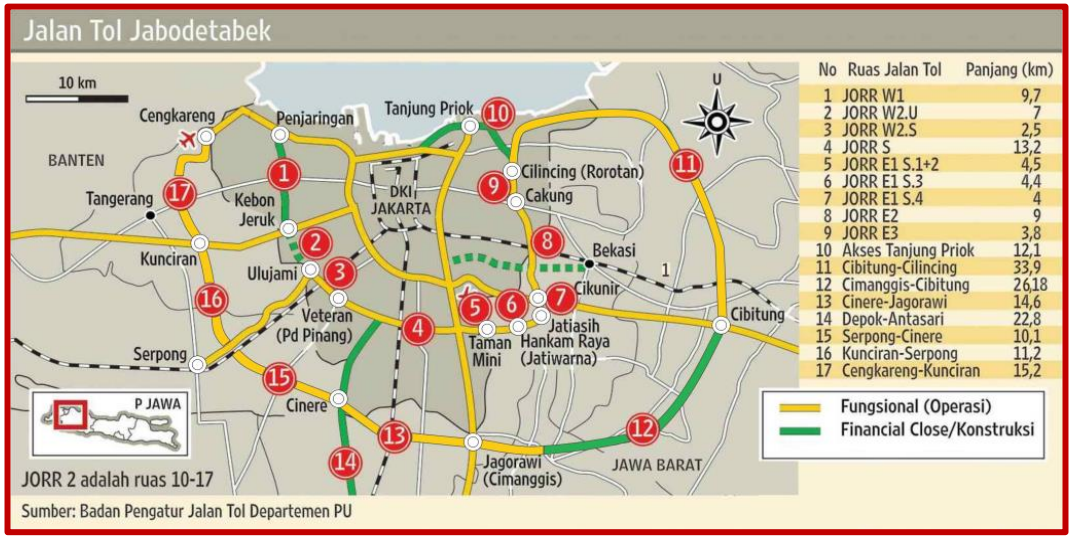
BEST PRACTICE IMPELEMNTASI MANAJEMEN ASET

Jalan Tol Cimanggis-Cibitung

Selasa, 24 September 2024

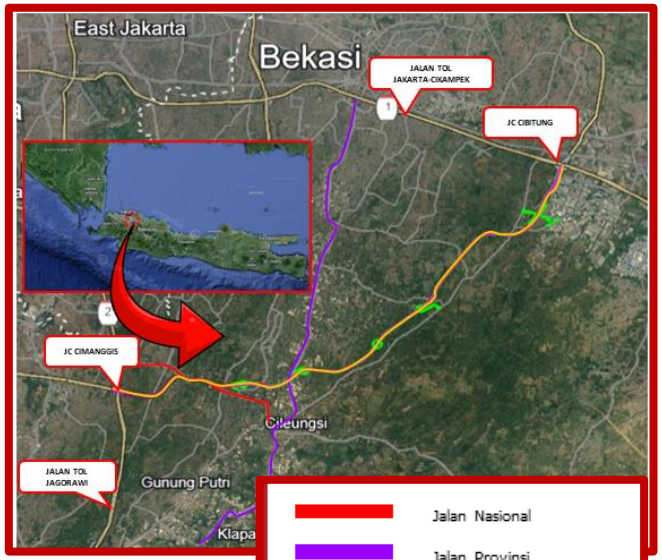


TENTANG JALAN TOL CIMANGGIS-CIBITUNG



No	Ruas Jalan Tol	Panjang (km)
1	JORR W1	9,7
2	JORR W2.U	7
3	JORR W2.S	2,5
4	JORR S	13,2
5	JORR E1 S.1+2	4,5
6	JORR E1 S.3	4,4
7	JORR E1 S.4	4
8	JORR E2	9
9	JORR E3	3,8
10	Akses Tanjung Priok	12,1
11	Cibitung-Cilincing	33,9
12	Cimanggis-Cibitung	26,18
13	Cinere-Jagorawi	14,6
14	Depok-Antasari	22,8
15	Serpong-Cinere	10,1
16	Kunciran-Serpong	11,2
17	Cengkareng-Kunciran	15,2

Sumber: Badan Pengatur Jalan Tol Departemen PU



DATA TEKNIS

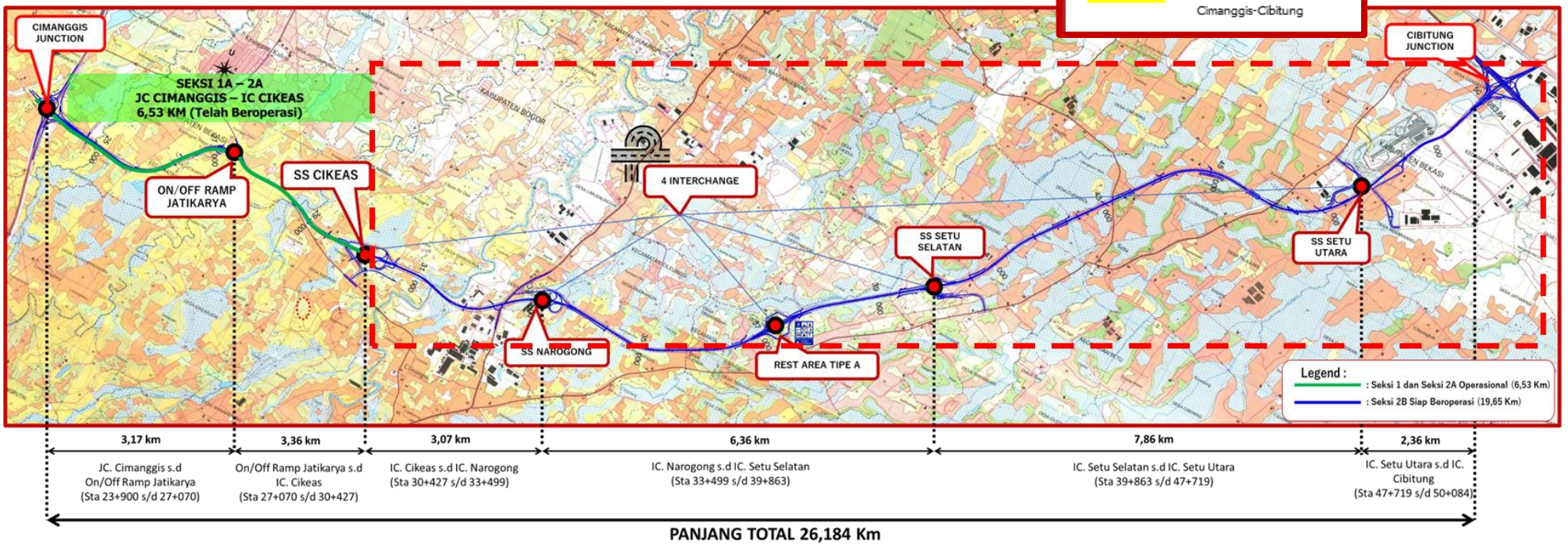
Total Panjang 26,18 Km

Jumlah Lajur 2x3 Lajur

Lebar Lajur 3,6 M

Jenis Perkerasan Rigid Pavement

Jumlah TIP 1 Pasang Tipe A



RENCANA KERJA BIDANG MANAJEMEN ASET

SASARAN KERJA

PROGRAM KERJA

✓ Mewujudkan **tertib adminstrasi dan tertib pengelolaan ASET**.

➢ **Penatausahaan Aset** / Penyusunan Data Base Aset.



Label Barang

✓ Pengelolaan dan peningkatan layanan **manajemen ASET** jalan tol yang **terintegrasi**.

➢ Pembuatan **sistem aplikasi terintegrasi dengan layanan Operasi dan pemeliharaan.**

Integrated Operations and Management System (**IOMS**)

NSPK MANAJEMEN ASET

1. PP Nomor 23 tahun 2024 tentang Jalan Tol;
2. PP Nomor 28 Tahun 2020 tentang Perubahan atas Peraturan Pemerintah Nomor 27 Tahun 2014 Tentang Pengelolaan Barang Milik Negara/Daerah;
3. PP Nomor 71 Tahun 2010 Tentang Standar Akuntansi Pemerintah;
4. PMK Nomor 181/PMK.06/2016 tentang Penatausahaan Barang Milik Negara;
5. PMK Nomor 29 tahun 2010 tentang Penggolongan dan Kodefikasi BMN beserta perubahaanya;
6. PMK Nomor: 84/PMK.05/2021 tentang Pernyataan Standar Akuntansi Pemerintah Berbasis Akrual Nomor 16 Perjanjian Konsesi Jasa-pemberi Konsesi.

KONSEP SIKLUS MANAJEMEN ASET JALAN TOL CIMANGGIS-CIBITUNG

1 Perencanaan

- ✓ Identifikasi Kebutuhan Aset
- ✓ Review Kebutuhan Aset
- ✓ Analisa Biaya Manfaat

2 Pengadaan

- ✓ Evaluasi Risiko
- ✓ Penyusunan Dokumen Pengadaan
- ✓ Pelaksanaan Pengadaan

3 Operasi dan Pemeliharaan

- ✓ Kondisi Aset
- ✓ Program Pemeliharaan
- ✓ Penilaian Aset
- ✓ Status Pemanfaatan Aset

4 Peningkatan/Penghapusan

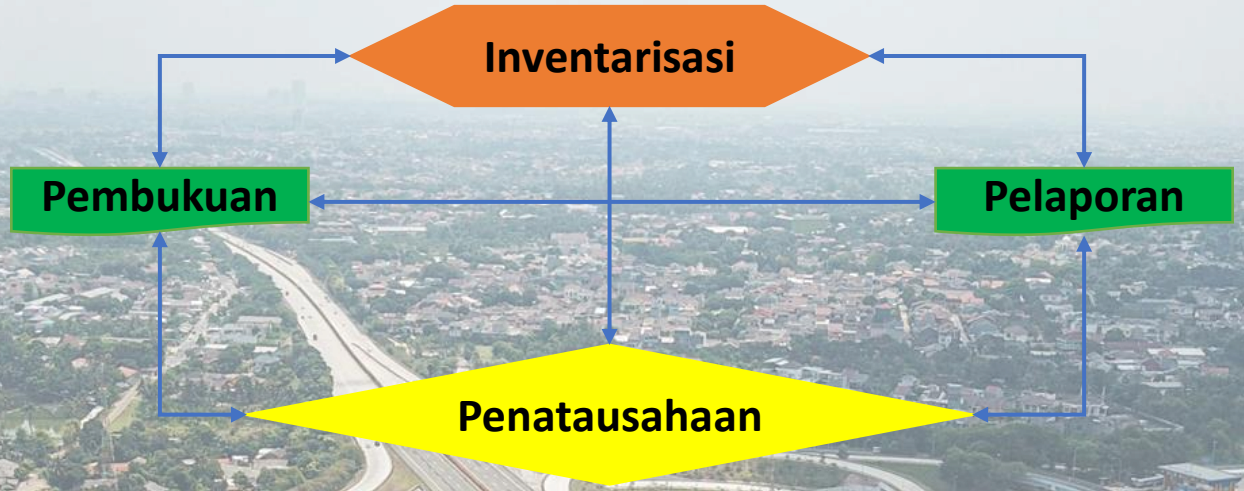
- ✓ Pemindahtanganan
- ✓ Pemusnahan
- ✓ Pembaharuan/Peningkatan
- ✓ Penggantian
- ✓ Pemindahan

5 Penatausahaan Aset

Tujuan dan Maksud

- Inventarisasi aset jalan tol **untuk memudahkan** kegiatan pengelolaan dan pemeliharaan aset jalan tol;
- **Identifikasi, Klasifikasi, Kodefikasi dan Labeling aset** berdasarkan ketentuan/aturan yang telah ditetapkan oleh Kementerian Keuangan dan disinkronkan dengan dokumen Leger jalan tol;
- **Perhitungan jumlah aset jalan tol** untuk mendukung perhitungan nilai aset Konsesi Jasa PT CCT;
- Menyusun data base aset yang **terintegrasi** sistem manajemen aset (operasi dan pemeliharaan) PT CCT yang disesuaikan dengan aturan/kebijakan tentang Penatausahaan Barang Milik Negara.

KONSEP SIKLUS MANAJEMEN ASET JALAN TOL CIMANGGIS-CIBITUNG



Inventarisasi:
- Data PPJT
- Data Kontrak (Konstruksi, Konsultansi, dll)
- Data Pembebasan Lahan

Pembukuan:
- Dokumen Leger Jalan
- Dokumen Pendukung untuk Asuransi CECR
- Dokumen untuk Pajak PBB
- Dokumen Pengesahan Perlengkapan Keselamatan Jalan (Perambuan)

Penatausahaan:
- Penyeragaman penggolongan, kodefikasi, dan pelabelan BMN (Buku Data Aset)
- Kapitalisasi BMN
- Rekonsiliasi Nilai BMN

Pelaporan:
- Aset Konsesi Jasa
- Internal

Inventarisasi dan Pembukuan Aset Jalan Tol

Proses yang berlangsung saat ini yaitu inventarisasi dan pembukuan aset jalan tol, yang meliputi:

1. Pengesahan Rambu Terbangun Seksi 1 (2022) √
2. Leger Jalan Tol Cimanggis-Cibitung Seksi 1 dan 2A (2023) √
3. Penyelesaian Leger Jalan Tol Seksi 2B
4. Proses Pengesahan Rambu Terbangun Seksi 2A dan 2B

❖ Batasan Jenis Aset yang diidentifikasi:

1. Tanah
2. Mesin dan Peralatan
3. Gedung dan Bangunan
4. Jalan, Irigasi, dan Jaringan

Penatausahaan Aset Jalan Tol

Proses yang akan dilakukan dalam rangka penatausahaan aset jalan tol yaitu meliputi:

1. Klasifikasi dan Kodefikasi Aset
2. Labelling Fisik Aset Jalan Tol
3. Pembuatan Buku Data Base Aset
4. Pembuatan Sistem Aplikasi Data Base Aset Terintegrasi

A. Klasifikasi dan Kodefikasi Aset

Referensi pedoman pelaksanaan penggolongan dan kodefikasi barang milik negara merujuk pada Peraturan Menteri Keuangan No. 29 Tahun 2010 dan Perubahannya.

Kode Lokasi

X	X	X	.	X	X	.	X	X	X	X	.	X	X	X	X	X	X	.	X	X	X	. JK

Tiga angka/digit pertama	:	menunjukkan kode Pengguna Barang
Dua angka/digit kedua	:	menunjukkan kode Eselon I
Empat angka/digit ketiga	:	menunjukkan kode Wilayah
Enam angka/digit keempat	:	menunjukkan kode Kuasa Pengguna Barang
Tiga angka/digit kelima	:	menunjukkan kode Pembantu Kuasa Pengguna Barang

Penjelasan:

1) Kode Pengguna Barang, mengacu kepada kode Bagian Anggaran Kementerian Negara/Lembaga yang bersangkutan.
2) Kode Eselon I, mengacu kepada Kode Unit Eselon I Bagian Anggaran pada Kementerian Negara/Lembaga yang bersangkutan.
3) Kode Wilayah, mengacu kepada Kode Propinsi. Unit kerja pada kantor pusat Kementerian Negara/Lembaga dan unit eselon-1, kode wilayah diisi dengan 00.
4) Kode Kuasa Pengguna Barang, mengacu kepada Kode Satuan Kerja pada Kode Bagian Anggaran.
5) Jenis Kewenangan (JK), memuat uraian yang terdiri dari Jenis Kewenangan Kantor Pusat (KP), Kantor Daerah (KD), Dekonsentrasi (DK), dan Tugas Pembantuan (TP).

Kode Barang

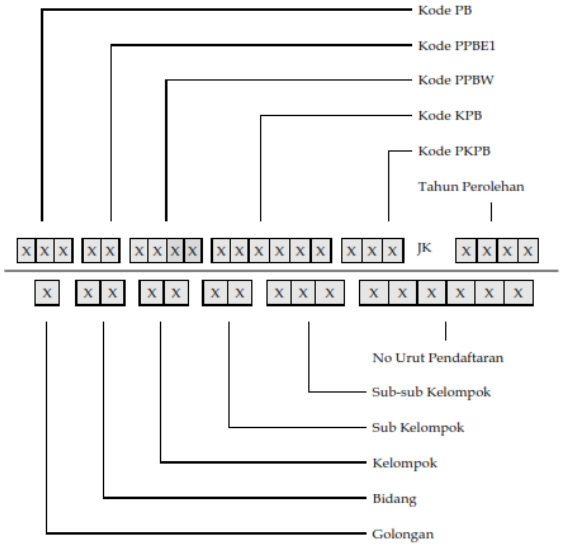
Kode barang baru masih terdiri dari 10 (sepuluh) angka/digit yang terbagi dalam lima kelompok kode dengan susunan sebagai berikut :

x	.	x	x	.	x	x	.	x	x	.	x	x	x

Satu angka/digit pertama : menunjukkan kode Golongan Barang
Dua angka/digit kedua : menunjukkan kode Bidang Barang
Dua angka/digit ketiga : menunjukkan kode Kelompok Barang
Dua angka/digit keempat : menunjukkan kode Sub Kelompok Barang
Tiga angka/digit kelima : menunjukkan kode Sub-sub Kelompok Barang

Kode Registerasi

Kode Registrasi merupakan identitas barang yang dipergunakan sebagai tanda pengenal yang dilekatkan pada barang yang bersangkutan. Kode Registrasi terdiri dari 18 (delapan belas) angka/digit kode lokasi ditambah 4 (empat) angka/digit tahun perolehan dan 10 (sepuluh) angka/digit kode barang ditambah 6 (enam) angka/digit nomor urut pendaftaran barang, dengan susunan sebagai berikut :

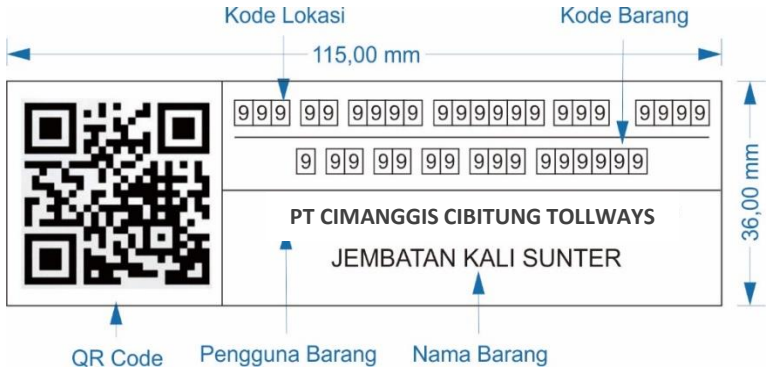


Penjelasan :

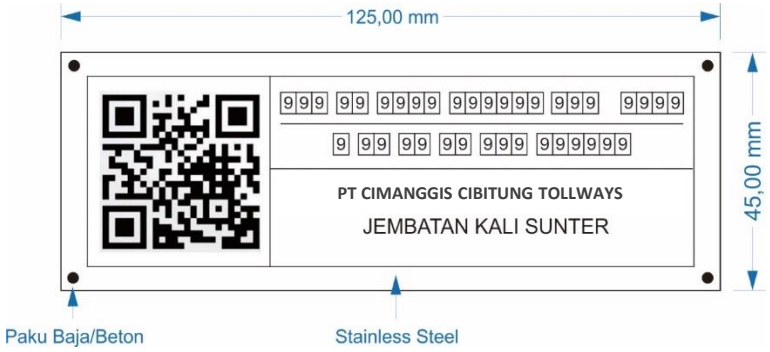
- Cara penulisan Kode Registrasi adalah untuk kode lokasi dan tahun perolehan pada bagian atas, sedangkan untuk kode barang dan nomor urut pendaftaran barang pada bagian bawah.
- Nomor urut pendaftaran adalah nomor urut yang diberikan pada setiap jenis barang (sub-sub kelompok barang) yang dimulai dari 000001 dan seterusnya.

B. Labelling Fisik Aset Jalan Tol

- Kode Registrasi dicetak pada stiker label dan diberikan QR Code
- Stiker label terdiri dari 2 jenis :
  - Stiker label Type A
    - (Berbahan Vinyl, Thermal Printing, Tahan terhadap cuaca dan suhu)
  - Stiker Label Type B
    - (Berbahan Stainless Steel), dipasang pada aset berbahan beton
- Papan Nama Bangunan Penghubung (Jembatan, Overpass, Underpass, Box Traffic/Pedestrian) dengan standar perambuan



STIKER TIPE A



STIKER TIPE B

Template Labelling Fisik Aset Jalan Tol



Standar papan nama menggunakan standar perambu-rambuan di Indonesia (Menteri Perhubungan Nomor PM 13 Tahun 2014),
Bahan, Bentuk, Jenis Font, Ukuran Font.

SISTEM APLIKASI TERINTEGRASI



“Integrated Operations and Management System (**IOMS**) adalah solusi komprehensif yang dirancang untuk **mengoptimalkan operasional dan manajemen perusahaan jalan tol** dengan integrasi **holistik** antar layanannya”

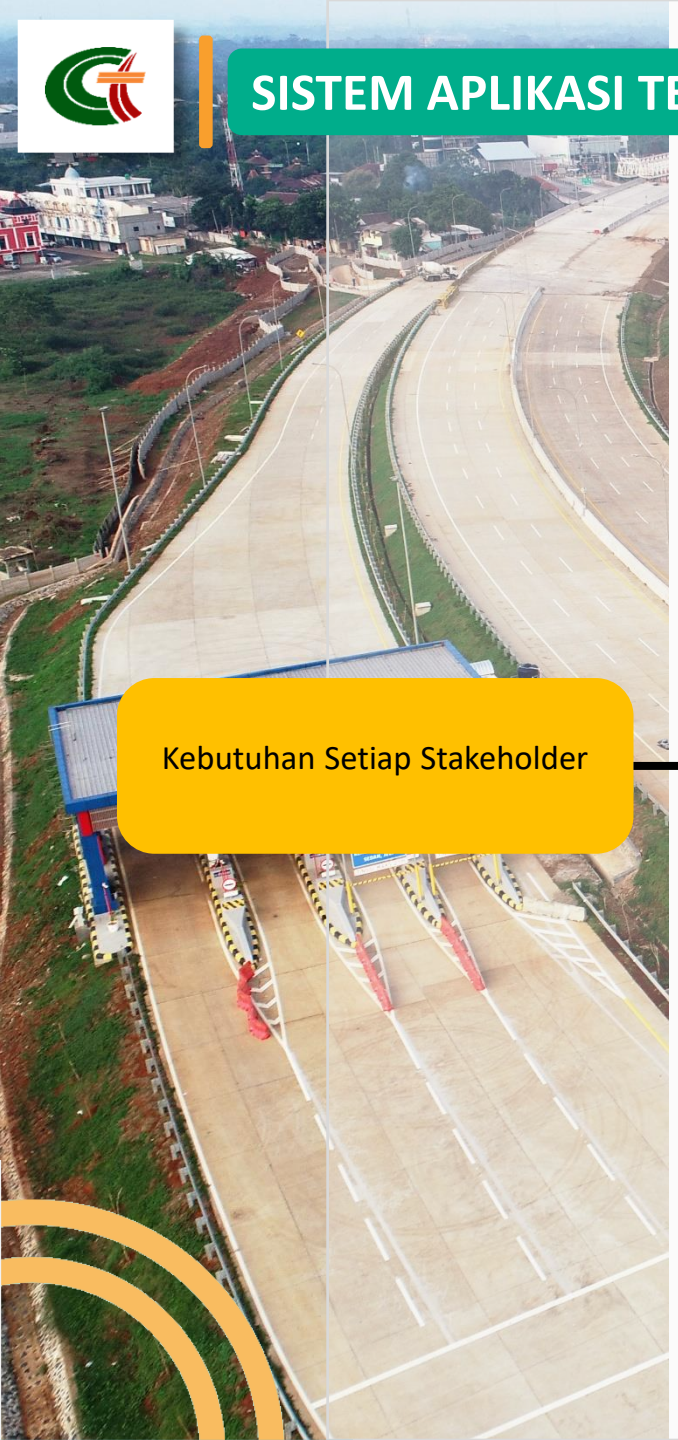
"Overcoming Operational Hurdles with a Unified Approach"

Critical Pain Point

IOMS Urgency

Unintentional Inefficiency - Proses operasional bisnis yang tidak efektif dan efisien sehingga banyak sumber daya waktu, tenaga, dan *indirect cost* yang terbuang tanpa disadari.

SISTEM APLIKASI TERINTEGRASI



BASIC CONCEPT

Peraturan SPM Jalan Tol
Permen PU No. 16/PRT/M/2024

Kebutuhan Setiap Stakeholder

Conceptual Basis IOMS

Kebutuhan Manajemen Perusahaan

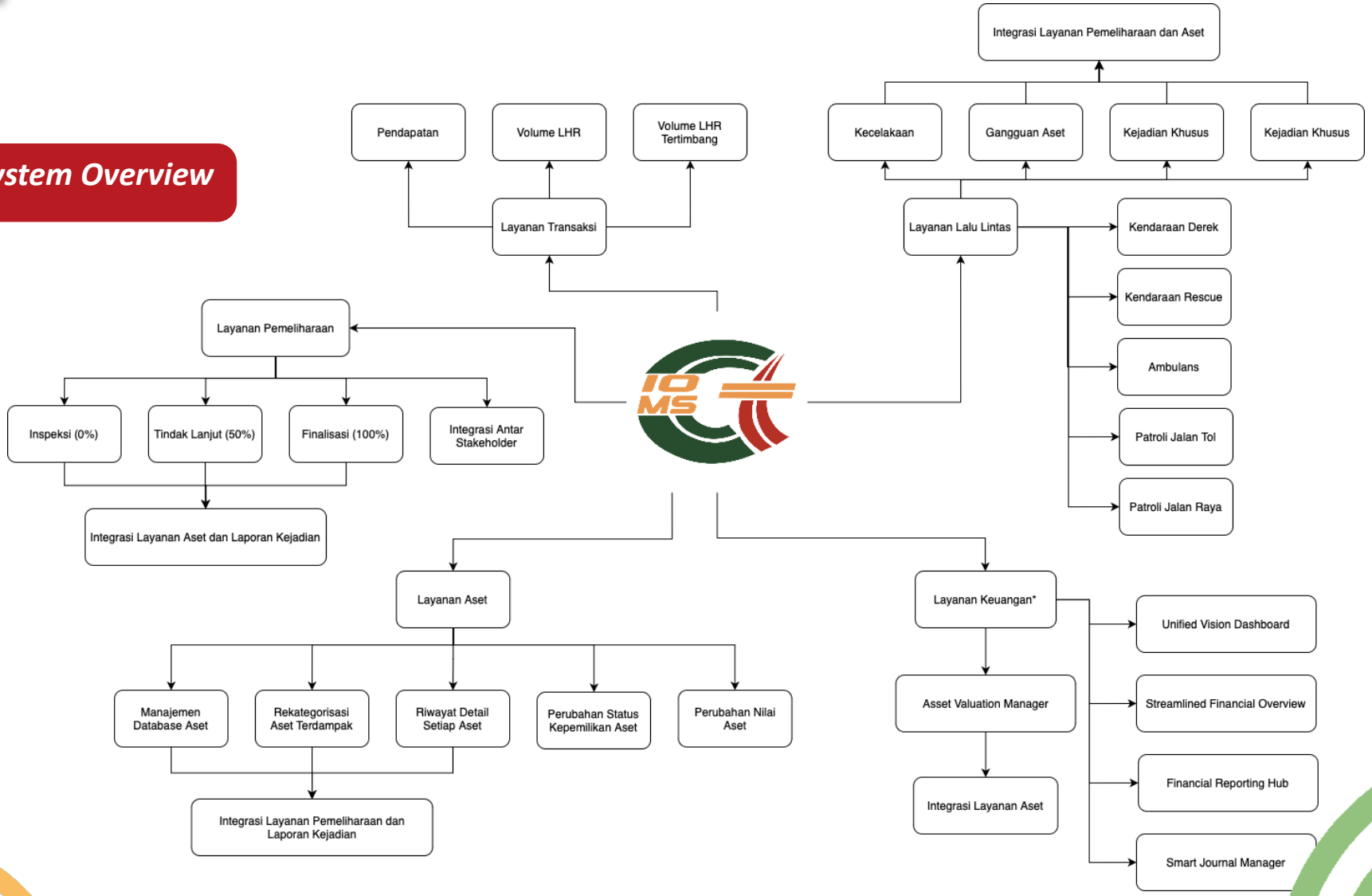
SOP Internal Perusahaan

SISTEM APLIKASI TERINTEGRASI

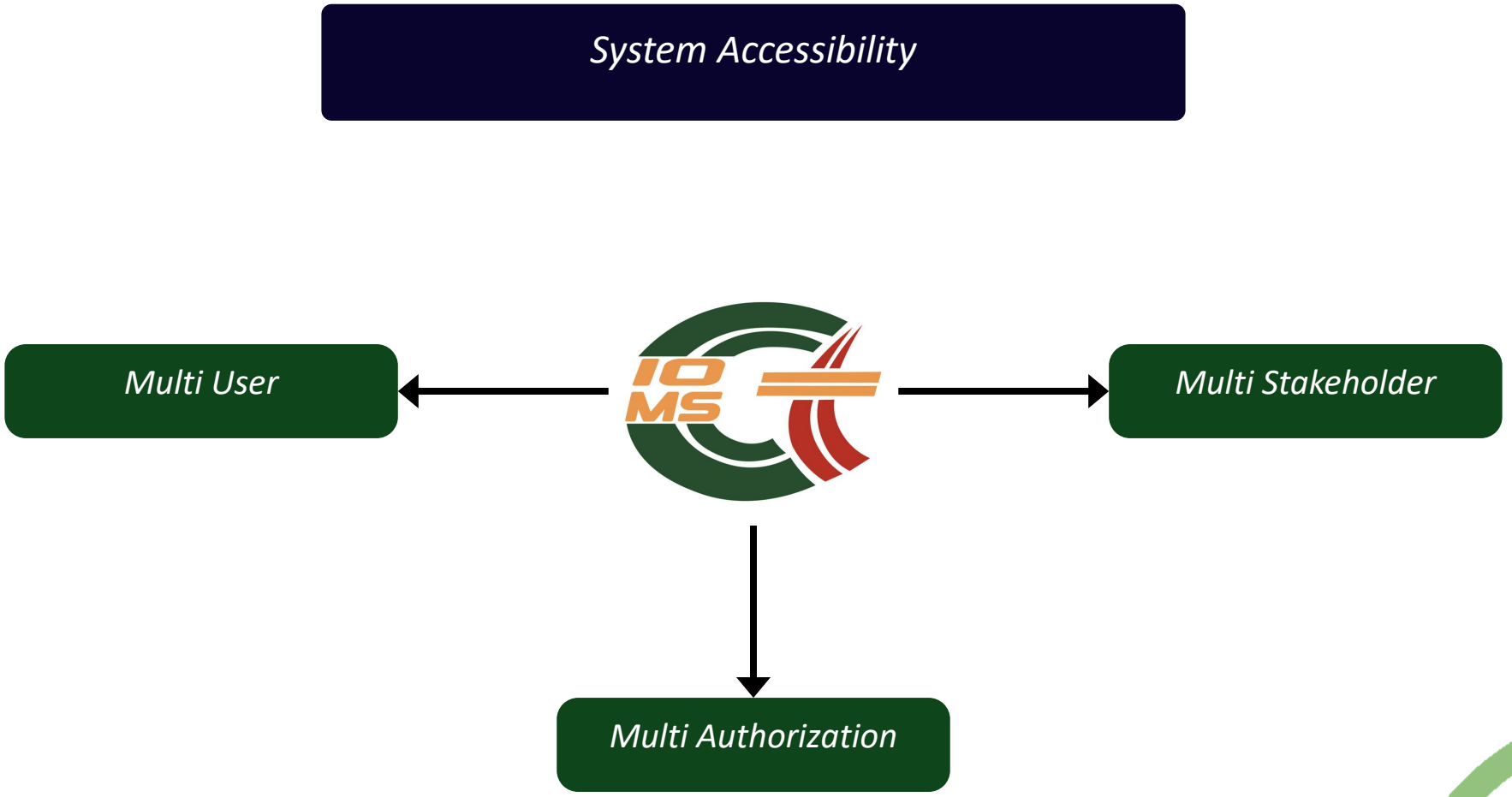


SISTEM APLIKASI TERINTEGRASI

System Overview

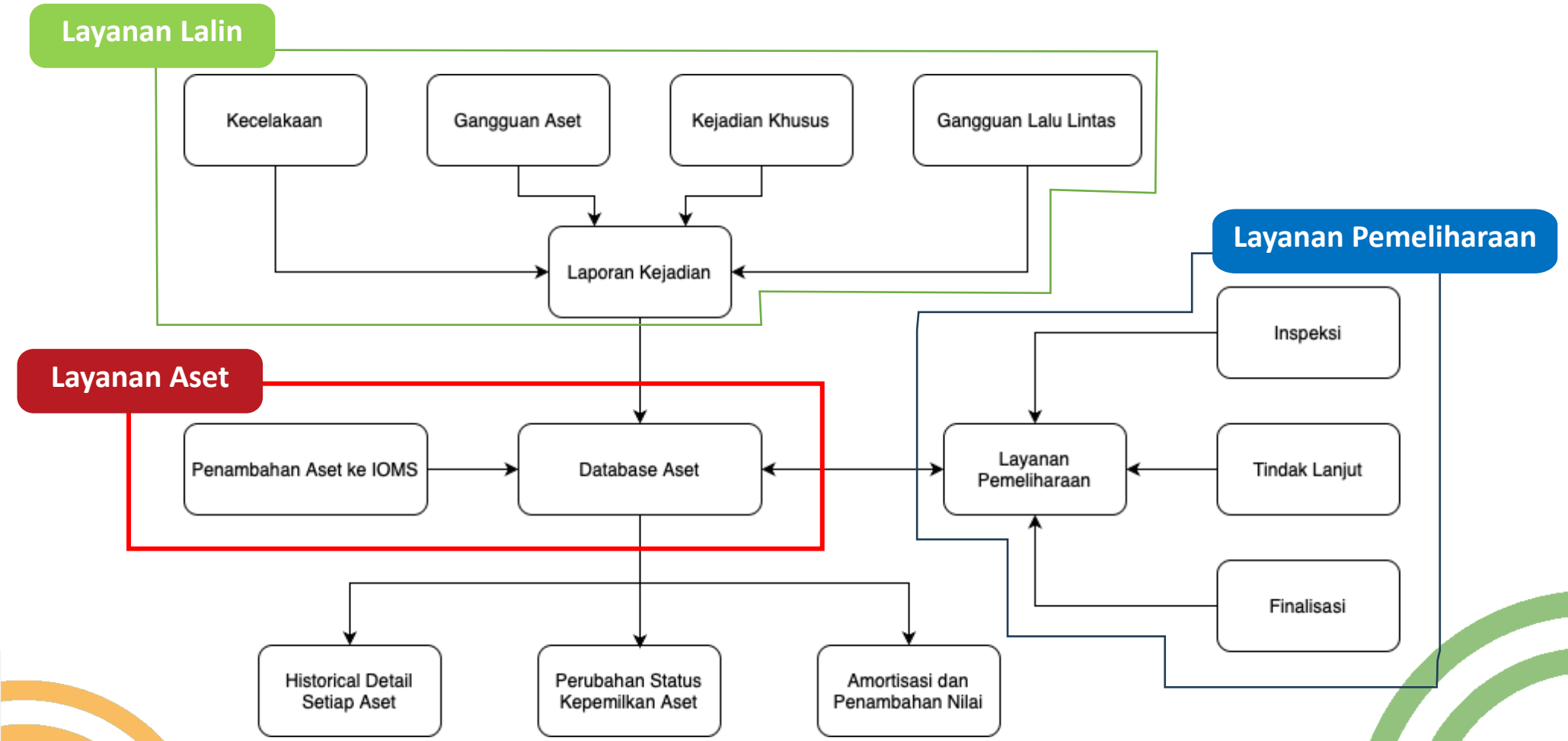


SISTEM APLIKASI TERINTEGRASI

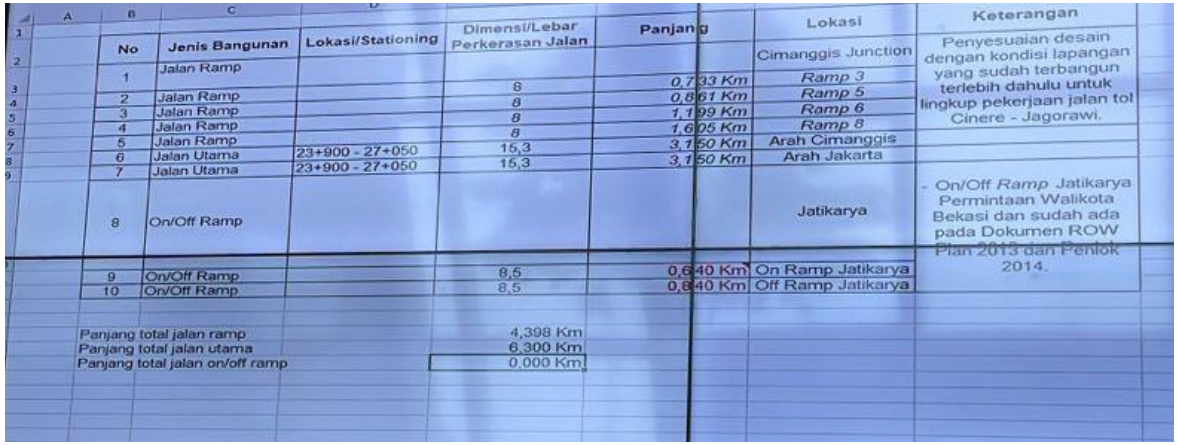


SISTEM APLIKASI TERINTEGRASI

"Asset Management Service Integration Flow"



SISTEM APLIKASI TERINTEGRASI



No	Jenis Bangunan	Lokasi/Stationing	Dimensi/Lebar Perkerasan Jalan	Panjang	Lokasi	Keterangan
					Cimanggis Junction	Penyesuaian desain dengan kondisi lapangan yang sudah terbangun terlebih dahulu untuk lingkup pekerjaan jalan tol Cinere - Jagorawi.
1	Jalan Ramp		8	0,743 Km	Ramp 3	
2	Jalan Ramp		8	0,861 Km	Ramp 5	
3	Jalan Ramp		8	1,199 Km	Ramp 6	
4	Jalan Ramp		8	1,605 Km	Ramp 8	
5	Jalan Ramp		15,3	3,150 Km	Arah Cimanggis	
6	Jalan Utama	23+900 - 27+050	15,3	3,150 Km	Arah Jakarta	
7	Jalan Utama	23+900 - 27+050				
8	On/Off Ramp				Jatikarya	- On/Off *Ramp* Jatikarya Permintaan Walikota Bekasi dan sudah ada pada Dokumen ROW Plan 2013 dan Penlok 2014.
9	On/Off Ramp		8,5	0,640 Km	On Ramp Jatikarya	
10	On/Off Ramp		8,5	0,840 Km	Off Ramp Jatikarya	
	Panjang total jalan ramp		4,398 Km			
	Panjang total jalan utama		6,300 Km			
	Panjang total jalan on/off ramp		0,000 Km			



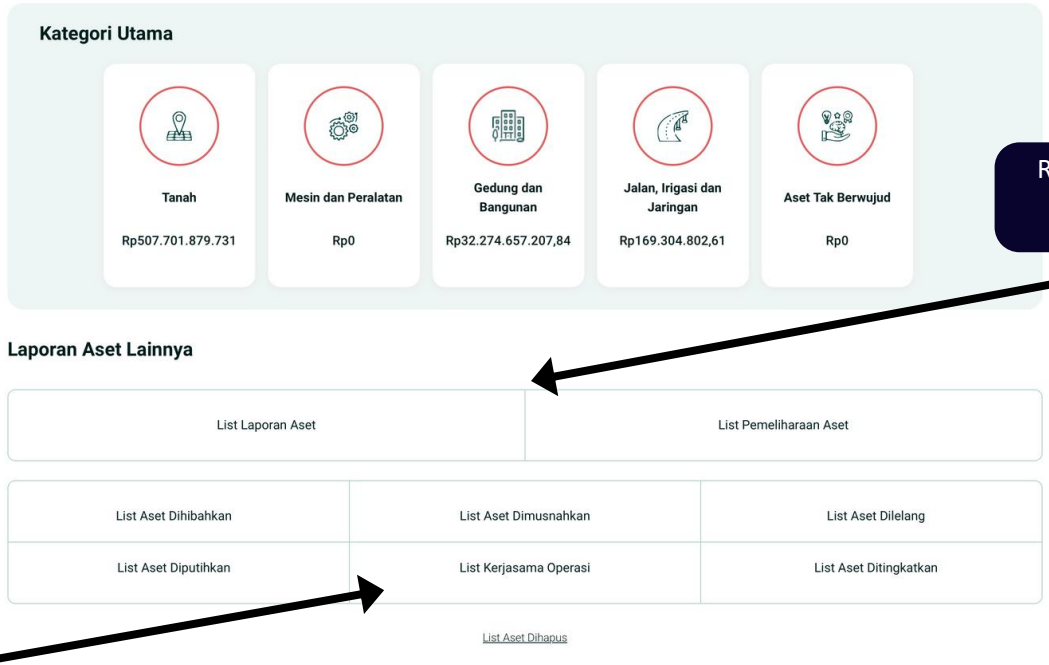
Pencatatan Aset Secara Konvensional

- Risiko ketidakakuratan data-data aset
- Minimnya transparansi, visibilitas, dan kontrol terhadap aset dimiliki
- Tidak adanya dokumentasi historis setiap asetnya
- Tidak adanya integrasi data antar divisi yang *seamless*
- Tidak fleksibel dan efisien dalam pengelolaan aset
- Kurangnya data pendukung audit aset perusahaan

SISTEM APLIKASI TERINTEGRASI

Short Overview
Layanan Aset

Database Kategorisasi Aset Tedaftar dan Nilainya



Rekategorisasi dari Inspeksi dan Laporan Kejadian

Perubahan Status Kepemilikan Aset

SISTEM APLIKASI TERINTEGRASI

Short Overview
Layanan Aset

Layanan Aset

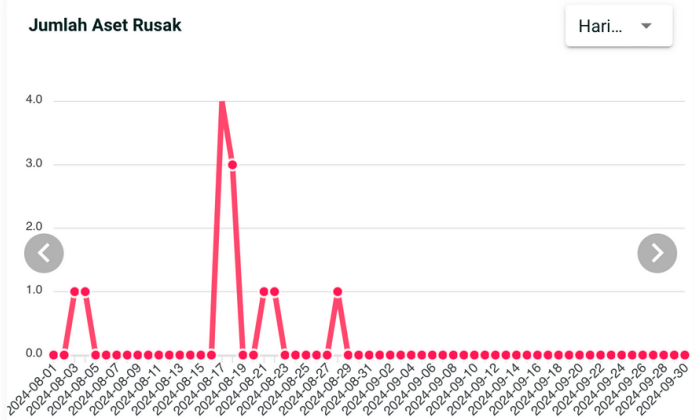
Layanan Aset

Pilih Tanggal 2024-08-01 s.d. 2024-09-30

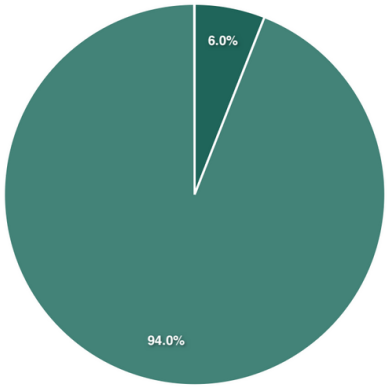
Unggah Aset

Persentase Nilai Aset

Jumlah Aset Rusak



Persentasi Nilai Perolehan Aset



Total Nilai Perolehan Aset : Rp Rp540.145.841.741,45

Infografis Aset Rusak dan Fluktuasi Jumlah Aset

SISTEM APLIKASI TERINTEGRASI

Database Aset Tedaftar dan detailnya

Short Overview
Layanan Aset



Jalan, Irigasi, dan Jaringan

Lihat Riwayat

Layanan Aset / Jalan, Irigasi, dan Jaringan

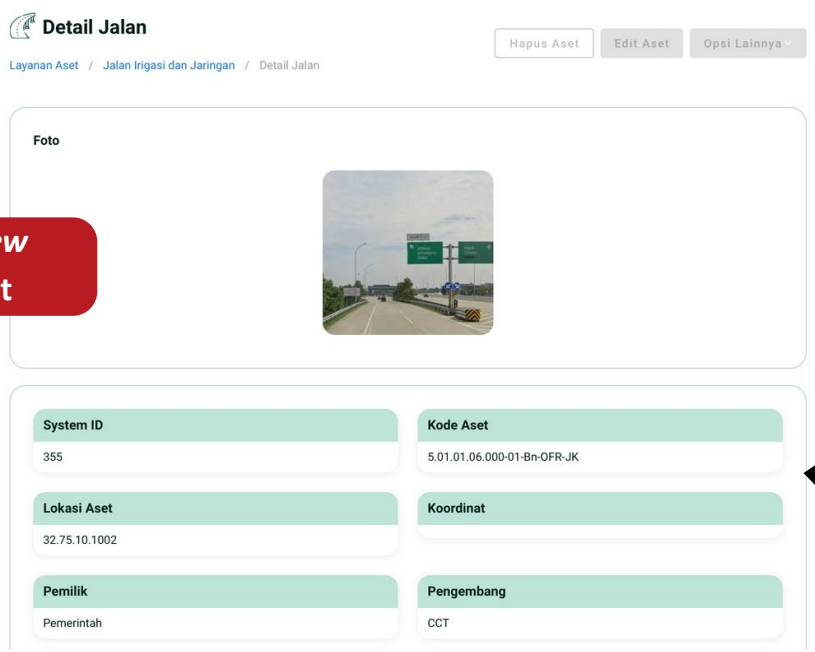
Search

Download

ID System	Nama Aset	Kode Aset	Lokasi Aset	Pemilik	Pengembang	Operator	Keterangan Tambahan	Harga Perolehan	Tanggal Perolehan	Koordinat X
365	Jalan	5.01.01.06.000-05-Bu-MR	32.75.10.1002	Pemerintah	CCT	CCT	Nilai Perolehan sudah termasuk nilai perlengkapan keselamatan jalan	Rp7.235.160,47,-	2020-10-26	711982.264
364	Jalan	5.01.01.06.000-05-Bn-MR	32.75.10.1002	Pemerintah	CCT	CCT	Nilai Perolehan sudah termasuk nilai	Rp16.226.645,36,-	2020-10-26	711982.264

SISTEM APLIKASI TERINTEGRASI

Short Overview
Layanan Aset



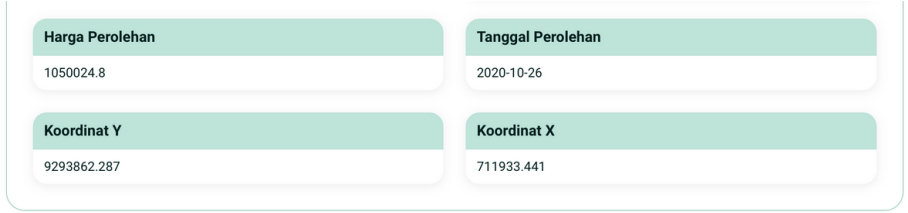
Riwayat Daftar dan Seluruh Informasi Perubahan, Kerusakan, Perbaikan dsbnya

Dapat Terhubung dengan Laporan Perbaikan

Detail Aset (Customized)

Harga Perolehan Aset

*Akan Ditambahkan Amortisasi, Nilai Pertambahan, Ditingkatkan Setiap Tahunnya. Diakhiri Nilai Aset Saat Ini



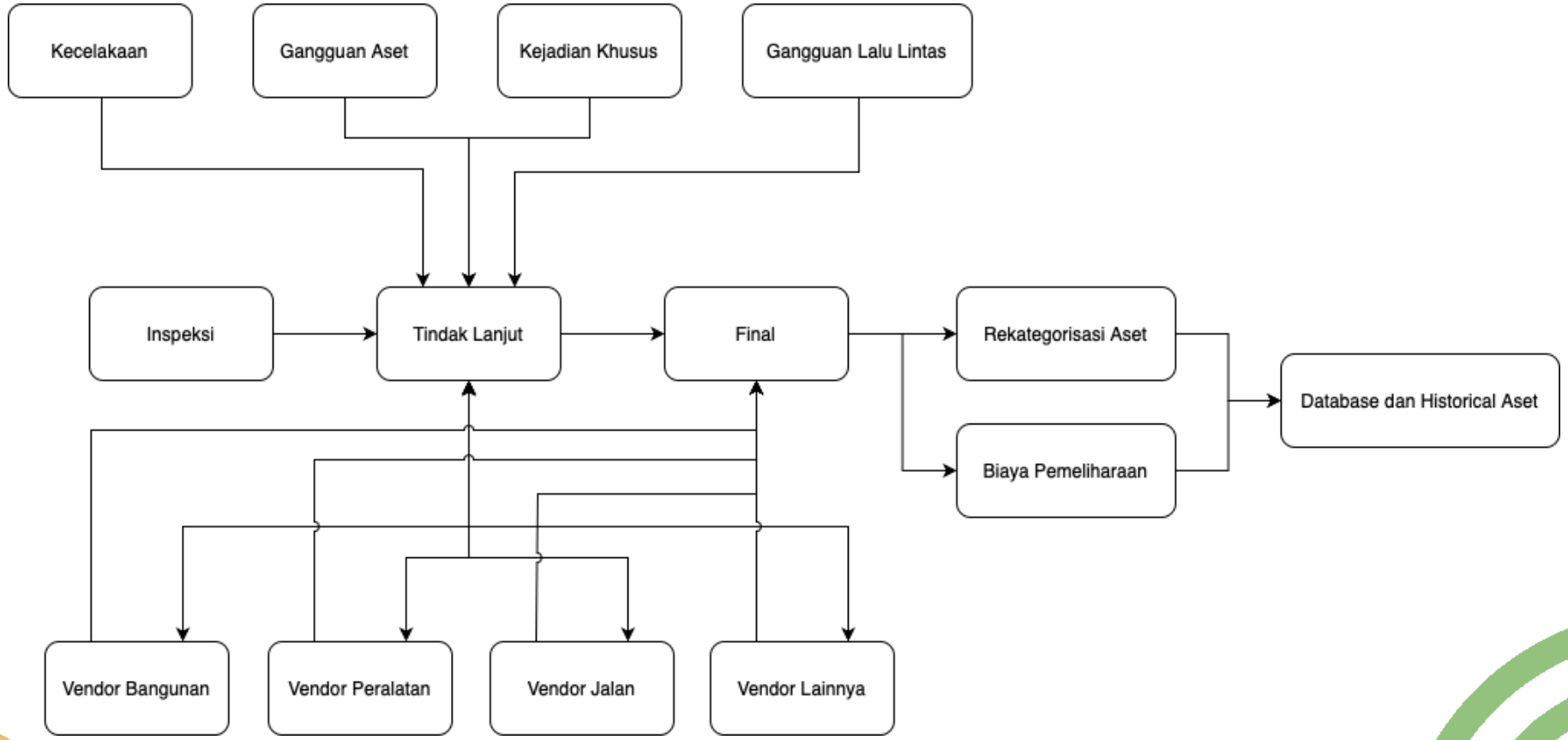
Layanan Pemeliharaan

Proses Laporan Perbaikan dan Pemeliharaan Secara *Broadcast Message*



- Kurangnya koordinasi yang efektif antar stakeholder
- Riwayat perbaikan masih dibuat secara manual per periode tertentu
- Dokumentasi yang tersebar dam tidak terintegrasi
- Minimnya informasi laporan perbaikan untuk pencatatan terhadap aset
- Kurangnya akuntabilitas terstruktur untuk setiap laporan pemeliharaan dan perbaikan

Maintenance and Restoration Services



SISTEM APLIKASI TERINTEGRASI

Short Overview
Layanan Pemeliharaan

Infografis Inspeksi Pemeliharaan dan Perbaikan



Laporan Tiap Fase

Inisiasi | Tindak Lanjut | **Final**

List Laporan Pemeliharaan

Laporan Final

Search | Download

Waktu Laporan	Kategori Utama	Sub Kategori	Lokasi Observasi	Waktu Selesai Laporan
2024-08-30 19:44:01	Jalan, Irigasi, dan Jaringan	Fasilitas Lainnya	KM 61300 - Jalur B - Bahu Luar	00:02:52
2024-08-30 19:33:30	Jalan, Irigasi, dan Jaringan	Fasilitas Lainnya	KM 500 - Jalur A - Bahu Luar	318:51:18
2024-08-29 17:30:43	Jalan, Irigasi, dan Jaringan	Fasilitas Lainnya	KM 62400 - Jalur B - Bahu Luar	291:28:48

SISTEM APLIKASI TERINTEGRASI

Short Overview
Layanan Pemeliharaan

Pengkategorian Sesuai Permen PU No. 16/PRT/M/2024

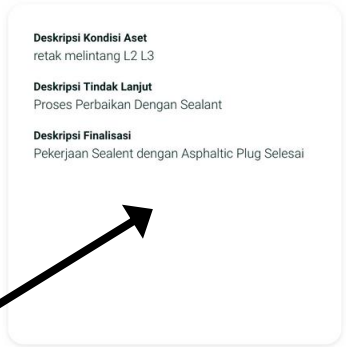
















Deskripsi Tiap Fase Perbaikan

Stakeholder Pemeliharaan

Detail Waktu dan Perhitungan Sesuai Permen PU No. 16/PRT/M/2024

SISTEM APLIKASI TERINTEGRASI

Short Overview
Integrasi Layanan

Inisiasi Laporan (Temuan)

Layanan Aset / List Pemeliharaan Aset / Inisiasi Laporan (Temuan)

Berisikan daftar aset yang menjadi temuan saat inspeksi dilakukan yang harus di kategorisasi.

Kategori Utama	Sub Kategori	Lokasi	Deskripsi Kondisi Aset	Foto
Jalan, Irigasi, dan Jaringan	Perkerasan Jalur Utama	KM 54500 - Jalur A - Lajur 3	retak melintang L2 L3	

Re-kategorisasi

Pilih Kategori Utama

Pilih

Cari Nama Aset

Cari

Dari proses ini, didapatkan data historical data aset (mulai awal, record perbaikan, dan biaya perbaikannya)

KESIMPULAN



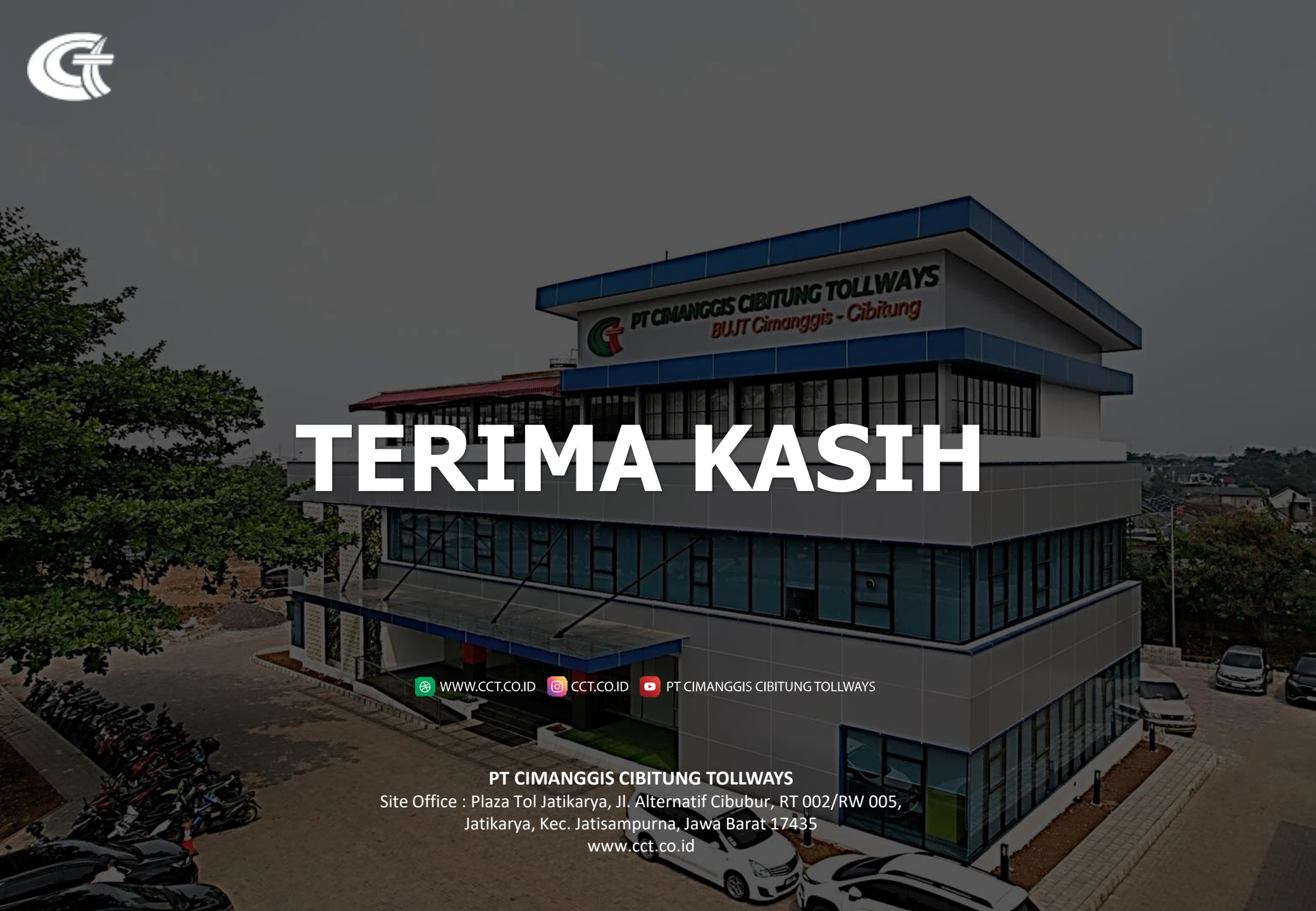
Label Barang



Integrated Operations and Management System (**IOMS**)

Terselenggaranya **manajemen tata Kelola aset jalan tol Cimanggis-Cibitung** yang meliputi:

- Te**registerasi**nya seluruh aset jalan tol;
- Tersusunnya **Buku Inventaris Aset** jalan tol;
- Terselenggaranya pengoperasian dan pemeliharaan aset jalan tol yang **terintegrasi** melalui sistem aplikasi;
- Tersedianya **data histori aset jalan tol** (aset awal, peningkatan, penggantian, penghapusan, dll).



TERIMA KASIH

WWW.CCT.CO.ID CCT.CO.ID PT CIMANGGIS CIBITUNG TOLLWAYS

PT CIMANGGIS CIBITUNG TOLLWAYS
Site Office : Plaza Tol Jatikarya, Jl. Alternatif Cibubur, RT 002/RW 005,
Jatikarya, Kec. Jatisampurna, Jawa Barat 17435
www.cct.co.id

WORKSHOP

Upgrading of E-SPM (Electronic of Minimum Service Standard)

BIDANG OPERASI DAN PEMELIHARAAN, SEKRETARIAT BPJT

May, 2023

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL



OUTLINE



01 E – S P M (ELECTRONIC OF MINIMUM SERVICE STANDARD)

- SPM Fulfillment Conventional Method vs E-SPM Implementation
- Architecture and Functional of E-SPM
- Infrastructure Development
- Web Application Interface Development
- E-SPM Features Development (WEB)
- Toll-road Inventory
- Maintenance Plan
- Traffic Volume
- SPM Monitoring
- Performance Evaluation
- Blacklisting
- Traffic Accident Analysis (Blackspot)
- Traffic Accident Analysis (Accident Rate)
- Deterioration Trend Analysis
- Deterioration Forecasting Model
- Detailed Investigation
- Documentation
- Reporting
- Application Demo



01

E – S P M
ELECTRONIC OF MINIMUM SERVICE STANDARD

01 SPM Fulfillment Conventional Method vs E-SPM Implementation



SPM FULFILLMENT CONVENTIONALLY

MONITORING THE SPM FULFILLMENT

- Record of findings is done manually using the survey form.
- Record of findings includes : findings indicator, findings location (sta, line, lane), documentation / photo number, notes / description.

OFFICIAL REPORT / REPORT OF MONITORING RESULTS

- Official Report / Report of Monitoring Result created manually after field monitoring finished.

REPAIRMENT FOLLOW-UP

- Official Report is used as a reference by TRO in the context of repairment follow-up, the speed follow-up is calculated after the issuance of Official Report
- Follow-up Report is done manually by TRO, and sent to ITRA when the repairment has been completed
- Opportunities in manipulating the duration, location, quantity and suitability between repairment follow-up findings

EVALUATION AND OFFICIAL REPORT OF REPAIRMENT FOLLOW-UP

- After ITRA received the TRO Follow-up Report
- Refusal of repairment follow-up can be made at this stage if there is no field review



THE USE OF E-SPM

SPM FULFILLMENT MONITORING

- Record of findings is carried out using a mobile-based e-SPM application (Android and iOS)
- Recording includes everything in the conventional method and equipped with location coordinates and accuracy features automatically
- Provision of standard data capture and driving mode

OFFICIAL REPORT / REPORT OF MONITORING RESULTS

- Official Report / Report of Monitoring Result can be generated automatically using e-SPM application

REPAIRMENT FOLLOW-UP

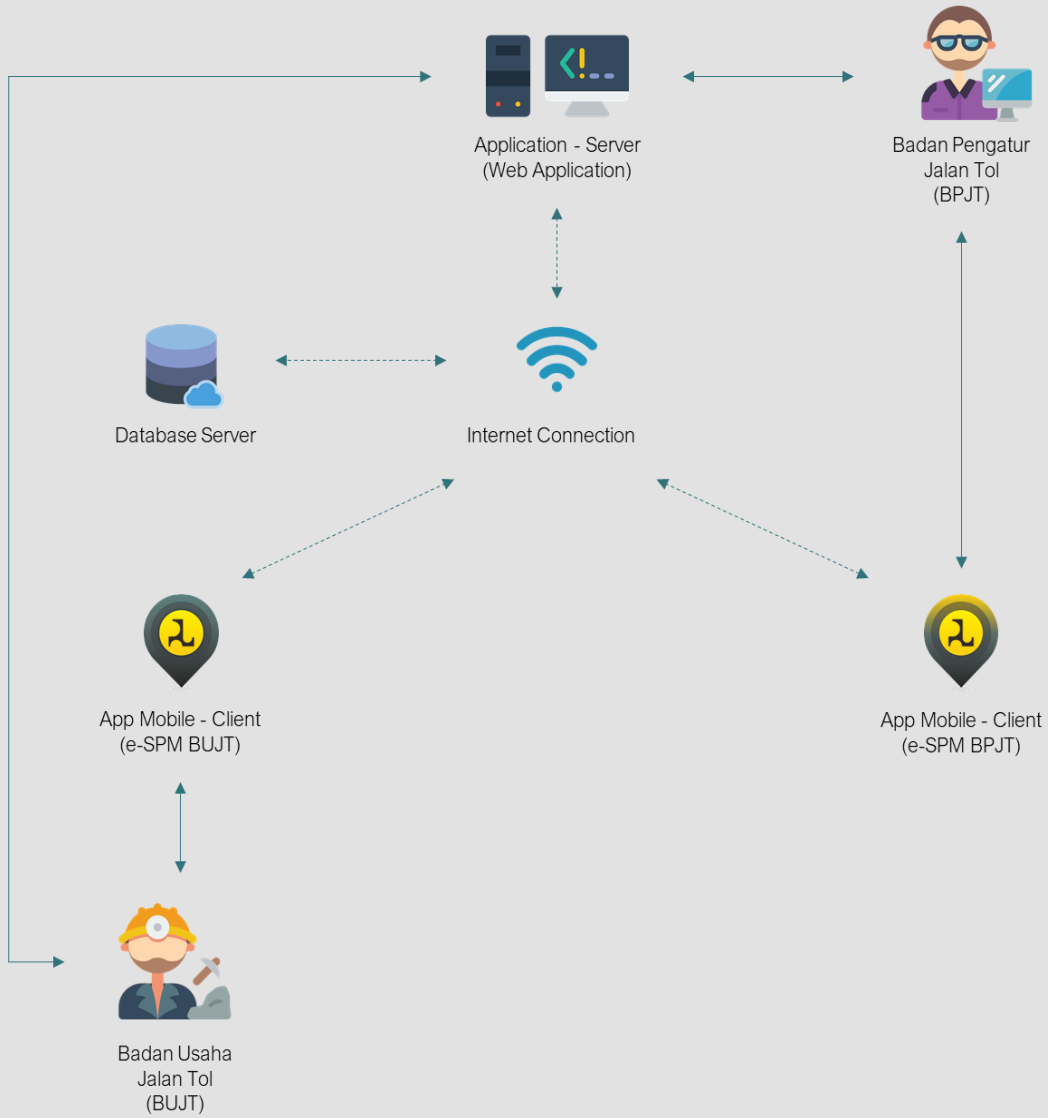
- Each field findings is delivered in real time through TRO e-SPM application, the speed follow-up is calculated automatically based on the time of findings
- Follow-up report is automatically created by e-SPM and can be accessed by TRO and ITRA at any time without waiting for the repairment to be fully completed
- Minimize manipulation of duration, location, quantity and suitability between findings and repairment

EVALUATION AND OFFICIAL REPORT OF REPAIRMENT FOLLOW-UP

- Can be done at any time as needed
- Refusal of repairment follow-up can be done directly by ITRA. Review and comment features available

01 ARCHITECTURE AND FUNCTIONAL OF E-SPM

USER	ACTIVITY DETAIL	APPLICATION
ITRA	Monitoring the fulfilment of SPM for the semester and monthly period	Mobile, Web
	Monitoring repairment follow-up by TRO in real time	Mobile, Web
	Monitoring TRO Self Assessment reporting in real time	Mobile, Web
	Monitoring the operational and maintenance activities carried out by TRO in real time	Web
	Monitoring SPM competition in real time	Web
	Obtain the reporting of SPM and SA fulfillment activities that carried out by TRO automatically	Web
	Monitoring traffic condition per segment on each operating toll road section in real time	Mobile, Web
TRO	Repairment follow-up to SPM fulfillment by ITRA	Mobile, Web
	Self Assessment reporting	Mobile, Web
	Reporting Operation field activities on the toll road	Mobile, Web
	Reporting Maintenance field activities on the toll road	Mobile, Web
	Reporting traffic condition for each segment in real time	Mobile, Web
	Monitoring SPM competition in real time	Web
	Obtain the reporting of SPM and SA fulfillment activities automatically	Web
	Receive emergency reports by TRO along with the coordinates	Mobile, Web

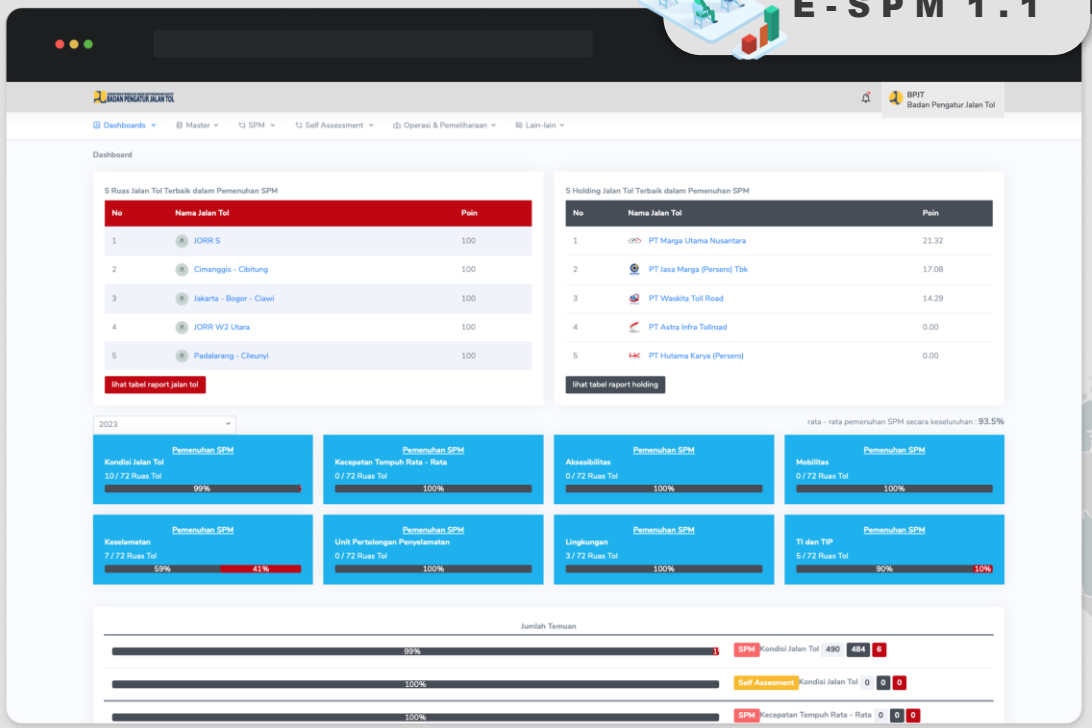


01 INFRASTRUCTURE DEVELOPMENT

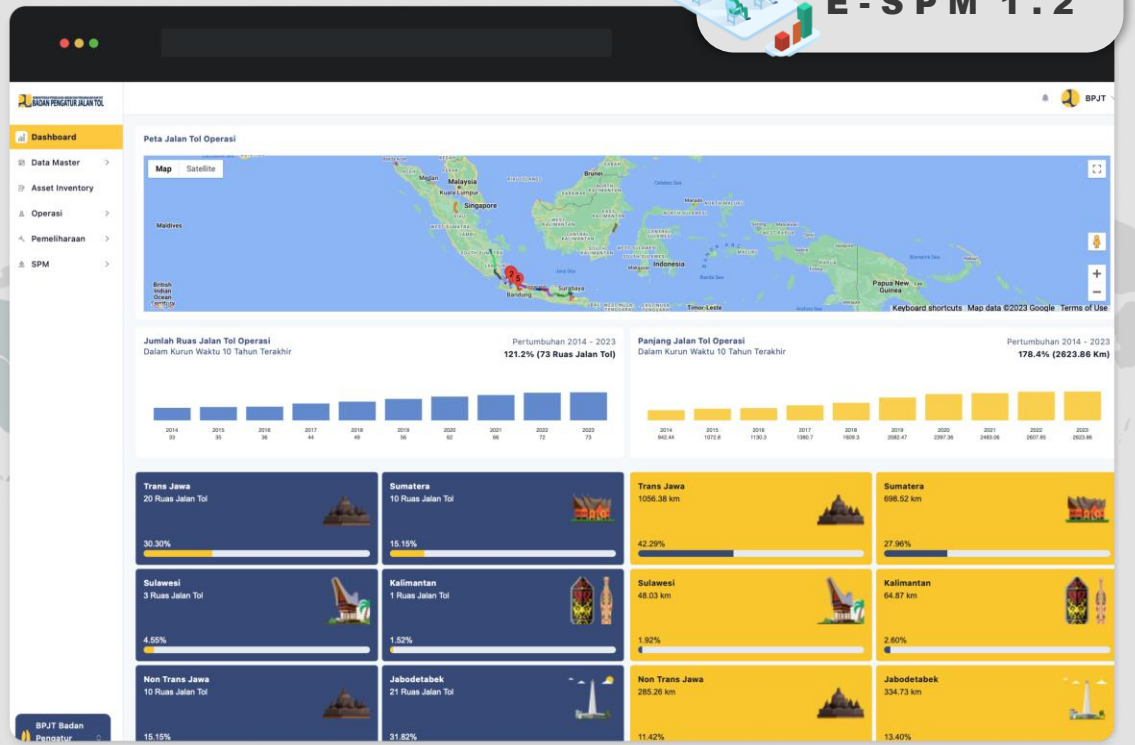
CATEGORY	COMPONENT	E-SPM 1.1	E-SPM 1.2
Network	Server	Server PUSDATIN PUPR	Server PUSDATIN PUPR
	Domain	https://www.espm.bpjt.pu.go.id	http://espmbpjt.pu.go.id
	IP Server	103.211.50.23	103.8.238.226
	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) CPU E7-8870 v2
	RAM	8 GB	8 GB
	Storage	500 GB	500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS
	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29
	PHP	PHP 7.2	PHP 7.2
	DBMS	MySQL 5.7	MySQL 5.7
Web Application	Framework	Laravel	Laravel
	CMS	October CMS	October CMS
Mobile Application	Framework	Flutter 2.5	Flutter 2.5
	Backend Service	Firebase	Firebase
UI / UX Design	Tools	Figma	Figma

01 WEB INTERFACE DEVELOPMENT

E-SPM 1.1



E-SPM 1.2



01 E-SPM(WEB) FEATURES DEVELOPMENT

Not Yet Available Already Available

Chapter 1/3

MENU	E-SPM 1.1	E-SPM 1.2
DASHBOARD (ASSET MANAGEMENT SYSTEM)		
MASTER DATA		
Highway		
Highway Segment		
Tollgates		
BUJT (TRO)		
Holding		
Highway Group		
Substances		
Indicator		
Asset		
Asset Category		
Asset Damage Category		
Document		
Document Category		
User Data		
ASSET INVENTORY		
Tollgates		
Pool dan Vehicle Service		
Rest Area		
Bridge		
OPERATION		
Operation Activity		

Not yet Available Already Available

Chapter 2/3

MENU	E-SPM 1.1	E-SPM 1.2
Gate Traffic Volume		
Segment Traffic Volume		
Volume Capacity Ratio (VCR)		
Accident Data		
Accident Summary		
Accident Stripmaps		
Accident-prone Location		
Fatality Rate		
Important Events		
MAINTENANCE		
Maintenance Activity		
Maintenance Planning		
IRI Deterioration		
Deterioration Forecasting		
SPM		
Dashboard		
Highways Ranking		
Holding Ranking		
Findings Not Yet Followed Up		
Activity		
Findings History		
SPM Performance Comparison		
SPM Performance Detail		

01 E-SPM(WEB) FEATURES DEVELOPMENT

Not Yet Available Already Available

Chapter 3/3

MENU	E-SPM 1.1	E-SPM 1.2
SPM Fulfillment		
Official Report		
Follow-up Report		
Extended Follow-up Time		
Detailed Investigation		
Self Assessment Fulfillment		
Self Assessment Follow-up Report		
Self Assessment Report		
Skid Resistance		
Roughness		
Average Travel Speed		
Transaction Speed		
Vehicle Queue		
Observation Area / Patrol Monitoring		
Time Response		
Handling of Crashed Vehicle		
PJR Handling Speed		
Mark Reflectivity		
Sign Reflectivity		
Guide Post / Reflector Reflectivity		
Schedule		
Decision Letter		

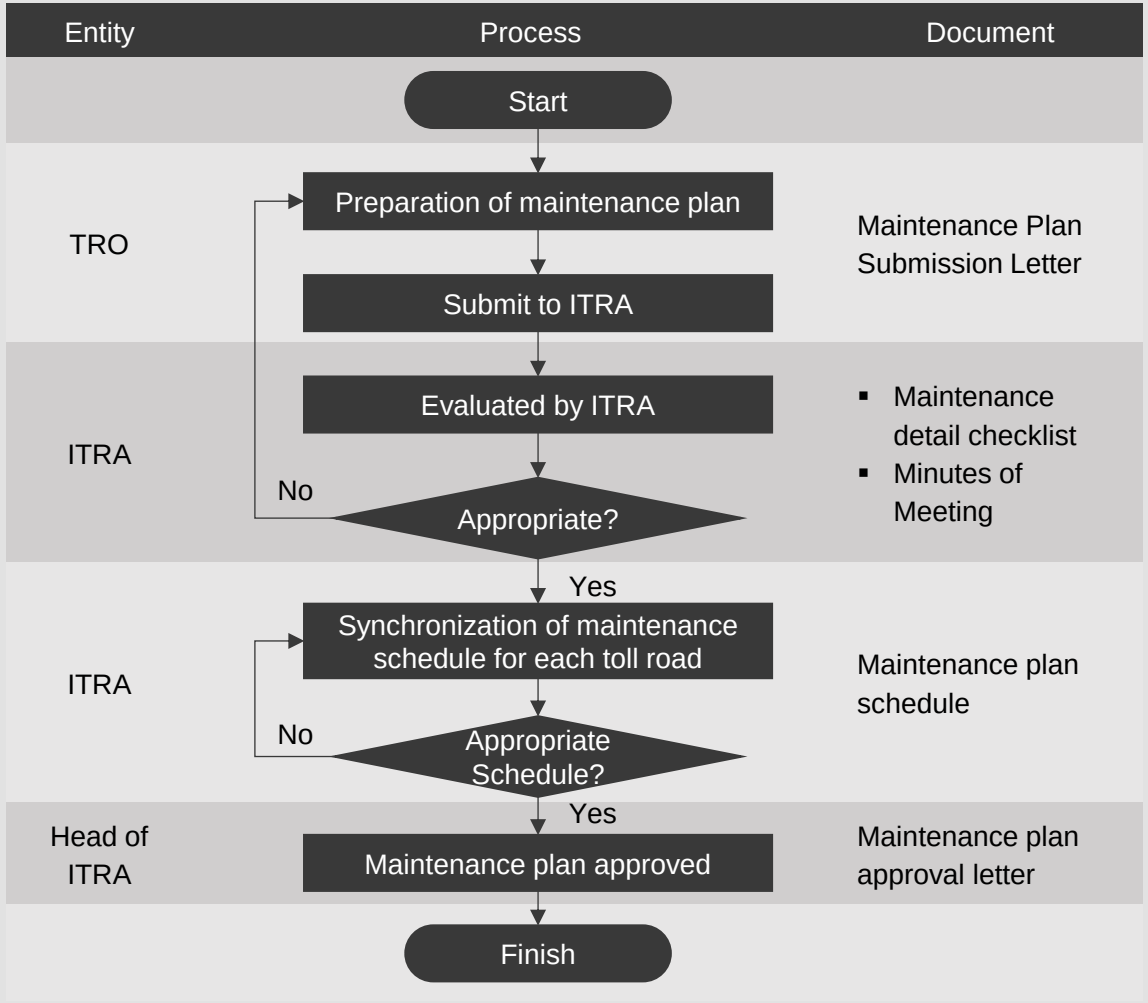
01 TOLLROAD INVENTORY

Requirement : The Sub-Consultant shall develop a road inventory data inputting module for the following inventory data
Progress : 100%
Module Link : Separated per module detail

No	Inventory Data / Data Inputting	Module Link	Data Attributes
1	Highway Segments	https://espm.varianglobal.com/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp ▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude ▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year ▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*) *(*) Details for each lane (shoulder, main lane and motorcycle lane)*
2	Toll Gates	https://espm.varianglobal.com/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name ▪ Gate Type ▪ Transaction Type ▪ Entrance Booth ▪ Exit Booth ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Station	https://espm.varianglobal.com/rescuestation	▪ ID ▪ Highway ID ▪ Station Name ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
4	Vehicle Service	https://espm.varianglobal.com/v1-kendaraanlayanan	▪ ID ▪ Highway ID ▪ Rescue Station ID ▪ Vehicle Code ▪ Vehicle Type ▪ Police Number ▪ Vehicle Number ▪ Description
5	Bridges	https://espm.varianglobal.com/bridge	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position ▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure Configuration ▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.varianglobal.com/restarea	▪ ID ▪ Highway ID ▪ Rest Area Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Direction ▪ Rest Area Type ▪ Pavement Type

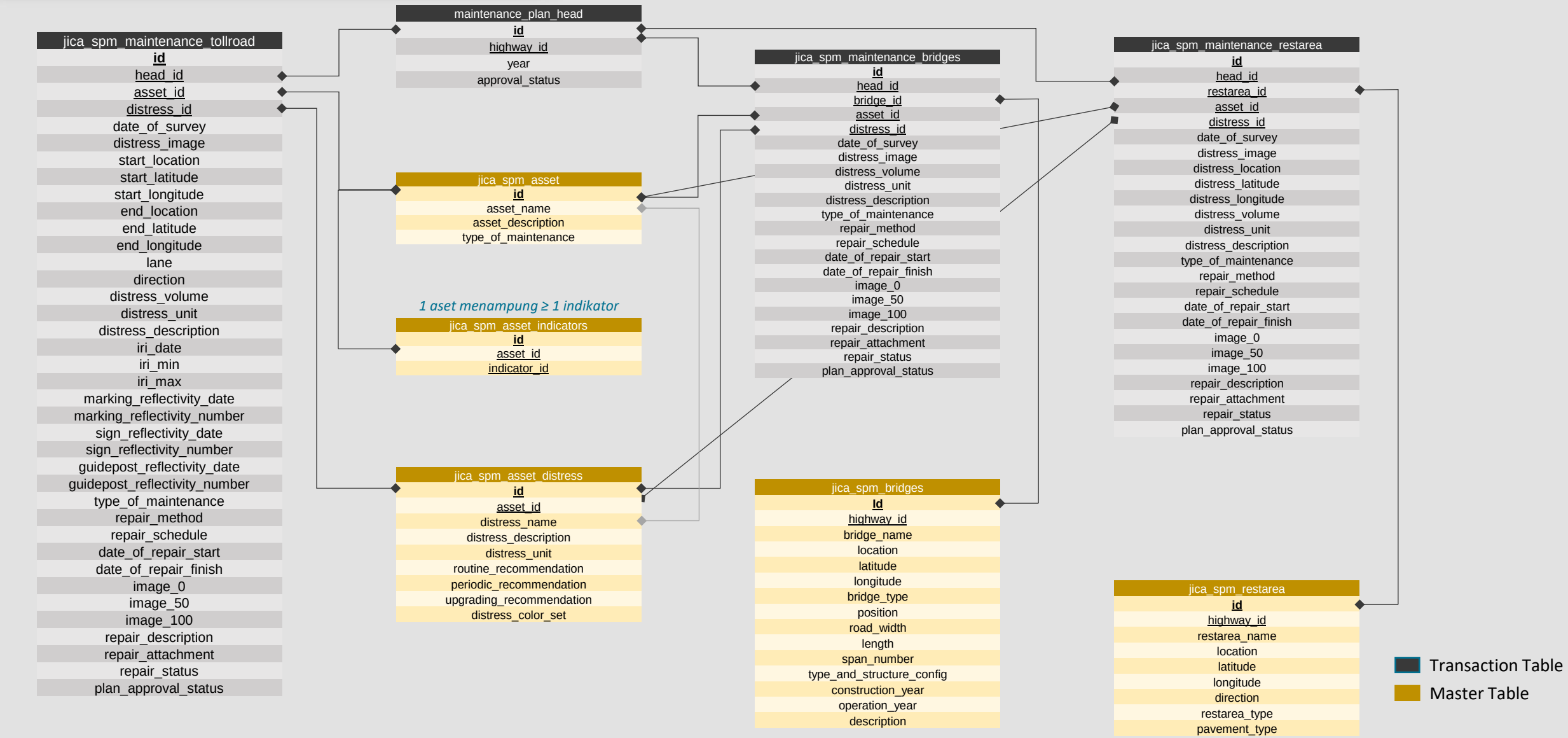
01 MAINTENANCE PLAN

Requirement : The Sub-Consultant shall develop an interface to input information related to maintenance plan formulated by each TRO
Progress : 100%
Module Link : https://espm.varianglobal.com/maintenanceplan



- Maintenance plan must be reported by TRO **annually**
- Maintenance plan prepared only for periodic maintenance and upgrading maintenance
- Maintenance plan are classified in 3 categories, including: Toll Road; Bridges; Services Area (each category has several indicators)
- Each category is reported in the form of damage details, repair plan, repair schedule, and strip map (certain indicators)
- The maintenance plan applies an approval system by ITRA
- The details of the maintenance plan will be reviewed by ITRA, ITRA will approve or reject one by one the detailed data that has been reported by the TRO
- Schedule synchronization by ITRA on the consideration of several programs such as: SPM fulfillment, rate adjustment, prohibition of work on holidays and new year, etc.
- The maintenance plan report that has been evaluated will be approved by the head of ITRA
- The approved maintenance plan will be used as a reference for ITRA to monitor and evaluate repair results **(repair activity must also be reported by TRO)**

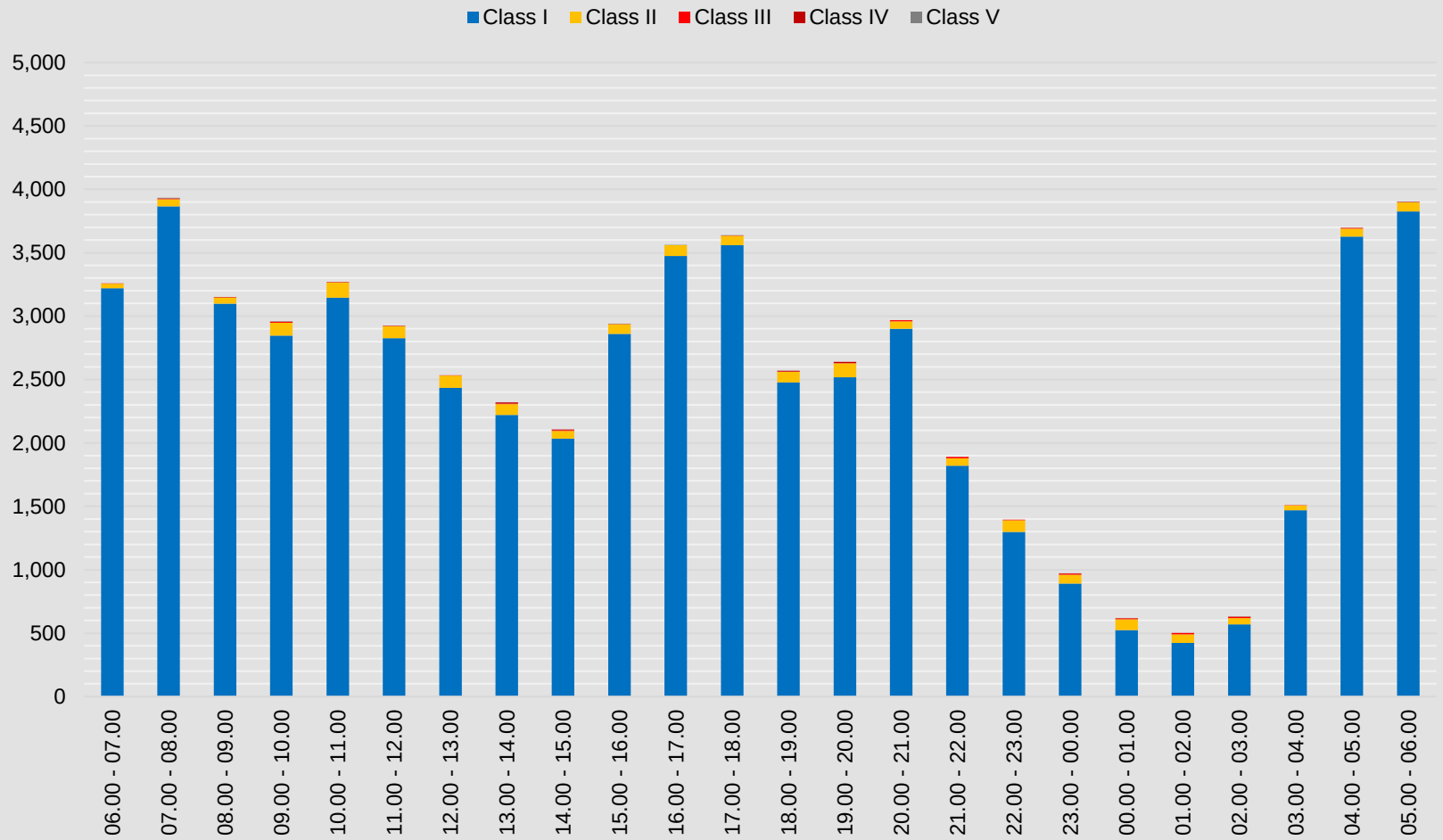
01 MAINTENANCE PLAN



01 TRAFFIC VOLUME

Requirement : The Sub-Consultant shall develop the the interface for inputting information related to traffic volume
Progress : 100%
Module Link : https://espm.varianglobal.com/v1-trfvolsegment

No	Data Attributes
1	ID
2	Highway
3	Highway Segment
4	Traffic Date
5	Name of Traffic Counting Station
6	Chainage of Traffic Counting Station (Km)
7	Latitude of Traffic Counting Station
8	Longitude of Traffic Counting Station
9	Traffic Counting Method
10	Description
11	Class 1 Traffic Volume at 00 am - 01 am
…	…
34	Class 1 Traffic Volume at 11 pm - 12 am
35	Class 2 Traffic Volume at 00 am - 01 am
…	…
58	Class 2 Traffic Volume at 11 pm - 12 am
59	Class 3 Traffic Volume at 00 am - 01 am
…	…
82	Class 3 Traffic Volume at 11 pm - 12 am
83	Class 4 Traffic Volume at 00 am - 01 am
…	…
106	Class 4 Traffic Volume at 11 pm - 12 am
107	Class 5 Traffic Volume at 00 am - 01 am
…	…
130	Class 5 Traffic Volume at 11 pm - 12 am



01 SPM MONITORING

Requirement : The Sub-Consultant shall develop the single interface for monitoring SPM indicators recorded by TRI and ITRA Inspection Team on top of minimum indicator stipulated by regulation (No. 16/PRT/M/2014)

Progress : 100%

Module Link : https://espm.varianglobal.com/jica-spm-monitoring

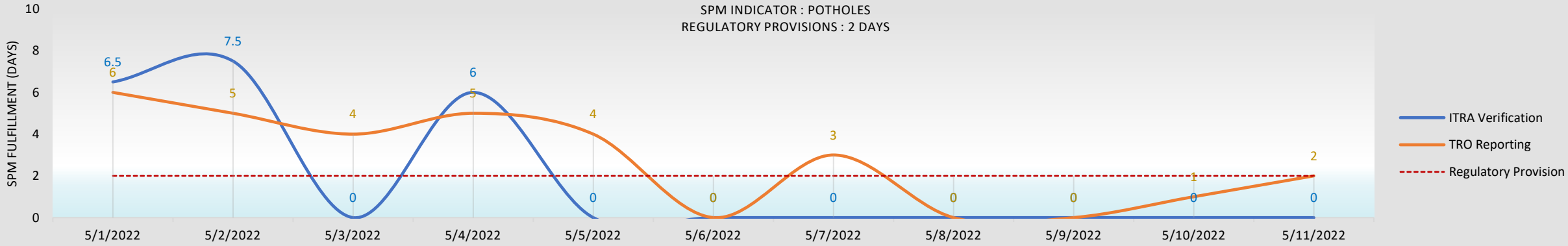
The analysis feature is to find out the comparison of SPM fulfillment by TRO, ITRA and regulatory provisions. The technical approach will be described through a sample case of SPM fulfillment.

ITRA Verification			TRO Reporting		
Damage Found (Date)	Repair Date	Repair Duration (Days)	Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5	01/05/2022	07/05/2022	6
01/05/2022	06/05/2022	5	02/05/2022	07/05/2022	5
01/05/2022	09/05/2022	8	03/05/2022	07/05/2022	4
01/05/2022	09/05/2022	8	04/05/2022	09/05/2022	5
02/05/2022	09/05/2022	7	04/05/2022	09/05/2022	5
02/05/2022	10/05/2022	8	04/05/2022	09/05/2022	5
04/05/2022	10/05/2022	6	05/05/2022	09/05/2022	4
04/05/2022	10/05/2022	6	07/05/2022	10/05/2022	3
04/05/2022	10/05/2022	6	10/05/2022	11/05/2022	1
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfillment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Damage found (datetime format)

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



01 PERFORMANCE EVALUATION

Requirement : The Sub-Consultant shall develop an analytical module to conduct performance evaluation of TROs using data collected for E-SPM. In the current version of E-SPM, there is a kind of performance evaluation but comparative evaluation is missing

Progress : 100%

Module Link : https://espm.varianglobal.com/highwayperformancecomparison

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road. The technical approach will be described through a sample case of SPM fulfilment.

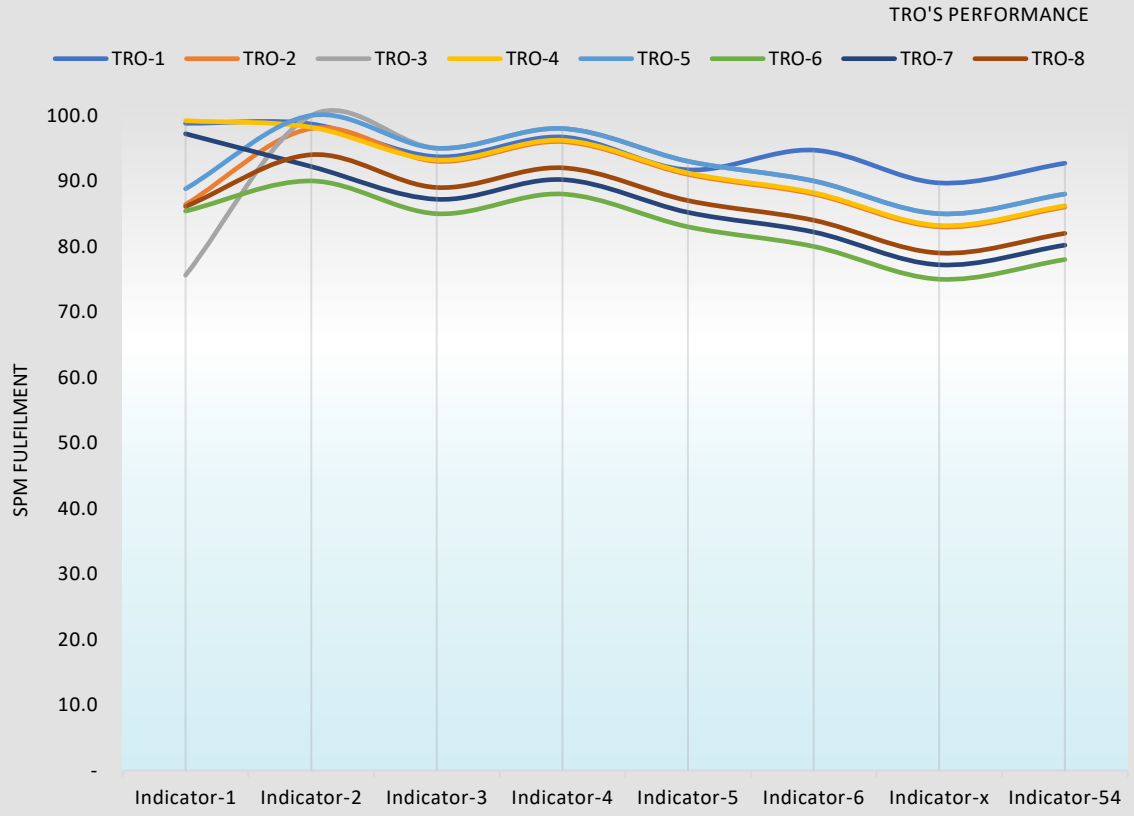
Indicator	SPM Fulfilment							
	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators

n_{finish} : Amount of damage that has been repaired

n : Amount of damage/issue



01 BLACKLISTING

Requirement : The Sub-Consultant are advised to create a list of black listed TROs who do not fulfill the requirements of SPM. The Sub-Consultant shall develop a tool to list up the TROs which do not fulfill the requirements of SPM

Progress : 100%

Module Link : https://espm.varianglobal.com/v1-scoring

ITRA has developed an SPM competition system which is an assessment concept in order to create positive enthusiasm for each TRO to compete in providing the best service for road users. The system mechanism that is carried out is like a 'football league' competition, where after passing a period of time, the team with the highest points (win 3 points, draw 1 point, lose 0 points) will become the champion of the competition. If in football points are determined from the results of the match, the points earned in this SPM competition are determined based on the percentage and duration of repairs to damage referring to the tolerance time for repairs in accordance with Minister of Public Works Regulation Number No.16/PRT/M/2014 about Minimum Services Standard for Toll Road. Each indicator and substance are also given a calculation weight as a multiplier, was obtained from previous ITRA studies.

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

iv : Indicator Value
a : Indicator-a
n : Amount of damage/issue in 1 indicator
$jptw$: Number of repairs on time
iw : Indicator Weight
ipv : Indicator Percentage Value (%)
sv : Substance Value
54 : Total amount of indicators
b : Substance-b
sw : Substance Weight

Weighting of substances

No	Substances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Assistance	10.47
7	Environment	3.40
8	Rest Area	4.67
	Total	100.00

No	TRO	Fulfilment Percentage by Substances Score Range: 0 - 100 Minimum Score: 75								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

01 TRAFFIC ACCIDENT ANALYSIS (BLACKSPOT)

Requirement : The black spot analysis module shall develop in such a way that the module can identify the black spots based on accident analysis. The module shall also be able to prepare accident and black spot maps

Progress : 100%

Module Link : https://espm.varianglobal.com/accidentanalysis

Source: Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

↓

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

↓

Determining the Upper Control Limit (BKA)

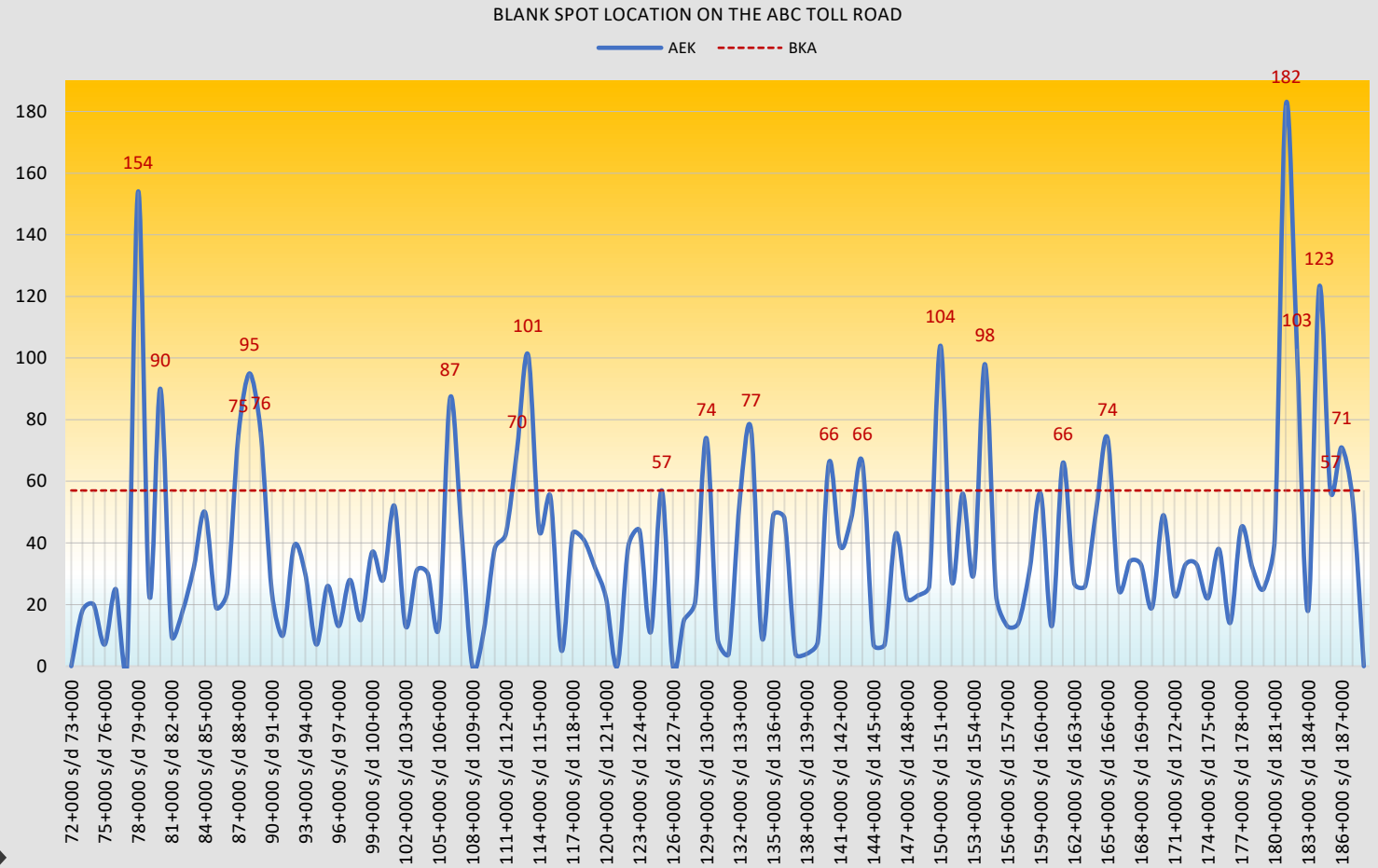
$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

BKA : Upper Control Limit
C : AEK Accident Rate

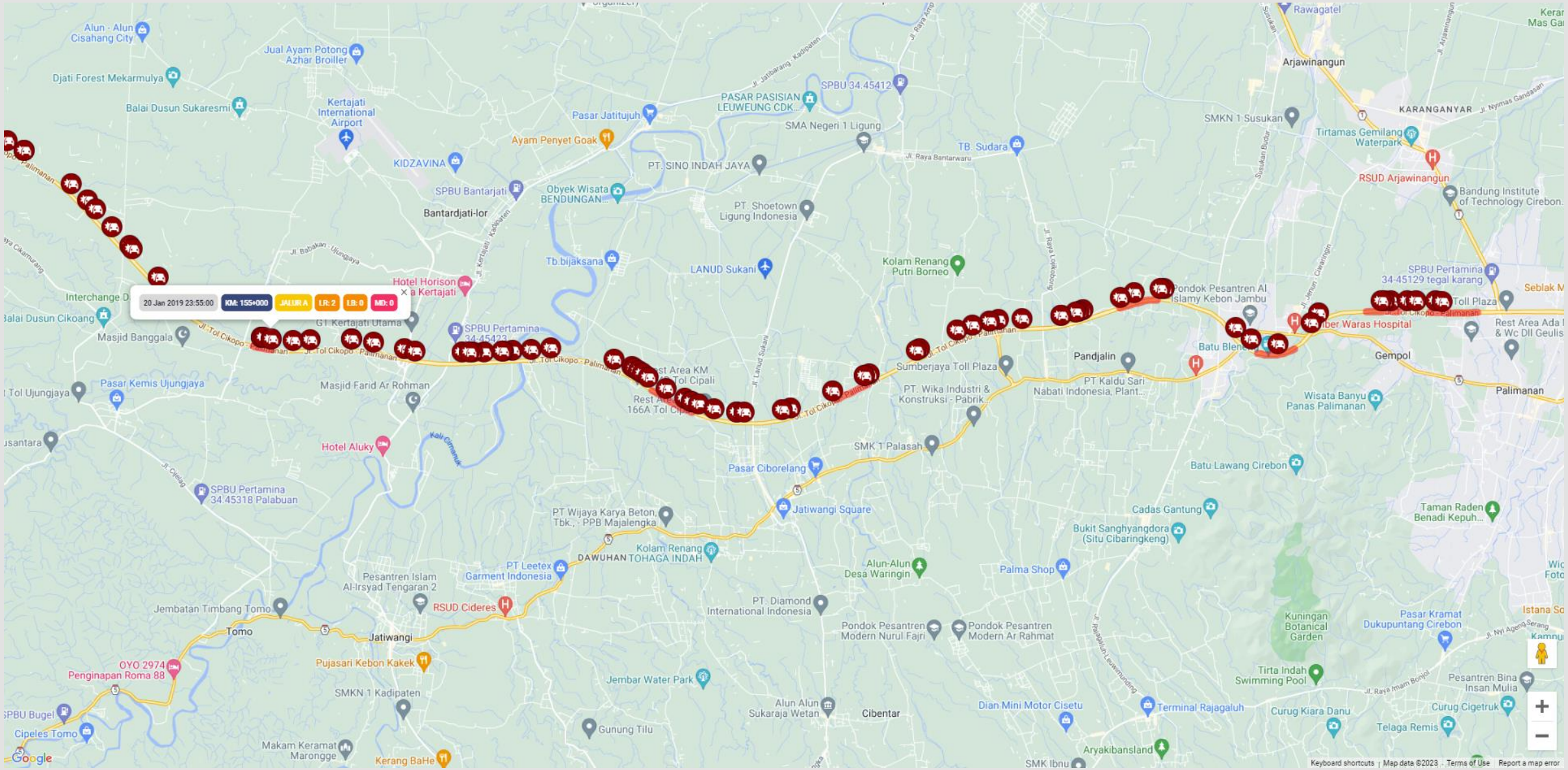
↓

Determining Blank Spot Location

$$AEK > BKA$$



01 TRAFFIC ACCIDENT ANALYSIS(BLACKSPOT)



01 TRAFFIC ACCIDENT ANALYSIS (ACCIDENT RATE)

Requirement : Additional (based on the results of the virtual meeting on December 7, 2022, ITRA requested the addition of an accident analysis module in the form of accident rates for each toll road in Indonesia)

Progress : 100% (ITRA was asked to add the calculation of "Fatality Rate" to the analysis module "accident rate")

Module Link : https://espm.varianglobal.com/accidentrate

The method used is also adopted from Guidelines for Handling Traffic Accident-Prone Locations in Indonesia No **PdT-09-2004-B** (same as guidelines for determining blackspot locations). The accident rate is calculated using the following equation:

$$T_k = \frac{F_k \times 10^6}{LHR_T \times n \times L \times 30}$$

T_k : Accident Rate (100 JPKP)
F_k : Frequency of traffic accidents for n-month data
LHR_T : Annual average traffic volume
n : Number of month data
L : Road length (km)
$100JPKP$: Accident rate unit (accident/one hundred million vehicle trips per-kilometre)

$$T_f = \frac{F_k \times 10^8}{LHR_T \times n \times L \times 30}$$

T_f : Accident Rate (100 JPKP)
F_k : Frequency of traffic accidents for n-month data
LHR_T : Annual average traffic volume
n : Number of month data
L : Road length (km)
$100JPKP$: Accident rate unit (accident/one hundred million vehicle trips per-kilometre)

No	Highway	L (Km)	T_k												F_k											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Cikampek - Palimanan	116,75	2,54	1,94	1,55	2,11	3,01	4,51	4,33	6,43	6,88	8,11	7,45	9,35	0,34	0,31	0,22	1,43	2,75	1,42	4,51	3,87	6,32	8,44	9,12	6,61
2	Cikampek - Padalarang	58,00	1,32	3,12	2,31	0	0	0	4,12	2,11	3,11	0	4,32	5,61	0,43	2,31	3,1	0	0	0	2,11	3,27	2,14	0	5,32	6,12
3	Semarang - Batang	75,00	4,12	1,11	0	0	0	0	0	0	0	0	2,11	5,15	1,44	0,12	0	0	0	0	0	0	0	0	4,12	3,11
4	Semarang - Solo	72,95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	Solo - Ngawi	90,12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Krian - Legundi - Manyar	29,00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	Ciawi - Sukabumi	15,35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	Jakarta - Bogor - Ciawi	59,00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

01 DETERIORATION TREND ANALYSIS

Requirement : Deterioration prediction for ITRA is only to see the trend of deterioration in individual toll road and periodically check whether the maintenance works carried out by TROs are proper or not

Progress : 100%

Module Link : https://espm.varianglobal.com/deterioration

IRI deterioration modelling for e-SPM adopts the **HDM-III (Highway Design and Maintenance) model simplification method** - Patterson & Attoh (1992) through the calculation stages:

Data Available
vgp_spm_trfvolsegments

Traffic Volume

Data Not Available
(using standard load)

Vehicle Load

$$VDF = \left(\frac{P}{k}\right)^4 \text{ ...(Eq 4.17)}$$

P : Axle load (ton)
k : Axle factor/configuration

Data Not Available
(input)

Pavement Layers

Data Not Available
(input / using standard)

Bearing Capacity of Subgrade / CBR (%)

$$SN_{sg} = 3.51 \log CBR - 0.86(\log CBR)^2 - 1.43 \text{ ...(Eq 4.14)}$$

CBR : In situ California Bearing Ratio of subgrade (%)

Data Available
vgp_spm_iriheads,
vgp_spm_iridetails

IRI Measurement Result

$$W_{18} = \sum LHR \times VDF \times D_D \times D_L \text{..... (Eq 4.16)}$$

LHR : Annual Average Daily Traffic (AADT)
VDF : Vehicle Damage Factor/Truck Factor (**Eq 4.17**)
D_D : Direction distribution factor
D_L : Lane distribution factor = 0,8 - 1,0 (PtT-01-2002-B Bina Marga)

Cumulative Standard Axle (CSA)

Structure Number of Pavement Strength

$$SNC = \{0.04 \times \sum(a_i \times h_i)\} + SN_{sg} \text{ ..... (Eq 4.13)}$$

a_i : Material and layer strength coefficient
h_i : Layer thickness (mm)
SN_{sg} : Subgrade contribution calculated by the formula Hodges et al, 1975 (**Eq 4.14**)

$$CSA_n = \sum_1^N W_{18} \text{ ..... (Eq 4.15)}$$

N : Year
W_{18} : Equivalent Single Axle Load (ESAL) (**Eq 4.16**)

IRI Deterioration Model (HDM-III Simplified)

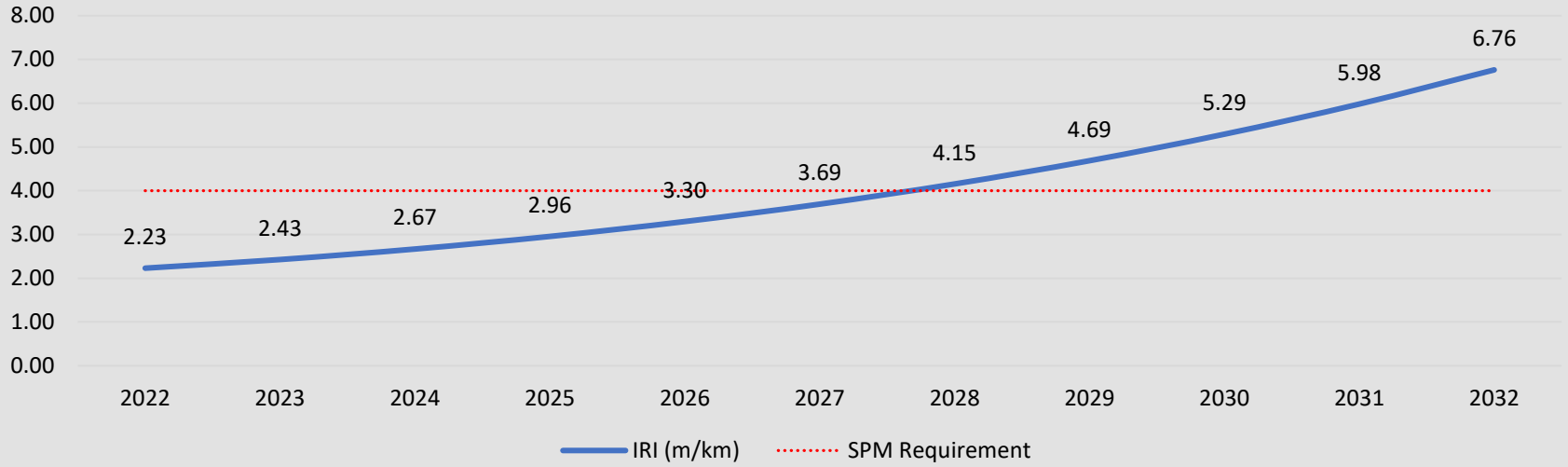
$$IRI_n = 1.04e^{0.023_n}\left|IRI_0 + 263(1 + SNC)^{-5} \times CSA_n\right| \text{ ..... (Eq 4.12)}$$

IRI_n : Road roughness of the road in the n^{th} year (m/km)
IRI_0 : Road roughness of the road in the base year (m/km)
SNC : Structure number of pavement strength (**Eq 4.13**)
CSA_n : Cumulative standard axle year-n (million ESA/lane) (**Eq 4.15**)

01 DETERIORATION TREND ANALYSIS (OUTPUT)

[Highway Name] **Toll Road**

Km [Sta Start] ([Direction]) - Km [Sta Finish] ([Direction])



Source:
Routine maintenance for roads and bridges, Bina Marga

IRI (m/km)	Road Condition
IRI ≤ 4	Good
IRI > 4 & IRI ≤ 8	Fair
IRI > 8 & IRI ≤ 12	Lightly Damaged
IRI > 12	Heavy Damage

Stationary		Section	Pavement Type	CBR rep. (%)	SNsg	SNC	IRI (m/km)										
Start	Finish						2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
6,800	6,900	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,23	2,43	2,67	2,96	3,30	3,69	4,15	4,69	5,29	5,98	6,76
6,900	7,000	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,99	3,24	3,53	3,87	4,27	4,73	5,26	5,86	6,54	7,31	8,18
7,000	7,100	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,19	2,38	2,62	2,91	3,24	3,64	4,10	4,62	5,23	5,91	6,69
7,100	7,200	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,08	2,27	2,50	2,77	3,10	3,49	3,94	4,45	5,04	5,72	6,48
7,200	7,300	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,93	2,11	2,33	2,59	2,91	3,28	3,72	4,22	4,80	5,46	6,20
7,300	7,400	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,28	2,48	2,72	3,02	3,36	3,76	4,23	4,76	5,37	6,07	6,85
7,400	7,500	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,33	2,53	2,78	3,08	3,42	3,83	4,30	4,84	5,46	6,16	6,95
7,500	7,600	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,51	1,66	1,85	2,09	2,37	2,71	3,11	3,57	4,11	4,72	5,42
7,600	7,700	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,24	1,37	1,55	1,76	2,03	2,34	2,72	3,15	3,66	4,25	4,92
7,700	7,800	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,95	2,13	2,35	2,62	2,94	3,31	3,75	4,25	4,83	5,49	6,24
7,800	7,900	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,61	1,77	1,97	2,21	2,50	2,85	3,25	3,73	4,27	4,90	5,61
7,900	8,000	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	7,22	7,74	8,32	8,97	9,70	10,50	11,40	12,40	13,50	14,72	16,06
8,000	8,100	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	8,16	8,74	9,38	10,10	10,90	11,79	12,77	13,85	15,05	16,36	17,81

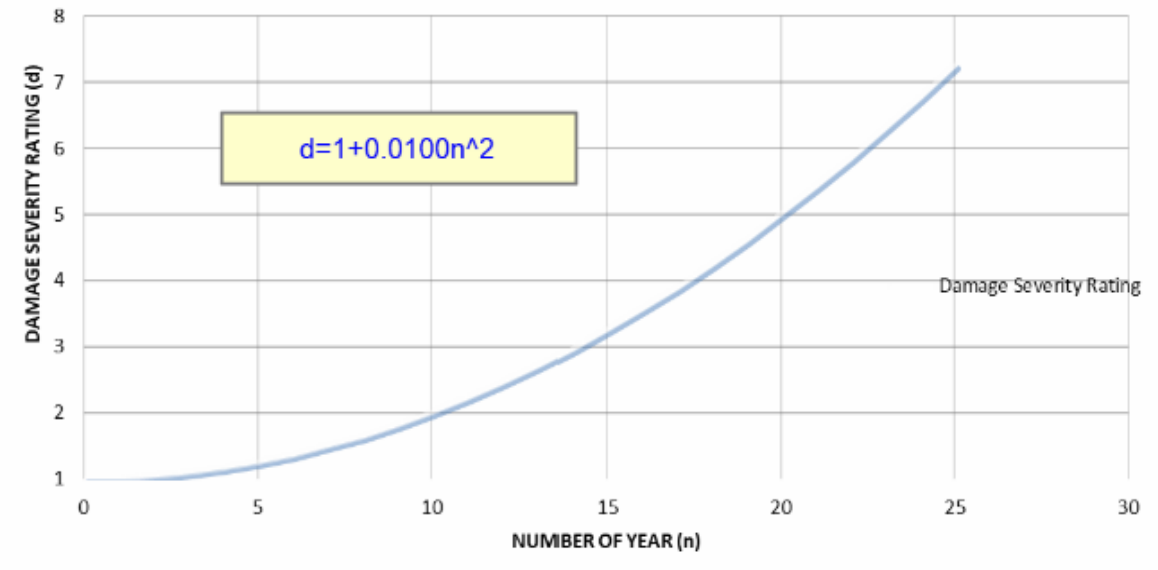
01 DETERIORATION FORECASTING MODEL

Requirements : Deterioration prediction for ITRA only to view the deterioration trend on each toll road and periodically check whether the maintenance work carried out by ITRA is proper or not

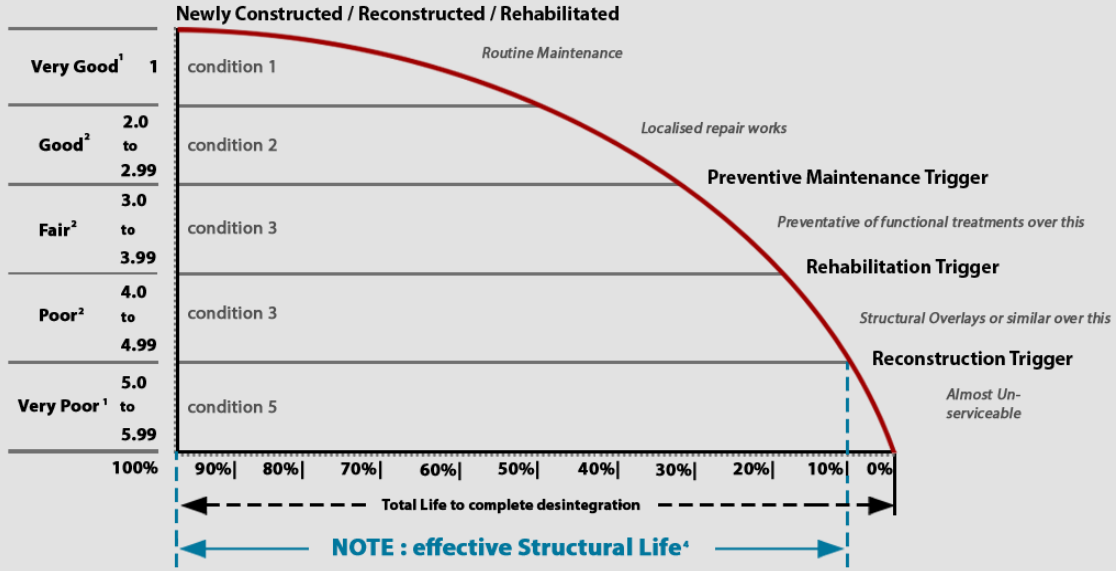
Progress : 100%

Module Link : https://espm.varianglobal.com/deterioration-jica

Based on the results of the meeting on January 27, 2023, the JICA Project Team requested the addition of a deterioration module as stated in the TRO. However, the deterioration model still exists. Referring to TRO, Bina Marga and CFRI are currently developing a general damage forecasting model using the regression method. The technical approach used is to determine the condition of the road pavement based on years of operation to get an estimate of the remaining service life. Road conditions are determined variable "Damage Severity Rating (d)" variable using a scale of 1-5 (1: Very Good, 2: Good, 3: Okay, 4: Less Good, 5: Very Poor).



Deterioration forecasting model (pavement) using regression method

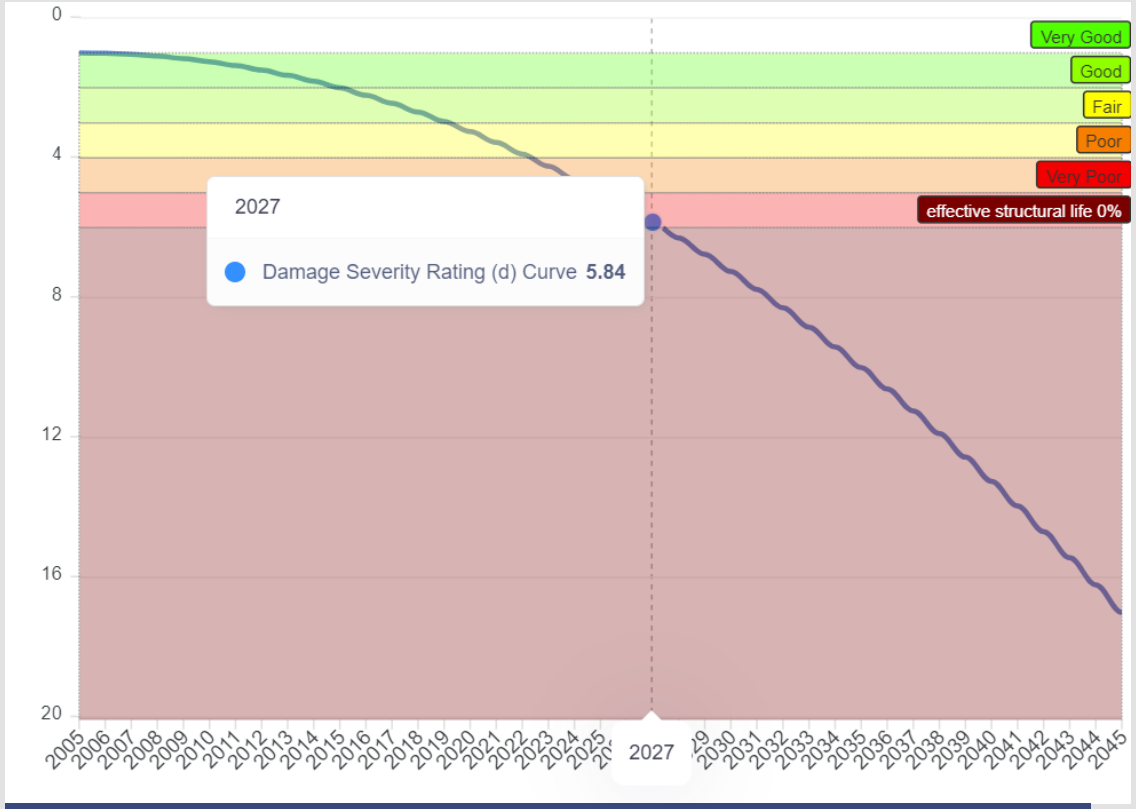


Typical pavement asset degradation curve

01 DETERIORATION FORECASTING MODEL

Highway	Operation Year	damage severity rating (d)	Status
Akses Tanjung Priok	2017	1.36	Very Good
Bakauheni - Terbanggi Besar	2019	1.16	Very Good
Balikpapan - Samarinda	2019	1.16	Very Good
Bekasi - Cawang - Kampung Melayu	2017	1.36	Very Good
Belawan - Medan - Tanjung Morawa	1989	12.56	effective structural life < 0%
Binjai - Langsa	2022	1.01	Very Good
Bogor Ring Road Seksi I-IIIA	2009	2.96	Good
Cawang - Tomang - Pluit	1987	13.96	effective structural life < 0%
Cengkareng - Batu Ceper - Kunciran	2021	1.04	Very Good
Ciawi - Sukabumi	2018	1.25	Very Good
Cibitung - Cilincing	2021	1.04	Very Good
Cikampek - Palimanan	2015	1.64	Very Good
Cikampek - Purwakarta - Padalarang	2005	4.24	Poor
Cileunyi - Sumedang - Dawuan	2022	1.01	Very Good
Cimanggis - Cibitung	2020	1.09	Very Good
Cinere - Jagorawi	2012	2.21	Good

Damage Severity Rating (d) Curve



Highway	Year	damage severity rating (d)	Status
Cikampek - Purwakarta - Padalarang	2005	1.00	Very Good
Cikampek - Purwakarta - Padalarang	2006	1.01	Very Good
Cikampek - Purwakarta - Padalarang	2007	1.04	Very Good

01 DETAILED INVESTIGATION

Requirement : The Sub-Consultant shall develop an analytic interface to recommend for the detailed investigation by analyzing the historical damage detection in the same location. Sub-Consultant shall create a list with recommended detailed investigation based on the threshold of damages detected in the same location/area. Also, upon double click of damage location point, the Sub-Consultant will develop a pop-up window to show details of damages including damage photos. Maintenance works carried out by TROs are proper or not.

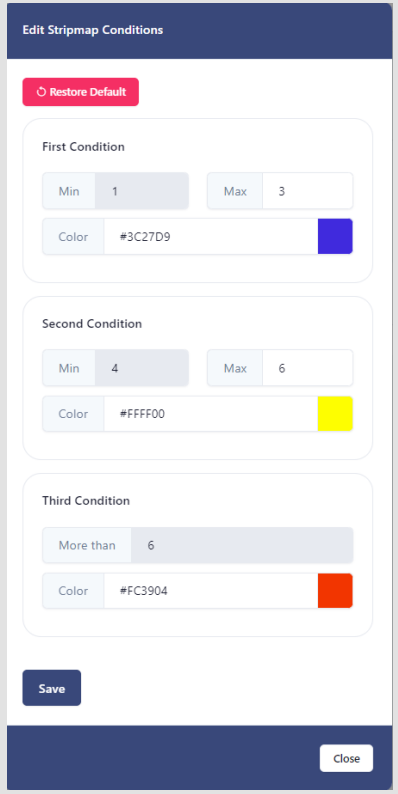
Progress : 100% (revised by adding custom number, issue completed)

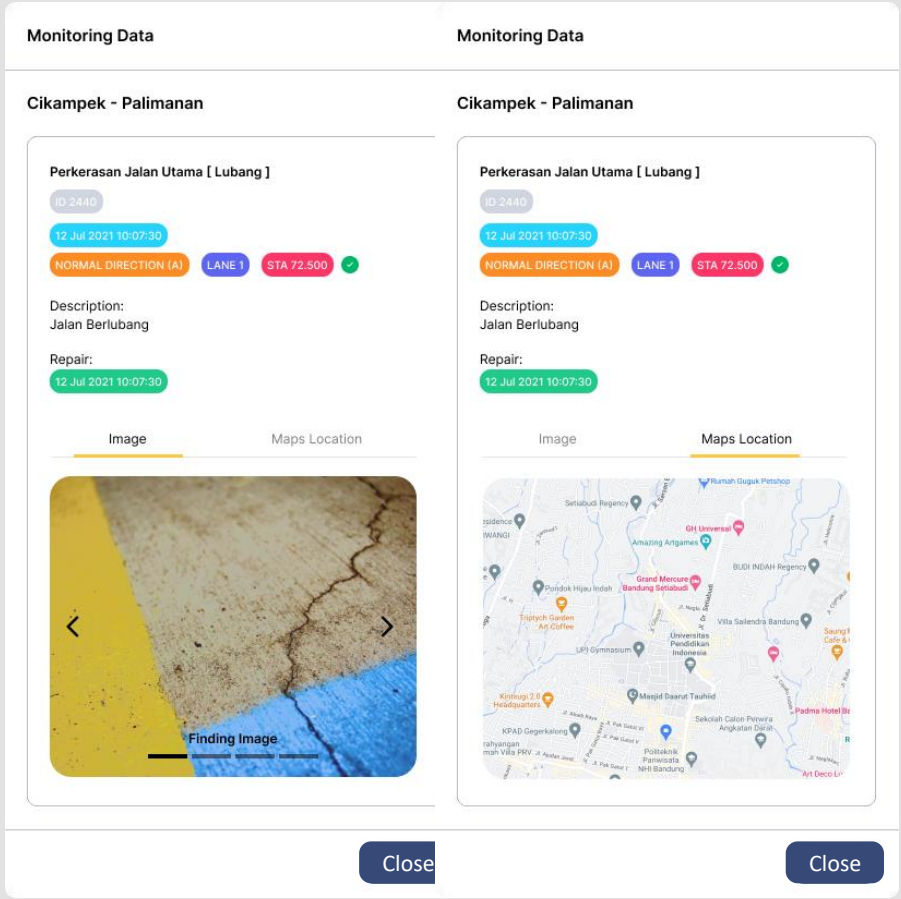
Module Link : https://espm.varianglobal.com/v1-stripmap

Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...
Direction →	ROW Fence						
	Drainage			2			
	Safety Fence						
	Outer Shoulder						
	Lane 1						
	Lane 2						
	Lane 3				3		
	Inner Shoulder						
	Median						
	Inner Shoulder						
	Lane 3						
	Lane 2						
	Lane 1					12	
	Outer Shoulder	8					
	Safety Fence						
	Drainage						
← Direction	ROW Fence						
Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...

number of issues = 1-5; number of issues = 5-10; number of issues : > 10

unrepair issue/damage



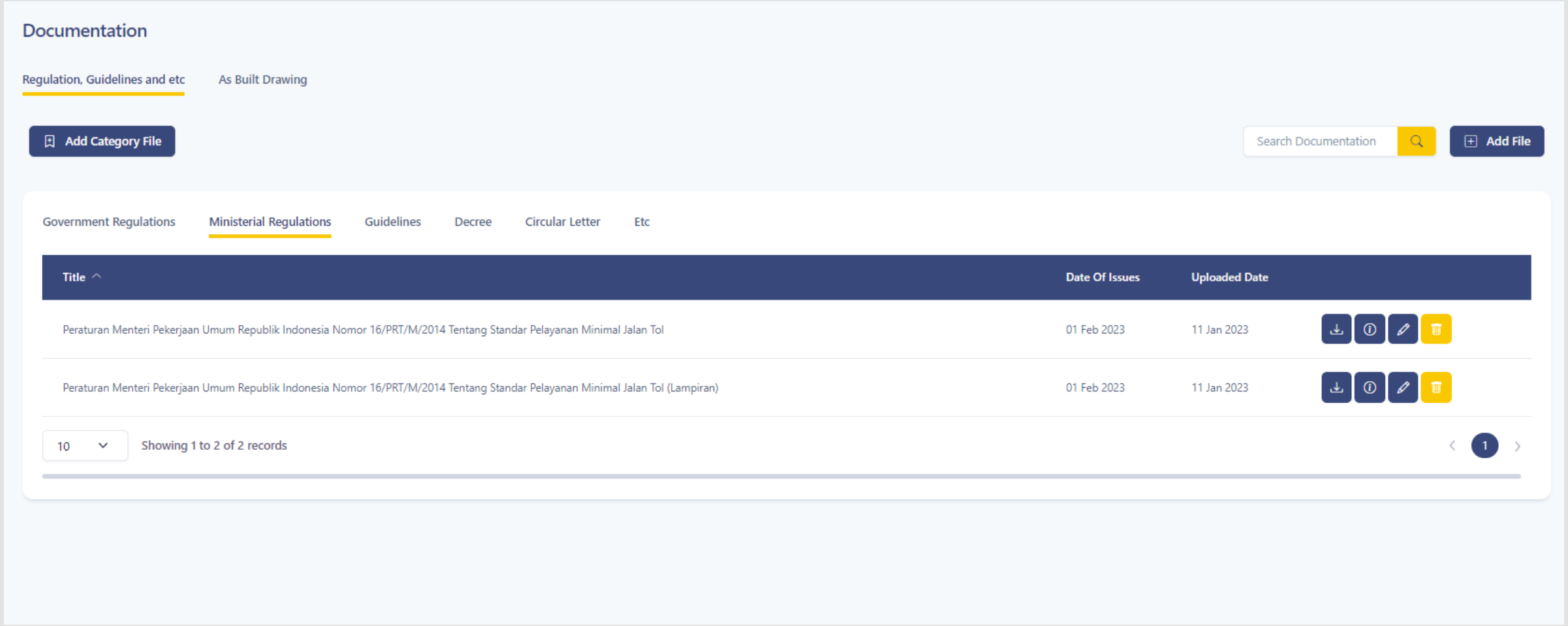


01 DOCUMENTATION

Requirement : Sub-Consultant shall develop document module to store relevant documents such as user manual, road maintenance manual, norms and standards, and project-related documents (As-Built Drawings, etc) in PDF format

Progress : 100% (revision of the addition of the publication date is complete)

Module Link : https://espm.varianglobal.com/documentation



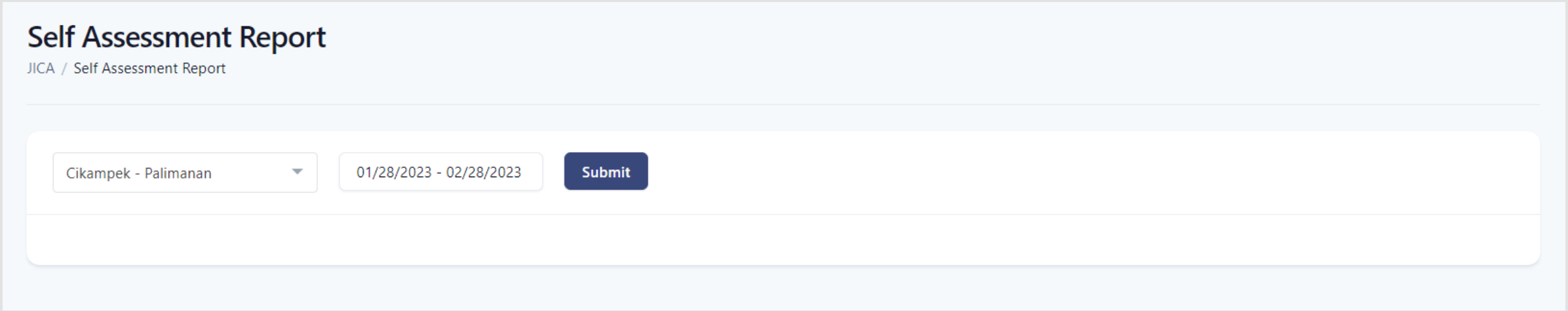
01 REPORTING

Requirement : The Sub-Consultant shall develop reporting tool to generate static (i.e., defined format) report and dynamic (i.e., user's selection). The format/template of static report will be provided by the Project in due course.

Progress : 100%

Module Link : https://espm.varianglobal.com/sa-report

Based on the results of discussions with ITRA, the report needed is the "Toll Road Operation and Maintenance Report" referring to the current hardcopy report format. The design of the report is presented separately in the appendix of this report. The data presented in the report will be filtered within the desired date range, with the user interface visible in the following image:





DEMO E-SPM

https://www.espm.bpjt.pu.go.id

Ministry of Public Works and Housing

REPUBLIC OF INDONESIA
PROJECT FOR STRENGTHENING MANAGEMENT CAPACITY OF TOLL ROAD DEVELOPMENT

Japan International Cooperation Agency

2nd WORKSHOP ON "SOCIALIZATION OF UPGRADED FEATURES OF E-SPM AND OPERATION OF E-SPM"

Dr. Bhoj Raj PANTHAA
JICA Expert

November 28, 2023

Asset Management or Managing Assets

Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

Then, what is the role of PUPR/BPJT/DGH in regard to toll road?

How about for national road?

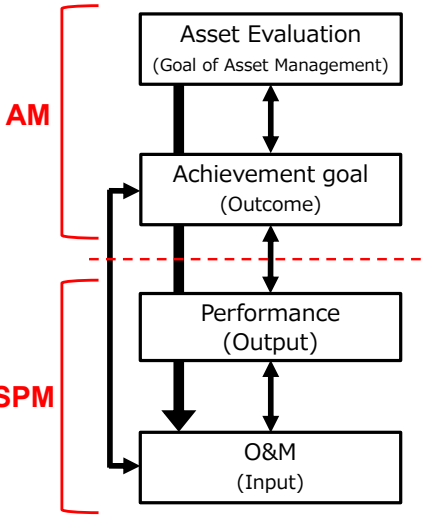
Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performance

Source : https://committee.iso.org/home/tc251

Concept of Asset Management in BPJT for PPP Toll Road Management

- Why should governments manage asset management data in PPP schemes?
  - To allow the government to see the history of the asset when the concession period ends, and the asset is handed over to the government.
  - Governments need to always manage all data about asset performance.
- In O&M stage
  - The Government (MPWH) is always responsible for the contractor's failure (responsibility for outcomes achievement), even if the risk is transferred to the contractor (TROs).
- Government takes risks and is accountable to the public
  - **Quality assurance of assets**
  - Road and facility malfunctions
  - Road accident and safety
  - Road surrounding environment, etc.



Hierarchical Management Cycle for Toll Road Operation

ASSET MANAGEMENT

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

MANAGING ASSET

New action based on the direction from TOP Management

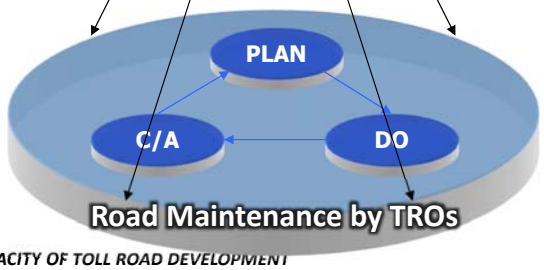


Report and data accumulation from O&M work

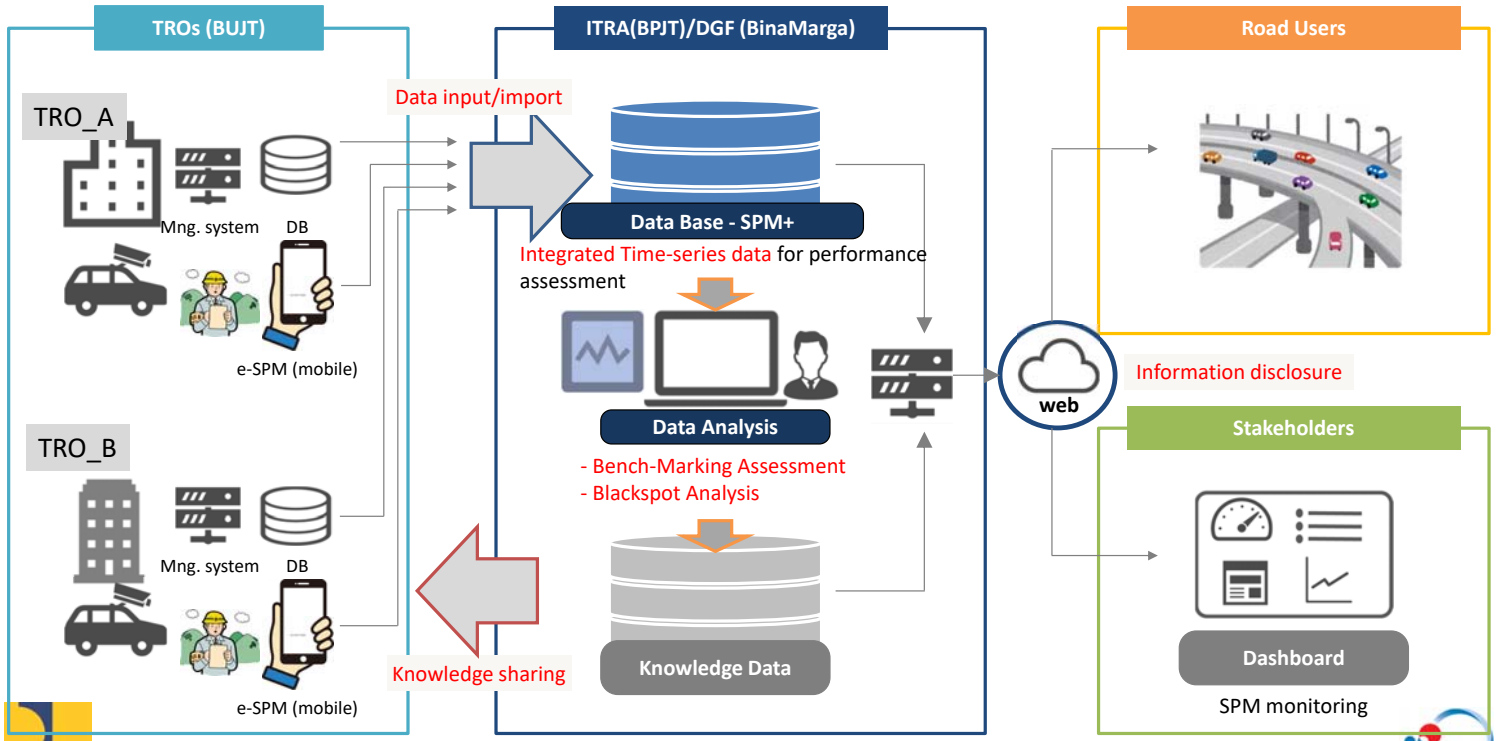








Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading

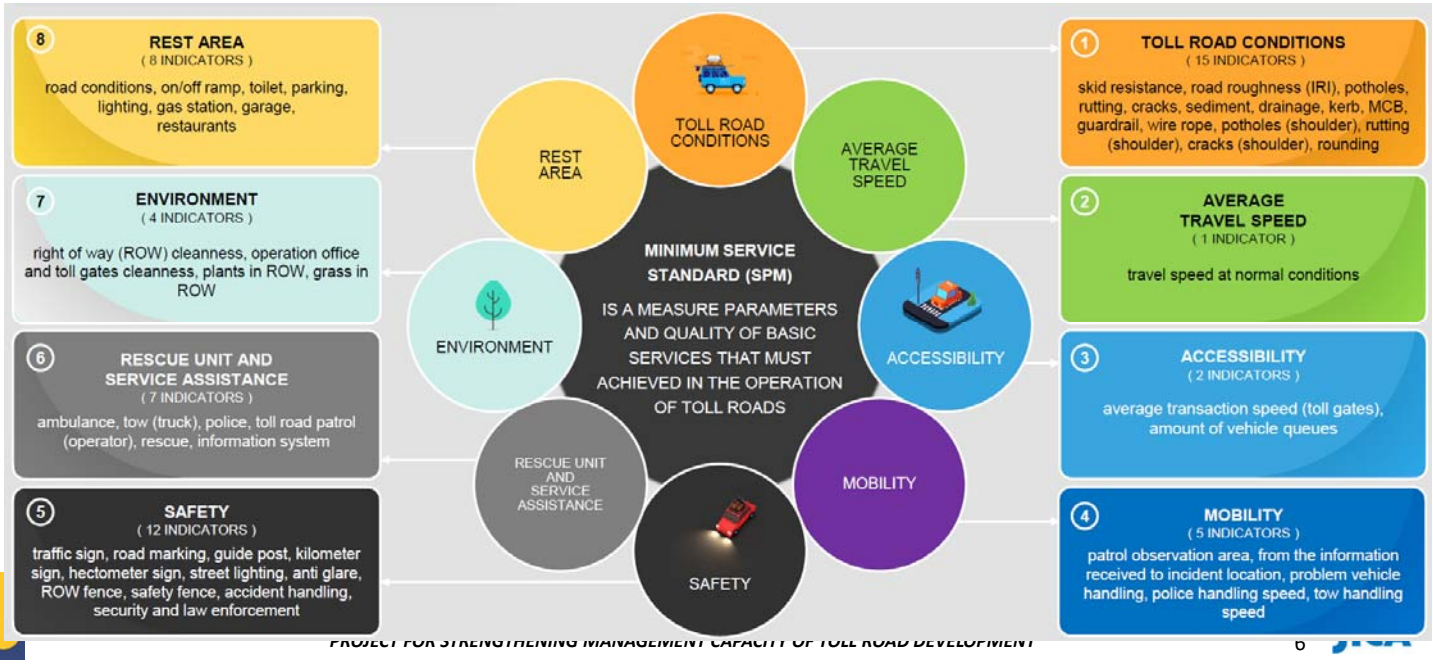


8 Substances
54 Indicators

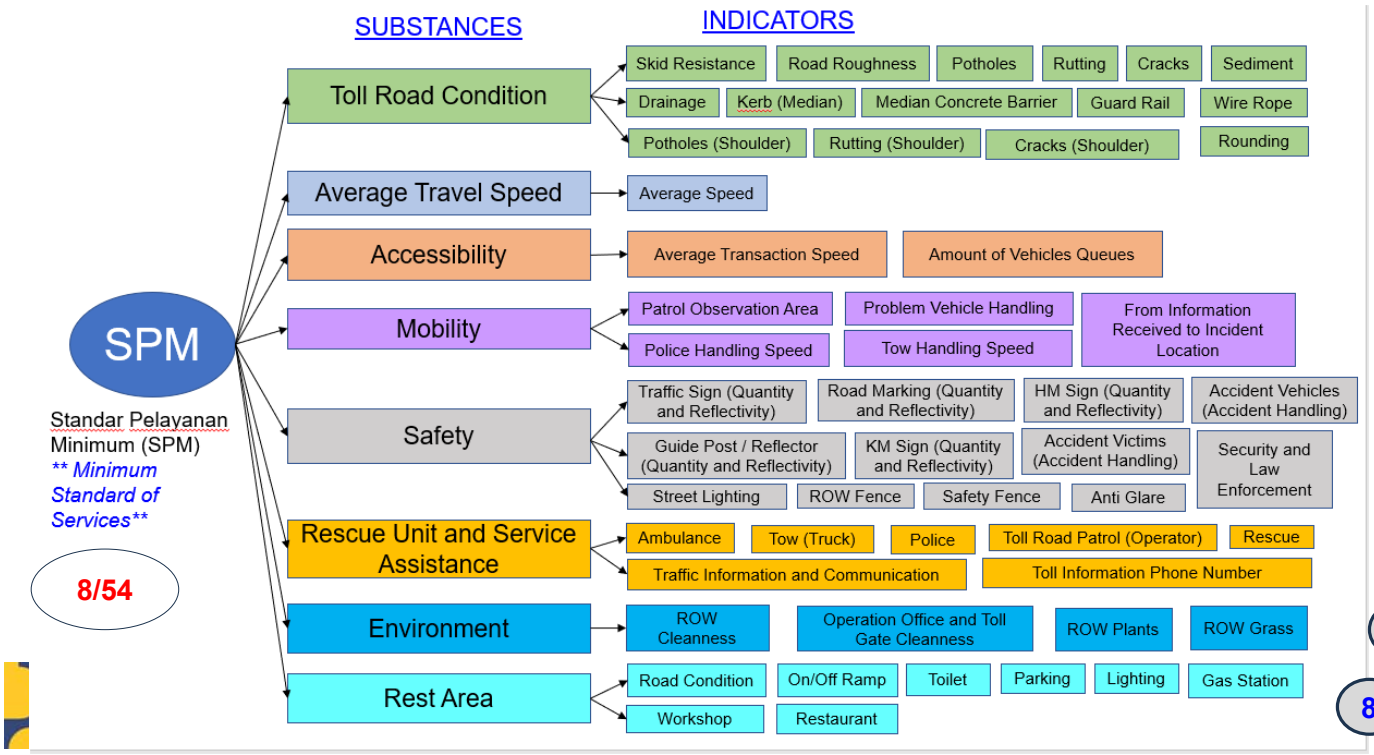
SPM Monitoring



- Regulation No. 16 Year 2014 (Stipulates the Obligations of SPM Monitoring)

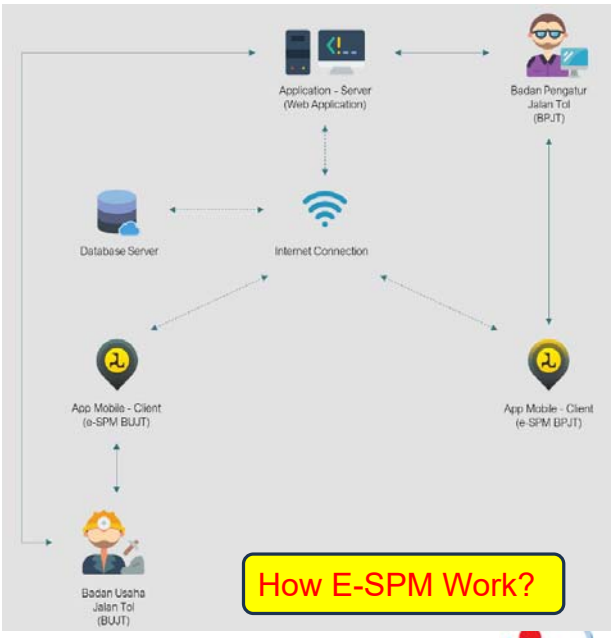


Minimum Standard of Services (SPM) Outline



Electronic - Minimum Standard of Service (E-SPM)

CONVENTIONAL METHOD	USING E-SPM Why E-SPM?
› Data collection by manual	✓ Data collection by mobile App
› Monitoring report is created manually	✓ Inspection report is generated automatically by e-SPM
› Repair reports are created manually by toll road operator, and sent to BPJT when repairs has been completed	✓ Repair reports are available on e- SPM, which can be accessed by toll road operator (BUJT) and BPJT at any time without having to wait for the repair to be fully completed.



SPM Monitoring – Frequency of SPM fulfillment by e-SPM

TOLL ROAD CONDITIONS

No	Fulfillment Indicators	Freq
1	Skid Resistance (Main Road)	Annual
2	Road Roughness (Main Road)	Annual
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Sediment	Daily
7	Drainage	Daily
8	Kerb (Median)	Daily
9	MCB (Median Concrete Barrier)	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

AVERAGE TRAVEL SPEED

No	Fulfillment Indicators	Freq
1	Travel Speed at Normal Condition	Monthly

ACCESSIBILITY

No	Fulfillment Indicators	Freq
1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly

MOBILITY

No	Fulfillment Indicators	Freq
1	Patrol Observation Area	Monthly
2	From The Information Received to Incident Location	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

SAFETY

No	Fulfillment Indicators	Freq
1	Traffic Sign (quantity and reflectivity)	3 Month
2	Road Marking (quantity and reflectivity)	3 Month
3	Guide Post / Reflector (quantity and reflectivity)	3 Month
4	Kilometer Sign (quantity and reflectivity)	3 Month
5	Hectometer Sign (quantity and reflectivity)	3 Month
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims (Accident Handling)	Monthly
11	Accident Vehicles (Accident Handling)	Monthly
12	Security and Law Enforcement	Monthly

RESCUE UNIT, SERVICE ASISTANCE

No	Fulfillment Indicators	Freq
1	Ambulance	Monthly
2	Tow (Truck)	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Information and Communication	Monthly
7	Phone Number for Toll Info	Monthly

ENVIRONTMENT

No	Fulfillment Indicators	Freq
1	ROW Cleanness	Daily
2	Operation and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Month
4	ROW Grass	3 Month

REST AREA

No	Fulfillment Indicators	Freq
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

- Routine, Every Day
- Periodic, Every Month
- Periodic, Every 3 Month
- Periodic, Every Year

What will happen if SPM requirements are not fulfilled?
>> Existing regulations, cancellation of concessionaire contract only.
>> New regulations (yet to go for enforcement), warning, rejection for tariff adjustment, penalty, cancellation of contract

Why e-SPM Upgrading Necessary?

e-SPM Mobile (Applicable at Site)



- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Web e-SPM

1. Dashboard

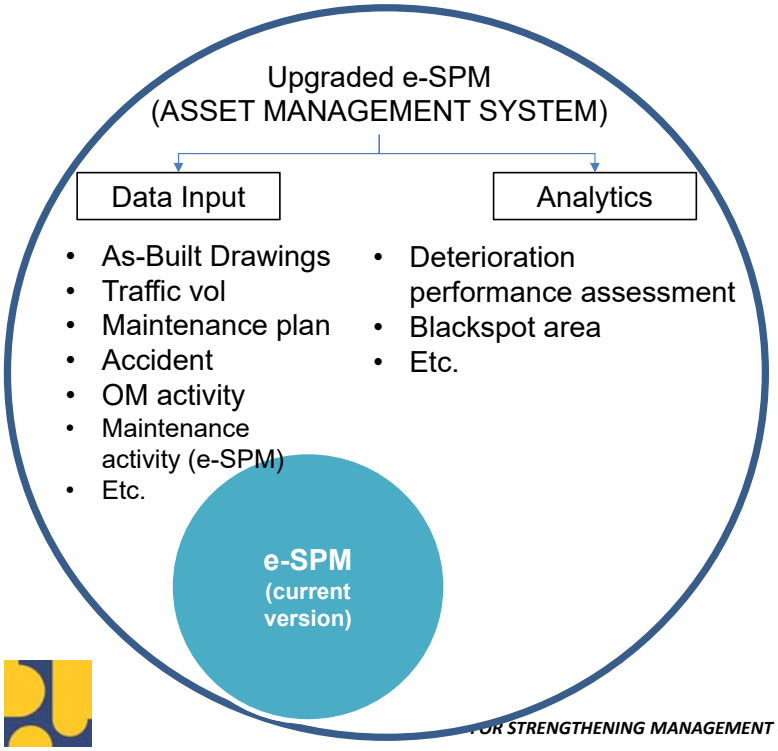
2. Data Inputting
- SPM Monitoring Data
  - Road Condition (Partially)
  - Mobility
  - Safety (Partially)
  - Rescue and Service (Partially)

3. Analytics Module
- Statistical Analysis of Various Indicators

Are inputted information sufficient for PPP toll road management?

Are there sufficient analysis tools for toll road monitoring?

Rationale for e-SPM Upgrading



- e-SPM would be part of Asset Management System (AMS)
- AMS content:
  - Technical Information about toll road
  - Performance data
  - Other information
  - Analytics
- AMS will used for general estimation about road performance, not for budget optimalization, so that government could evaluate TRO's activities
- AMS shall feedback provide useful information for better Asset management to TROs
- AMS will be used by ITRA for monitoring all activities

Concept of e-SPM Upgrading for Asset Management

- **Enhanced data input function**
  - Improving operational efficiency by promoting digitalization of SPM operations
  - Improvement of data reliability
- **Enhanced data analysis function**
  - Analytical capabilities for assessing the performance of TROs' asset management
- **Strengthening data utilization methods**
  - Feedback to TROs for better Asset Management Activity
  - Providing information to road users and related organizations

Framework for Upgrading e-SPM

To be Expanded by JICA Project	Why Upgrading E-SPM?
1. Data Inputting • Inventory Data • Maintenance Plan • Traffic Volume	**1. Data Inputting** • Inventory Data>>> Incomplete Inventory Data • Maintenance Plan>>> Not available in the existing version • Traffic Volume>>> Not available in existing version
2. Analysis Module • SPM Monitoring • Performance Evaluation (TRO) • Black Listing Evaluation (TRO) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation	**2. Analysis Module** • SPM Monitoring >>>Available in the current version but only table only • Performance Evaluation (TRO)>>>Not available in existing version • Black Listing Evaluation (TRO)>>> Not available in existing version • Accident (Black Spot) Analysis>>> Not available in existing version • Deterioration Trend Analysis>>> Not available in existing version • Detailed Investigation>>> Not available in existing version
3. Reporting Module	**3. Reporting Module>>>** Not available in existing version
4. Document Module	**4. Document Module>>>** Not available in existing version

AMS Framework (E-SPM Upgrading)

1. Data Inputting Interface
   - 1.1 Develop an interface to input basic inventory data including As-Built Drawings
   - 1.2 Develop interface for inputting maintenance plans
   - 1.3 Traffic Volume Data (Extraction/conversion from current E-SPM)
   - 1.4 Traffic Accident Data (Extraction/conversion from current E-SPM)
2. Analysis Modules
   - 2.1 A single interface to monitor SPM indicators recorded by TRO and ITRA Inspection Team on top of minimum indicator stipulated by regulation
   - 2.2 Performance Evaluation of TROs (Updating in current rating system)
   - 2.3 Blackspot Analysis (Accident Data Analysis)
   - 2.4 Rank TROs based on unrepair/noncompliance events (blacklist rating)
   - 2.5 Deterioration Trend Analysis (same as NR Model??)
   - 2.6 An interface to recommend detailed investigation based on defects repetition
3. Integration with Other System
4. Reporting Module
5. Documentation Module

Overall Structure of the Upgraded e-SPM



Android Application (e-SPM Mobile) (Applicable at Site)

- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Application Server (e-SPM Web)









API

- Other Systems integrated to e-SPM (IIRMS, ???)

e-SPM Database

Existing E-SPM	To be Expanded by JICA Project
1. Dashboard	**1. Data Inputting** • Inventory Data • Maintenance Plan • Traffic Volume
2. Data Inputting • SPM Monitoring Data ❖ Road Condition (Partially) ❖ Mobility ❖ Safety (Partially) ❖ Rescue and Service (Partially)	**2. Analysis Module** • SPM Monitoring • Performance Evaluation (TRO) • Black Listing Evaluation (TRO) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation
3. Analytics Module • Statistical Analysis of Various Indicators	**3. Reporting Module**
	4. Document Module

Inventory Data Inputting Interface

No	Inventory Data / Data Inputting	Module Link	Data Attributes			
1	Highway Segments	https://espm.varianglobal.com/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp	▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude	▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year	▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*)
2	Toll Gates	https://espm.varianglobal.com/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name	▪ Gate Type ▪ Transaction Type ▪ Entrance Booth	▪ Exit Booth ▪ Direction ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Station	https://espm.varianglobal.com/rescuestation	▪ ID ▪ Highway ID	▪ Station Name ▪ Direction	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Description
4	Vehicle Service	https://espm.varianglobal.com/v1-kendaraanlayanan	▪ ID ▪ Highway ID	▪ Rescue Station ID ▪ Vehicle Code	▪ Vehicle Type ▪ Police Number	▪ Vehicle Number ▪ Description
5	Bridges	https://espm.varianglobal.com/bridge	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position	▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure	▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.varianglobal.com/restarea	▪ ID ▪ Highway ID ▪ Rest Area Name	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Direction	▪ Rest Area Type ▪ Pavement Type

Maintenance Plan

Article 8 Maintenance of concession agreement (sample)

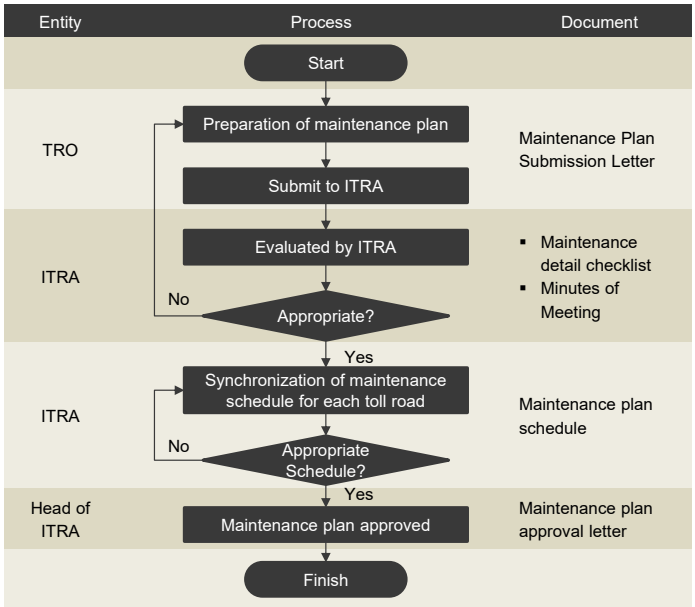
8.1 Maintenance Obligations

8.1.1. Toll Road Business Entities are required to submit a Maintenance program Plan, during the Operational period which has been discussed with the Government, no later than 60 (sixty) Days after the issuance of the Operational Stipulation, to obtain Government's approval.

8.2 Report

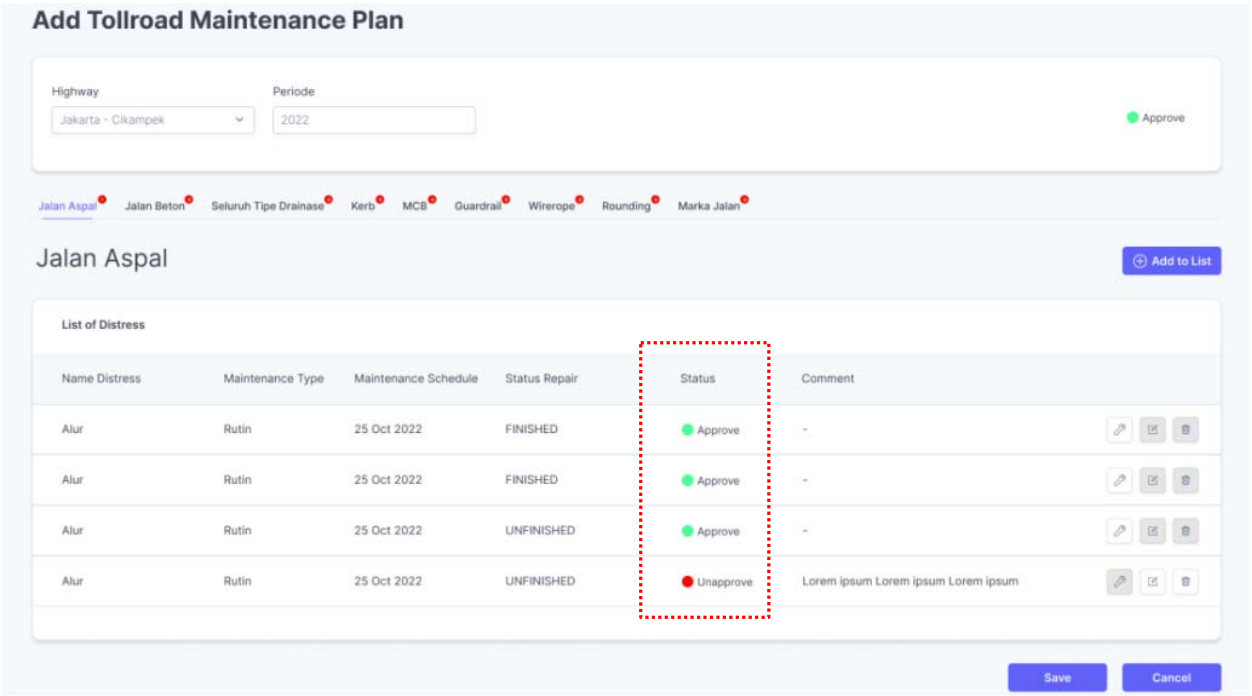
Toll Road Business Entities are required to submit a Quarterly Report on Maintenance activities no later than the 20 (twentieth) day of the following month. Toll Road Business Entities are required to report to the Government the condition of Toll Roads every 20 (twentieth) January of the following year and every subsequent year.

Maintenance Plan



- Maintenance plan must be reported by TRO **annually**
- Maintenance plan prepared only for periodic maintenance and upgrading maintenance
- Maintenance plan are classified in 3 categories, including: Toll Road; Bridges; Services Area (each category has several indicators)
- Each category is reported in the form of damage details, repair plan, repair schedule, and strip map (certain indicators)
- The maintenance plan applies an approval system by ITRA
- The details of the maintenance plan will be reviewed by ITRA, ITRA will approve or reject one by one the detailed data that has been reported by the TRO
- Schedule synchronization by ITRA on the consideration of several programs such as: SPM fulfilment, rate adjustment, prohibition of work on holidays and new year, etc.
- The maintenance plan report that has been evaluated will be approved by the head of ITRA
- The approved maintenance plan will be used as a reference for ITRA to monitor and evaluate repair results **(repair activity must also be reported by TRO)**

Management of Maintenance Plan



SPM Monitoring – Macro Analysis

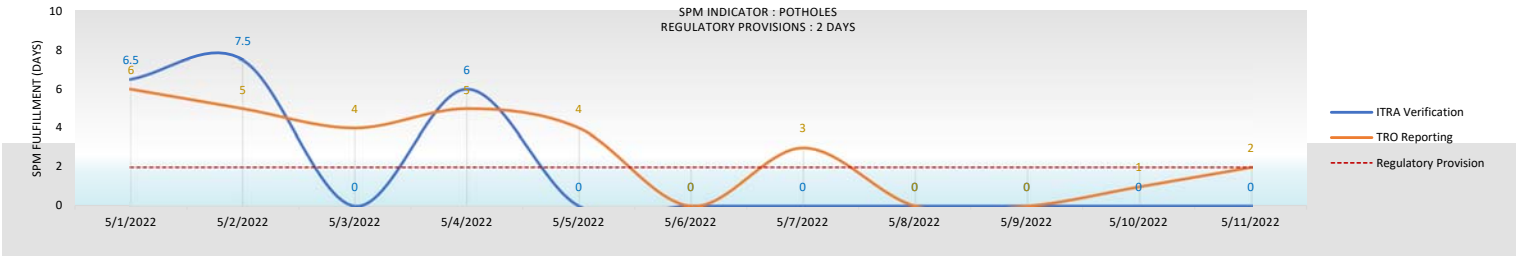
The analysis feature is to find out the comparison of SPM fulfillment by TRO, ITRA and regulatory provisions. The technical approach will be described through a sample case of SPM fulfillment.

ITRA Verification			TRO Reporting		
Damage Found (Date)	Repair Date	Repair Duration (Days)	Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5	01/05/2022	07/05/2022	6
01/05/2022	06/05/2022	5	02/05/2022	07/05/2022	5
01/05/2022	09/05/2022	8	03/05/2022	07/05/2022	4
01/05/2022	09/05/2022	8	04/05/2022	09/05/2022	5
02/05/2022	09/05/2022	7	04/05/2022	09/05/2022	5
02/05/2022	10/05/2022	8	04/05/2022	09/05/2022	5
04/05/2022	10/05/2022	6	05/05/2022	09/05/2022	4
04/05/2022	10/05/2022	6	07/05/2022	10/05/2022	3
04/05/2022	10/05/2022	6	10/05/2022	11/05/2022	1
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfillment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Damage found (datetime format)

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



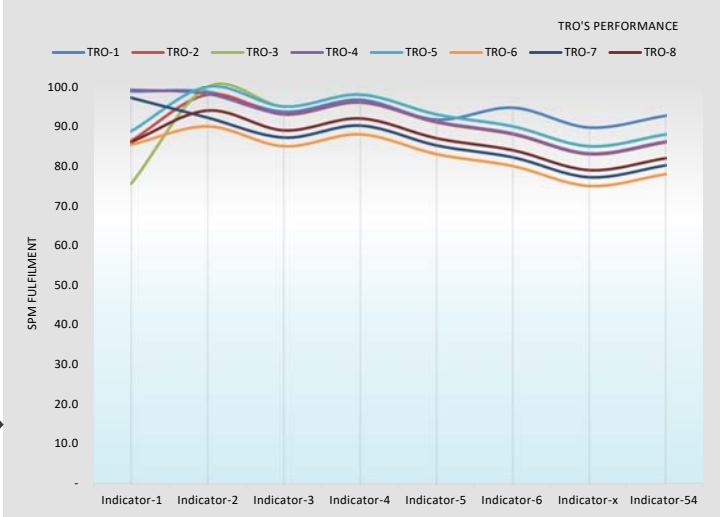
Performance Evaluation – Macro Analysis

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road.

Indicator	SPM Fulfilment							
	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators
n_{finish} : Amount of damage that has been repaired
n : Amount of damage/issue



Performance Evaluation – Macro Analysis - Blacklisting

The results of the ranking evaluation of SPM achievement are displayed Points are awarded for achievement against the criteria set for each SPM indicator and the corresponding time for repair, etc. The scores of the TROs are calculated and displayed in the ranking.

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

iv : Indicator Value
a : Indicator-a
n : Amount of damage/issue in 1 indicator
$jptw$: Number of repairs on time
iw : Indicator Weight
ipv : Indicator Percentage Value (%)
sv : Substance Value
54 : Total amount of indicators
b : Substance-b

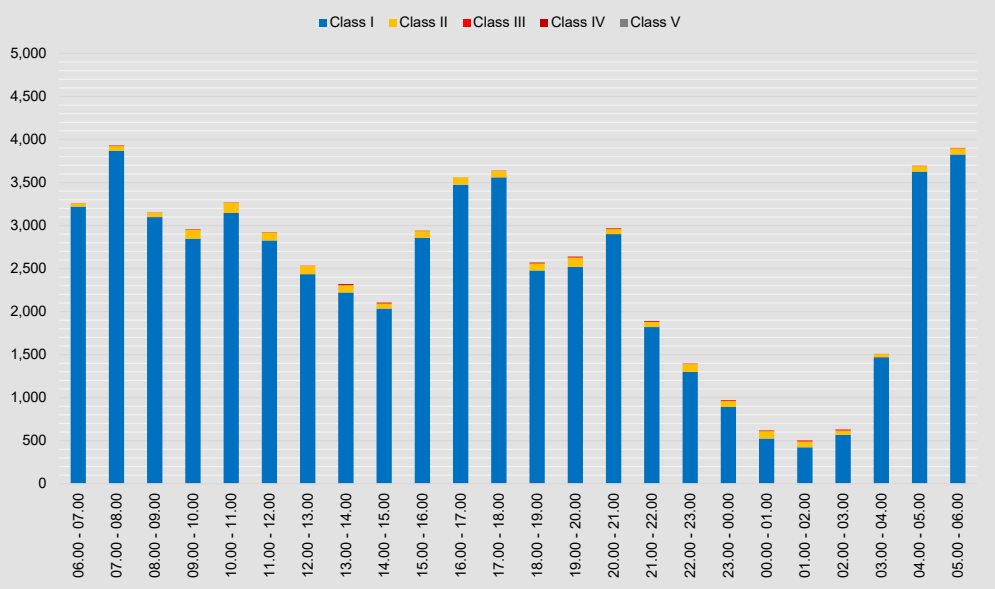
Weighting of substances

No	Ssubstances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Assistance	10.47
7	Eenvironment	3.40
8	Rest Area	4.67
	Total	100.00

No	TRO	Fulfilment Percentage by Substances Score Range: 0 - 100 Minimum Score: 75								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

Traffic Volume Data

No	Data Attributes
1	ID
2	Highway
3	Highway Segment
4	Traffic Date
5	Name of Traffic Counting Station
6	Chainage of Traffic Counting Station (Km)
7	Latitude of Traffic Counting Station
8	Longitude of Traffic Counting Station
9	Traffic Counting Method
10	Description
11	Class 1 Traffic Volume at 00 am - 01 am
…	…
34	Class 1 Traffic Volume at 11 pm - 12 am
35	Class 2 Traffic Volume at 00 am - 01 am
…	…
58	Class 2 Traffic Volume at 11 pm - 12 am
59	Class 3 Traffic Volume at 00 am - 01 am
…	…
82	Class 3 Traffic Volume at 11 pm - 12 am
83	Class 4 Traffic Volume at 00 am - 01 am
…	…
106	Class 4 Traffic Volume at 11 pm - 12 am
107	Class 5 Traffic Volume at 00 am - 01 am
…	…
130	Class 5 Traffic Volume at 11 pm - 12 am



Traffic Accident Data Analysis (Blackspot Analysis

Based on the Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

↓

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

↓

Determining the Upper Control Limit (BKA)

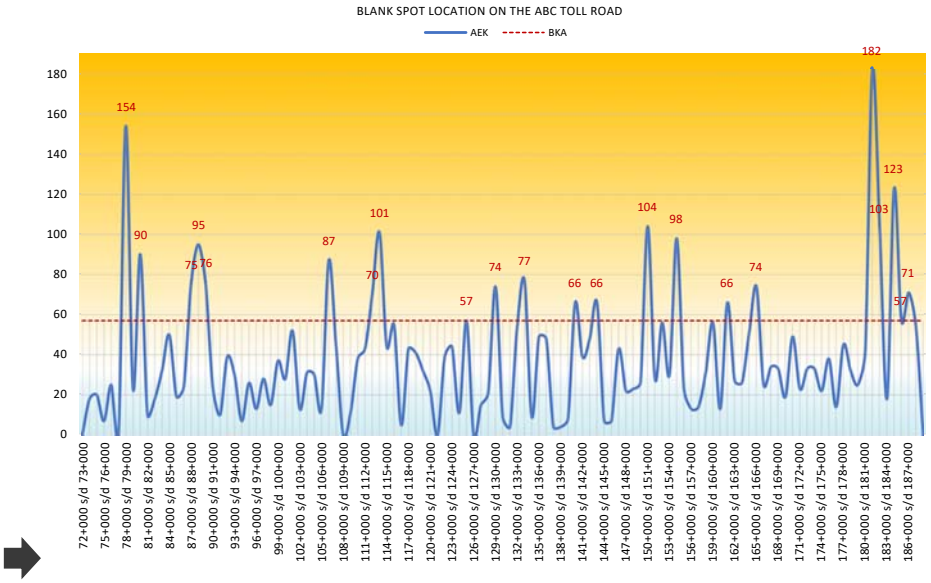
$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

BKA : Upper Control Limit
C : AEK Accident Rate

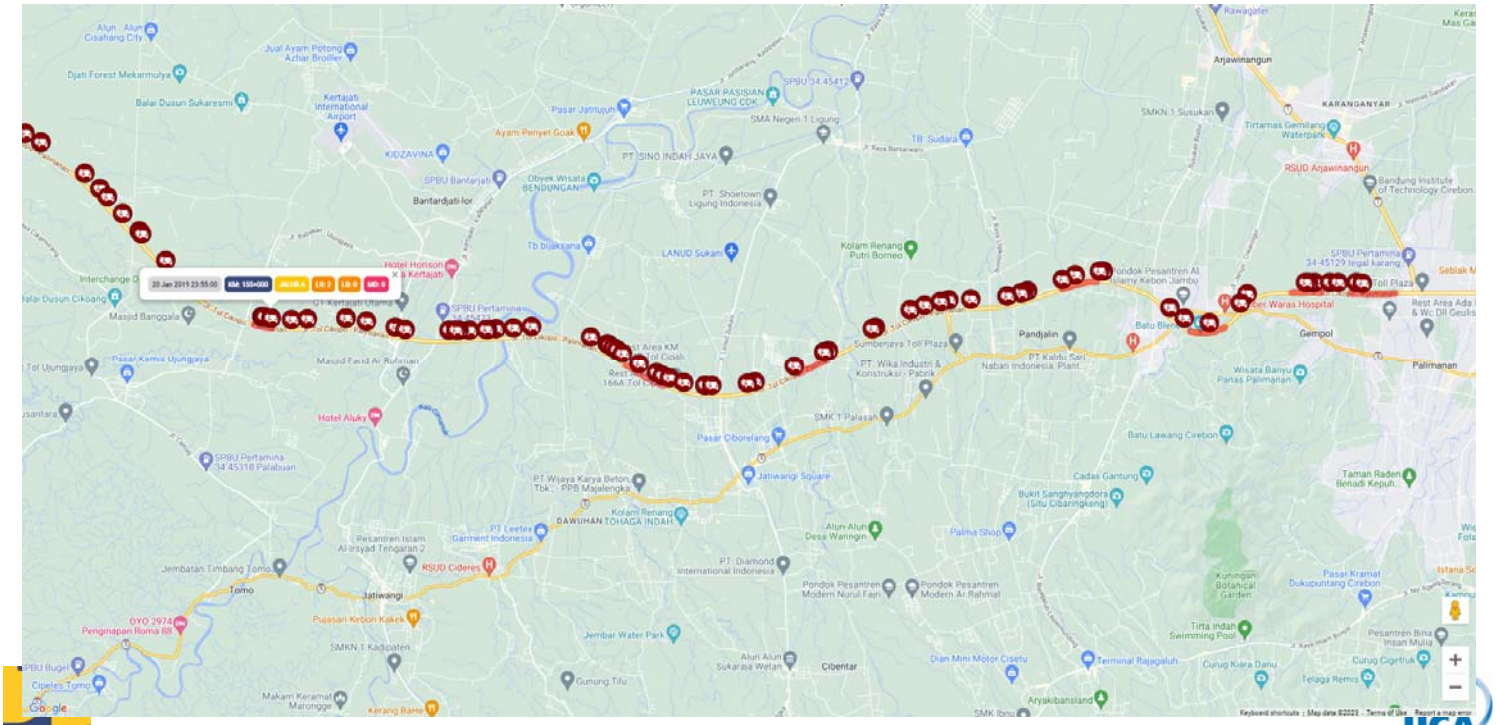
↓

Determining Blank Spot Location

$AEK > BKA$



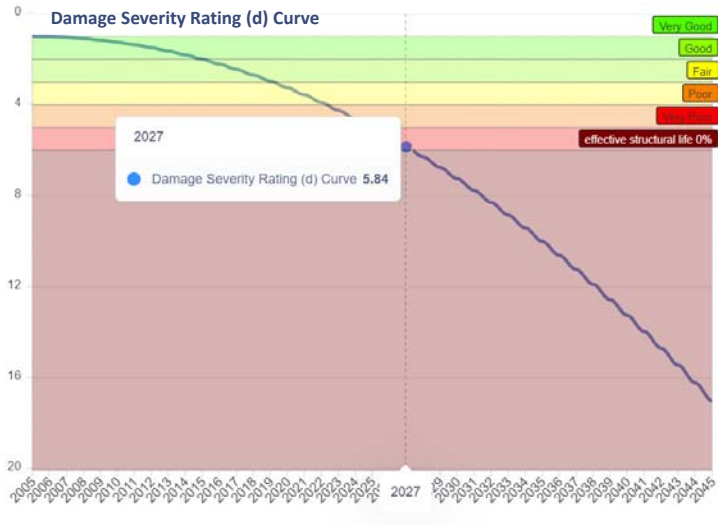
Traffic Accident Data Analysis (Blackspot Analysis)



Performance Evaluation – Micro Analysis – Deterioration Performance

- Deterioration Prediction Model ≠ Deterioration Performance Evaluation
- The actual performance of each route or road segment is checked if it is fast or slow by comparison to a Bench-Mark case of deterioration speed based on the data collected.

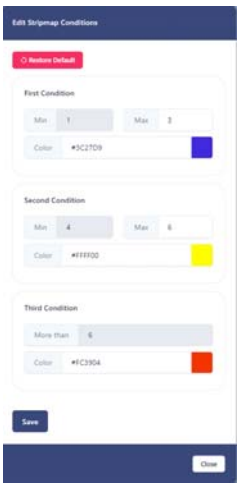
Highway	Operation Year	damage severity rating (d)	Status
Akses Tanjung Priok	2017	1.36	
Bakauheni - Terbanggi Besar	2019	1.16	
Balikpapan - Samarinda	2019	1.16	
Bekasi - Cawang - Kampung Melayu	2017	1.36	
Belawan - Medan - Tanjung Morawa	1988	12.56	
Binjai - Langsa	2022	1.01	
Bogor Ring Road Seksi I-IIIA	2009	2.96	
Cawang - Tomang - Pluit	1987	13.96	
Cengkareng - Batu Ceper - Kunciran	2021	1.04	
Ciawi - Sukabumi	2018	1.25	
Cibitung - Cilincing	2021	1.04	
Cikampek - Palimanan	2015	1.64	
Cikampek - Purwakarta - Padalarang	2005	4.24	
Cileunyi - Sumedang - Dawuan	2022	1.01	
Cimanggis - Cibitung	2020	1.09	
Cinere - Jagorawi	2012	2.21	

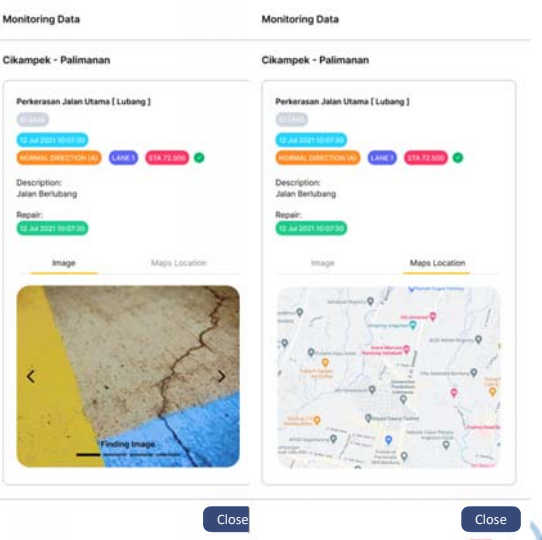


Performance Evaluation – Micro Analysis – Recommendation for Detailed Investigation

An analytic module to recommend for the detailed investigation by analyzing the historical damage detection in the same location. A list with recommended detailed investigation based on the threshold of damages detected in the same location/area is shown. Also, upon double click of damage location point, the Sub-Consultant will develop a pop-up window to show details of damages including damage photos. Maintenance works carried out by TROs are proper or not.

Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...
Direction →	ROW Fence						
	Drainage			2			
	Safety Fence						
	Outer Shoulder						
	Lane 1						
	Lane 2						
	Lane 3				3		
	Inner Shoulder						
	Median						
	Inner Shoulder						
	Lane 3						
	Lane 2						
	Lane 1					12	
	Outer Shoulder	8					
	Safety Fence						
	Drainage						
← Direction	ROW Fence						
Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...

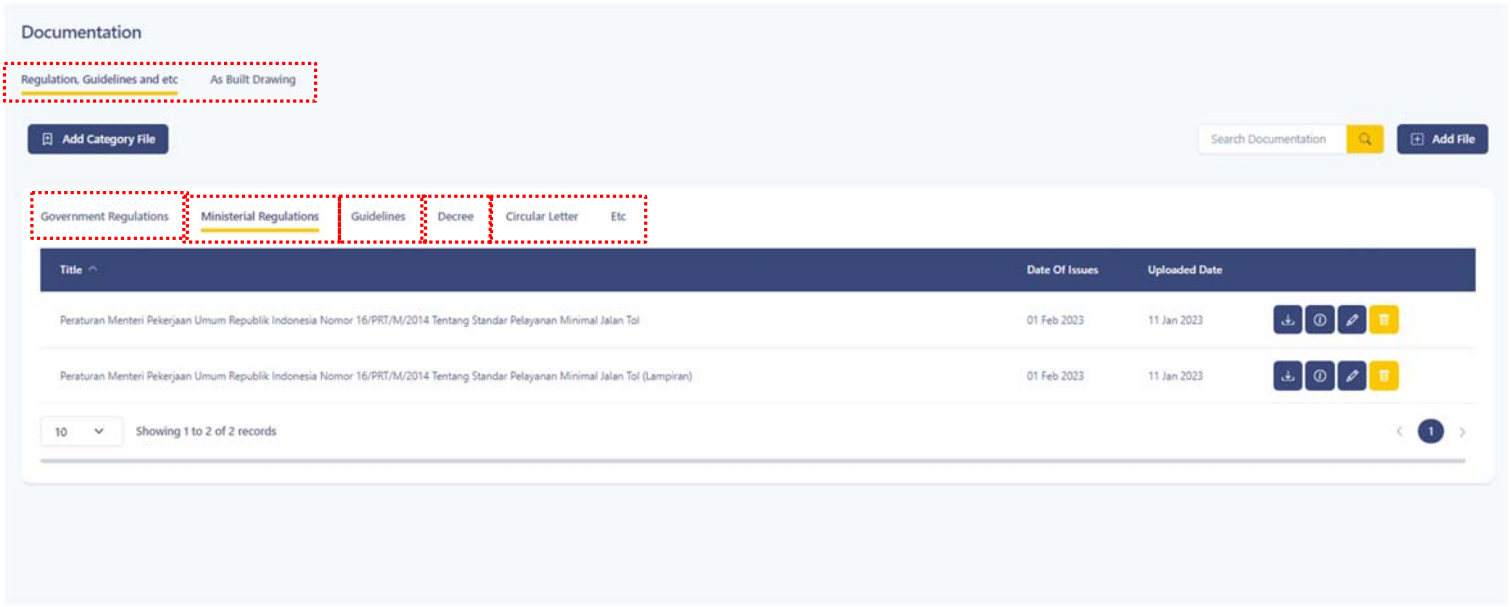




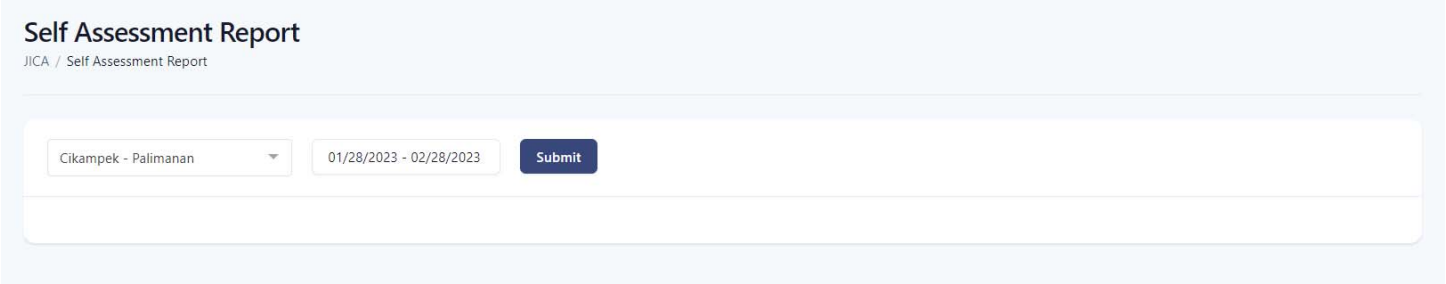
number of issues = 1-5; number of issues = 5-10; number of issues : > 10
unrepair issue/damage

Close Close

Documentation



Reporting



Terima kasih

Workshop

E-SPM



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JAKARTA, 28 NOVEMBER 2023



Jalan Tol Operasi di Indonesia



Panjang Tol +73%

Ruas Tol +55%

Dalam kurun 5 tahun Terakhir, terhitung tahun 2019 - 2023

Jalan Tol Operasi di Indonesia

Riwayat perkembangan jumlah dan panjang jalan tol operasi di Indonesia dalam 5 tahun terakhir :

1978 - 2018

Jumlah Ruas Jalan Tol Operasi : 47 ruas

Panjang Jalan Tol Operasi : 1.628,53 km

2019 - 2023

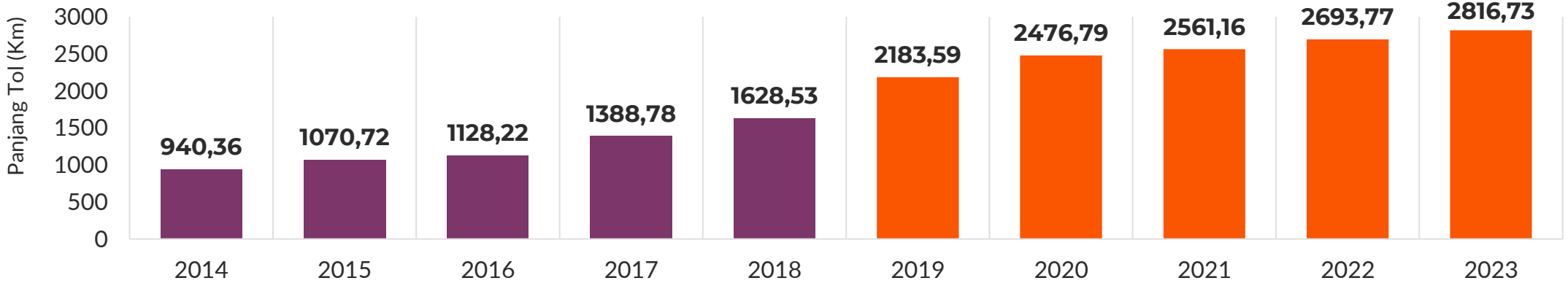
Jumlah Ruas Jalan Tol Operasi : 73 ruas

Penambahan dalam 5 tahun terakhir : + 26 ruas

Panjang Jalan Tol Operasi : 2.816,73 km

Penambahan dalam 5 tahun terakhir : + 1.188,20 km

Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi
31	**33**	**34**	**42**	**47**	**54**	**60**	**64**	**69**	**73**
	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol
	+14%	+5%	+23%	+17%	+34%	+13%	+3%	+5%	+4%
	130,36 km tol baru	**57,50 km** tol baru	**260,56 km** tol baru	**239,75 km** tol baru	**555,06 km** tol baru	**293,20 km** tol baru	**84,37 km** tol baru	**132,61 km** tol baru	**122,96 km** tol baru





Standar Pelayanan Minimal Jalan Tol

PERMEN PU No. 16/PRT/M/2014

Tentang Standar Pelayanan Minimal Jalan Tol

Pasal 1 Ayat 2

Standar Pelayanan Minimal Jalan Tol adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Pasal 4 Ayat 1

Tata Cara Pengukuran Standar Pelayanan Minimal Jalan Tol merupakan panduan metode pengukuran dalam pencapaian Standar Pelayanan Minimal Jalan Tol yang harus dilakukan oleh setiap Badan Usaha Jalan Tol

Pasal 5

Standar Pelayanan Minimal Jalan Tol **wajib dipenuhi oleh Badan Usaha Jalan Tol** dalam rangka pelayanan kepada pengguna jalan tol

Pasal 6 Ayat 1 dan 2

Standar Pelayanan Minimal Jalan Tol **dievaluasi secara berkala** berdasarkan hasil pengawasan fungsi dan manfaat

Kondisi Jalan Tol	15 *indikator*
Kecepatan Tempuh Rata - Rata	1 *indikator*
Aksesibilitas	2 *indikator*
Mobilitas	5 *indikator*
Keselamatan	12 *indikator*
Unit Pertolongan / Penye ..	7 *indikator*
Lingkungan	4 *indikator*
TI dan TIP	8 *indikator*

8 substansi, 54 indikator

toleransi

- toleransi pemenuhan tidak diatur/ tiap saat (25 indikator) **46%**
- toleransi pemenuhan diatur (29 indikator) **54%**



frekuensi

- rutin setiap hari (20 indikator) **37%**
- setiap bulan (25 indikator) **46%**
- setiap 3 bulan (7 indikator) **13%**
- setiap 1 tahun (2 indikator) **4%**



aktivitas

- pemeliharaan (32 indikator) **59%**
- operasional (22 indikator) **41%**



MONITORING PEMENUHAN SPM

BA / LAPORAN HASIL MONITORING

TINDAK LANJUT PERBAIKAN OLEH BUJT

EVALUASI DAN BA TINDAK LANJUT PERBAIKAN

Pemenuhan SPM Konvensional

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan secara manual menggunakan form survei
- Pencatatan temuan meliputi : indikator temuan, lokasi temuan (sta, jalur, lajur), dokumentasi / no foto, catatan / deskripsi

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Hasil Monitoring dibuat secara manual setelah kegiatan monitoring lapangan selesai

Tindak Lanjut Perbaikan

- Berita Acara dijadikan acuan oleh BUJT dalam rangka tindak lanjut perbaikan, kecepatan tindak lanjut dihitung setelah diterbitkannya Berita Acara
- Pelaporan tindak lanjut dikerjakan secara manual oleh BUJT, dan dikirimkan kepada BPJT apabila perbaikan telah selesai dilakukan
- Peluang manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan tindak lanjut perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Setelah BPJT mendapatkan laporan tindak lanjut BUJT
- Penolakan tindak lanjut perbaikan baru dapat dilakukan pada tahap ini jika tidak ada peninjauan ulang lapangan
- Analisis dilakukan sesuai kebutuhan secara manual dan terpisah

Penggunaan e-SPM

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan menggunakan aplikasi e-SPM berbasis mobile (Android dan iOS)
- Pencatatan meliputi semua yang ada di metode konvensional dan dilengkapi fitur koordinat lokasi dan akurasi secara otomatis
- Penyediaan mode pengambilan data standar dan berkendara

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Pemenuhan dapat di-generate secara otomatis menggunakan aplikasi e-SPM

Tindak Lanjut Perbaikan

- Setiap temuan lapangan tersampaikan secara real time melalui aplikasi e-SPM BUJT, kecepatan tindak lanjut dihitung secara otomatis berdasarkan waktu temuan
- Pelaporan tindak lanjut secara otomatis oleh e-SPM dan bisa diakses oleh BUJT dan BPJT kapan saja tanpa harus menunggu perbaikan selesai sepenuhnya
- Meminimalisir manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan dan perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Dapat dilakukan kapan saja sesuai dengan kebutuhan
- Penolakan tindak lanjut perbaikan dapat langsung dilakukan oleh BPJT. Tersedia fitur ulasan dan komentar
- Tersedia beberapa fitur analisis

SERVER

HARDWARE

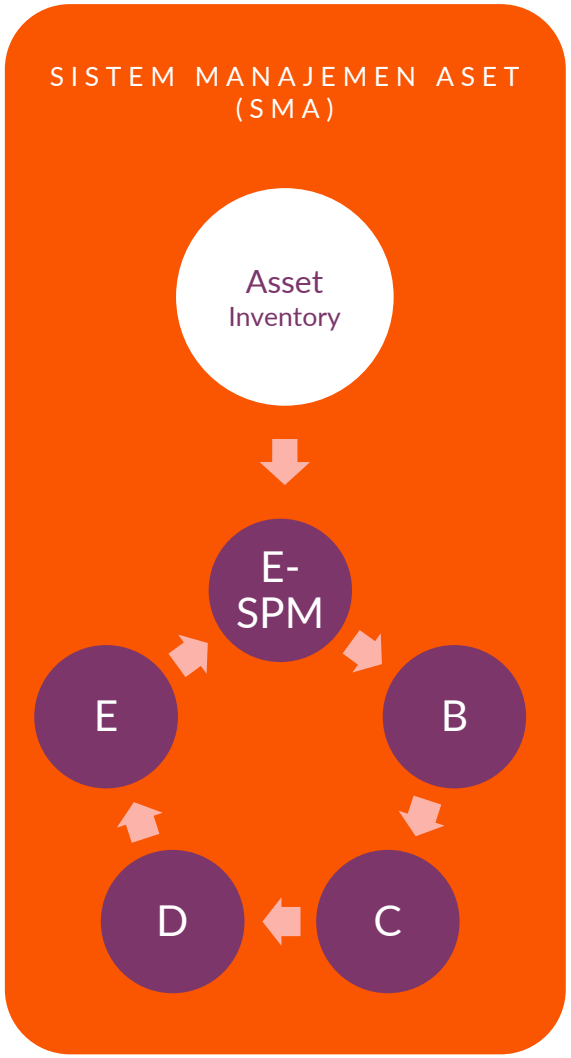
SOFTWARE

APP & DESIGN

Pengembangan Infrastruktur e-SPM

Kategori	Komponen	e-SPM 2019	e-SPM 2021	e-SPM 2023
Network	Server	Cloud Server (Google)	Server PUSDATIN PUPR	Server PUSDATIN PUPR
Network	Domain	www.espmweb.varianglobal.tech	www.espmbpjt.pu.go.id	www.espm.bpjt.pu.go.id
Network	IP Server	auth-db364.hostinger.com	103.211.50.23	103.8.238.226
Network	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	VCPU 2 Core	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) Gold 6330H
Hardware	RAM	4 GB	8 GB	8 GB
Hardware	Storage	200 GB	500 GB	1.500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS	Ubuntu Server 21.04 LTS
Software	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29	Apache 2 versi 2.4.46
Software	PHP	PHP 7.2	PHP 7.2	PHP 7.4
Software	DBMS	MySQL 5.7	MySQL 5.7	MySQL 8
Web Application	Framework	Laravel	Laravel	Laravel
Web Application	CMS	October CMS	October CMS	October CMS
Mobile Application	Framework	Native Android	Flutter 2.5	Flutter 3.7.9
Mobile Application	Backend Service	-	Firebase	Firebase
UI / UX Design	Tools	Corel Draw GraphicSuite 2020	Figma	Figma

Rencana Pengembangan e-SPM



KOMPARASI	E-SPM (SAAT INI)	E-SPM (SMA)
Fungsional	**Berdiri Sendiri (Stand Alone)** e-SPM saat ini berjalan dan berdiri sendiri, tidak terintegrasi dengan sistem atau aplikasi manapun	**Sistem Manajemen Aset (SMA)** e-SPM merupakan bagian dari Sistem Manajemen Aset jalan tol, saling terhubung dan tidak dapat berdiri sendiri
Oritentasi	**Pemenuhan SPM (PERMEN PU)** Dikembangkan dan dijalankan sesuai dengan tata cara pemenuhan SPM sesuai dengan regulasi	**Aset Jalan Tol** Dikembangkan untuk berorientasi kepada "Asset Inventory" yang ada di jalan tol
Objek (Contoh)	**Indikator, Lokasi (KM, Lokasi, Koordinat)** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan atribut : indikator temuan dan detail lokasi. Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU KM : 05+200 Lajur : Non-Lajur Jalur : Jalur A Latitude (Deg) : -6.12345678 Longitude (Deg) : 120.12345678	**Indikator, ID Asset** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan data aset yang sudah di-inventory dan tersimpan di database Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU ID Rambu / PJU : TS-0000262626 **Informasi Aset (Otomatis)** KM : 05+200 Lajur : Non-Lajur Jalur : Jalur A Latitude (Deg) : -6.12345678 Longitude (Deg) : 120.12345678
Riwayat, Trend (Contoh)	**Mengandalkan Lokasi** Riwayat temuan, perbaikan mengandalkan lokasi. Untuk objek yang sama memungkinkan terjadi kesalahan pendataan.	**Tepat Sasaran** Riwayat temuan dan perbaikan terekam dengan tepat, meminimalisir kesalahan karena spesifik berdasarkan data inventory

DEMO APLIKASI

https://www.espm.bpjt.pu.go.id

Ministry of Public Works and Housing

REPUBLIC OF INDONESIA
PROJECT FOR STRENGTHENING MANAGEMENT CAPACITY OF TOLL ROAD DEVELOPMENT

Japan International Cooperation Agency

W O R K S H O P
ON
"SOCIALIZATION OF UPGRADED FEATURES OF E-SPM AND OPERATION OF E-SPM"

Dr. Bhoj Raj PANTHAA
JICA Expert

December 4, 2023

Asset Management or Managing Assets

Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

Then, what is the role of PUPR/BPJT/DGH in regard to toll road?

Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performance

What is Role of BUJT?

Source : https://committee.iso.org/home/tc251

Hierarchical Management Cycle for Toll Road Operation

ASSET MANAGEMENT

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

MANAGING ASSET

New action based on the direction from TOP Management



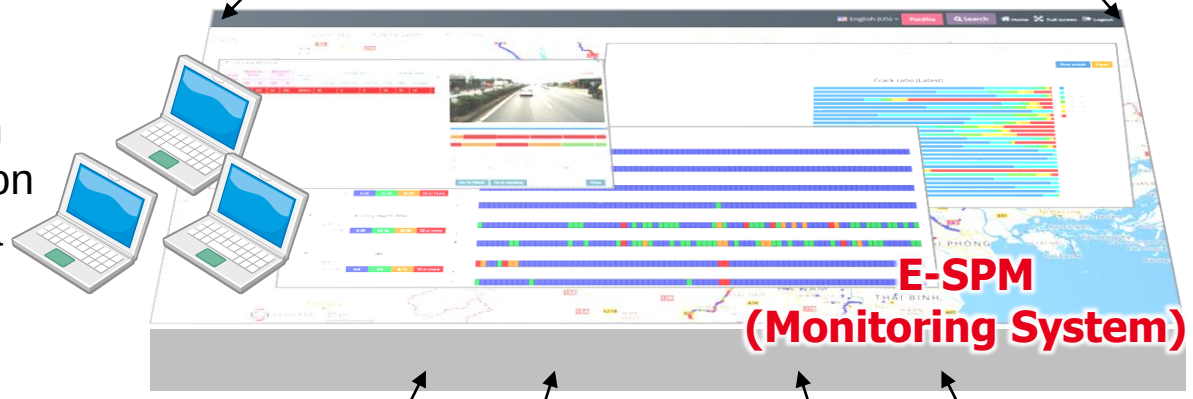
Report and data accumulation from O&M work



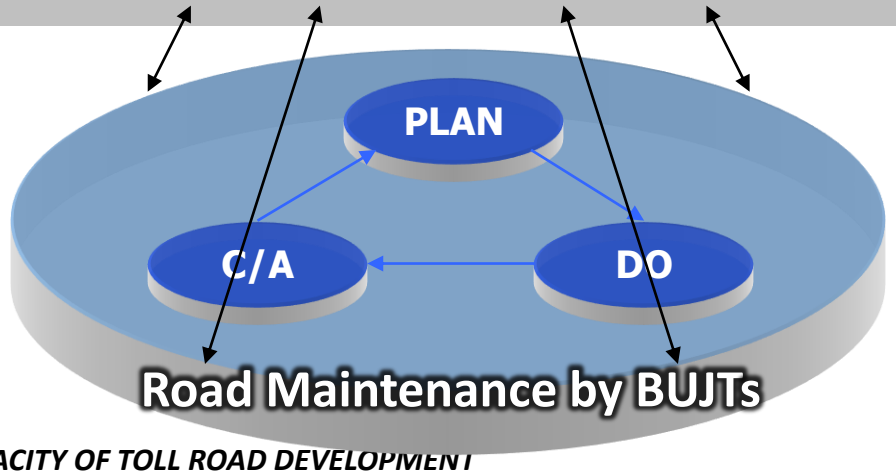


Monitoring/Assessment/Technical Guidance

Governance by BPJT



E-SPM (Monitoring System)



Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading

TROs (BUJT)

BUJT_A

Mng. system

DB

e-SPM (mobile)

BUJT_B

Mng. system

DB

e-SPM (mobile)

Data input/import

ITRA(BPJT)/DGF (BinaMarga)

Data Base - SPM+

Integrated Time-series data for performance assessment

Data Analysis

- Bench-Marking Assessment
- Blackspot Analysis

Knowledge Data

Knowledge sharing

web

Information disclosure

Road Users



Stakeholders



Dashboard

SPM monitoring

8 Substances
54 Indicators

SPM Monitoring


MENTERI PEKERJAAN UMUM
REPUBLIK INDONESIA

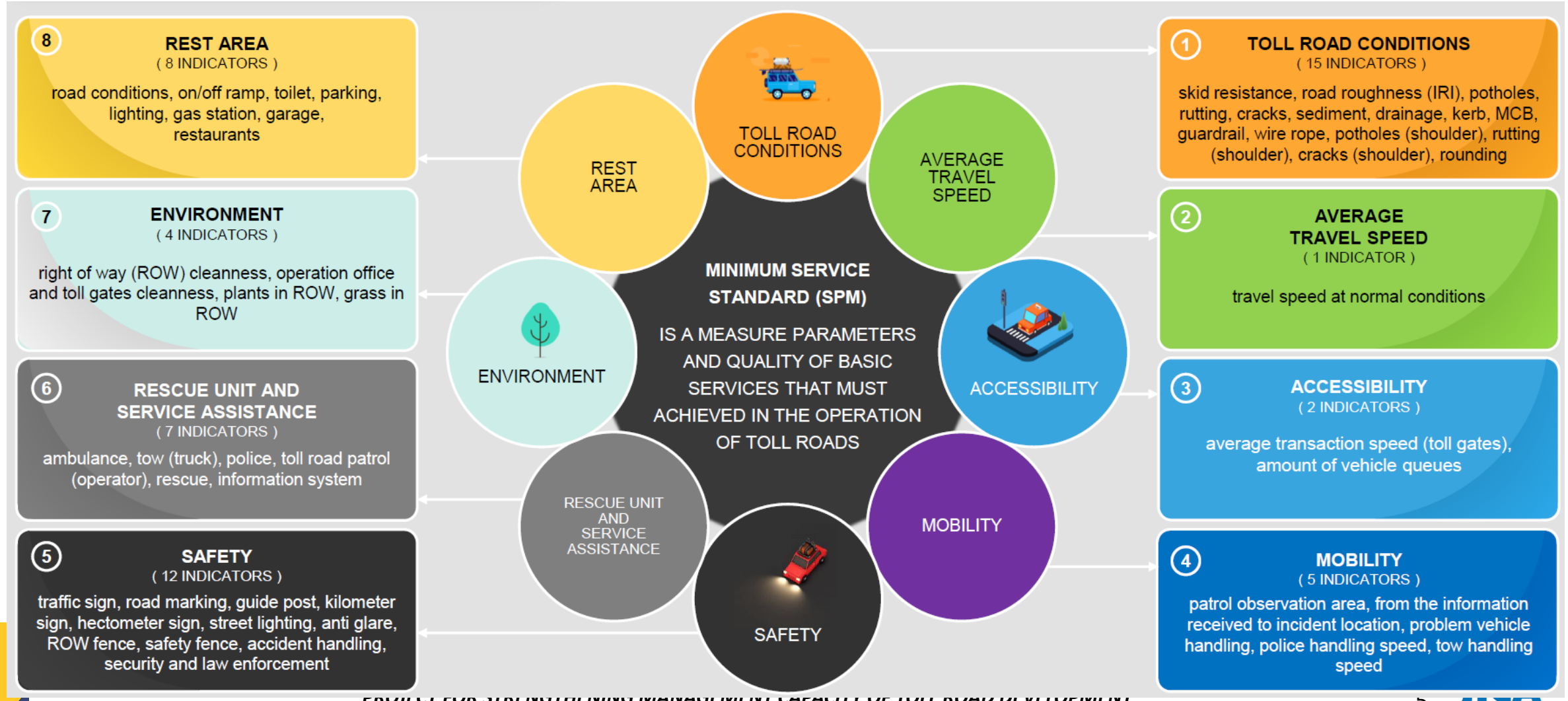
PERATURAN MENTERI PEKERJAAN UMUM REPUBLIK INDONESIA
NOMOR 16/PRT/M/2014

TENTANG

STANDAR PELAYANAN MINIMAL JALAN TOL

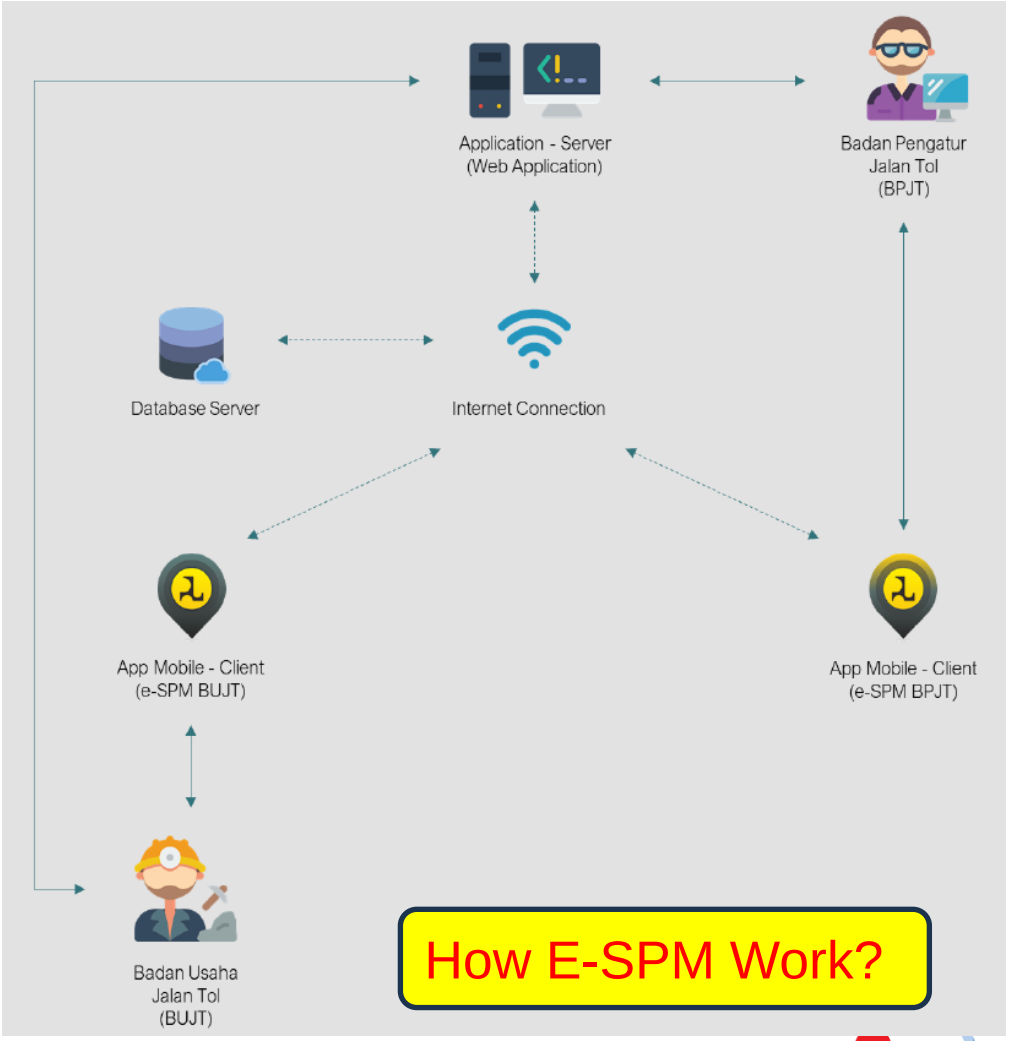
DENGAN RAHMAT TUHAN YANG MAHA ESA
MENTERI PEKERJAAN UMUM REPUBLIK INDONESIA,

- Regulation No. 16 Year 2014 (Stipulates the Obligations of SPM Monitoring)



Electronic - Minimum Standard of Service (E-SPM)

CONVENTIONAL METHOD	USING E-SPM Why E-SPM?
› Data collection by manual	✓ Data collection by mobile App
› Monitoring report is created manually	✓ Inspection report is generated automatically by e-SPM
› Repair reports are created manually by toll road operator, and sent to BPJT when repairs has been completed	✓ Repair reports are available on e- SPM, which can be accessed by toll road operator (BUJT) and BPJT at any time without having to wait for the repair to be fully completed.



SPM Monitoring – Frequency of SPM fulfillment by e-SPM

TOLL ROAD CONDITIONS

No	Fulfillment Indicators	Freq
1	Skid Resistance (Main Road)	Annual
2	Road Roughness (Main Road)	Annual
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Sediment	Daily
7	Drainage	Daily
8	Kerb (Median)	Daily
9	MCB (Median Concrete Barrier)	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

AVERAGE TRAVEL SPEED

No	Fulfillment Indicators	Freq
1	Travel Speed at Normal Condition	Monthly

ACCESSIBILITY

No	Fulfilment Indicators	Freq
1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly

MOBILITY

No	Fulfillment Indicators	Freq
1	Patrol Observation Area	Monthly
2	From The Information Received to Incident Location	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

SAFETY

No	Fulfillment Indicators	Freq
1	Traffic Sign (quantity and reflectivity)	3 Month
2	Road Marking (quantity and reflectivity)	3 Month
3	Guide Post / Reflector (quantity and reflectivity)	3 Month
4	Kilometer Sign (quantity and reflectivity)	3 Month
5	Hectometer Sign (quantity and reflectivity)	3 Month
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims (Accident Handling)	Monthly
11	Accident Vehicles (Accident Handling)	Monthly
12	Security and Law Enforcement	Monthly

RESCUE UNIT, SERVICE ASISTANCE

No	Fulfillment Indicators	Freq
1	Ambulance	Monthly
2	Tow (Truck)	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Information and Communication	Monthly
7	Phone Number for Toll Info	Monthly

ENVIRONTMENT

No	Fulfillment Indicators	Freq
1	ROW Cleanness	Daily
2	Operation and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Month
4	ROW Grass	3 Month

REST AREA

No	Fulfillment Indicators	Freq
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

- Routine, Every Day
- Periodic, Every Month
- Periodic, Every 3 Month
- Periodic, Every Year

Why e-SPM Upgrading Necessary?

e-SPM Mobile (Applicable at Site)



- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Web e-SPM

1. Dashboard

2. Data Inputting
- SPM Monitoring Data
  - Road Condition (Partially)
  - Mobility
  - Safety (Partially)
  - Rescue and Service (Partially)

3. Analytics Module
- Statistical Analysis of Various Indicators

Are inputted information sufficient for PPP toll road management?

Are there sufficient analysis tools for toll road monitoring?

Concept of e-SPM Upgrading for Asset Management

- **Enhanced data input function**
  - Improving operational efficiency by promoting digitalization of SPM operations
  - Improvement of data reliability
- **Enhanced data analysis function**
  - Analytical capabilities for assessing the performance of BUJTs' asset management
- **Strengthening data utilization methods**
  - Feedback to BUJTs for better Asset Management Activity
  - Providing information to road users and related organizations

Framework for Upgrading e-SPM

To be Expanded by JICA Project	Why Upgrading E-SPM?
1. Data Inputting • Inventory Data • Maintenance Plan • Traffic Volume	**1. Data Inputting** • Inventory Data>>> Incomplete Inventory Data • Maintenance Plan>>> Not available in the existing version • Traffic Volume>>> Not available in existing version
2. Analysis Module • SPM Monitoring • Performance Evaluation (BUJT) • Black Listing Evaluation (BUJT) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation	**2. Analysis Module** • SPM Monitoring >>>Available in the current version but only table only • Performance Evaluation (BUJT)>>>Not available in existing version • Black Listing Evaluation (BUJT)>>> Not available in existing version • Accident (Black Spot) Analysis>>> Not available in existing version • Deterioration Trend Analysis>>> Not available in existing version • Detailed Investigation>>> Not available in existing version
3. Reporting Module	**3. Reporting Module>>>** Not available in existing version
4. Document Module	**4. Document Module>>>** Not available in existing version

Inventory Data Inputting Interface

No	Inventory Data / Data Inputting	Module Link	Data Attributes			
1	Highway Segments	https://espm.varianglobal.com/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp	▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude	▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year	▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*)
2	Toll Gates	https://espm.varianglobal.com/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name	▪ Gate Type ▪ Transaction Type ▪ Entrance Booth	▪ Exit Booth ▪ Direction ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Station	https://espm.varianglobal.com/rescuestation	▪ ID ▪ Highway ID	▪ Station Name ▪ Direction	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Description
4	Vehicle Service	https://espm.varianglobal.com/v1-kendaraanlayanan	▪ ID ▪ Highway ID	▪ Rescue Station ID ▪ Vehicle Code	▪ Vehicle Type ▪ Police Number	▪ Vehicle Number ▪ Description
5	Bridges	https://espm.varianglobal.com/bridge	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position	▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure	▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.varianglobal.com/restarea	▪ ID ▪ Highway ID ▪ Rest Area Name	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Direction	▪ Rest Area Type ▪ Pavement Type

Maintenance Plan

Article 8 Maintenance of concession agreement (sample)

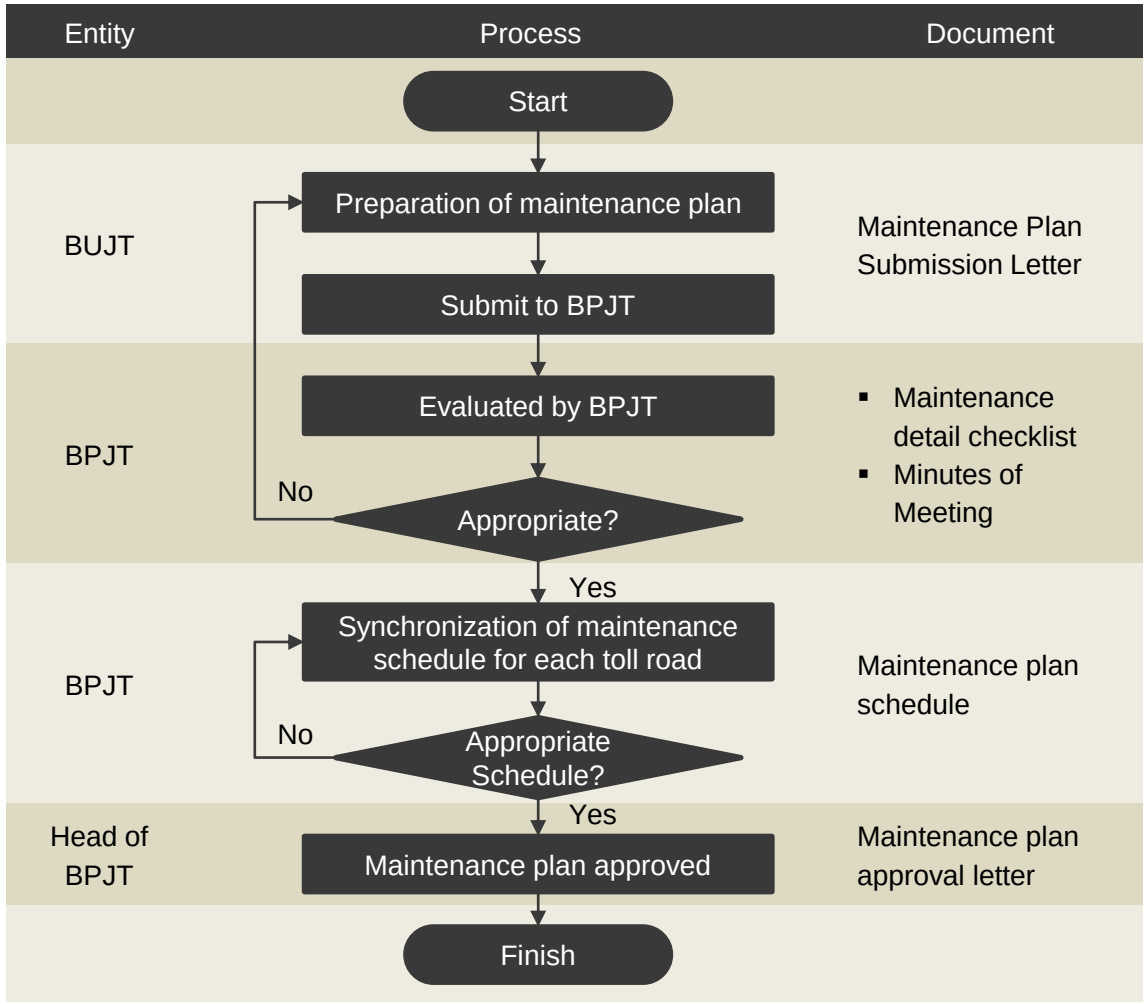
8.1 Maintenance Obligations

8.1.1. Toll Road Business Entities are required to submit a Maintenance program Plan, during the Operational period which has been discussed with the Government, no later than 60 (sixty) Days after the issuance of the Operational Stipulation, to obtain Government's approval.

8.2 Report

Toll Road Business Entities are required to submit a Quarterly Report on Maintenance activities no later than the 20 (twentieth) day of the following month. Toll Road Business Entities are required to report to the Government the condition of Toll Roads every 20 (twentieth) January of the following year and every subsequent year.

Maintenance Plan



- Maintenance plan must be reported by TRO **annually**

- Maintenance plan prepared only for periodic maintenance and upgrading maintenance
- Maintenance plan are classified in 3 categories, including: Toll Road; Bridges; Services Area (each category has several indicators)
- Each category is reported in the form of damage details, repair plan, repair schedule, and strip map (certain indicators)

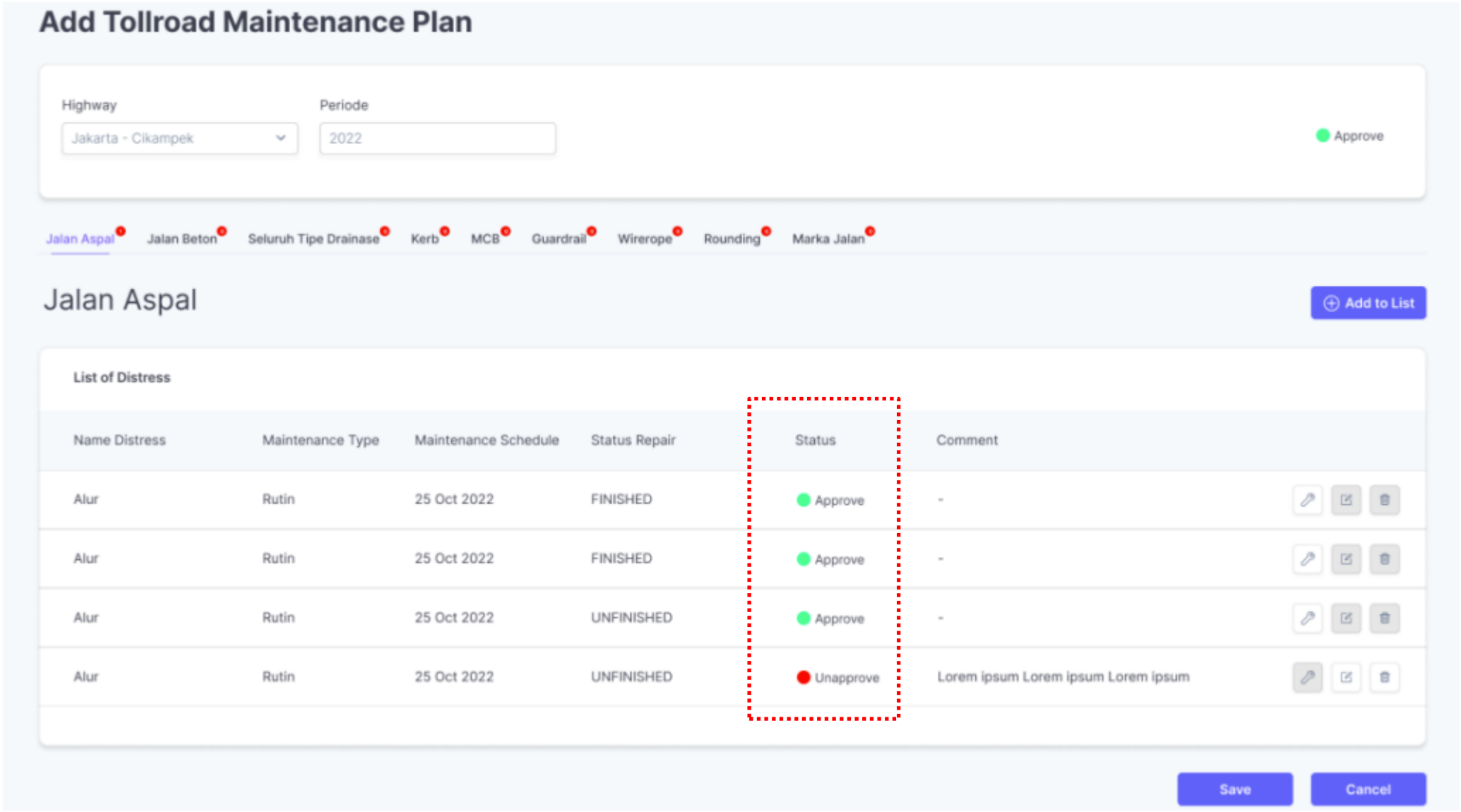
- The maintenance plan applies an approval system by BPJT
- The details of the maintenance plan will be reviewed by BPJT, BPJT will approve or reject one by one the detailed data that has been reported by the BUJT

- Schedule synchronization by ITRA on the consideration of several programs such as: SPM fulfilment, rate adjustment, prohibition of work on holidays and new year, etc.

- The maintenance plan report that has been evaluated will be approved by the head of BPJT

- The approved maintenance plan will be used as a reference for ITRA to monitor and evaluate repair results **(repair activity must also be reported by BUJT)**

Management of Maintenance Plan



SPM Monitoring – Macro Analysis

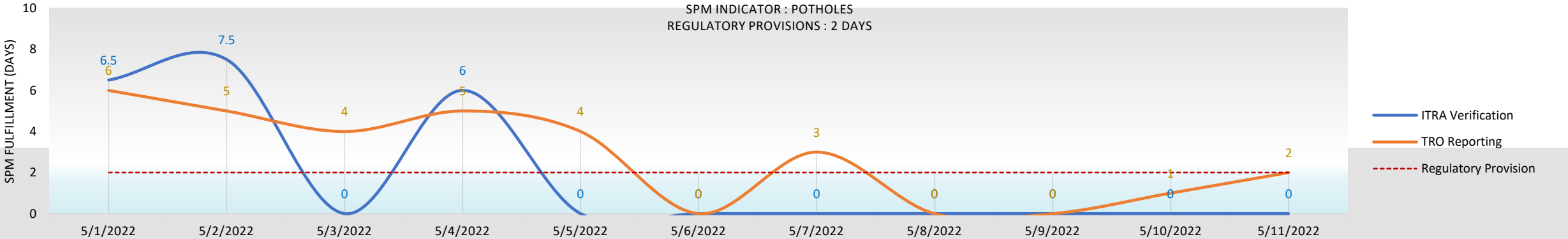
The analysis feature is to find out the comparison of SPM fulfillment by TRO, ITRA and regulatory provisions. The technical approach will be described through a sample case of SPM fulfillment.

ITRA Verification			TRO Reporting		
Damage Found (Date)	Repair Date	Repair Duration (Days)	Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5	01/05/2022	07/05/2022	6
01/05/2022	06/05/2022	5	02/05/2022	07/05/2022	5
01/05/2022	09/05/2022	8	03/05/2022	07/05/2022	4
01/05/2022	09/05/2022	8	04/05/2022	09/05/2022	5
02/05/2022	09/05/2022	7	04/05/2022	09/05/2022	5
02/05/2022	10/05/2022	8	04/05/2022	09/05/2022	5
04/05/2022	10/05/2022	6	05/05/2022	09/05/2022	4
04/05/2022	10/05/2022	6	07/05/2022	10/05/2022	3
04/05/2022	10/05/2022	6	10/05/2022	11/05/2022	1
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfillment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Damage found (datetime format)

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



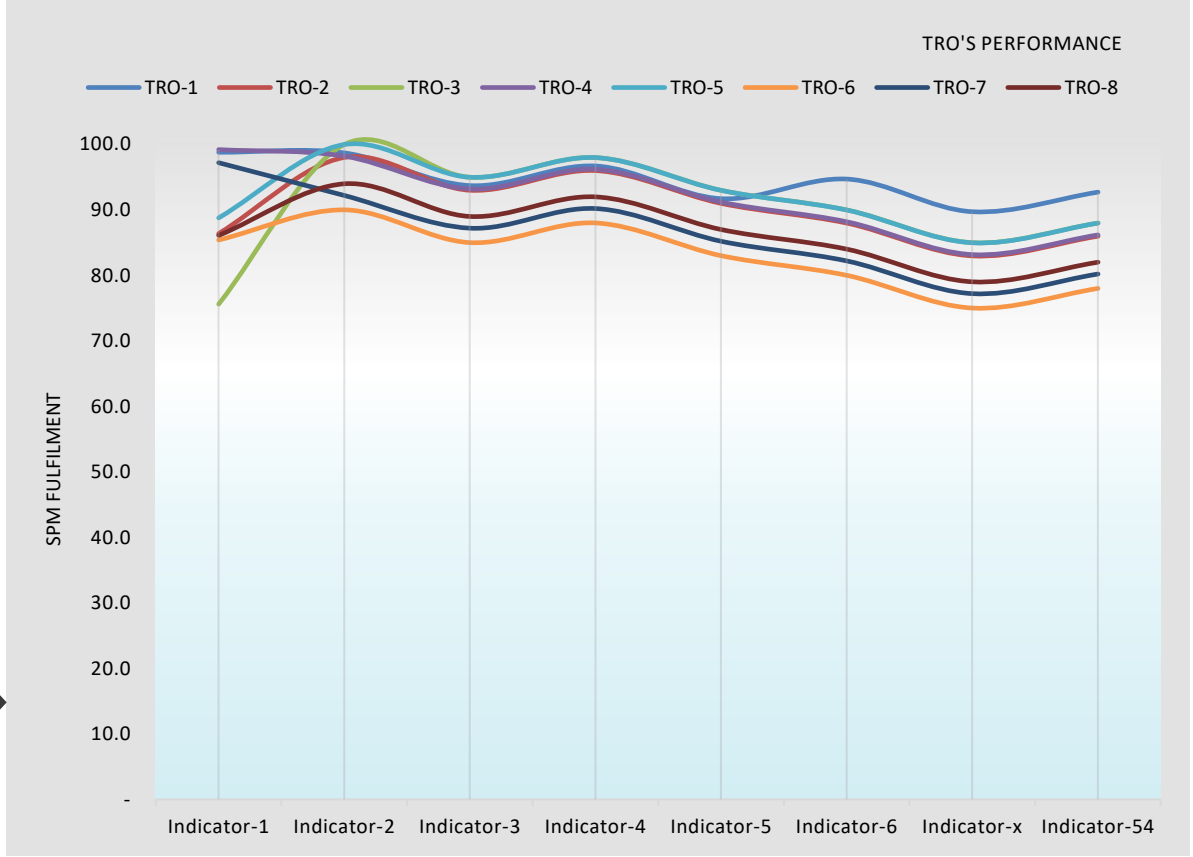
Performance Evaluation – Macro Analysis

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road.

Indicator	SPM Fulfilment							
	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators
n_{finish} : Amount of damage that has been repaired
n : Amount of damage/issue



Performance Evaluation – Macro Analysis - Blacklisting

The results of the ranking evaluation of SPM achievement are displayed Points are awarded for achievement against the criteria set for each SPM indicator and the corresponding time for repair, etc. The scores of the TROs are calculated and displayed in the ranking.

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

iv	:	Indicator Value
a	:	Indicator-a
n	:	Amount of damage/issue in 1 indicator
$jptw$	:	Number of repairs on time
iw	:	Indicator Weight
ipv	:	Indicator Percentage Value (%)
sv	:	Substance Value
54	:	Total amount of indicators
b	:	Substance-b

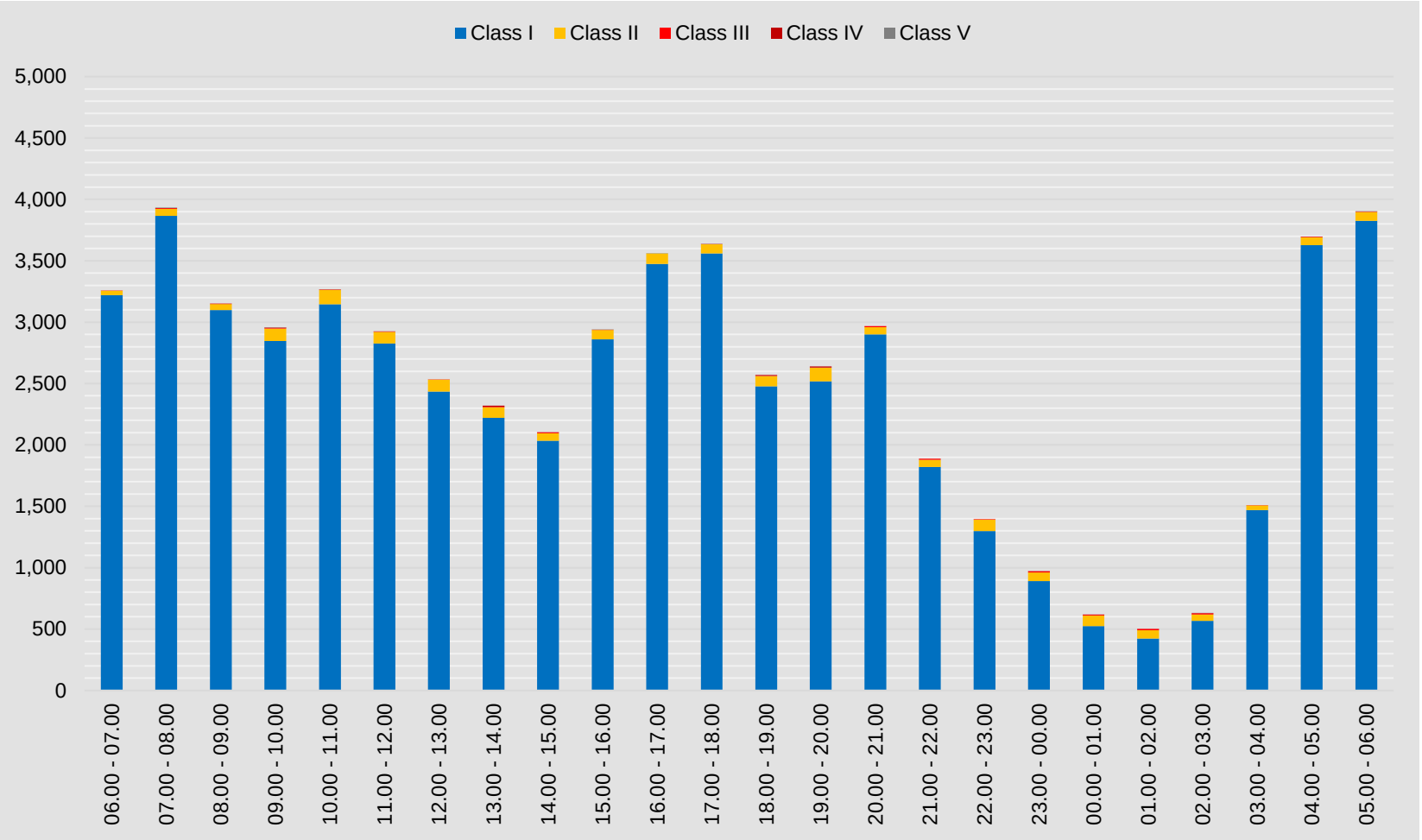
Weighting of substances

No	Ssubstances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Assistance	10.47
7	Eenvironment	3.40
8	Rest Area	4.67
	Total	100.00

No	TRO	Fulfilment Percentage by Substances Score Range: 0 - 100 Minimum Score: 75								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

Traffic Volume Data

No	Data Attributes
1	ID
2	Highway
3	Highway Segment
4	Traffic Date
5	Name of Traffic Counting Station
6	Chainage of Traffic Counting Station (Km)
7	Latitude of Traffic Counting Station
8	Longitude of Traffic Counting Station
9	Traffic Counting Method
10	Description
11	Class 1 Traffic Volume at 00 am - 01 am
…	…
34	Class 1 Traffic Volume at 11 pm - 12 am
35	Class 2 Traffic Volume at 00 am - 01 am
…	…
58	Class 2 Traffic Volume at 11 pm - 12 am
59	Class 3 Traffic Volume at 00 am - 01 am
…	…
82	Class 3 Traffic Volume at 11 pm - 12 am
83	Class 4 Traffic Volume at 00 am - 01 am
…	…
106	Class 4 Traffic Volume at 11 pm - 12 am
107	Class 5 Traffic Volume at 00 am - 01 am
…	…
130	Class 5 Traffic Volume at 11 pm - 12 am



Traffic Accident Data Analysis (Blackspot Analysis

Based on the Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

↓

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

↓

Determining the Upper Control Limit (BKA)

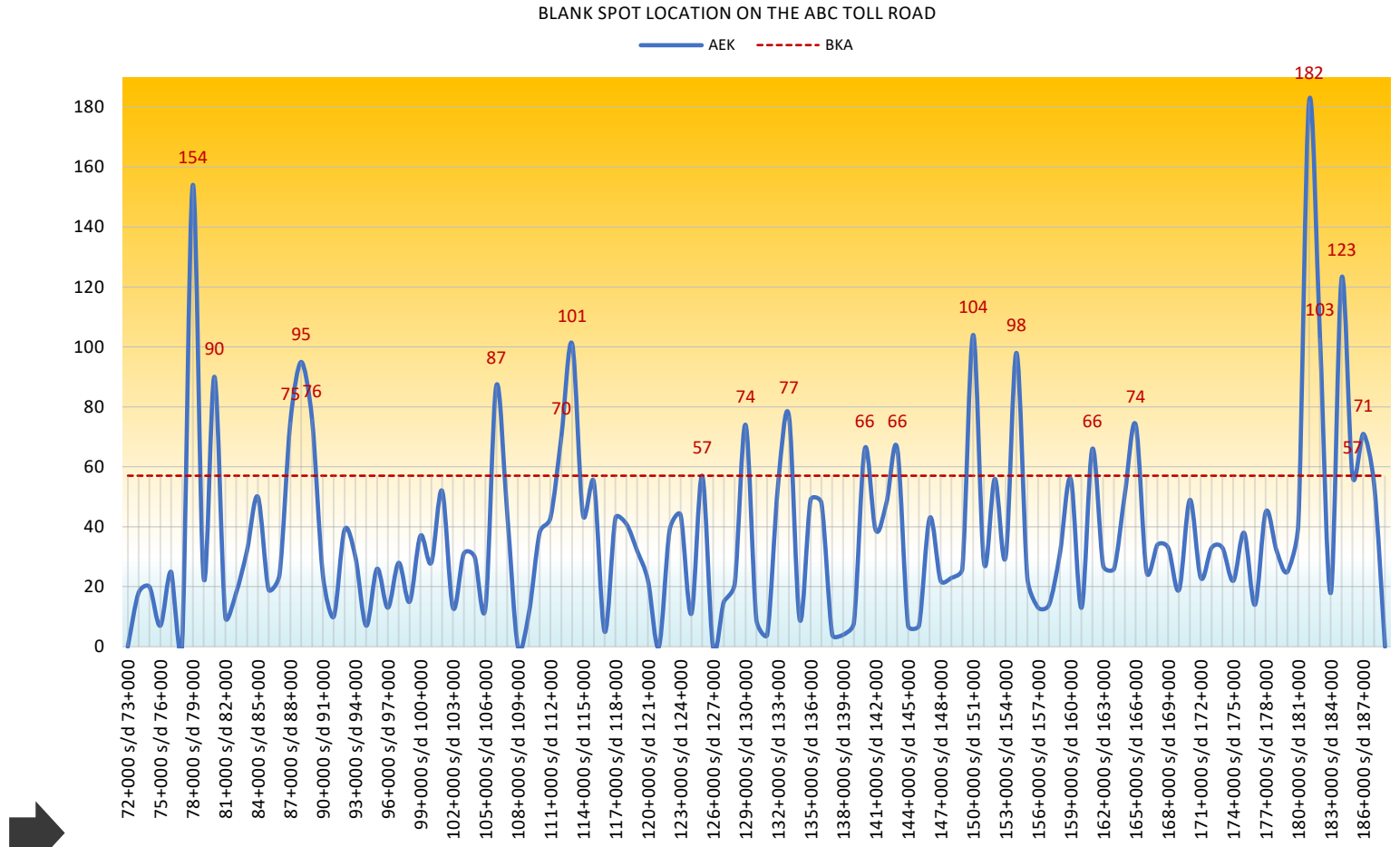
$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

BKA : Upper Control Limit
C : AEK Accident Rate

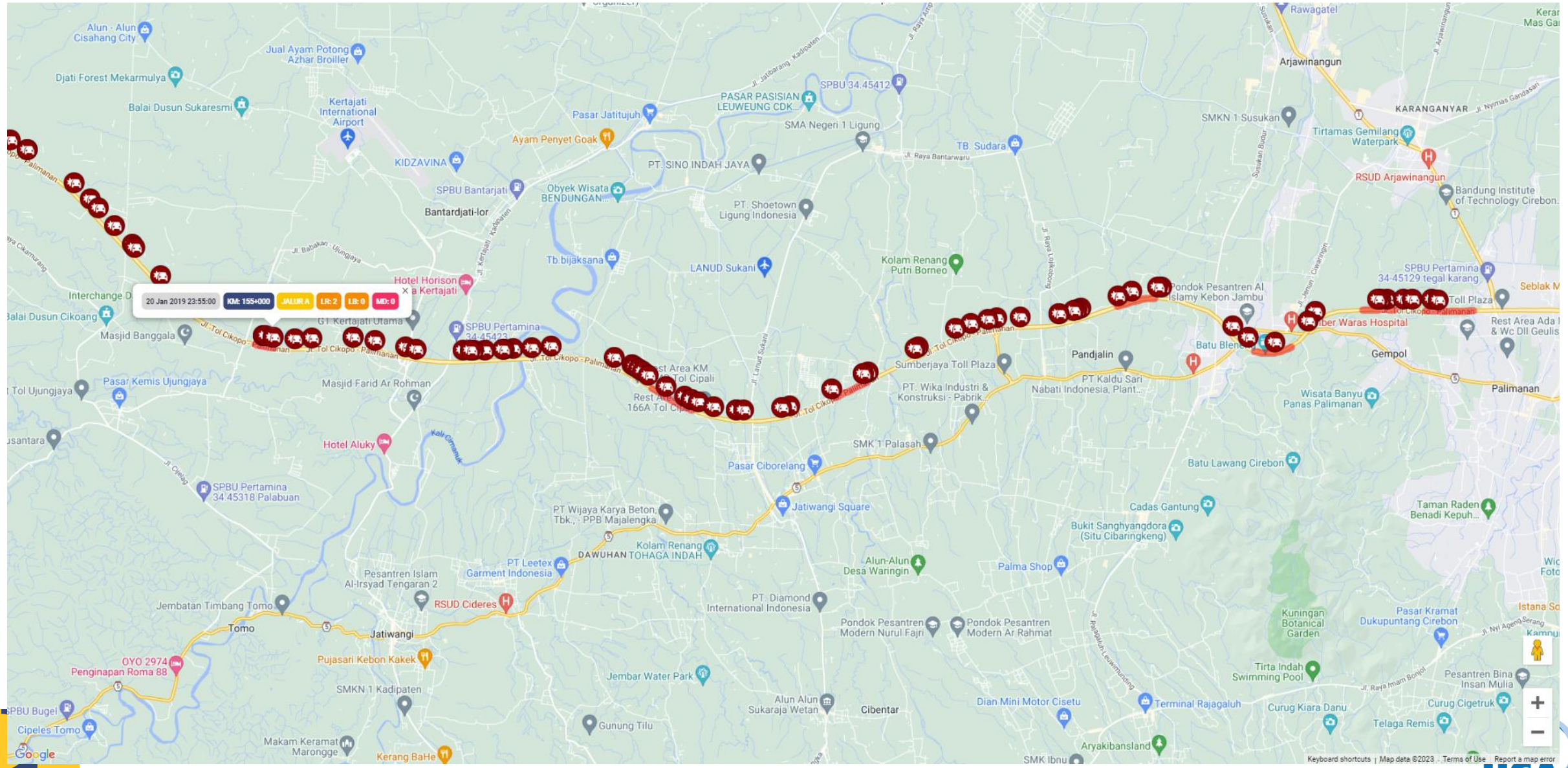
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Determining Blank Spot Location

$$AEK > BKA$$



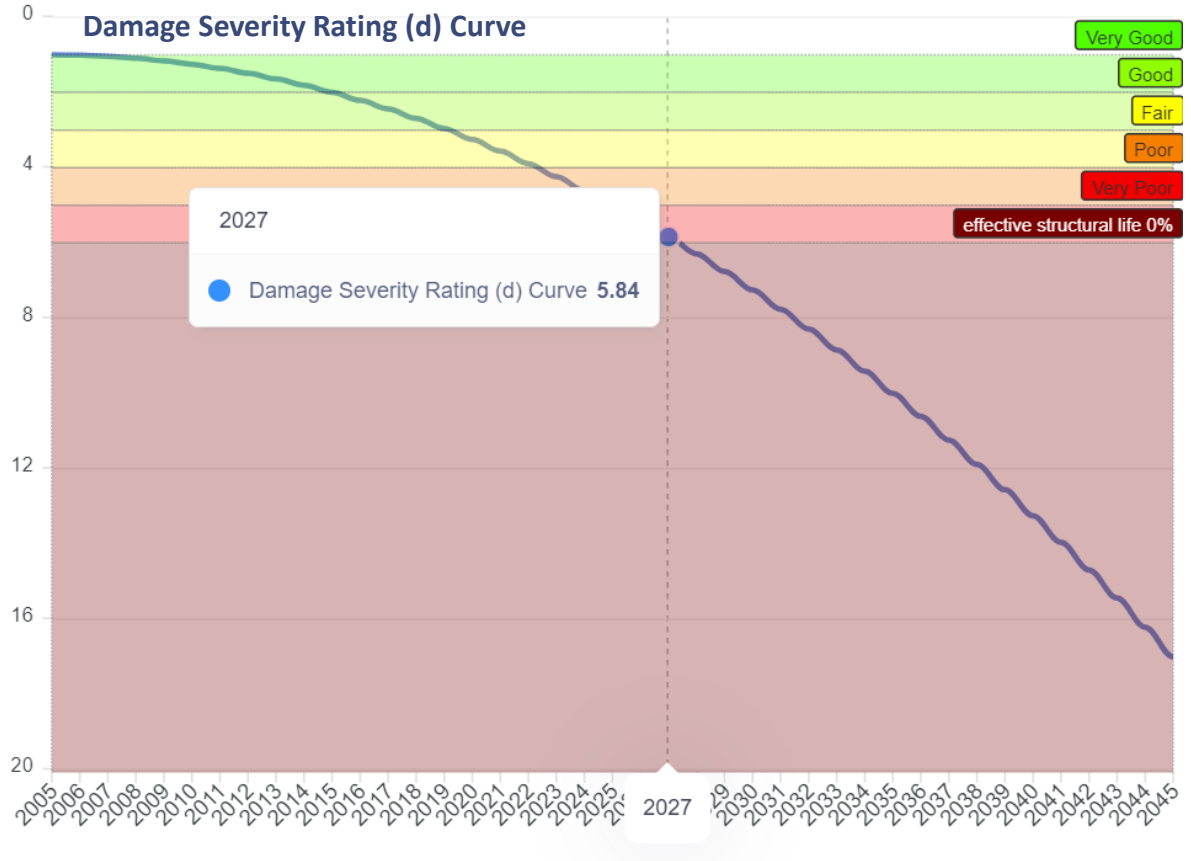
Traffic Accident Data Analysis (Blackspot Analysis)



Performance Evaluation – Micro Analysis – Deterioration Performance

- Deterioration Prediction Model ≠ Deterioration Performance Evaluation
- The actual performance of each route or road segment is checked if it is fast or slow by comparison to a Bench-Mark case of deterioration speed based on the data collected.

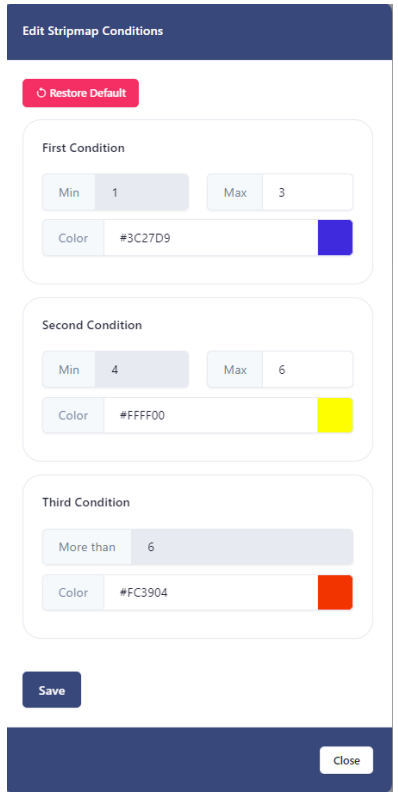
Highway	Operation Year	damage severity rating (d)	Status
Akses Tanjung Priok	2017	1.36	Very Good
Bakauheni - Terbanggi Besar	2019	1.16	Very Good
Balikpapan - Samarinda	2019	1.16	Very Good
Bekasi - Cawang - Kampung Melayu	2017	1.36	Very Good
Belawan - Medan - Tanjung Morawa	1989	12.56	effective structural life < 0%
Binjai - Langsa	2022	1.01	Very Good
Bogor Ring Road Seksi I-IIIA	2009	2.96	Good
Cawang - Tomang - Pluit	1987	13.96	effective structural life < 0%
Cengkareng - Batu Ceper - Kunciran	2021	1.04	Very Good
Ciawi - Sukabumi	2018	1.25	Very Good
Cibitung - Cilincing	2021	1.04	Very Good
Cikampek - Palimanan	2015	1.64	Very Good
Cikampek - Purwakarta - Padalarang	2005	4.24	Poor
Cileunyi - Sumedang - Dawuan	2022	1.01	Very Good
Cimanggis - Cibitung	2020	1.09	Very Good
Cinere - Jagorawi	2012	2.21	Good

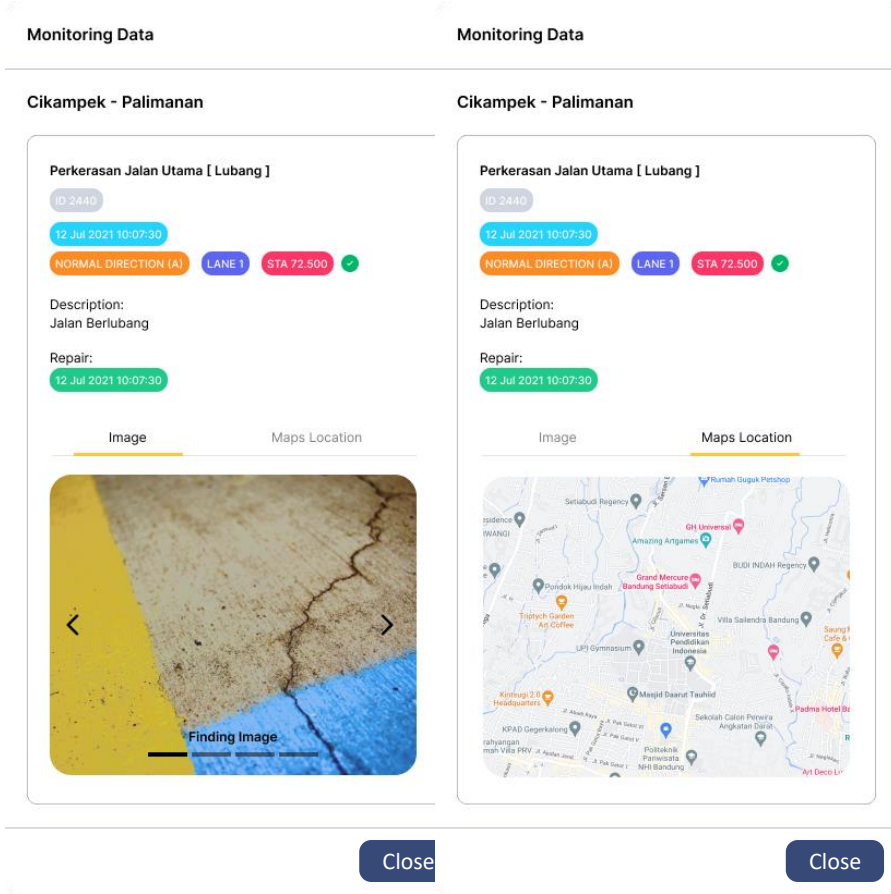


Performance Evaluation – Micro Analysis – Recommendation for Detailed Investigation

An analytic module to recommend for the detailed investigation by analyzing the historical damage detection in the same location. A list with recommended detailed investigation based on the threshold of damages detected in the same location/area is shown. Also, upon double click of damage location point, the Sub-Consultant will develop a pop-up window to show details of damages including damage photos. Maintenance works carried out by BUJTs are proper or not.

Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...
Direction →	ROW Fence						
	Drainage			2			
	Safety Fence						
	Outer Shoulder						
	Lane 1						
	Lane 2						
	Lane 3				3		
	Inner Shoulder						
	Median						
	Inner Shoulder						
	Lane 3						
	Lane 2						
	Lane 1					12	
	Outer Shoulder	8					
	Safety Fence						
	Drainage						
← Direction	ROW Fence						
Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...

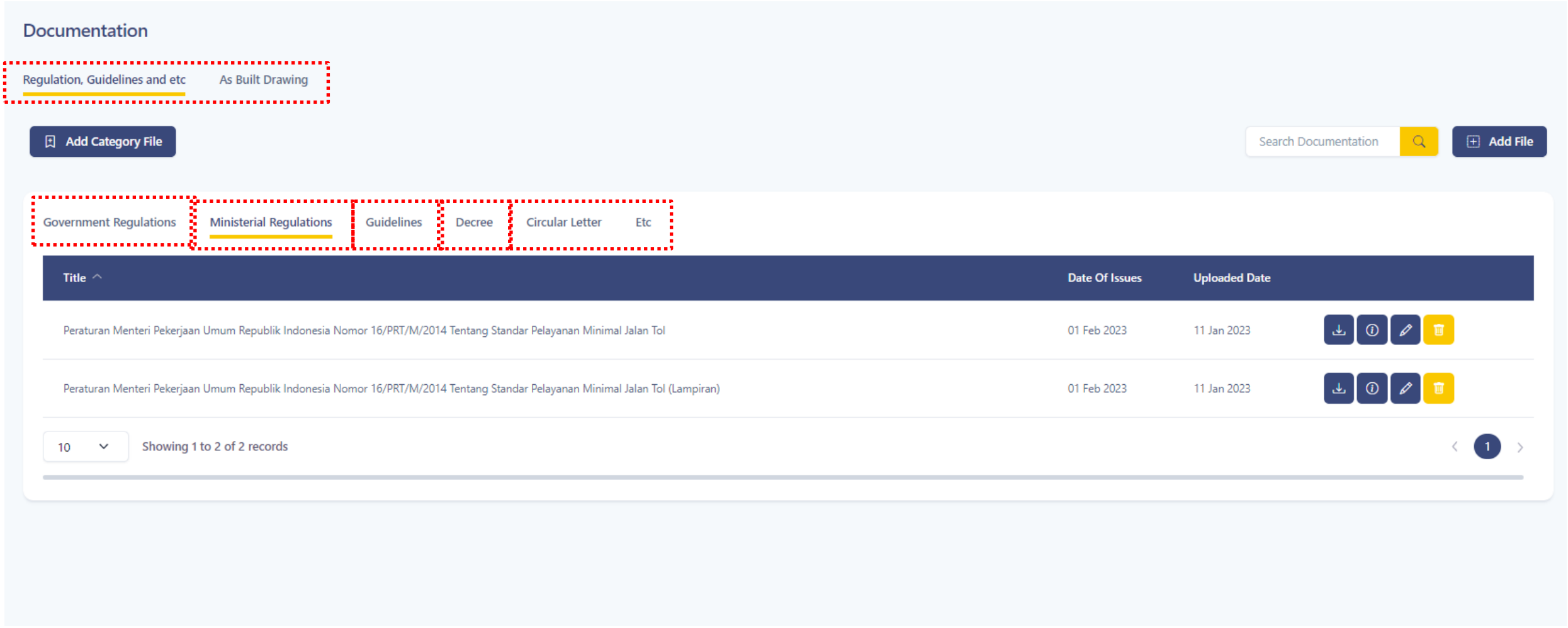




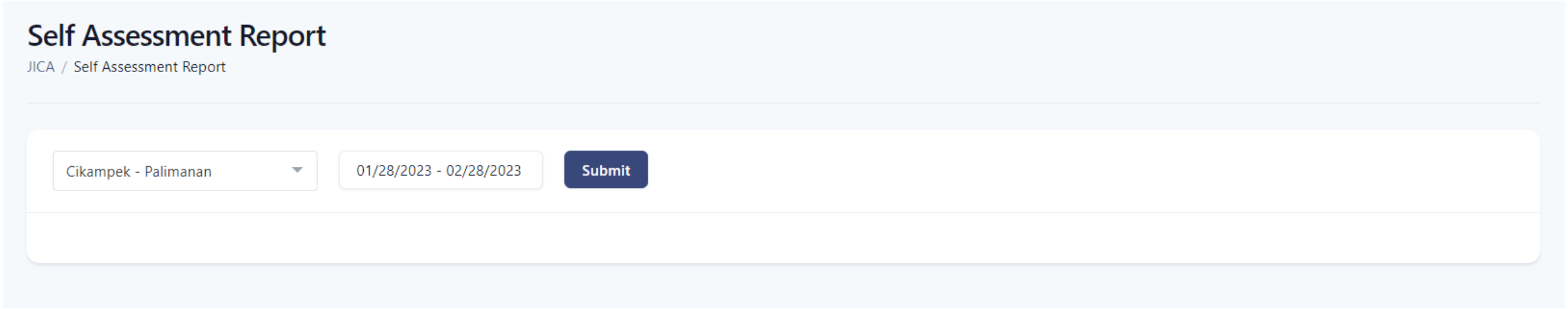
number of issues = 1-5; number of issues = 5-10; number of issues : > 10

unrepair issue/damage

Documentation



Reporting


Self Assessment Report
JICA / Self Assessment Report
Cikampek - Palimanan
01/28/2023 - 02/28/2023
Submit

Terima kasih

Workshop

E-SPM



KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JAKARTA, 28 NOVEMBER 2023



Jalan Tol Operasi di Indonesia



Panjang Tol +73%

Ruas Tol +55%

Dalam kurun 5 tahun Terakhir, terhitung tahun 2019 - 2023

Jalan Tol Operasi di Indonesia

Riwayat perkembangan jumlah dan panjang jalan tol operasi di Indonesia dalam 5 tahun terakhir :

1978 - 2018

Jumlah Ruas Jalan Tol Operasi : 47 ruas

Panjang Jalan Tol Operasi : 1.628,53 km

2019 - 2023

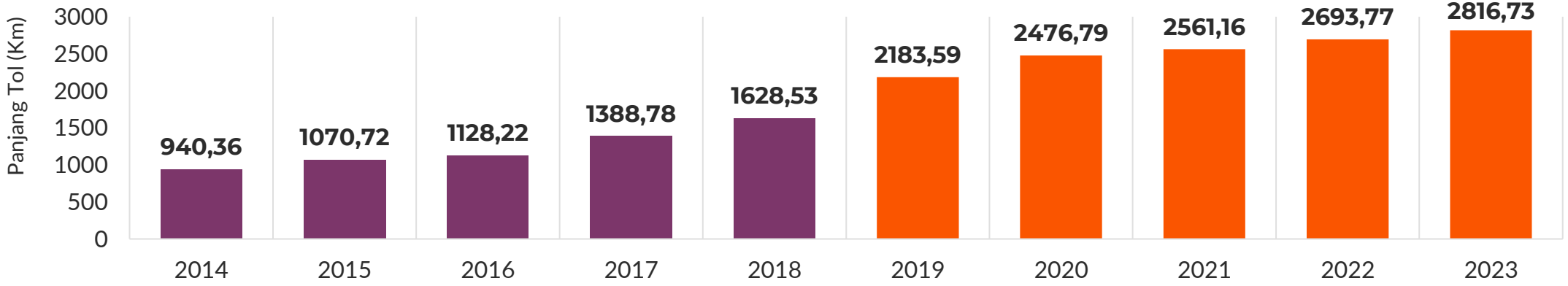
Jumlah Ruas Jalan Tol Operasi : 73 ruas

Penambahan dalam 5 tahun terakhir : + 26 ruas

Panjang Jalan Tol Operasi : 2.816,73 km

Penambahan dalam 5 tahun terakhir : + 1.188,20 km

Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi	Ruas Tol Operasi
31	**33**	**34**	**42**	**47**	**54**	**60**	**64**	**69**	**73**
	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol	Panjang Tol
	+14%	+5%	+23%	+17%	+34%	+13%	+3%	+5%	+4%
	130,36 km tol baru	**57,50 km** tol baru	**260,56 km** tol baru	**239,75 km** tol baru	**555,06 km** tol baru	**293,20 km** tol baru	**84,37 km** tol baru	**132,61 km** tol baru	**122,96 km** tol baru





Standar Pelayanan Minimal Jalan Tol

PERMEN PU No. 16/PRT/M/2014

Tentang Standar Pelayanan Minimal Jalan Tol

Pasal 1 Ayat 2

Standar Pelayanan Minimal Jalan Tol adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Pasal 4 Ayat 1

Tata Cara Pengukuran Standar Pelayanan Minimal Jalan Tol merupakan panduan metode pengukuran dalam pencapaian Standar Pelayanan Minimal Jalan Tol yang harus dilakukan oleh setiap Badan Usaha Jalan Tol

Pasal 5

Standar Pelayanan Minimal Jalan Tol **wajib dipenuhi oleh Badan Usaha Jalan Tol** dalam rangka pelayanan kepada pengguna jalan tol

Pasal 6 Ayat 1 dan 2

Standar Pelayanan Minimal Jalan Tol **dievaluasi secara berkala** berdasarkan hasil pengawasan fungsi dan manfaat

Kondisi Jalan Tol	15 *indikator*
Kecepatan Tempuh Rata - Rata	1 *indikator*
Aksesibilitas	2 *indikator*
Mobilitas	5 *indikator*
Keselamatan	12 *indikator*
Unit Pertolongan / Penye ..	7 *indikator*
Lingkungan	4 *indikator*
TI dan TIP	8 *indikator*

8 substansi, 54 indikator

toleransi

- toleransi pemenuhan tidak diatur/ tiap saat (25 indikator) **46%**
- toleransi pemenuhan diatur (29 indikator) **54%**



frekuensi

- rutin setiap hari (20 indikator) **37%**
- setiap bulan (25 indikator) **46%**
- setiap 3 bulan (7 indikator) **13%**
- setiap 1 tahun (2 indikator) **4%**



aktivitas

- pemeliharaan (32 indikator) **59%**
- operasional (22 indikator) **41%**



MONITORING PEMENUHAN SPM

BA / LAPORAN HASIL MONITORING

TINDAK LANJUT PERBAIKAN OLEH BUJT

EVALUASI DAN BA TINDAK LANJUT PERBAIKAN

Pemenuhan SPM Konvensional

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan secara manual menggunakan form survei
- Pencatatan temuan meliputi : indikator temuan, lokasi temuan (sta, jalur, lajur), dokumentasi / no foto, catatan / deskripsi

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Hasil Monitoring dibuat secara manual setelah kegiatan monitoring lapangan selesai

Tindak Lanjut Perbaikan

- Berita Acara dijadikan acuan oleh BUJT dalam rangka tindak lanjut perbaikan, kecepatan tindak lanjut dihitung setelah diterbitkannya Berita Acara
- Pelaporan tindak lanjut dikerjakan secara manual oleh BUJT, dan dikirimkan kepada BPJT apabila perbaikan telah selesai dilakukan
- Peluang manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan tindak lanjut perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Setelah BPJT mendapatkan laporan tindak lanjut BUJT
- Penolakan tindak lanjut perbaikan baru dapat dilakukan pada tahap ini jika tidak ada peninjauan ulang lapangan
- Analisis dilakukan sesuai kebutuhan secara manual dan terpisah

Penggunaan e-SPM

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan menggunakan aplikasi e-SPM berbasis mobile (Android dan iOS)
- Pencatatan meliputi semua yang ada di metode konvensional dan dilengkapi fitur koordinat lokasi dan akurasi secara otomatis
- Penyediaan mode pengambilan data standar dan berkendara

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Pemenuhan dapat di-generate secara otomatis menggunakan aplikasi e-SPM

Tindak Lanjut Perbaikan

- Setiap temuan lapangan tersampaikan secara real time melalui aplikasi e-SPM BUJT, kecepatan tindak lanjut dihitung secara otomatis berdasarkan waktu temuan
- Pelaporan tindak lanjut secara otomatis oleh e-SPM dan bisa diakses oleh BUJT dan BPJT kapan saja tanpa harus menunggu perbaikan selesai sepenuhnya
- Meminimalisir manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan dan perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Dapat dilakukan kapan saja sesuai dengan kebutuhan
- Penolakan tindak lanjut perbaikan dapat langsung dilakukan oleh BPJT. Tersedia fitur ulasan dan komentar
- Tersedia beberapa fitur analisis

SERVER

HARDWARE

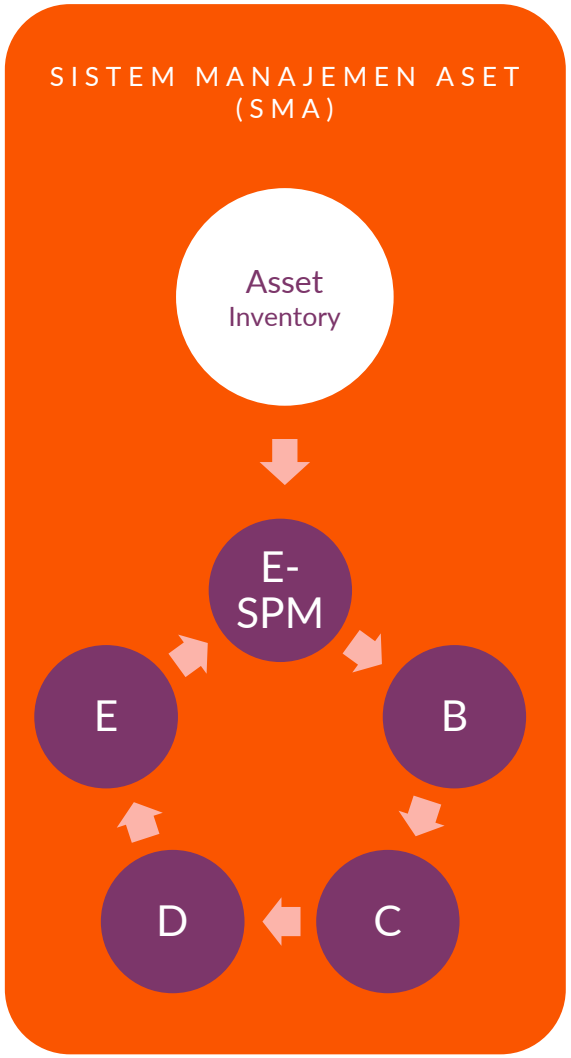
SOFTWARE

APP & DESIGN

Pengembangan Infrastruktur e-SPM

Kategori	Komponen	e-SPM 2019	e-SPM 2021	e-SPM 2023
Network	Server	Cloud Server (Google)	Server PUSDATIN PUPR	Server PUSDATIN PUPR
Network	Domain	www.espmweb.varianglobal.tech	www.espmbpjt.pu.go.id	www.espm.bpjt.pu.go.id
Network	IP Server	auth-db364.hostinger.com	103.211.50.23	103.8.238.226
Network	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	VCPU 2 Core	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) Gold 6330H
Hardware	RAM	4 GB	8 GB	8 GB
Hardware	Storage	200 GB	500 GB	1.500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS	Ubuntu Server 21.04 LTS
Software	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29	Apache 2 versi 2.4.46
Software	PHP	PHP 7.2	PHP 7.2	PHP 7.4
Software	DBMS	MySQL 5.7	MySQL 5.7	MySQL 8
Web Application	Framework	Laravel	Laravel	Laravel
Web Application	CMS	October CMS	October CMS	October CMS
Mobile Application	Framework	Native Android	Flutter 2.5	Flutter 3.7.9
Mobile Application	Backend Service	-	Firebase	Firebase
UI / UX Design	Tools	Corel Draw GraphicSuite 2020	Figma	Figma

Rencana Pengembangan e-SPM



KOMPARASI	E-SPM (SAAT INI)	E-SPM (SMA)
Fungsional	**Berdiri Sendiri (Stand Alone)** e-SPM saat ini berjalan dan berdiri sendiri, tidak terintegrasi dengan sistem atau aplikasi manapun	**Sistem Manajemen Aset (SMA)** e-SPM merupakan bagian dari Sistem Manajemen Aset jalan tol, saling terhubung dan tidak dapat berdiri sendiri
Oritentasi	**Pemenuhan SPM (PERMEN PU)** Dikembangkan dan dijalankan sesuai dengan tata cara pemenuhan SPM sesuai dengan regulasi	**Aset Jalan Tol** Dikembangkan untuk berorientasi kepada "Asset Inventory" yang ada di jalan tol
Objek (Contoh)	**Indikator, Lokasi (KM, Lokasi, Koordinat)** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan atribut : indikator temuan dan detail lokasi. Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU KM : 05+200 Lajur : Non-Lajur Jalur : Jalur A Latitude (Deg) : -6.12345678 Longitude (Deg) : 120.12345678	**Indikator, ID Asset** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan data aset yang sudah di-inventory dan tersimpan di database Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU ID Rambu / PJU : TS-0000262626 **Informasi Aset (Otomatis)** KM : 05+200 Lajur : Non-Lajur Jalur : Jalur A Latitude (Deg) : -6.12345678 Longitude (Deg) : 120.12345678
Riwayat, Trend (Contoh)	**Mengandalkan Lokasi** Riwayat temuan, perbaikan mengandalkan lokasi. Untuk objek yang sama memungkinkan terjadi kesalahan pendataan.	**Tepat Sasaran** Riwayat temuan dan perbaikan terekam dengan tepat, meminimalisir kesalahan karena spesifik berdasarkan data inventory

DEMO APLIKASI

https://www.espm.bpjt.pu.go.id

Ministry of Public Works and Housing

REPUBLIC OF INDONESIA
PROJECT FOR STRENGTHENING MANAGEMENT CAPACITY OF TOLL ROAD DEVELOPMENT

Japan International Cooperation Agency

2nd WORKSHOP ON "SOCIALIZATION OF UPGRADED FEATURES OF E-SPM AND OPERATION OF E-SPM"

Dr. Bhoj Raj PANTHAA
JICA Expert

November 28, 2023

Asset Management or Managing Assets

Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

Then, what is the role of PUPR/BPJT/DGH in regard to toll road?

How about for national road?

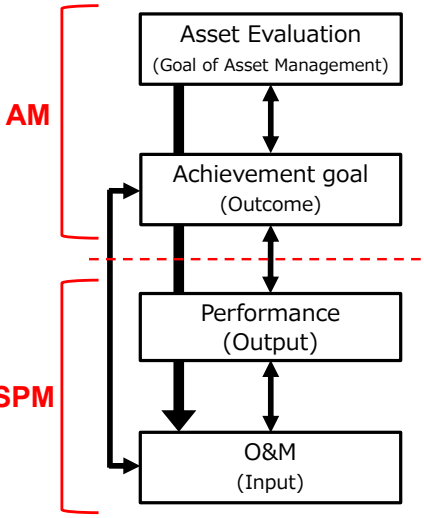
Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performance

Source : https://committee.iso.org/home/tc251

Concept of Asset Management in BPJT for PPP Toll Road Management

- Why should governments manage asset management data in PPP schemes?
  - To allow the government to see the history of the asset when the concession period ends, and the asset is handed over to the government.
  - Governments need to always manage all data about asset performance.
- In O&M stage
  - The Government (MPWH) is always responsible for the contractor's failure (responsibility for outcomes achievement), even if the risk is transferred to the contractor (TROs).
- Government takes risks and is accountable to the public
  - **Quality assurance of assets**
  - Road and facility malfunctions
  - Road accident and safety
  - Road surrounding environment, etc.



Hierarchical Management Cycle for Toll Road Operation

ASSET MANAGEMENT

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

MANAGING ASSET

New action based on the direction from TOP Management

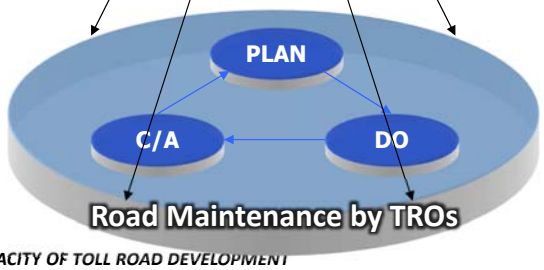


Report and data accumulation from O&M work

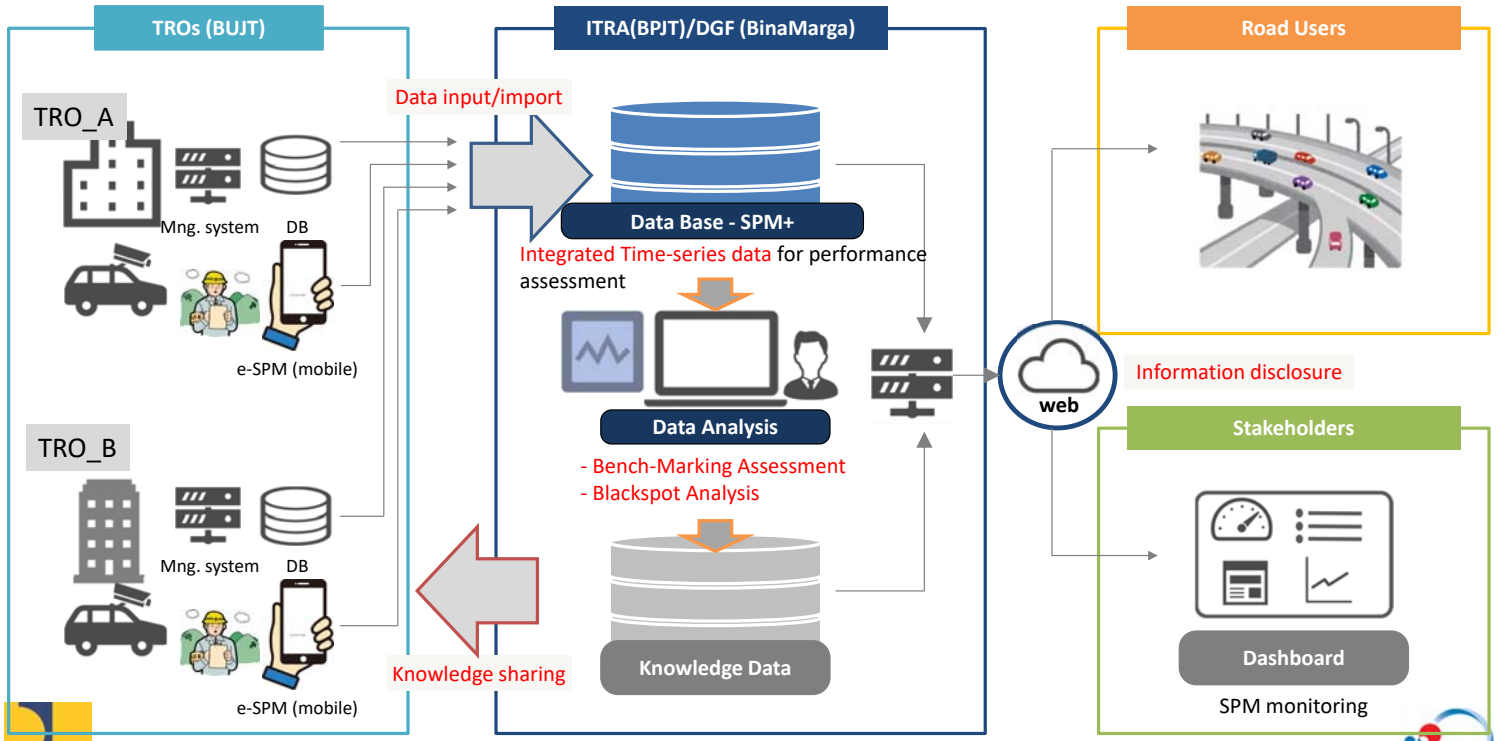








Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading

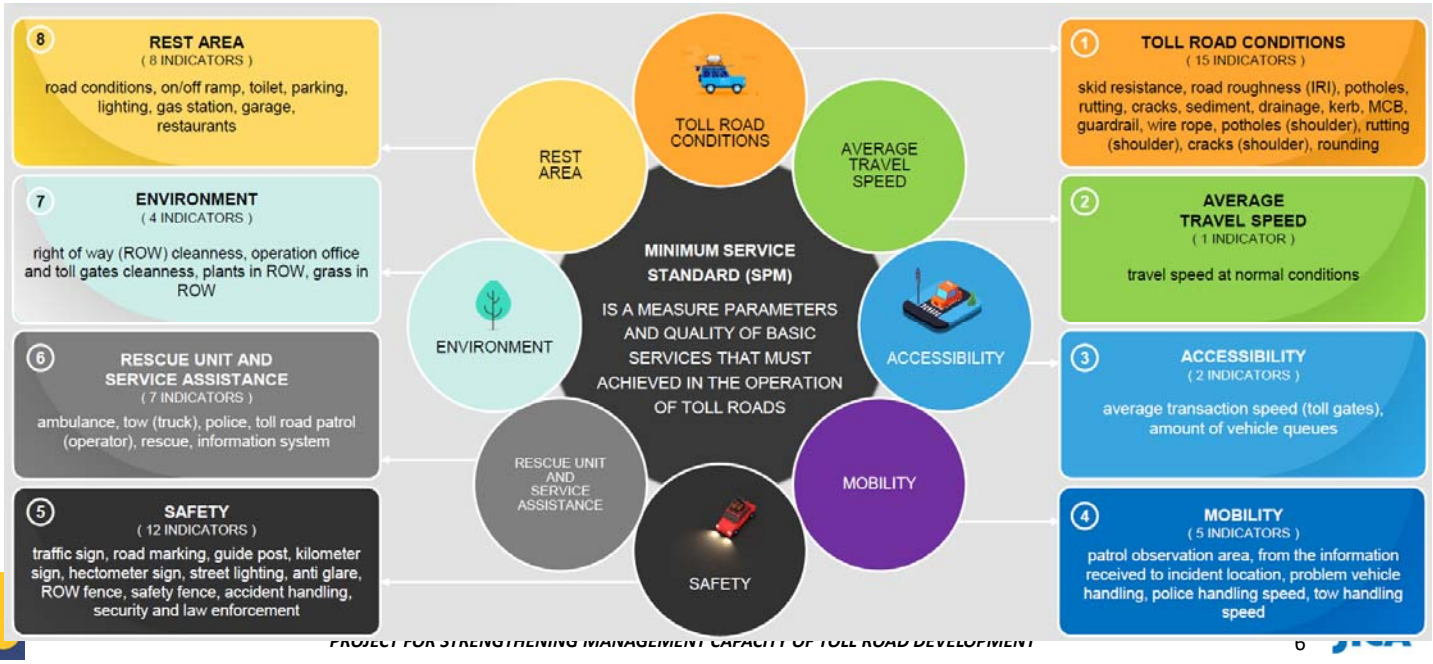


8 Substances
54 Indicators

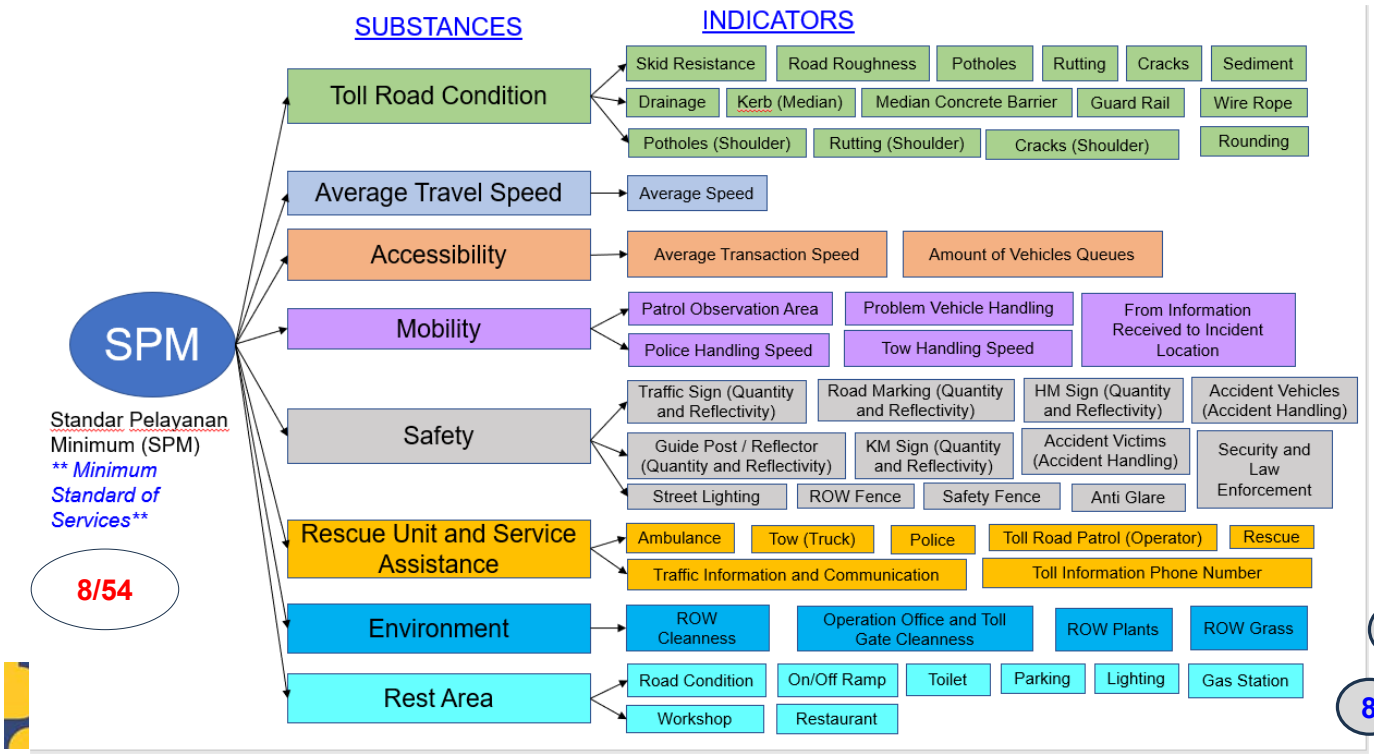
SPM Monitoring



- Regulation No. 16 Year 2014 (Stipulates the Obligations of SPM Monitoring)

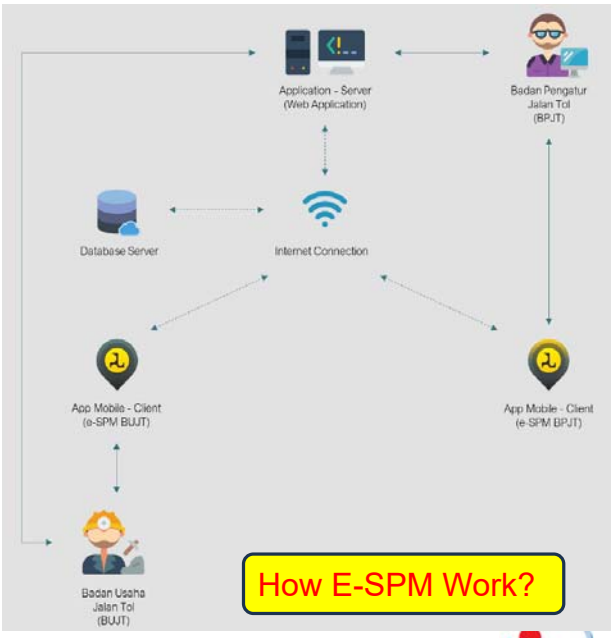


Minimum Standard of Services (SPM) Outline



Electronic - Minimum Standard of Service (E-SPM)

CONVENTIONAL METHOD	USING E-SPM Why E-SPM?
› Data collection by manual	✓ Data collection by mobile App
› Monitoring report is created manually	✓ Inspection report is generated automatically by e-SPM
› Repair reports are created manually by toll road operator, and sent to BPJT when repairs has been completed	✓ Repair reports are available on e- SPM, which can be accessed by toll road operator (BUJT) and BPJT at any time without having to wait for the repair to be fully completed.



SPM Monitoring – Frequency of SPM fulfillment by e-SPM

TOLL ROAD CONDITIONS

No	Fulfillment Indicators	Freq
1	Skid Resistance (Main Road)	Annual
2	Road Roughness (Main Road)	Annual
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Sediment	Daily
7	Drainage	Daily
8	Kerb (Median)	Daily
9	MCB (Median Concrete Barrier)	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

AVERAGE TRAVEL SPEED

No	Fulfillment Indicators	Freq
1	Travel Speed at Normal Condition	Monthly

ACCESSIBILITY

No	Fulfillment Indicators	Freq
1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly

MOBILITY

No	Fulfillment Indicators	Freq
1	Patrol Observation Area	Monthly
2	From The Information Received to Incident Location	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

SAFETY

No	Fulfillment Indicators	Freq
1	Traffic Sign (quantity and reflectivity)	3 Month
2	Road Marking (quantity and reflectivity)	3 Month
3	Guide Post / Reflector (quantity and reflectivity)	3 Month
4	Kilometer Sign (quantity and reflectivity)	3 Month
5	Hectometer Sign (quantity and reflectivity)	3 Month
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims (Accident Handling)	Monthly
11	Accident Vehicles (Accident Handling)	Monthly
12	Security and Law Enforcement	Monthly

RESCUE UNIT, SERVICE ASISTANCE

No	Fulfillment Indicators	Freq
1	Ambulance	Monthly
2	Tow (Truck)	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Information and Communication	Monthly
7	Phone Number for Toll Info	Monthly

ENVIRONTMENT

No	Fulfillment Indicators	Freq
1	ROW Cleanness	Daily
2	Operation and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Month
4	ROW Grass	3 Month

REST AREA

No	Fulfillment Indicators	Freq
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

- Routine, Every Day
- Periodic, Every Month
- Periodic, Every 3 Month
- Periodic, Every Year

What will happen if SPM requirements are not fulfilled?
>> Existing regulations, cancellation of concessionaire contract only.
>> New regulations (yet to go for enforcement), warning, rejection for tariff adjustment, penalty, cancellation of contract

Why e-SPM Upgrading Necessary?

e-SPM Mobile (Applicable at Site)



- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Web e-SPM

1. Dashboard

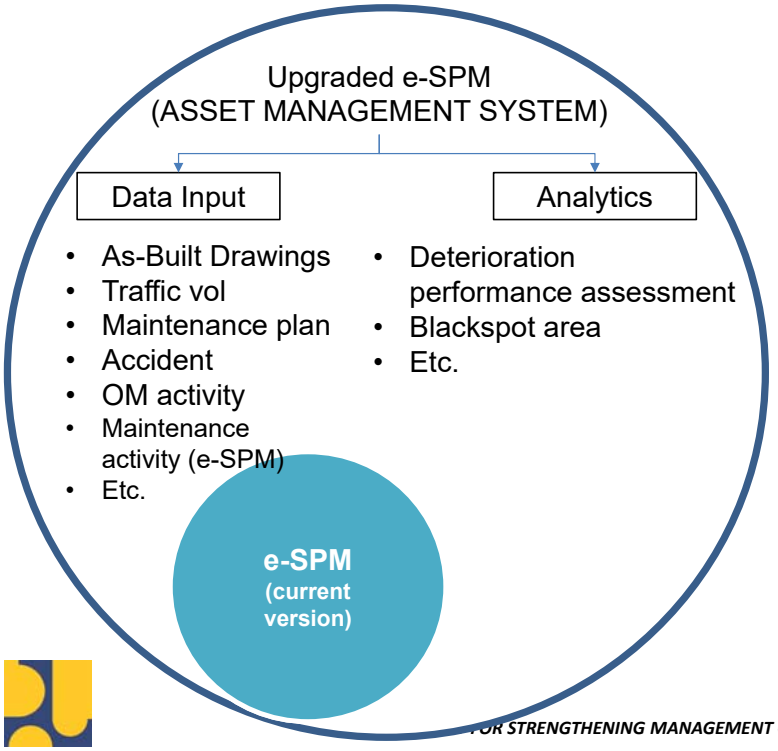
2. Data Inputting
- SPM Monitoring Data
  - Road Condition (Partially)
  - Mobility
  - Safety (Partially)
  - Rescue and Service (Partially)

3. Analytics Module
- Statistical Analysis of Various Indicators

Are inputted information sufficient for PPP toll road management?

Are there sufficient analysis tools for toll road monitoring?

Rationale for e-SPM Upgrading



- e-SPM would be part of Asset Management System (AMS)
- AMS content:
  - Technical Information about toll road
  - Performance data
  - Other information
  - Analytics
- AMS will used for general estimation about road performance, not for budget optimalization, so that government could evaluate TRO's activities
- AMS shall feedback provide useful information for better Asset management to TROs
- AMS will be used by ITRA for monitoring all activities

Concept of e-SPM Upgrading for Asset Management

- **Enhanced data input function**
  - Improving operational efficiency by promoting digitalization of SPM operations
  - Improvement of data reliability
- **Enhanced data analysis function**
  - Analytical capabilities for assessing the performance of TROs' asset management
- **Strengthening data utilization methods**
  - Feedback to TROs for better Asset Management Activity
  - Providing information to road users and related organizations

Framework for Upgrading e-SPM

To be Expanded by JICA Project	Why Upgrading E-SPM?
1. Data Inputting • Inventory Data • Maintenance Plan • Traffic Volume	**1. Data Inputting** • Inventory Data>>> Incomplete Inventory Data • Maintenance Plan>>> Not available in the existing version • Traffic Volume>>> Not available in existing version
2. Analysis Module • SPM Monitoring • Performance Evaluation (TRO) • Black Listing Evaluation (TRO) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation	**2. Analysis Module** • SPM Monitoring >>>Available in the current version but only table only • Performance Evaluation (TRO)>>>Not available in existing version • Black Listing Evaluation (TRO)>>> Not available in existing version • Accident (Black Spot) Analysis>>> Not available in existing version • Deterioration Trend Analysis>>> Not available in existing version • Detailed Investigation>>> Not available in existing version
3. Reporting Module	**3. Reporting Module>>>** Not available in existing version
4. Document Module	**4. Document Module>>>** Not available in existing version

AMS Framework (E-SPM Upgrading)

1. Data Inputting Interface
   - 1.1 Develop an interface to input basic inventory data including As-Built Drawings
   - 1.2 Develop interface for inputting maintenance plans
   - 1.3 Traffic Volume Data (Extraction/conversion from current E-SPM)
   - 1.4 Traffic Accident Data (Extraction/conversion from current E-SPM)
2. Analysis Modules
   - 2.1 A single interface to monitor SPM indicators recorded by TRO and ITRA Inspection Team on top of minimum indicator stipulated by regulation
   - 2.2 Performance Evaluation of TROs (Updating in current rating system)
   - 2.3 Blackspot Analysis (Accident Data Analysis)
   - 2.4 Rank TROs based on unrepair/noncompliance events (blacklist rating)
   - 2.5 Deterioration Trend Analysis (same as NR Model??)
   - 2.6 An interface to recommend detailed investigation based on defects repetition
3. Integration with Other System
4. Reporting Module
5. Documentation Module

Overall Structure of the Upgraded e-SPM



Android Application (e-SPM Mobile) (Applicable at Site)

- SPM Monitoring Data Entry (Partially)
  - Road Condition (Partially)
  - Travel Speed
  - Accessibility
  - Safety (Partially)
  - Rescue and Service (Partially)
  - Environment
  - Rest Area

Application Server (e-SPM Web)









API

- Other Systems integrated to e-SPM (IIRMS, ???)

e-SPM Database

Existing E-SPM	To be Expanded by JICA Project
1. Dashboard	**1. Data Inputting** • Inventory Data • Maintenance Plan • Traffic Volume
2. Data Inputting • SPM Monitoring Data ❖ Road Condition (Partially) ❖ Mobility ❖ Safety (Partially) ❖ Rescue and Service (Partially)	**2. Analysis Module** • SPM Monitoring • Performance Evaluation (TRO) • Black Listing Evaluation (TRO) • Accident (Black Spot) Analysis • Deterioration Trend Analysis • Detailed Investigation
3. Analytics Module • Statistical Analysis of Various Indicators	**3. Reporting Module**
	4. Document Module

Inventory Data Inputting Interface

No	Inventory Data / Data Inputting	Module Link	Data Attributes			
1	Highway Segments	https://espm.varianglobal.com/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp	▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude	▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year	▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*)
2	Toll Gates	https://espm.varianglobal.com/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name	▪ Gate Type ▪ Transaction Type ▪ Entrance Booth	▪ Exit Booth ▪ Direction ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Station	https://espm.varianglobal.com/rescuestation	▪ ID ▪ Highway ID	▪ Station Name ▪ Direction	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Description
4	Vehicle Service	https://espm.varianglobal.com/v1-kendaraanlayanan	▪ ID ▪ Highway ID	▪ Rescue Station ID ▪ Vehicle Code	▪ Vehicle Type ▪ Police Number	▪ Vehicle Number ▪ Description
5	Bridges	https://espm.varianglobal.com/bridge	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km)	▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position	▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure	▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.varianglobal.com/restarea	▪ ID ▪ Highway ID ▪ Rest Area Name	▪ Chainage (Km) ▪ Latitude (Deg)	▪ Longitude (Deg) ▪ Direction	▪ Rest Area Type ▪ Pavement Type

Maintenance Plan

Article 8 Maintenance of concession agreement (sample)

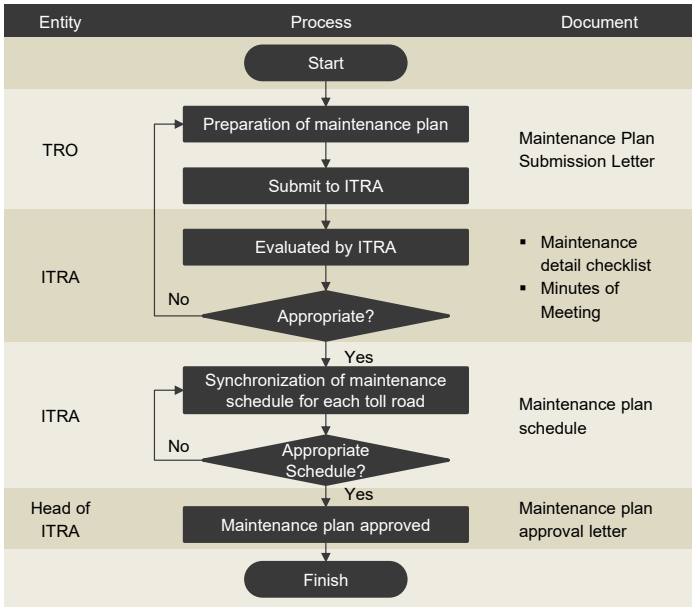
8.1 Maintenance Obligations

8.1.1. Toll Road Business Entities are required to submit a Maintenance program Plan, during the Operational period which has been discussed with the Government, no later than 60 (sixty) Days after the issuance of the Operational Stipulation, to obtain Government's approval.

8.2 Report

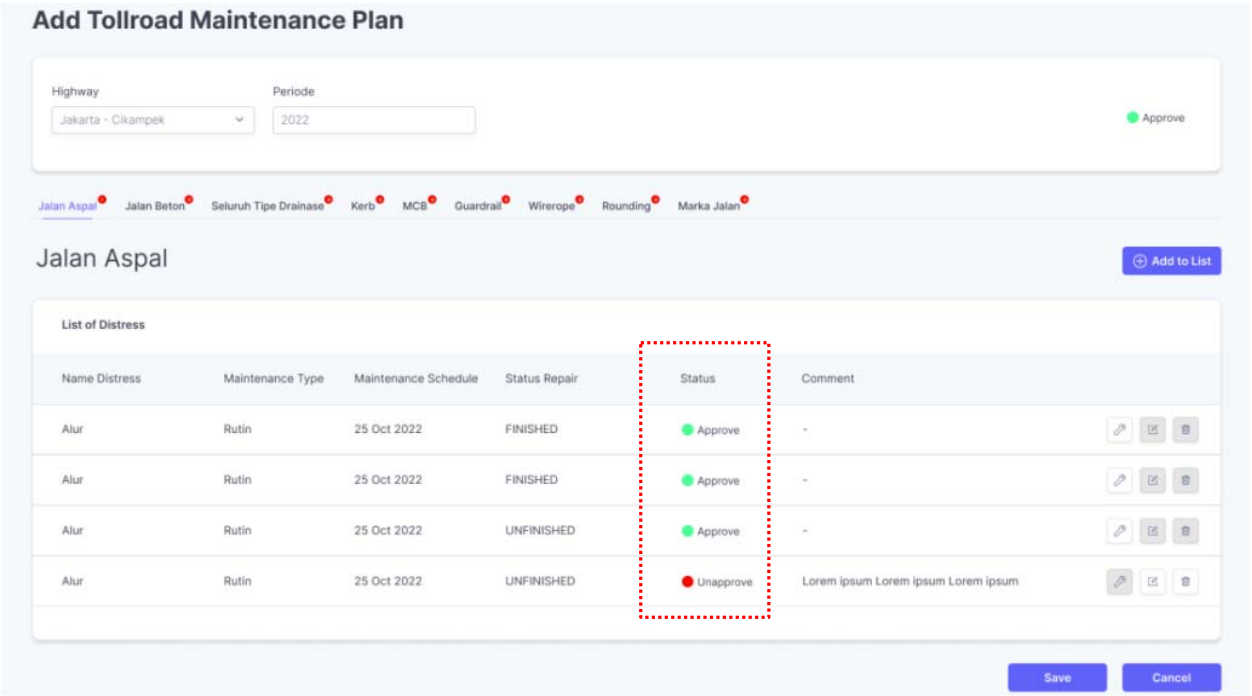
Toll Road Business Entities are required to submit a Quarterly Report on Maintenance activities no later than the 20 (twentieth) day of the following month. Toll Road Business Entities are required to report to the Government the condition of Toll Roads every 20 (twentieth) January of the following year and every subsequent year.

Maintenance Plan



- Maintenance plan must be reported by TRO **annually**
- Maintenance plan prepared only for periodic maintenance and upgrading maintenance
- Maintenance plan are classified in 3 categories, including: Toll Road; Bridges; Services Area (each category has several indicators)
- Each category is reported in the form of damage details, repair plan, repair schedule, and strip map (certain indicators)
- The maintenance plan applies an approval system by ITRA
- The details of the maintenance plan will be reviewed by ITRA, ITRA will approve or reject one by one the detailed data that has been reported by the TRO
- Schedule synchronization by ITRA on the consideration of several programs such as: SPM fulfilment, rate adjustment, prohibition of work on holidays and new year, etc.
- The maintenance plan report that has been evaluated will be approved by the head of ITRA
- The approved maintenance plan will be used as a reference for ITRA to monitor and evaluate repair results **(repair activity must also be reported by TRO)**

Management of Maintenance Plan



SPM Monitoring – Macro Analysis

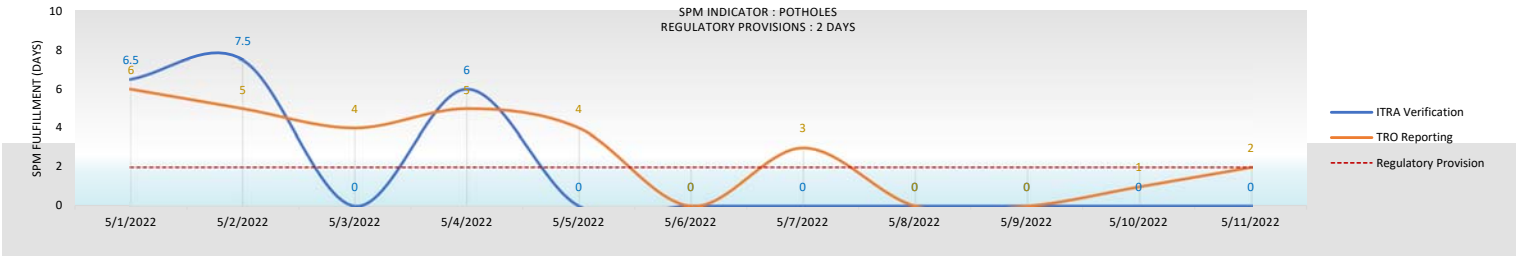
The analysis feature is to find out the comparison of SPM fulfillment by TRO, ITRA and regulatory provisions. The technical approach will be described through a sample case of SPM fulfillment.

ITRA Verification			TRO Reporting		
Damage Found (Date)	Repair Date	Repair Duration (Days)	Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5	01/05/2022	07/05/2022	6
01/05/2022	06/05/2022	5	02/05/2022	07/05/2022	5
01/05/2022	09/05/2022	8	03/05/2022	07/05/2022	4
01/05/2022	09/05/2022	8	04/05/2022	09/05/2022	5
02/05/2022	09/05/2022	7	04/05/2022	09/05/2022	5
02/05/2022	10/05/2022	8	04/05/2022	09/05/2022	5
04/05/2022	10/05/2022	6	05/05/2022	09/05/2022	4
04/05/2022	10/05/2022	6	07/05/2022	10/05/2022	3
04/05/2022	10/05/2022	6	10/05/2022	11/05/2022	1
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2
04/05/2022	12/05/2022	8	11/05/2022	13/05/2022	2

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfillment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Damage found (datetime format)

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



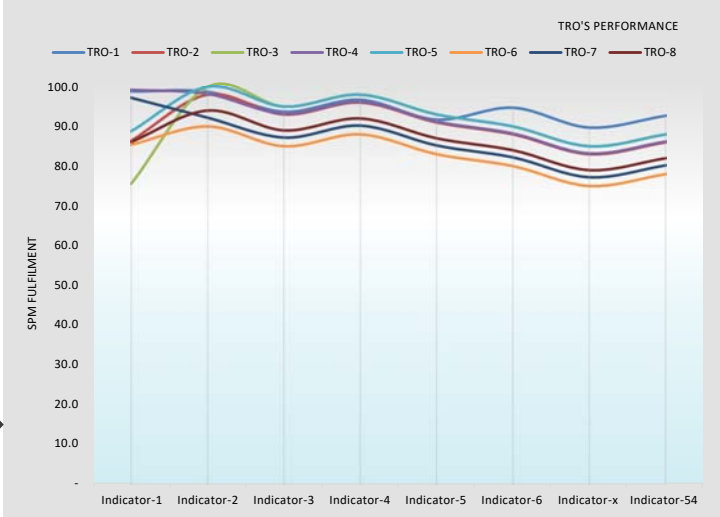
Performance Evaluation – Macro Analysis

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road.

Indicator	SPM Fulfilment							
	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators
n_{finish} : Amount of damage that has been repaired
n : Amount of damage/issue



Performance Evaluation – Macro Analysis - Blacklisting

The results of the ranking evaluation of SPM achievement are displayed Points are awarded for achievement against the criteria set for each SPM indicator and the corresponding time for repair, etc. The scores of the TROs are calculated and displayed in the ranking.

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

iv : Indicator Value
a : Indicator-a
n : Amount of damage/issue in 1 indicator
$jptw$: Number of repairs on time
iw : Indicator Weight
ipv : Indicator Percentage Value (%)
sv : Substance Value
54 : Total amount of indicators
b : Substance-b

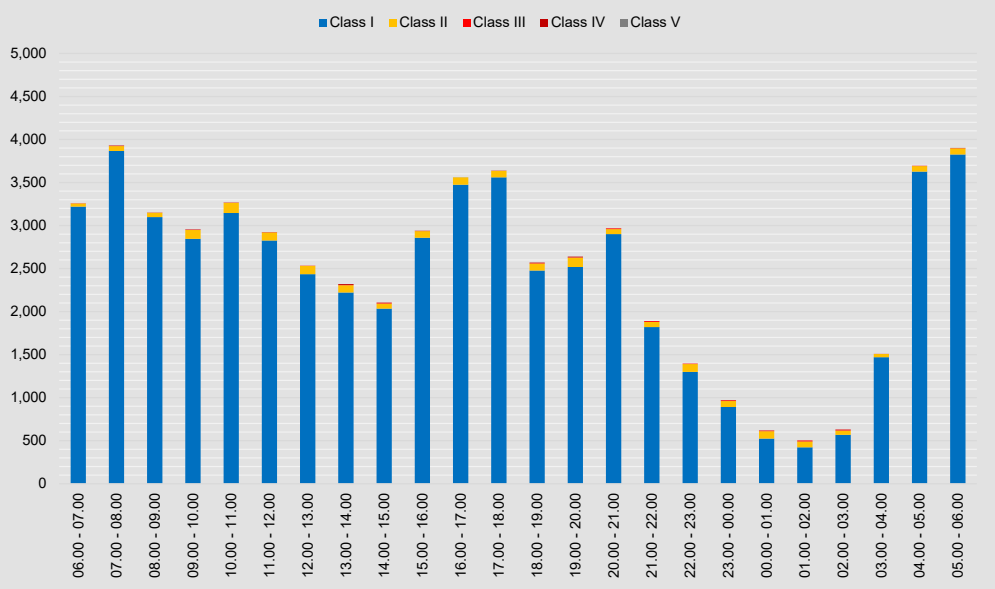
Weighting of substances

No	Ssubstances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Assistance	10.47
7	Eenvironment	3.40
8	Rest Area	4.67
	Total	100.00

No	TRO	Fulfilment Percentage by Substances Score Range: 0 - 100 Minimum Score: 75								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

Traffic Volume Data

No	Data Attributes
1	ID
2	Highway
3	Highway Segment
4	Traffic Date
5	Name of Traffic Counting Station
6	Chainage of Traffic Counting Station (Km)
7	Latitude of Traffic Counting Station
8	Longitude of Traffic Counting Station
9	Traffic Counting Method
10	Description
11	Class 1 Traffic Volume at 00 am - 01 am
…	…
34	Class 1 Traffic Volume at 11 pm - 12 am
35	Class 2 Traffic Volume at 00 am - 01 am
…	…
58	Class 2 Traffic Volume at 11 pm - 12 am
59	Class 3 Traffic Volume at 00 am - 01 am
…	…
82	Class 3 Traffic Volume at 11 pm - 12 am
83	Class 4 Traffic Volume at 00 am - 01 am
…	…
106	Class 4 Traffic Volume at 11 pm - 12 am
107	Class 5 Traffic Volume at 00 am - 01 am
…	…
130	Class 5 Traffic Volume at 11 pm - 12 am



Traffic Accident Data Analysis (Blackspot Analysis

Based on the Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

↓

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

↓

Determining the Upper Control Limit (BKA)

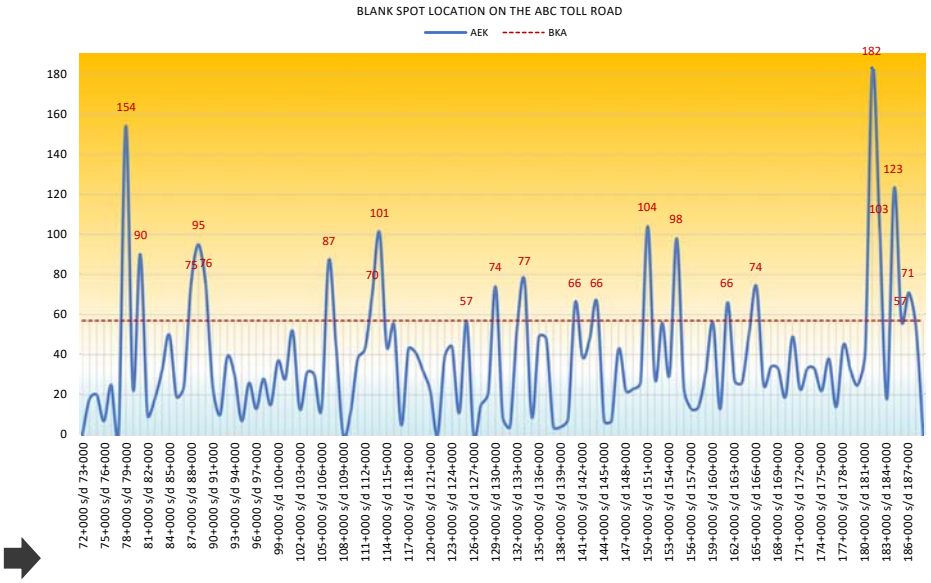
$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

BKA : Upper Control Limit
C : AEK Accident Rate

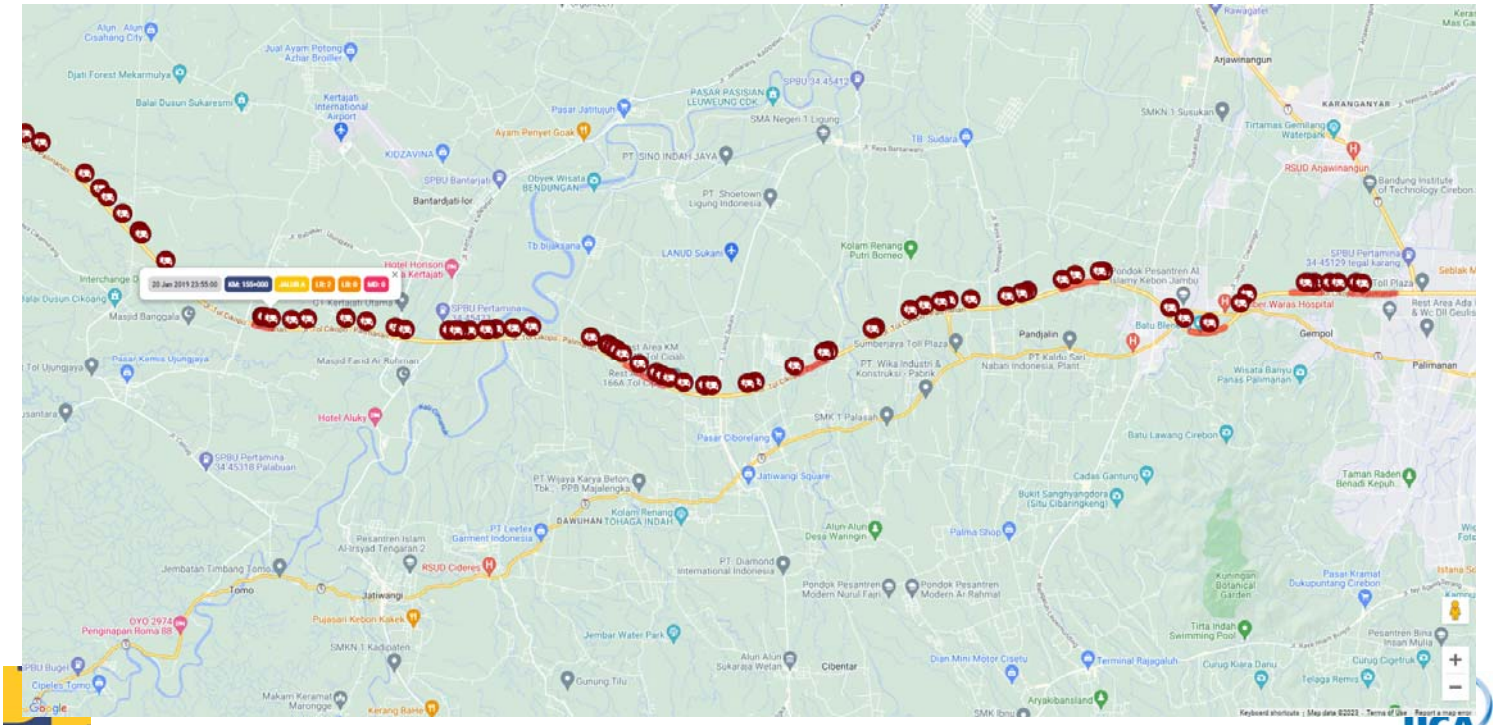
↓

Determining Blank Spot Location

$AEK > BKA$



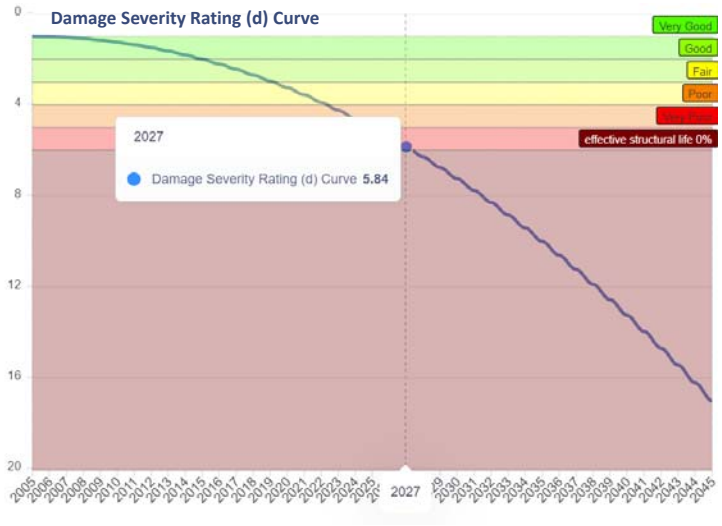
Traffic Accident Data Analysis (Blackspot Analysis)



Performance Evaluation – Micro Analysis – Deterioration Performance

- Deterioration Prediction Model ≠ Deterioration Performance Evaluation
- The actual performance of each route or road segment is checked if it is fast or slow by comparison to a Bench-Mark case of deterioration speed based on the data collected.

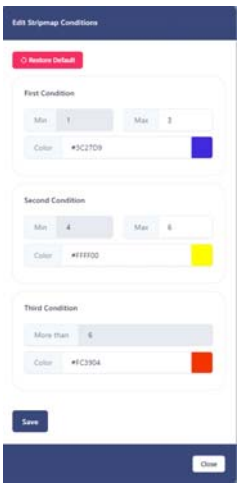
Highway	Operation Year	damage severity rating (d)	Status
Akses Tanjung Priok	2017	1.36	
Bakauheni - Terbanggi Besar	2019	1.16	
Balikpapan - Samarinda	2019	1.16	
Bekasi - Cawang - Kampung Melayu	2017	1.36	
Belawan - Medan - Tanjung Morawa	1988	12.56	
Binjai - Langsa	2022	1.01	
Bogor Ring Road Seksi I-IIIA	2009	2.96	
Cawang - Tomang - Pluit	1987	13.96	
Cengkareng - Batu Ceper - Kunciran	2021	1.04	
Ciawi - Sukabumi	2018	1.25	
Cibitung - Cilincing	2021	1.04	
Cikampek - Palimanan	2015	1.64	
Cikampek - Purwakarta - Padalarang	2005	4.24	
Cileunyi - Sumedang - Dawuan	2022	1.01	
Cimanggis - Cibitung	2020	1.09	
Cinere - Jagorawi	2012	2.21	

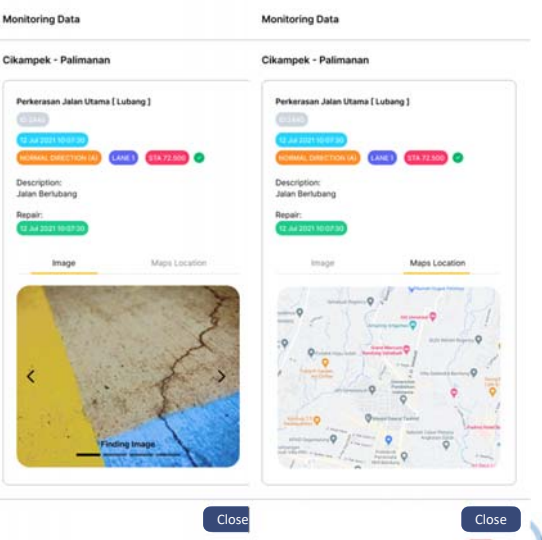


Performance Evaluation – Micro Analysis – Recommendation for Detailed Investigation

An analytic module to recommend for the detailed investigation by analyzing the historical damage detection in the same location. A list with recommended detailed investigation based on the threshold of damages detected in the same location/area is shown. Also, upon double click of damage location point, the Sub-Consultant will develop a pop-up window to show details of damages including damage photos. Maintenance works carried out by TROs are proper or not.

Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...
Direction →	ROW Fence						
	Drainage			2			
	Safety Fence						
	Outer Shoulder						
	Lane 1						
	Lane 2						
	Lane 3				3		
	Inner Shoulder						
	Median						
	Inner Shoulder						
	Lane 3						
	Lane 2						
	Lane 1					12	
	Outer Shoulder	8					
	Safety Fence						
	Drainage						
← Direction	ROW Fence						
Chainage (Km)		0+000	0+200	0+400	0+600	0+800	...

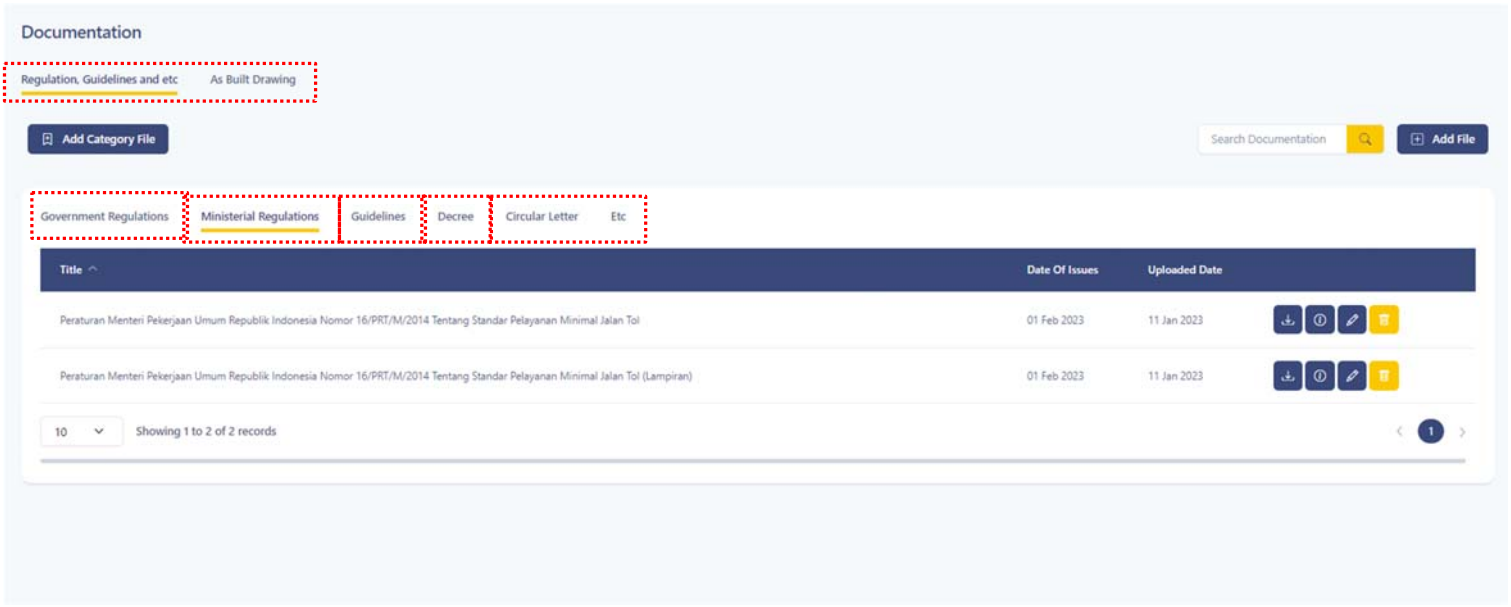




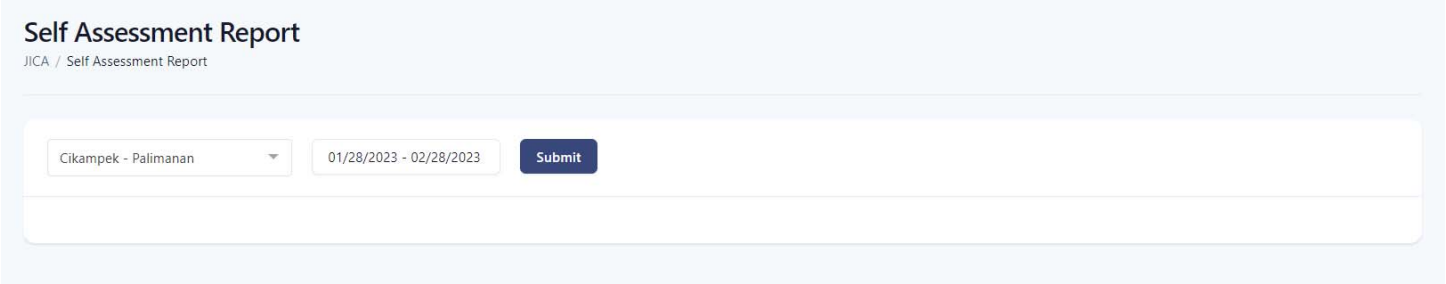
number of issues = 1-5; number of issues = 5-10; number of issues : > 10
unrepair issue/damage

Close Close

Documentation



Reporting



Terima kasih

BPJT

WORKSHOP
"PENGGUNAAN APLIKASI E-SPM DAN PENGEMBANGANNYA"

20 Mei 2024
Wilayah Kalimantan, Sulawesi,
Bali, dan sebagian Jawa Timur

BIDANG SILJT

OVERVIEW

01 - GAMBARAN UMUM

02 - SUBSTANSI PELAYANAN JALAN TOL

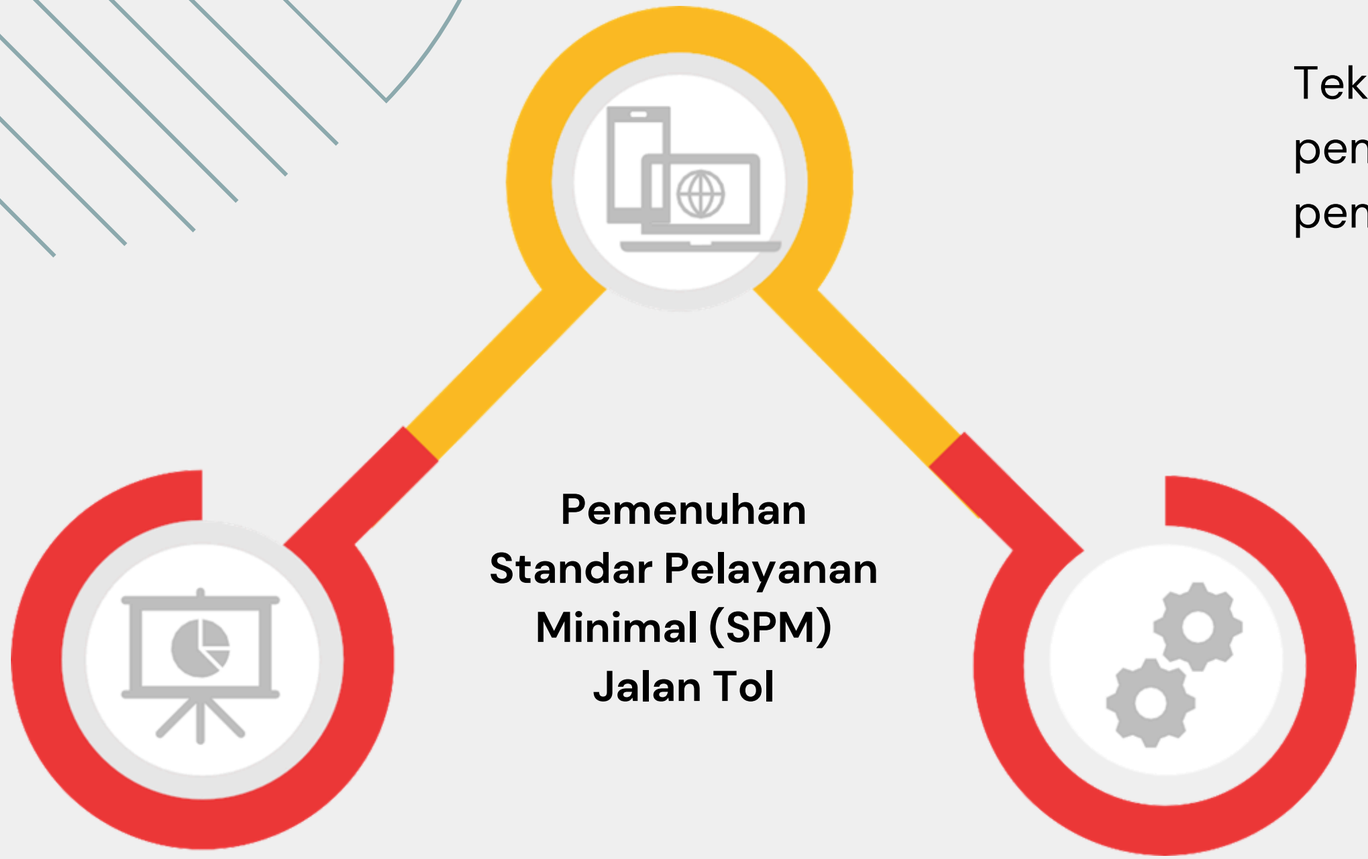
03 - MOBILE APP E-SPM

04 - WEB BASED E-SPM

05 - PENAMBAHAN FITUR

GAMBARAN UMUM

Tool Monitoring
E-SPM



Pemenuhan Standar Pelayanan Minimal (SPM) Jalan Tol

BPJT
Monitoring dan Evaluasi

BUJT
Pelaksanaan

Teknologi berbasis aplikasi digital dalam melakukan pemantauan terkait pengoperasian dan pemeliharaan jalan tol.

SASARAN

- Sebagai media bagi BUJT untuk melaksanakan pemantauan, pengoperasian, dan pemeliharaan jalan tol secara ***real time***.
- Memudahkan BPJT dalam melakukan pengawasan terhadap pelaksanaan pengoperasian dan pemeliharaan jalan tol oleh BUJT secara **real time**.

DASAR PELAKSANAAN:

1. Permen PU Nomor 16/PRT/M/2014 tentang SPM Jalan Tol
2. SE Kepala BPJT nomor 01/SE/P/2017 tanggal 16 Februari 2017 tentang Penerapan Self Assessment kepada Badan Usaha Jalan Tol;
3. Surat Kepala Badan Pengatur Jalan Tol nomor BM.07.02-P/23 tanggal 9 Januari 2023
4. Surat Pejabat Pembuat Komitmen Bidang Sistem Informasi Layanan Jalan Tol Satuan Kerja Sekretariat Pengatur Jalan Tol nomor 15/BM.07.02/SPJT/PPK/2024 tanggal 23 Februari 2024
5. Surat Kepala Badan Pengatur Jalan Tol nomor BM 0704-TL/197 tanggal 14 Maret 2024

BUTIR PENEKANAN IMPLEMENTASI E-SPM

01

sebagai kebutuhan **monitoring aset** jalan tol dan **evaluasi kondisi** aset

02

parameter keberhasilan BUJT adalah pemenuhan/perbaikan sesuai dengan ketentuan dalam Permen SPM baik dari sisi **kualitas maupun waktu pemenuhan**.

03

jumlah temuan tidak menjadi parameter baik/buruk kinerja BUJT, namun menjadi **bahan evaluasi** bersama terkait kondisi aset

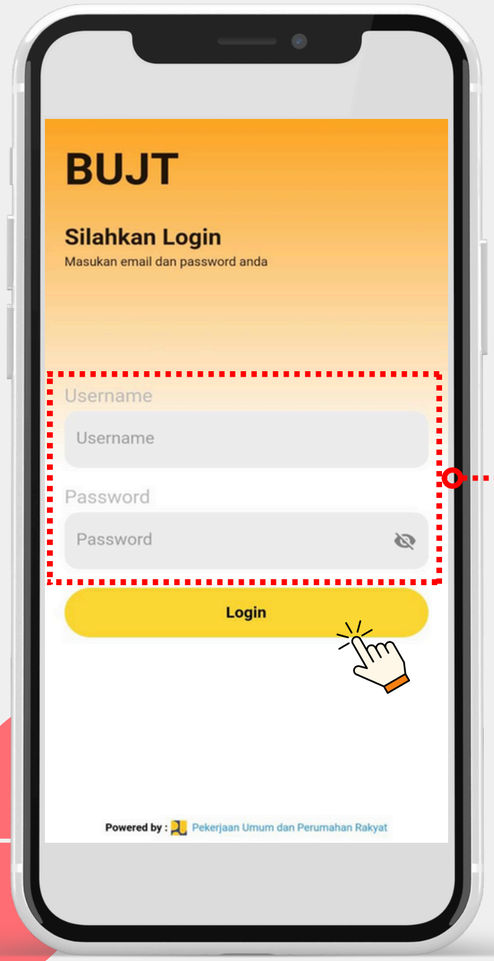
04

stakeholder utama adalah BPJT dan BUJT, pihak di luar BUJT menjadi tanggung jawab BUJT dan koordinasi tetap melalui BUJT

MOBILE APP E-SPM

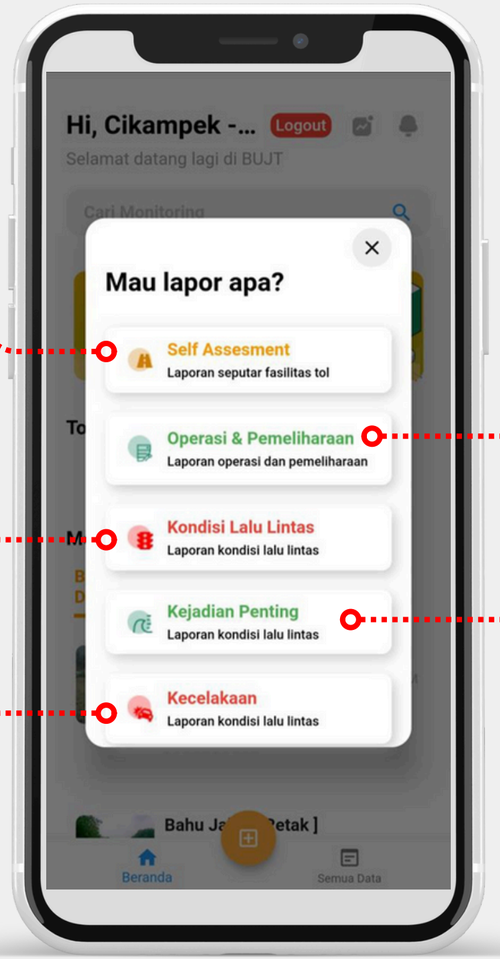
PUPR
SIGAP MEMBANGUN NEGERI

MENU LOG IN



Setiap **ruas jalan tol** memiliki *username* dan *password* masing-masing

MENU UTAMA (1/2)



Self Assesment

Menu ini berfungsi sebagai pemenuhan Self Assessment (Monitoring dan Tindak Lanjut) serta pelaporan kondisi harian pada ruas jalan tol masing-masing BUJT

Kondisi Lalu Lintas

Menu ini berfungsi sebagai media pelaporan kondisi lalu lintas terupdate pada ruas jalan tol masing-masing BUJT

Kecelakaan

Menu ini berfungsi sebagai media pelaporan tiap kejadian kecelakaan pada ruas jalan tol masing-masing BUJT

Operasi dan Pemeliharaan

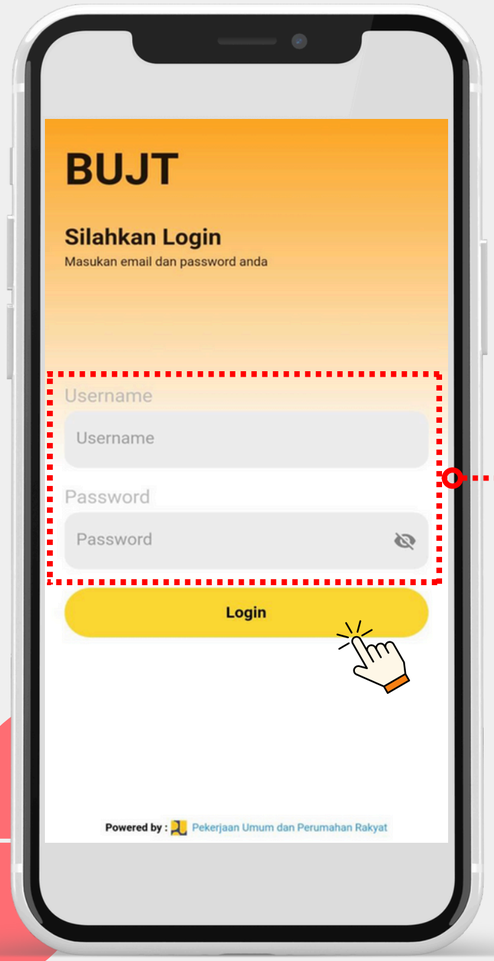
Menu ini berfungsi sebagai media pelaporan kegiatan operasional dan kegiatan pemeliharaan pada ruas jalan tol masing-masing BUJT

Kejadian Penting

Menu ini berfungsi sebagai media pelaporan kejadian penting seperti banjir, longsor, amblas, dll

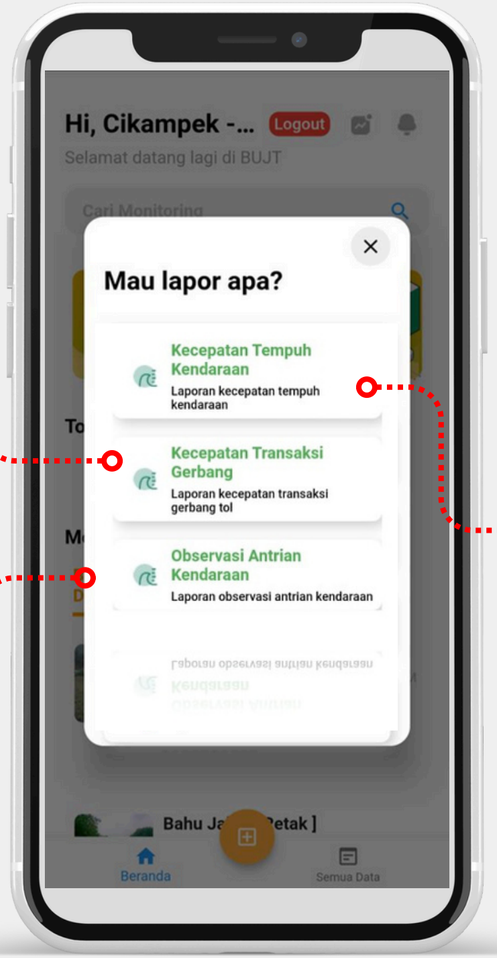
MOBILE APP E-SPM

MENU LOG IN



Setiap **ruas jalan tol** memiliki *username* dan *password* masing-masing

MENU UTAMA (2/2)



Kecepatan Transaksi Gerbang

Menu ini berfungsi untuk melaporkan data transaksi gerbang secara berkala

Kecepatan Tempuh Kendaraan

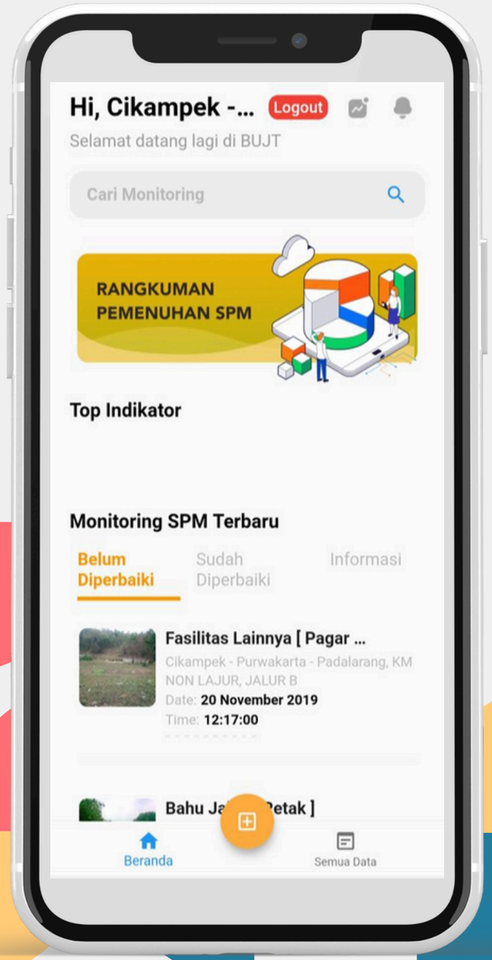
Menu ini berfungsi untuk melaporkan data kecepatan tempuh kendaraan secara berkala

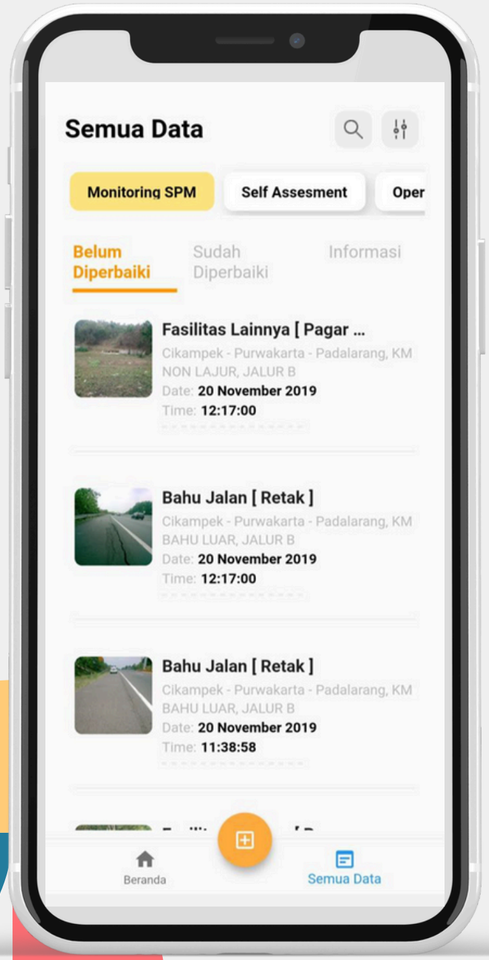
Observasi Antrian Kendaraan

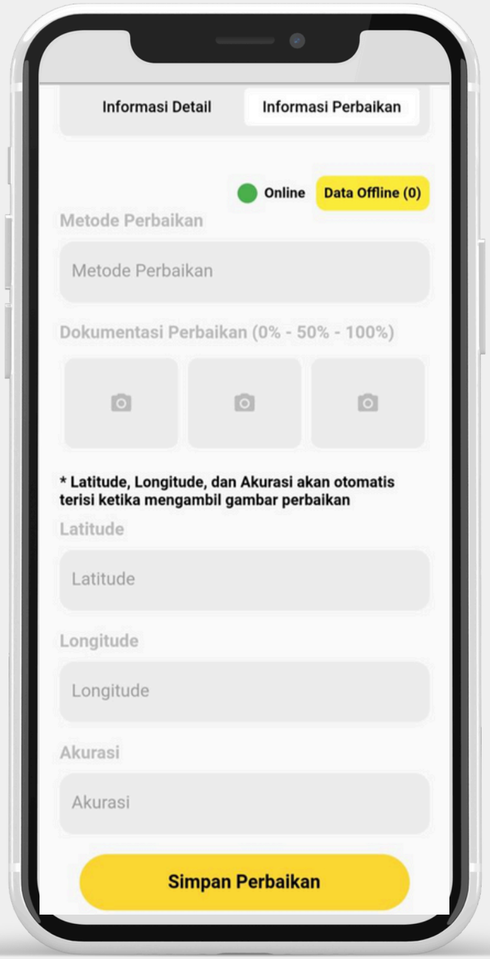
Menu ini berfungsi untuk melaporkan data antrian kendaraan secara berkala

MOBILE APP E-SPM

MENU MONITORING PEMENUHAN SPM





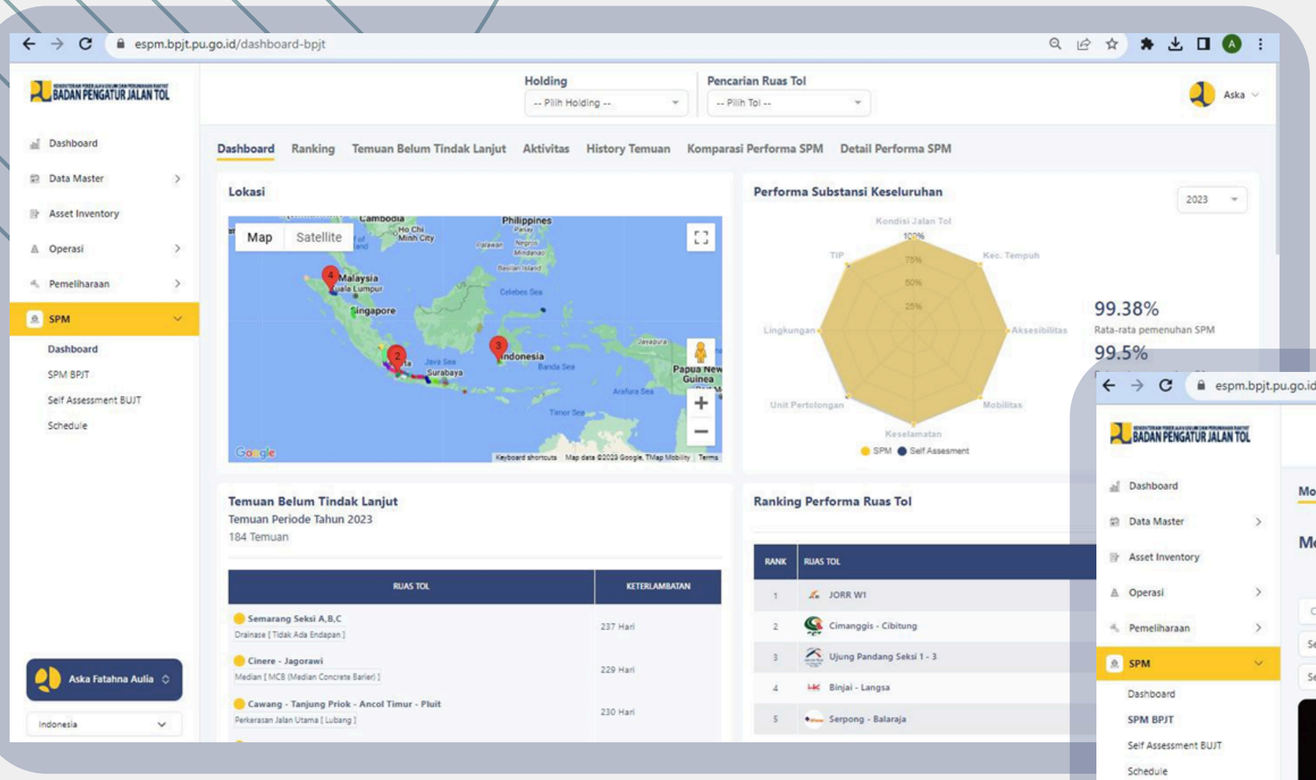


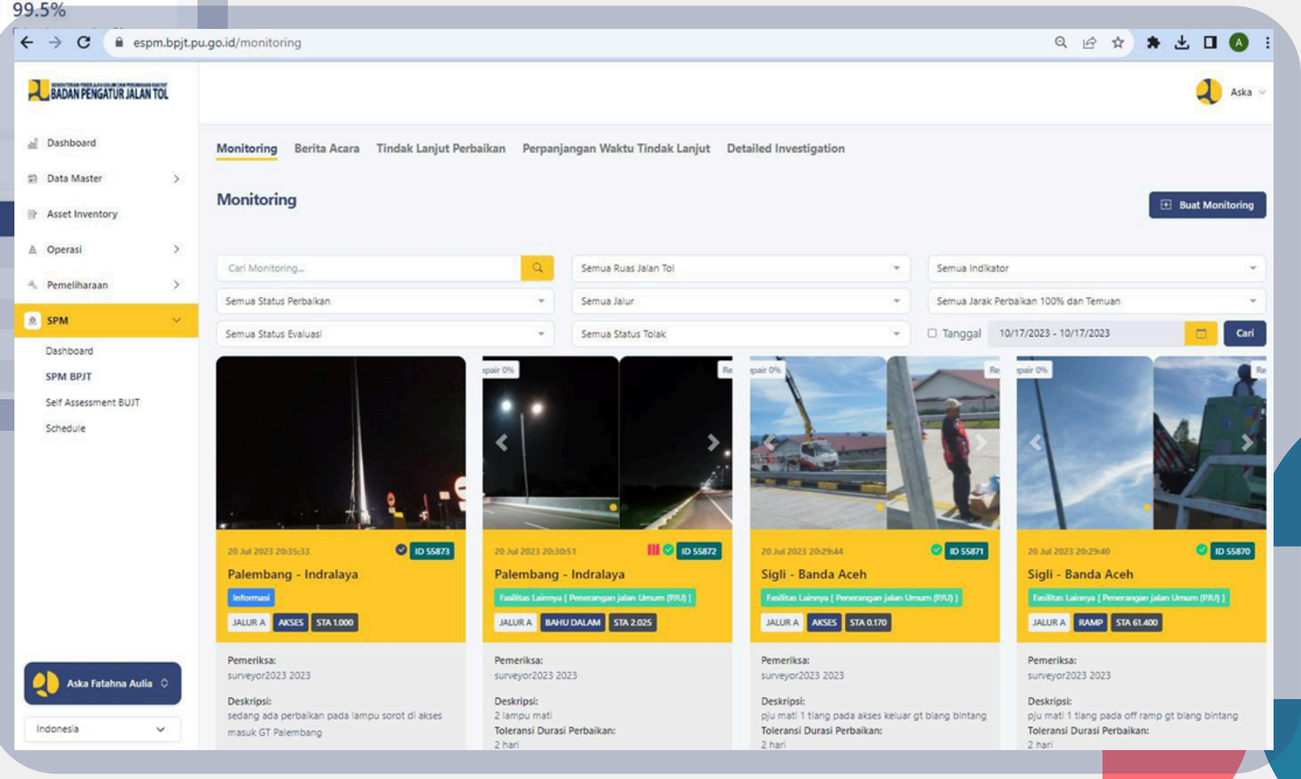
Menu ini berfungsi sebagai riwayat pemenuhan SPM berdasarkan hasil pemeriksaan monitoring SPM oleh BPJT maupun Konsultan, serta berfungsi sebagai pelaporan tindak lanjut SPM oleh pihak BUJT.

WEB BASED E-SPM

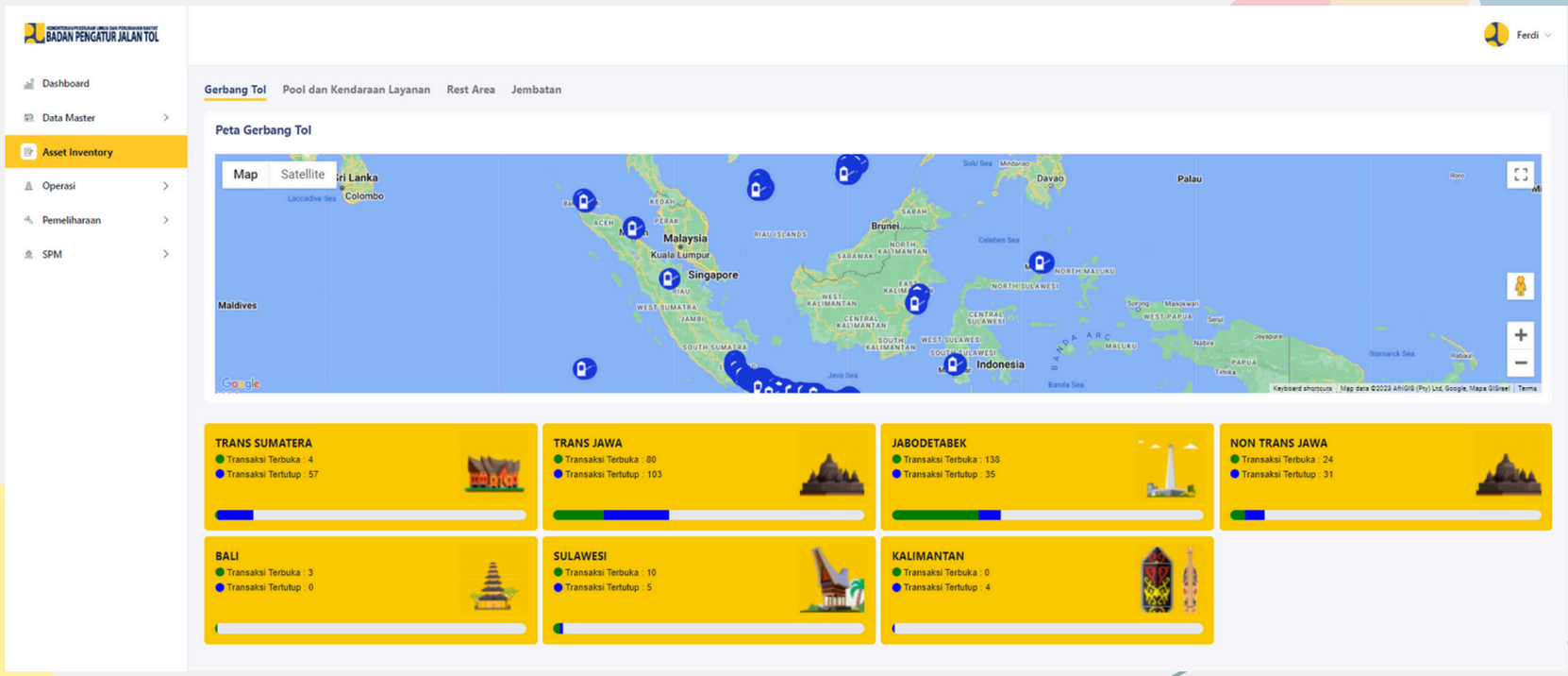
PUPR
SIGAP MEMBANGUN NEGERI

espm.bpjt.pu.go.id





Penambahan Fitur Data Operasi dan Pemeliharaan pada e-SPM



Asset Inventory

Dirancang sebagai database asset jalan tol.

- Gerbang Tol,
- Pool Kendaraan Layanan, termasuk lokasi pool dan jumlah kendaraan layan
- Rest Area
- Jembatan

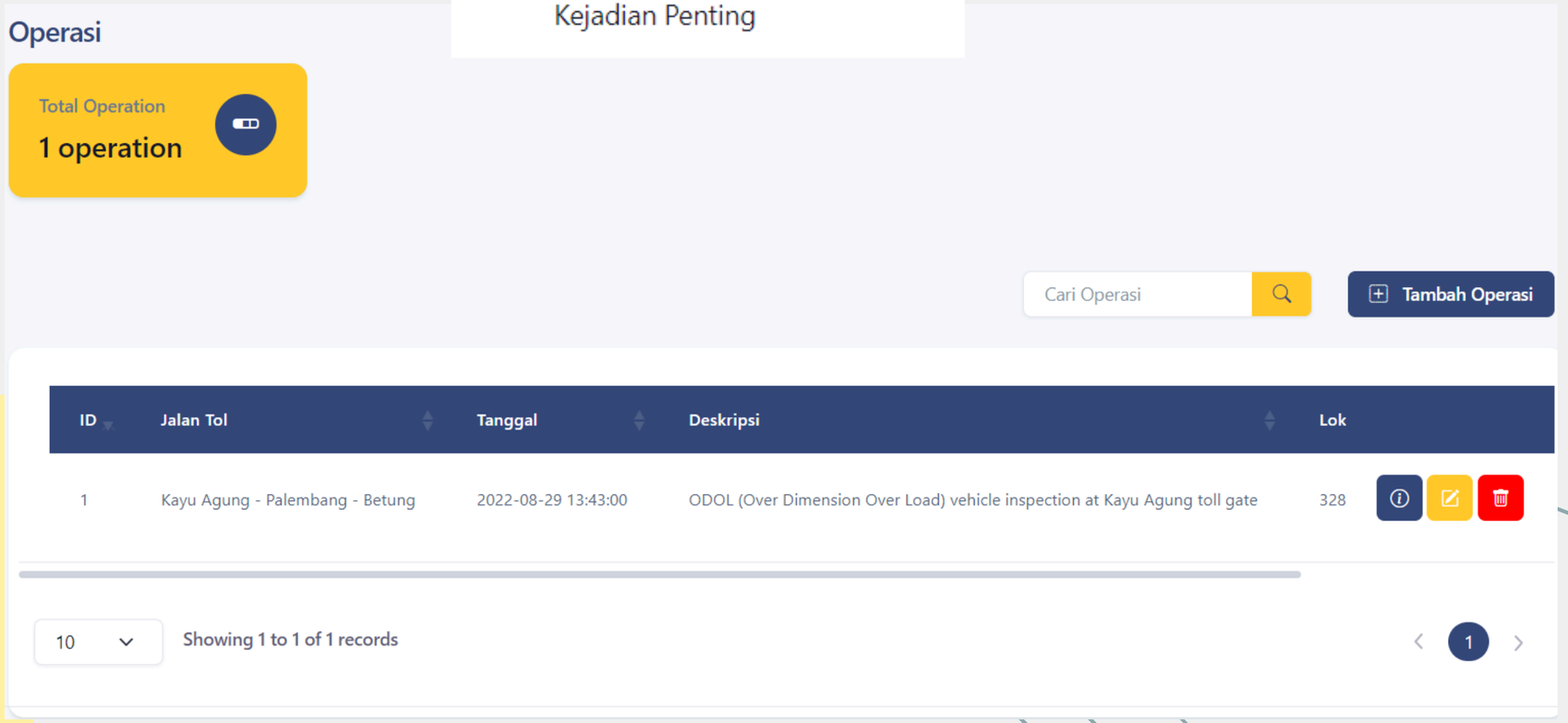
Penambahan Fitur Data Operasi dan Pemeliharaan pada e-SPM



Modul Operasi
> Kegiatan Operasi

Capture kegiatan rutin yang dilakukan pada ruas operasional:

- Inspeksi ODOL
- Safety Campaign
- Penanganan gangguan kendaraan

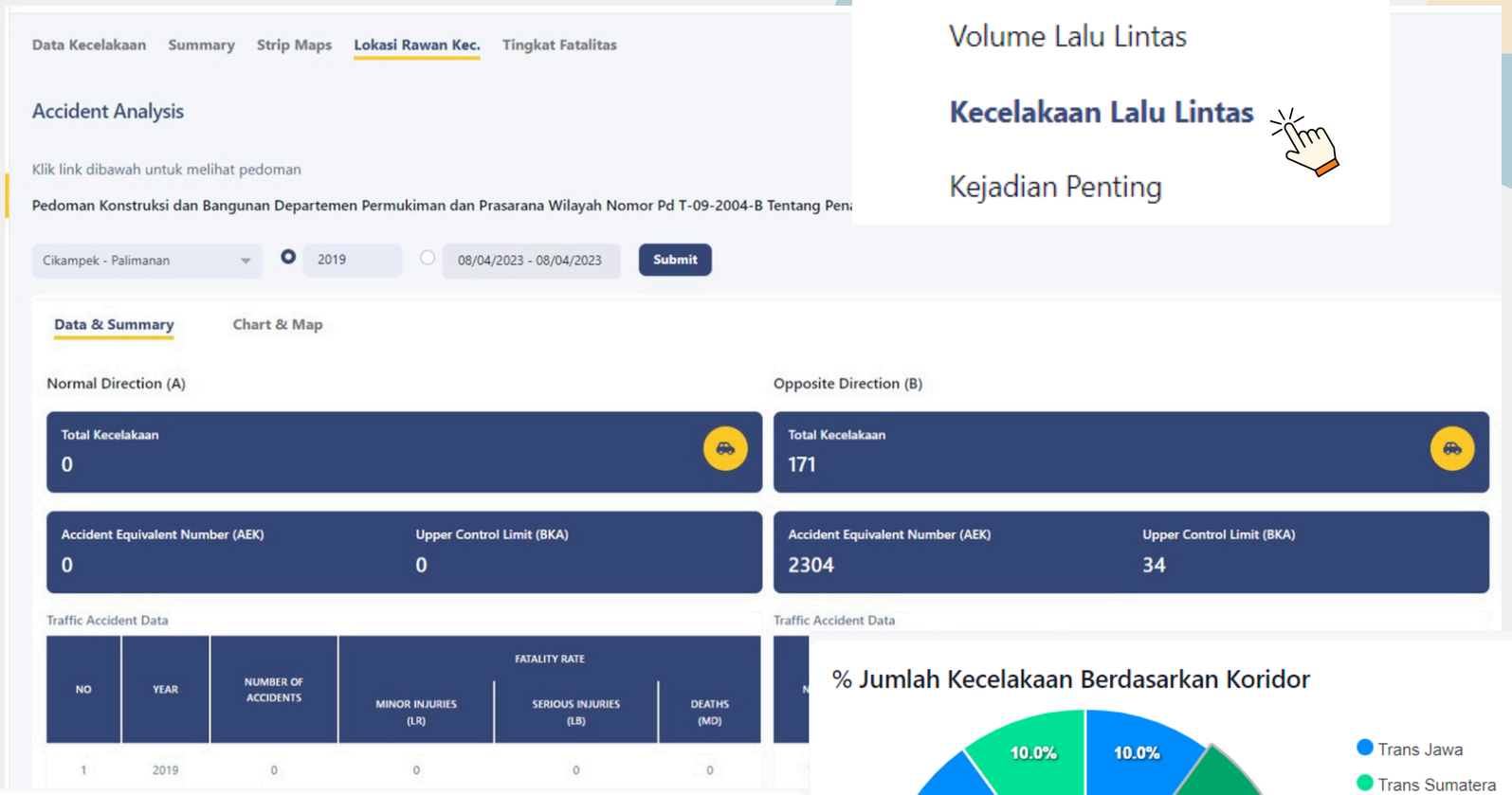


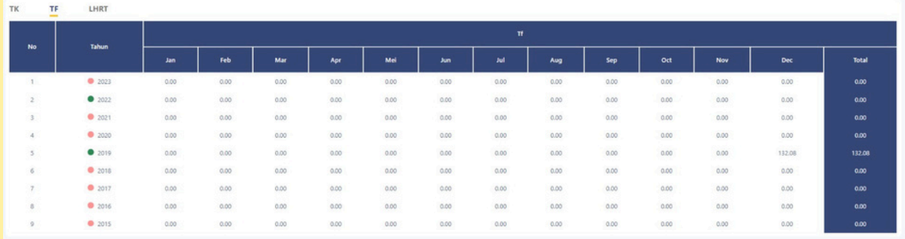
Penambahan Fitur Data Operasi dan Pemeliharaan pada e-SPM

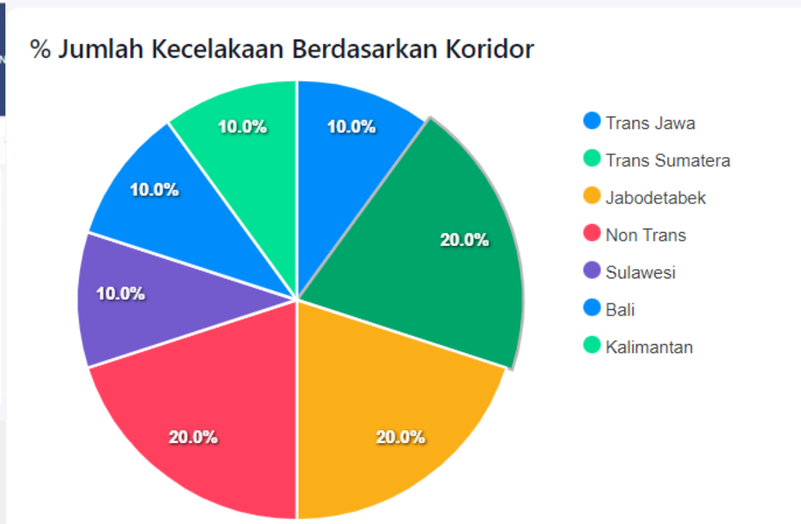
Modul Operasi
> Kecelakaan Lalin

- Data Kecelakaan,
- Summary,
- Stripmap Lokasi Kecelakaan,
- Lokasi Rawan,
- Tingkat Kecelakaan dan Fatalitas







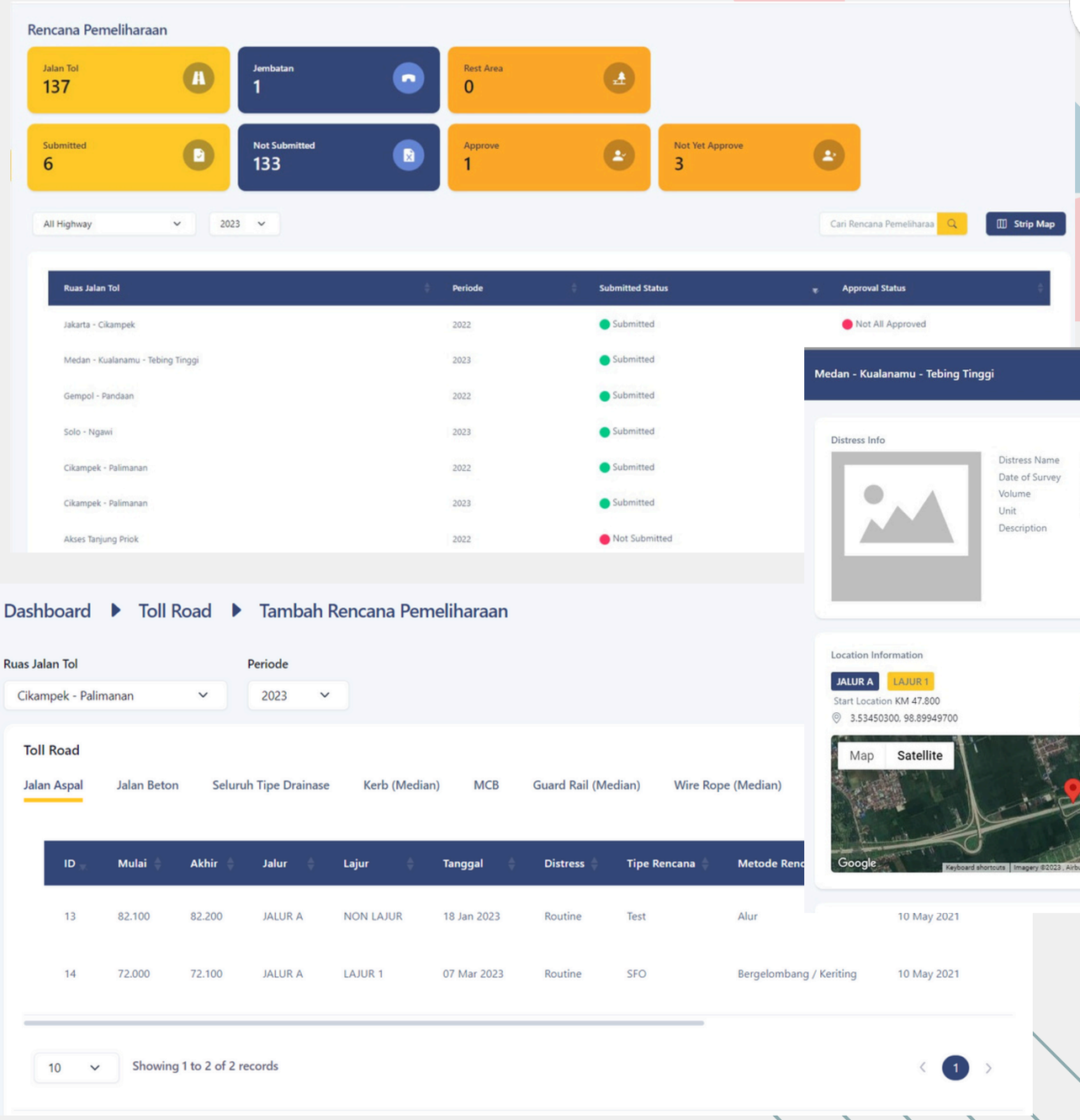


Penambahan Fitur Data Operasi dan Pemeliharaan pada e-SPM

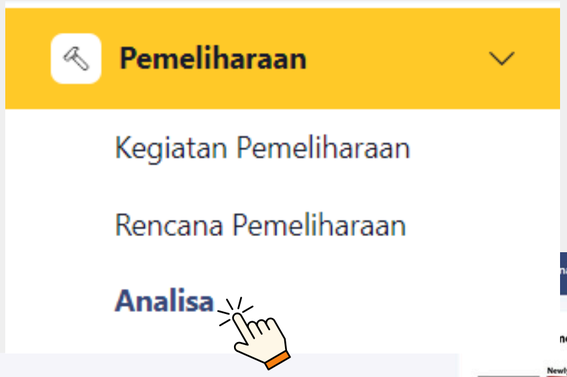


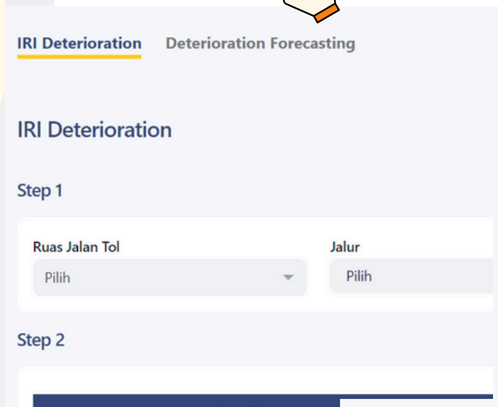
Modul Pemeliharaan
› Rencana Pemeliharaan

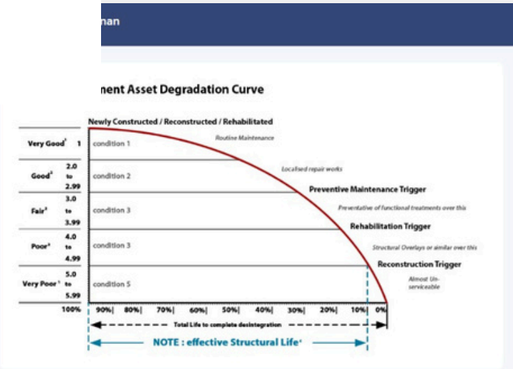
Penjadwalan pemeliharaan jalan tol oleh BUJT dan detail rencana pemeliharaan

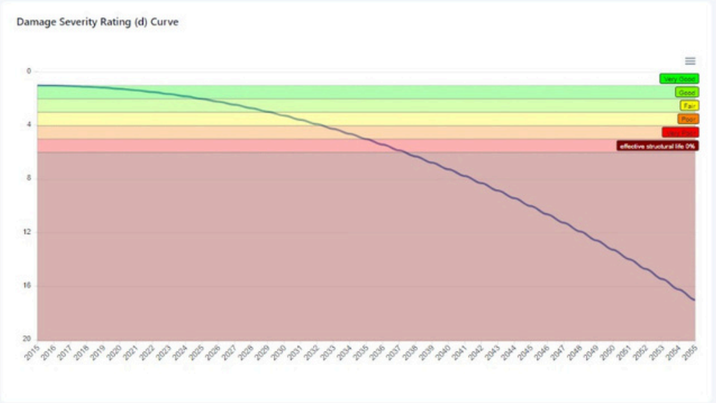


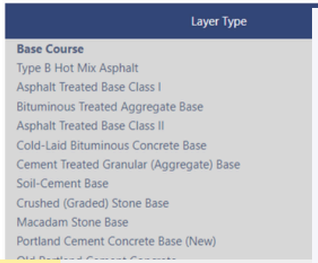
Penambahan Fitur Data Operasi dan Pemeliharaan pada e-SPM











Modul Pemeliharaan > Analisa

Analisa dan prakiraan model kerusakan pada perkerasan jalan tol

- IRI Deterioration
- Deterioration Forecasting

IRI Deterioration | Deterioration Forecasting

Deterioration Forecasting Model

Ruas Tol	Tahun Operasi	damage severity rating (d)	Status	
Akses Tanjung Priok	2017	1.36	Very Good	
Bakauheni - Terbanggi Besar	2019	1.16	Very Good	
Balikpapan - Samarinda	2019	1.16	Very Good	
Bekasi - Cawang - Kampung Melayu	2017	1.36	Very Good	
Belawan - Medan - Tanjung Morawa	1989	12.56	effective structural life < 0%	
Binjai - Langsa	2022	1.01	Very Good	
Bogor Ring Road Seksi I-IIIA	2009	2.96	Good	
Cawang - Tanjung Priok - Ancol Timur - Pluit	1989	12.56	effective structural life < 0%	

TERIMA KASIH

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PUPR BPJT

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WORKSHOP

PENGGUNAAN APLIKASI E-SPM DAN PENGEMBANGANNYA

THE PROJECT FOR STRENGTHENING MANAGEMENT
CAPACITY OF TOLL ROAD DEVELOPMENT

JAKARTA, 25 - 26 APRIL 2024

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA



JALAN TOL OPERASI DI INDONESIA



Panjang Tol	+73%
Ruas Tol	+55%

Dalam kurun 5 tahun Terakhir, terhitung tahun 2019 - 2023

Riwayat perkembangan jumlah dan panjang jalan tol operasi di Indonesia dalam 5 tahun terakhir :

1978 - 2018

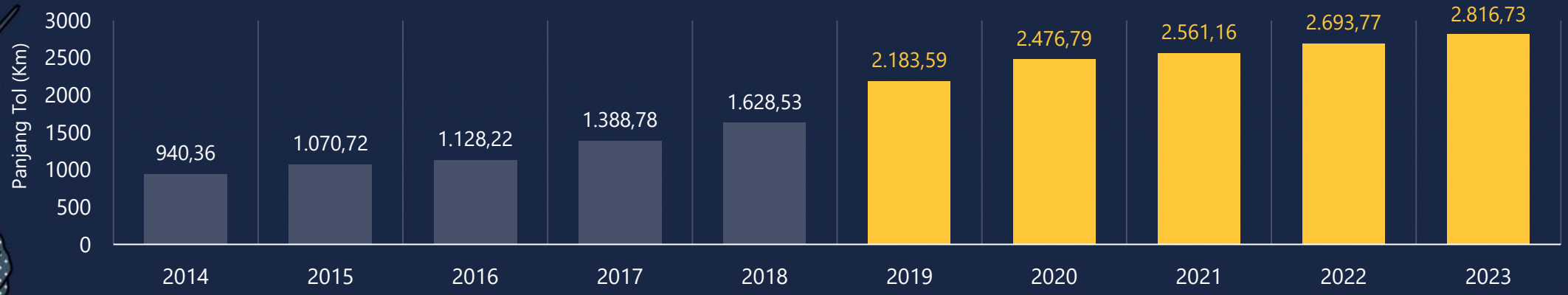
Jumlah Ruas Jalan Tol Operasi	:	47 ruas
Panjang Jalan Tol Operasi	:	1.628,53 km

2019 - 2023

Jumlah Ruas Jalan Tol Operasi	:	73 ruas
Penambahan dalam 5 tahun terakhir	:	**+ 26 ruas**
Panjang Jalan Tol Operasi	:	2.816,73 km
Penambahan dalam 5 tahun terakhir	:	**+ 1.188,20 km**

Ruas Tol Operasi	Panjang Tol	tol baru
31		
33	+14%	130,36 km
34	+5%	57,50 km
42	+23%	260,56 km
47	+17%	239,75 km
54	+34%	555,06 km
60	+13%	293,20 km
64	+3%	84,37 km
69	+5%	132,61 km
73	+4%	122,96 km





STANDAR PELAYANAN MINIMAL (SPM) JALAN TOL

PERMEN PU No. 16/PRT/M/2014

Tentang Standar Pelayanan Minimal Jalan Tol

Pasal 1 Ayat 2

Standar Pelayanan Minimal Jalan Tol adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Pasal 4 Ayat 1

Tata Cara Pengukuran Standar Pelayanan Minimal Jalan Tol merupakan panduan metode pengukuran dalam pencapaian Standar Pelayanan Minimal Jalan Tol yang harus dilakukan oleh setiap Badan Usaha Jalan Tol

Pasal 5

Standar Pelayanan Minimal Jalan Tol **wajib dipenuhi oleh Badan Usaha Jalan Tol** dalam rangka pelayanan kepada pengguna jalan tol

Pasal 6 Ayat 1 dan 2

Standar Pelayanan Minimal Jalan Tol **dievaluasi secara berkala** berdasarkan hasil pengawasan fungsi dan manfaat

Kondisi Jalan Tol	15 *indikator*
Kecepatan Tempuh Rata - Rata	1 *indikator*
Aksesibilitas	2 *indikator*
Mobilitas	5 *indikator*
Keselamatan	12 *indikator*
Unit Pertolongan / Penye ..	7 *indikator*
Lingkungan	4 *indikator*
TI dan TIP	8 *indikator*

8 substansi, 54 indikator



toleransi

- toleransi pemenuhan tidak diatur/ tiap saat (25 indikator) **46%**
- toleransi pemenuhan diatur (29 indikator) **54%**



frekuensi

- rutin setiap hari (20 indikator) **37%**
- setiap bulan (25 indikator) **46%**
- setiap 3 bulan (7 indikator) **13%**
- setiap 1 tahun (2 indikator) **4%**



aktivitas

- operasional (22 indikator) **41%**
- pemeliharaan (32 indikator) **59%**



PEMENUHAN SPM JALAN TOL



Pemenuhan SPM Konvensional

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan secara manual menggunakan form survei
- Pencatatan temuan meliputi : indikator temuan, lokasi temuan (sta, jalur, lajur), dokumentasi / no foto, catatan / deskripsi

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Hasil Monitoring dibuat secara manual setelah kegiatan monitoring lapangan selesai

Tindak Lanjut Perbaikan

- Berita Acara dijadikan acuan oleh BUJT dalam rangka tindak lanjut perbaikan, kecepatan tindak lanjut dihitung setelah diterbitkannya Berita Acara
- Pelaporan tindak lanjut dikerjakan secara manual oleh BUJT, dan dikirimkan kepada BPJT apabila perbaikan telah selesai dilakukan
- Peluang manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan tindak lanjut perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Setelah BPJT mendapatkan laporan tindak lanjut BUJT
- Penolakan tindak lanjut perbaikan baru dapat dilakukan pada tahap ini jika tidak ada peninjauan ulang lapangan
- Analisis dilakukan sesuai kebutuhan secara manual dan terpisah

Penggunaan e-SPM

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan menggunakan aplikasi e-SPM berbasis mobile (Android dan iOS)
- Pencatatan meliputi semua yang ada di metode konvensional dan dilengkapi fitur koordinat lokasi dan akurasi secara otomatis
- Penyediaan mode pengambilan data standar dan berkendara

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Pemenuhan dapat di-generate secara otomatis menggunakan aplikasi e-SPM

Tindak Lanjut Perbaikan

- Setiap temuan lapangan tersampaikan secara real time melalui aplikasi e-SPM BUJT, kecepatan tindak lanjut dihitung secara otomatis berdasarkan waktu temuan
- Pelaporan tindak lanjut secara otomatis oleh e-SPM dan bisa diakses oleh BUJT dan BPJT kapan saja tanpa harus menunggu perbaikan selesai sepenuhnya
- Meminimalisir manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan dan perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Dapat dilakukan kapan saja sesuai dengan kebutuhan
- Penolakan tindak lanjut perbaikan dapat langsung dilakukan oleh BPJT. Tersedia fitur ulasan dan komentar
- Tersedia beberapa fitur analisis

PENERAPAN APLIKASI E-SPM

Website

Aplikasi berbasis *web-based* yang dikembangkan untuk mengelola kegiatan pemenuhan SPM secara menyeluruh. Diperuntukkan pengolahan data, analisis dan pelaporan.

User : BPJT/BM, BUJT dan Holding BUJT

Mobile App

Aplikasi berbasis *mobile* (saat ini Android) yang dikembangkan dalam rangka pengambilan data-data di lapangan.

User : Tim/Konsultan BPJT/BM, Tim Operasi / Pemeliharaan BUJT

Server

Server e-SPM yang dikelola oleh PUSDATIN PUPR.

User : BPJT



PUSDATIN PUPR
E-SPM Server



DATABASE



E-SPM BPJT/BUJT
Mobile Application (Android)



https://espm.bpjt.pu.go.id
Web Application





Holding BUJT
Holding / Kantor Pusat Badan Usaha Jalan Tol



PUSDATIN PUPR
Pusat Data dan Teknologi Informasi



BUJT
Badan Usaha Jalan Tol



BPJT / BM
Badan Pengatur Jalan Tol / Bina Marga



Tim Lapangan Operasi / Pemeliharaan
Badan Usaha Jalan Tol



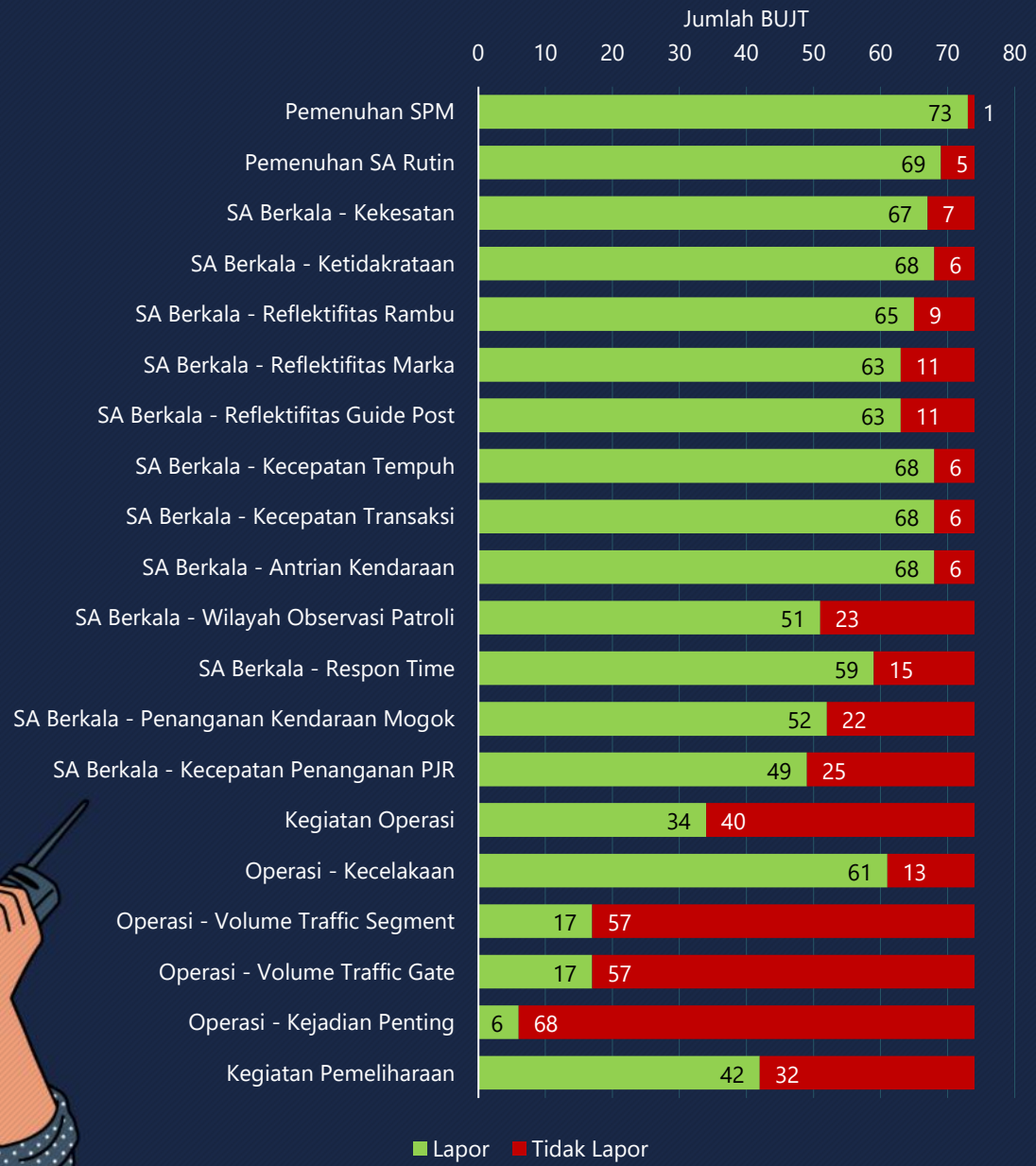
Tim-Konsultan BPJT / BM
Badan Pengatur Jalan Tol / Bina Marga

PENGGUNAAN E-SPM OLEH BUJT



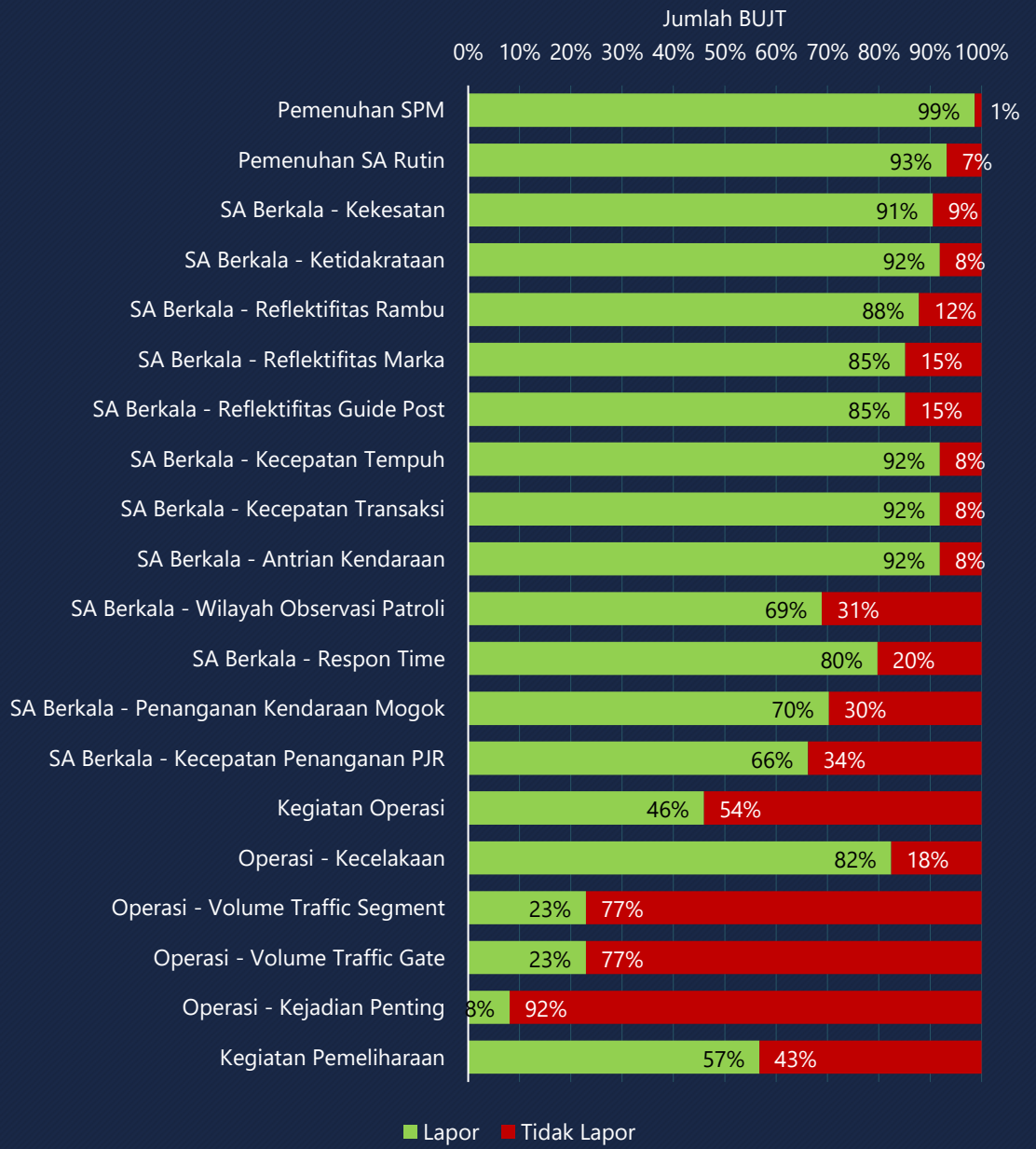
Penggunaan e-SPM oleh BUJT

3 Tahun Terakhir (2021 - 2023)



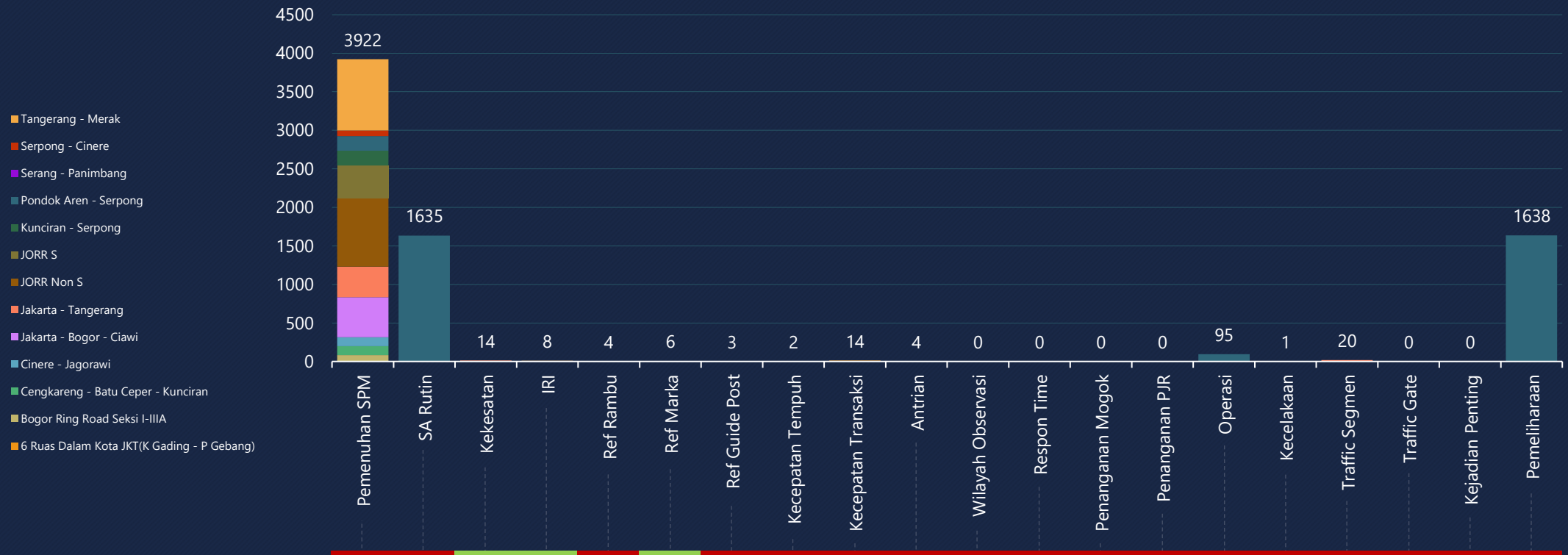
Persentase Penggunaan e-SPM oleh BUJT

3 Tahun Terakhir (2021 - 2023)



PENGGUNAAN E-SPM OLEH BUJT

Riwayat Penggunaan e-SPM oleh BUJT (Tim 1 Jakarta) Tahun 2021

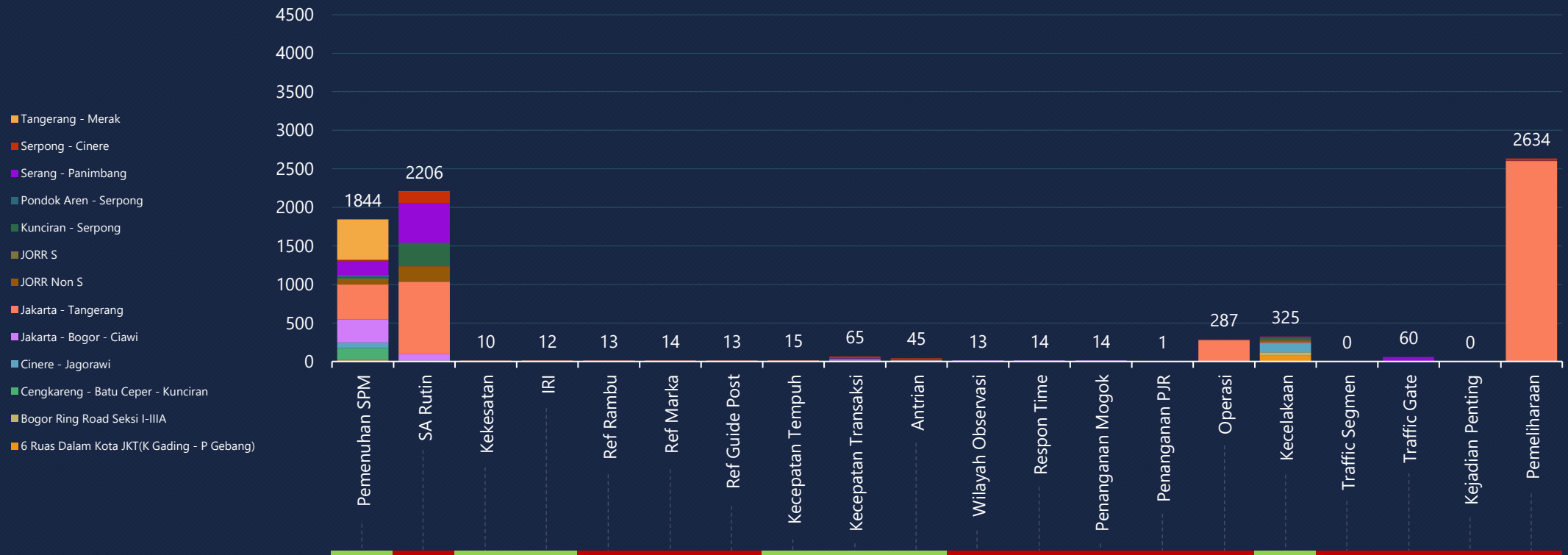


	Pemenuhan SPM	SA Rutin	Kekesatan	IRI	Ref Rambu	Ref Marka	Ref Guide Post	Kecepatan Tempuh	Kecepatan Transaksi	Antrian	Wilayah Observasi	Respon Time	Penanganan Mogok	Penanganan PJR	Operasi	Kecelakaan	Traffic Segmen	Traffic Gate	Kejadian Penting	Pemeliharaan
6 Ruas Dalam Kota Jakarta	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bogor Ring Road Seksi I-IIIA	85	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	114	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cinere - Jagorawi	118	0	1	1	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0
Jakarta - Bogor - Ciawi	519	0	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Jakarta - Tangerang	396	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
JORR Non S	887	0	1	1	0	0	0	2	12	2	0	0	0	0	0	0	0	0	0	2
JORR S	424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	191	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pondok Aren - Serpong	191	1635	1	1	1	1	1	0	0	0	0	0	0	0	95	0	0	0	0	1636
Serang - Panimbang	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serpong - Cinere	74	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tangerang - Merak	923	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0



PENGGUNAAN E-SPM OLEH BUJT

Riwayat Penggunaan e-SPM oleh BUJT (Tim 1 Jakarta) Tahun 2022

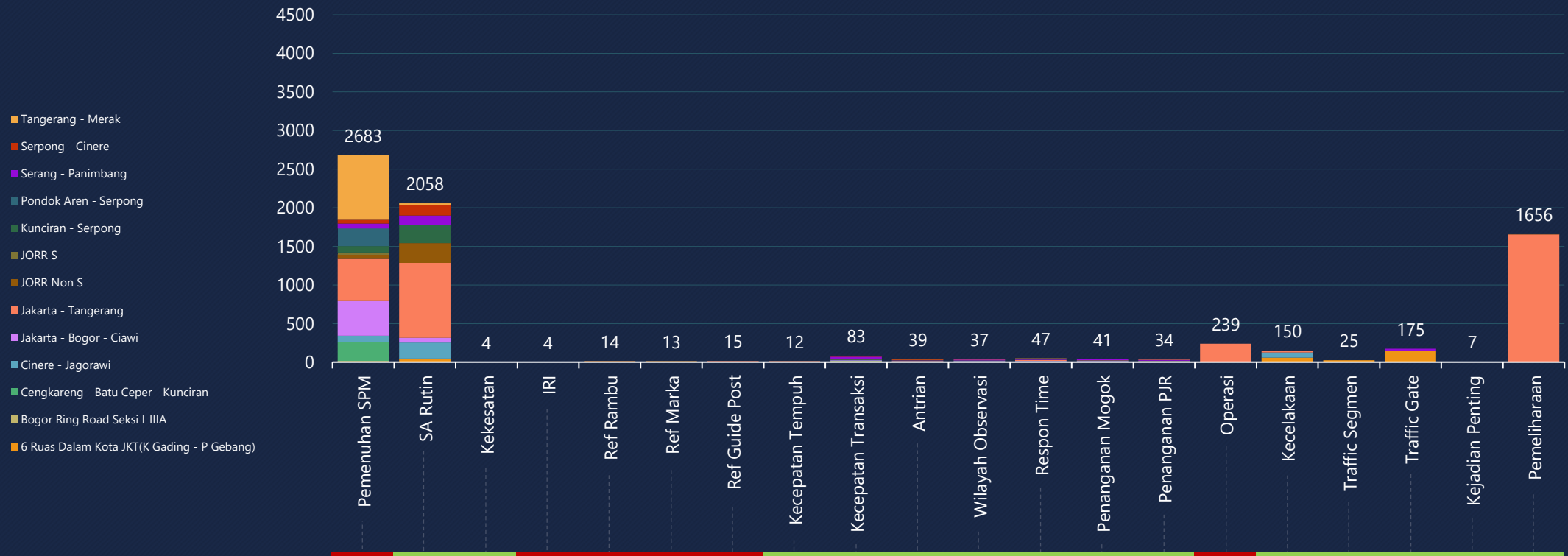


	Pemenuhan SPM	SA Rutin	Kekesatan	IRI	Ref Rambu	Ref Marka	Ref Guide Post	Kecepatan Tempuh	Kecepatan Transaksi	Antrian	Wilayah Observasi	Respon Time	Penanganan Mogok	Penanganan PJR	Operasi	Kecelakaan	Traffic Segmen	Traffic Gate	Kejadian Penting	Pemeliharaan
6 Ruas Dalam Kota Jakarta	14	0	1	1	0	0	0	1	3	3	0	0	0	0	0	85	0	0	0	0
Bogor Ring Road Seksi I-IIIA	8	13	1	0	1	1	1	2	7	7	1	2	2	1	0	36	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	154	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cinere - Jagorawi	74	1	1	1	1	1	1	2	3	3	0	0	0	0	0	108	0	0	0	0
Jakarta - Bogor - Ciawi	299	81	1	2	1	1	1	2	12	2	12	12	12	0	0	17	0	0	0	0
Jakarta - Tangerang	450	941	1	1	2	2	2	1	2	2	0	0	0	0	277	0	0	0	0	2602
JORR Non S	67	200	0	1	1	1	1	1	9	9	0	0	0	0	4	30	0	0	0	2
JORR S	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	19	307	1	2	1	1	1	2	5	5	0	0	0	0	0	29	0	0	0	0
Pondok Aren - Serpong	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serang - Panimbang	186	515	1	1	2	2	2	2	5	5	0	0	0	0	4	16	0	60	0	4
Serpong - Cinere	13	146	1	1	3	3	3	1	19	9	0	0	0	0	2	4	0	0	0	26
Tangerang - Merak	523	2	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0



PENGGUNAAN E-SPM OLEH BUJT

Riwayat Penggunaan e-SPM oleh BUJT (Tim 1 Jakarta) Tahun 2023



6 Ruas Dalam Kota Jakarta	0	40	1	0	0	0	0	1	9	3	1	1	1	1	0	61	25	147	7	3
Bogor Ring Road Seksi I-IIIA	17	1	0	1	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	246	5	0	0	1	1	1	1	2	2	1	1	1	1	0	0	0	0	0	0
Cinere - Jagorawi	81	210	1	1	4	4	4	2	6	6	12	12	12	11	0	66	0	0	0	0
Jakarta - Bogor - Ciawi	447	61	0	0	1	0	1	1	6	4	3	4	3	0	0	0	0	0	0	0
Jakarta - Tangerang	547	970	1	1	2	2	2	2	2	2	1	11	5	3	239	23	0	0	0	1652
JORR Non S	60	256	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
JORR S	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	82	230	0	0	1	1	1	1	9	5	4	4	4	4	0	0	0	0	0	0
Pondok Aren - Serpong	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serang - Panimbang	64	125	0	0	0	0	1	1	30	5	12	12	12	11	0	0	0	28	0	0
Serpong - Cinere	48	137	0	0	2	2	2	2	9	9	1	1	2	2	0	0	0	0	0	0
Tangerang - Merak	839	23	0	0	2	2	2	1	3	3	2	1	1	1	0	0	0	0	0	0



RENCANA PENGEMBANGAN E-SPM

E-SPM (Stand Alone)

e-SPM saat ini berjalan dan berdiri sendiri, tidak terintegrasi dengan sistem atau aplikasi manapun

Sistem Manajemen Aset (SMA)

e-SPM merupakan bagian dari Sistem Manajemen Aset jalan tol, saling terintegrasi dan tidak dapat berdiri sendiri



Item	E-SPM Saat Ini	E-SPM (Sistem Manajemen Aset)
Orientasi	**Pemenuhan SPM (PERMEN PU)** Dikembangkan dan dijalankan sesuai dengan tata cara pemenuhan SPM sesuai dengan regulasi	**Aset Jalan Tol** Dikembangkan untuk berorientasi kepada "Asset Inventory" yang ada di jalan tol
Objek (Contoh)	**Indikator, Lokasi (KM, Lokasi, Koordinat)** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan atribut : indikator temuan dan detail lokasi. Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU KM : 05+200 [input] Lajur : Non-Lajur [input] Jalur : Jalur A [input] Latitude (Deg) : -6.12345678 [otomatis] * Longitude (Deg) : 120.12345678 [otomatis] * * sesuai lokasi pengambilan data	**Indikator, ID Asset** Temuan dalam pemenuhan SPM diidentifikasi berdasarkan data aset yang sudah di-inventory dan tersimpan di database Sebagai contoh : **Temuan Rambu / PJU** Indikator : Rambu / PJU ID Rambu / PJU : TS-00262626 [pilih/cari] **Informasi Aset** **(Otomatis sesuai data inventory)** ↓ KM : 05+200 [otomatis] Lajur : Non-Lajur [otomatis] Jalur : Jalur A [otomatis] Latitude (Deg) : -6.12345678 [otomatis] Longitude (Deg) : 120.12345678 [otomatis]
Riwayat, Trend (Contoh)	**Mengandalkan Lokasi** Riwayat temuan, perbaikan mengandalkan lokasi. Untuk objek yang sama memungkinkan terjadi kesalahan pendataan.	**Tepat Sasaran** Riwayat temuan dan perbaikan terekam dengan tepat, meminimalisir kesalahan karena spesifik berdasarkan data inventory



PENINGKATAN FITUR E-SPM



e-SPM Versi Sebelumnya	Peningkatan Melalui JICA Project
Data Master	
▪ Jalan Tol	▪ Master Aset Jalan Tol
▪ Badan Usaha Jalan Tol (BUJT) dan Holding	▪ Kategori Aset Jalan Tol
▪ Grup Jalan Tol	▪ Kerusakan Aset Jalan Tol
▪ Segmen Jalan Tol	▪ Kategori Dokumen (Regulasi, Pedoman Teknis, dan lain sebagainya)
▪ Gerbang Tol	
▪ Substansi dan Indikator Pelayanan dalam Standar Pelayanan Minimal (SPM)	
Input Data	
▪ Kendaraan Layanan	▪ *Asset Inventory* - Pool dan Kendaraan Layanan
▪ Volume Lalu Lintas (Segmen Jalan Tol dan Gerbang Tol)	▪ *Asset Inventory* - Tempat Istirahat (TI) dan Tempat Istirahat Pelayanan (TIP)
▪ Kecelakaan Lalu Lintas	▪ *Asset Inventory* - Jembatan
▪ Aktivitas Pemeliharaan di Jalan Tol	▪ *Maintenance Plan*
▪ Aktivitas Operasi di Jalan Tol	▪ Dokumen
Analisis	
▪ Ringkasan Pemenuhan SPM oleh BPJT	▪ Evaluasi Performa Pemenuhan SPM oleh BPJT dan BUJT
▪ Ringkasan Self Assessment oleh BUJT	▪ *Blacklisting* pada Kompetisi SPM
▪ Kompetisi SPM	▪ Lokasi Rawan Kecelakaan atau *Blackspot*
▪ Ringkasan Kecelakaan Lalu Lintas	▪ *Deterioration Trend Analysis*
	▪ *Detailed Investigation*
Laporan	
▪ Berita Acara Pemenuhan SPM dan Laporan Tindak Lanjut Perbaikan	▪ Laporan Self Assessment BUJT

PENINGKATAN INFRASTRUKTUR E-SPM

Pengembangan Infrastruktur e-SPM

Kategori	Komponen	e-SPM 2019	e-SPM 2021	e-SPM 2023/2024
Network	Server	Cloud Server (Google)	Server PUSDATIN PUPR	Server PUSDATIN PUPR
Network	Domain	www.espmweb.varianglobal.tech	www.espmbpjt.pu.go.id	www.espm.bpjt.pu.go.id
Network	IP Server	auth-db364.hostinger.com	103.211.50.23	103.8.238.226
Network	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	VCPU 2 Core	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) Gold 6330H
Hardware	RAM	4 GB	8 GB	8 GB
Hardware	Storage	200 GB	500 GB	1.500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS	Ubuntu Server 21.04 LTS
Software	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29	Apache 2 versi 2.4.46
Software	PHP	PHP 7.2	PHP 7.2	PHP 7.4
Software	DBMS	MySQL 5.7	MySQL 5.7	MySQL 8
Web Application	Framework	Laravel	Laravel	Laravel
Web Application	CMS	October CMS	October CMS	October CMS
Mobile Application	Framework	Native Android	Flutter 2.5	Flutter 3.7.9
Mobile Application	Backend Service	-	Firebase	Firebase
UI / UX Design	Tools	Corel Draw GraphicSuite 2020	Figma	Figma



RENCANA / PROGRAM PEMELIHARAAN



Entitas	Proses	Dokumen	Keterangan
	Mulai		Rencana pemeliharaan harus dilaporkan oleh BUJT **setiap tahun**
 BUJT	Penyusunan *maintenance plan* ↓ Pelaporan ke BPJT	Surat pelaporan rencana pemeliharaan	▪ Penyusunan *maintenance plan* hanya untuk **pemeliharaan berkala** dan **program peningkatan / heavy maintenance / upgrading**; ▪ *Maintenance plan* terbagi menjadi 3 kategori, meliputi: **Jalan Tol**; **Jembatan**; **Rest Area** (setiap kategori memiliki beberapa indikator); ▪ Setiap kategori harus dilaporkan dalam bentuk **detail kerusakan**, **metode perbaikan**, **jadwal perbaikan** dan ***strip map*** (untuk indikator tertentu)
 BPJT	Dievaluasi oleh BPJT ↓ Sesuai ? Tidak: kembali ke Penyusunan *maintenance plan* Ya: ↓	▪ *Checklist* detail pemeliharaan ▪ Minutes of meeting	▪ Rencana pemeliharaan harus melalui **persetujuan** oleh BPJT ▪ Detail rencana pemeliharaan akan *di-review* oleh BPJT, kemudian BPJT akan menyetujui atau menolak **satu persatu data detail** yang telah dilaporkan oleh BUJT
 BPJT	Sinkronisasi jadwal pemeliharaan setiap ruas jalan tol ↓ Jadwal Sesuai ? Tidak: kembali ke Sinkronisasi jadwal pemeliharaan setiap ruas jalan tol Ya: ↓	Jadwal pemeliharaan	Sinkronisasi jadwal oleh BPJT atas pertimbangan beberapa program atau kegiatan seperti: pemenuhan SPM, penyesuaian tarif, larangan kerja pada hari libur dan tahun baru, dll.
 Kepala BPJT	Maintenance plan disetujui	Surat persetujuan rencana pemeliharaan	Laporan rencana pemeliharaan yang telah dievaluasi akan disetujui oleh Kepala BPJT
	Selesai		Rencana pemeliharaan yang telah disetujui akan dijadikan acuan bagi BPJT untuk memantau dan mengevaluasi hasil perbaikan (kegiatan perbaikan juga harus dilaporkan oleh BUJT)

RENCANA / PROGRAM PEMELIHARAAN

Rekap Rencana Pemeliharaan

Jalan Tol	Periode		Total Biaya	Status Pelaporan	Status Persetujuan
Akses Tanjung Priok	2024	Rp.	100.000.000.000,-	Sudah	Sudah disetujui
Bakauheni - Terbanggi Besar	2024	Rp.	375.000.000.000,-	Sudah	Sudah disetujui sebagian
Balikpapan - Samarinda	2024	Rp.	150.000.000.000,-	Sudah	Menunggu persetujuan
Bekasi - Cawang - Kampung Melayu	2024	Rp.	0,-	Belum	-

Detail Rencana Pemeliharaan

Jalan Tol	Periode	Perkerasan Jalan	Drainase	Rounding	Rambu Lalu Lintas	Guardrail	Lansekap	Lain-Lain
Akses Tanjung Priok	2024	9	2	2	7	2	5	3
Bakauheni - Terbanggi Besar	2024	4 1 1	2		4 1	2 4	2	1 5
Balikpapan - Samarinda	2024	8	4	9	7	7		4
Bekasi - Cawang - Kampung Melayu	2024							

Telah direview dan disetujui BPJT Belum direview oleh BPJT Ditolak oleh BPJT, untuk ditindaklanjuti

Konversi dalam bentuk Jadwal / Kalender

Jan Feb Mar Apr Mei Jun Jul Agu Sep Okt Nov Des

Semua Jalan Tol | 2024

Jalan Tol	Kategori	Nama Aset	Jenis Kerusakan	Lokasi (Km)	Jalur	Lajur	Jadwal	
Akses Tanjung Priok	Jalan Tol	Perkerasan Jalan	Rutting	10.000 - 11.200	Jalur A	Lajur 1	02 Mei 2024	Lihat Detail
Akses Tanjung Priok	Jalan Tol	Perkerasan Jalan	Rutting	08.400 - 09.800	Jalur B	Lajur 1	10 Mei 2024	Lihat Detail
Akses Tanjung Priok	Jalan Tol	Guardrail	Kerusakan Beam	11.200 - 11.250	Jalur A	Non Lajur	11 Mei 2024	Lihat Detail
Bakauheni - Terbanggi Besar	Jalan Tol	Perkerasan Jalan	Divided Slab	03.100 - 03.110	Jalur A	Lajur 1	20 Mei 2024	Lihat Detail
Bakauheni - Terbanggi Besar	Jalan Tol	Rounding	Amblas	24.100 - 24.150	Jalur B	Non Lajur	25 Mei 2024	Lihat Detail



KOMPARASI PEMENUHAN SPM BPJT & BUJT

Verifikasi BPJT

Temuan (Tanggal)	Tanggal Perbaikan	Durasi Perbaikan (Hari)
01/05/2022	06/05/2022	5
01/05/2022	06/05/2022	5
01/05/2022	09/05/2022	8
01/05/2022	09/05/2022	8
02/05/2022	09/05/2022	7
02/05/2022	10/05/2022	8
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	12/05/2022	8
04/05/2022	12/05/2022	8

Self Assessment BUJT

Temuan (Tanggal)	Tanggal Perbaikan	Durasi Perbaikan (Hari)
01/05/2022	07/05/2022	6
02/05/2022	07/05/2022	5
03/05/2022	07/05/2022	4
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
05/05/2022	09/05/2022	4
07/05/2022	10/05/2022	3
10/05/2022	11/05/2022	1
11/05/2022	13/05/2022	2
11/05/2022	13/05/2022	2

Fitur analisis untuk mengetahui komparasi pemenuhan SPM oleh BUJT, BPJT dan toleransi pemenuhan.

Pendekatan teknis dihitung menggunakan persamaan berikut:

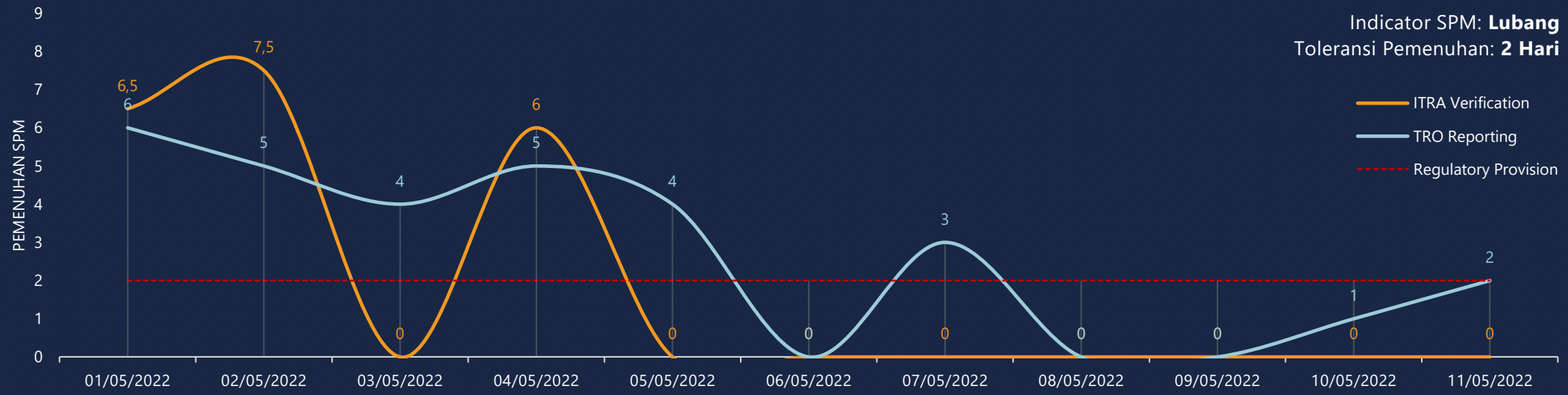
$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : Pemenuhan SPM (*daily*)
n : Jumlah temuan dalam 1 hari
rd : Tanggal perbaikan untuk setiap temuan (*datetime*)
df : Tanggal temuan (*datetime*)

Hasil Komparasi

Tanggal Pemenuhan SPM	BPJT	BUJT
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2





EVALUASI PERFORMA PEMENUHAN SPM

Pemenuhan SPM

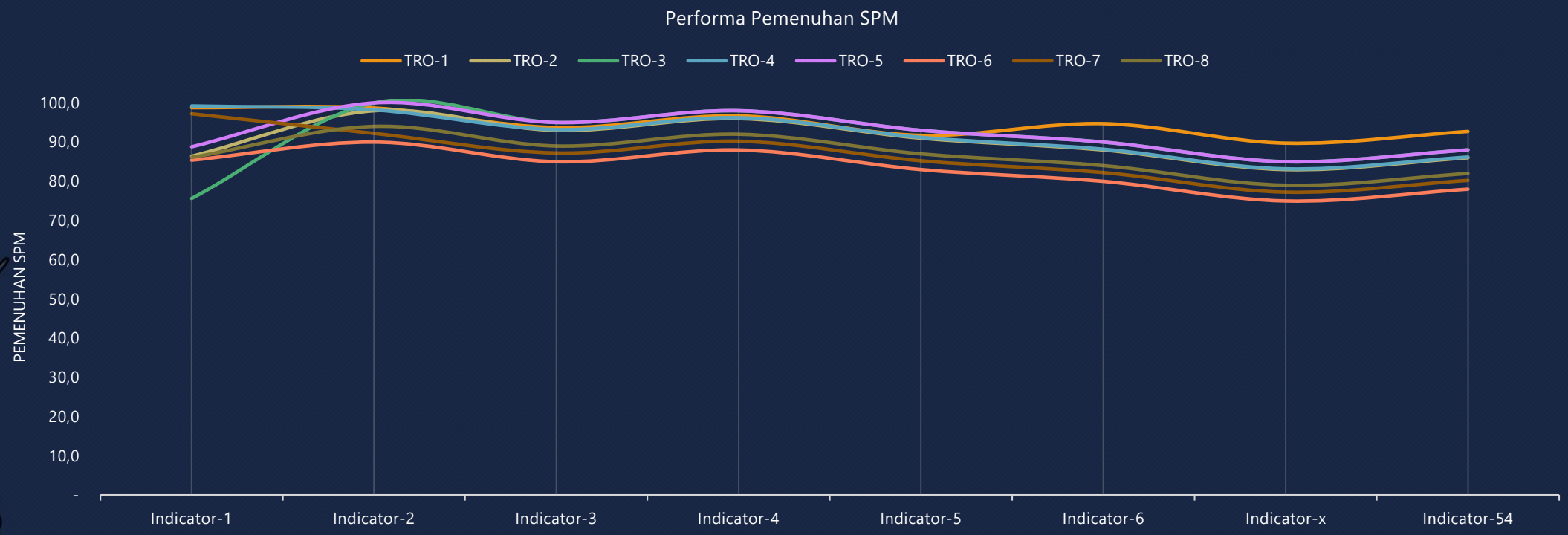
Indikator	BUJT-1	BUJT-2	BUJT-3	BUJT-4	BUJT-5	BUJT-6	BUJT-7	BUJT-8
Indikator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indikator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indikator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indikator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indikator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indikator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indikator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indikator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

Fitur analisis untuk mengetahui performa pemenuhan SPM berdasarkan indikator pada setiap ruas jalan tol.

Pendekatan teknis dihitung menggunakan persamaan berikut:

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : Pemenuhan SPM per-indikator
n_{finish} : Jumlah temuan yang sudah diperbaiki
n : Jumlah temuan





KOMPETISI SPM DAN BLACKLISTING

BPJT telah mengembangkan sistem kompetisi SPM yang merupakan konsep penilaian guna menciptakan semangat positif bagi setiap BUJT untuk bersaing dalam memberikan pelayanan terbaik bagi pengguna jalan. Mekanisme yang diterapkan menyerupai kompetisi 'liga sepak bola', dimana setelah melewati jangka waktu tertentu, tim dengan poin tertinggi (menang 3 poin, seri 1 poin, kalah 0 poin) akan menjadi juara dari kompetisi tersebut. Jika dalam sepak bola poin ditentukan dari hasil pertandingan, maka poin yang diperoleh pada kompetisi SPM ini ditentukan berdasarkan persentase dan durasi perbaikan terhadap kerusakan mengacu pada toleransi waktu perbaikan sesuai dengan Peraturan Menteri Pekerjaan Umum Nomor No. 16/PRT/M/2014. Setiap indikator dan substansi juga diberikan bobot perhitungan sebagai pengali, yang diperoleh dari penelitian terdahulu.

Pembobotan Substansi

No	Substansi	Bobot (%)
1	Kondisi Jalan Tol	25.62
2	Kecepatan Tempuh Rata ...	12.75
3	Aksesibilitas	11.07
4	Mobilitas	9.00
5	Keselamatan	23.02
6	Unit Pertolongan / Penye ..	10.47
7	Lingkungan	3.40
8	TI dan TIP	4.67
	Total	100.00



iv : Nilai indikator
a : Indikator-a
n : Jumlah temuan untuk 1 indikator
$jptw$: Jumlah Perbaikan Tepat Waktu
iw : Bobot Indikator
ipv : Nilai Indikator dalam persen (%)
sv : Nilai Substansi
54 : Jumlah Indikator
b : Substansi-b
sw : Bobot Substansi

Perhitungan Kuantitatif

- **Step 1**: Perhitungan nilai setiap Indikator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Perhitungan nilai % setiap Indikator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Perhitungan nilai setiap Substansi

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Perhitungan nilai % setiap Substansi

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Perhitungan *score* akhir

$$fs = \sum_{b=1}^{8} spv_b$$

Score Akhir Pemenuhan SPM (Contoh)

No	BUJT/ TRO	Pemenuhan SPM per-Substansi ***Score* Minimal: 75** (Rentang 0 – 100)								*Score* Akhir	Kategori
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

ANALISIS KECELAKAAN (LOKASI BLACKSPOT)

Sumber: Pedoman Pd-T-09-2004-B Tentang Penanganan Lokasi Rawan Kecelakaan

Data Kecelakaan Lalu Lintas (Tersedia di e-SPM)

↓

Pembobotan Tingkat Fatalitas

Tingkat Fatalitas	Bobot
Meninggal Dunia (MD)	12
Luka Berat (LB)	3
Luka Ringan (LR)	3
Kendaraan Terlibat (K)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Angka Ekivalen Kecelakaan

↓

Penentuan Batas Kontrol Atas (BKA)

$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

BKA : Batas Kontrol Atas C : Tingkat Kecelakaan

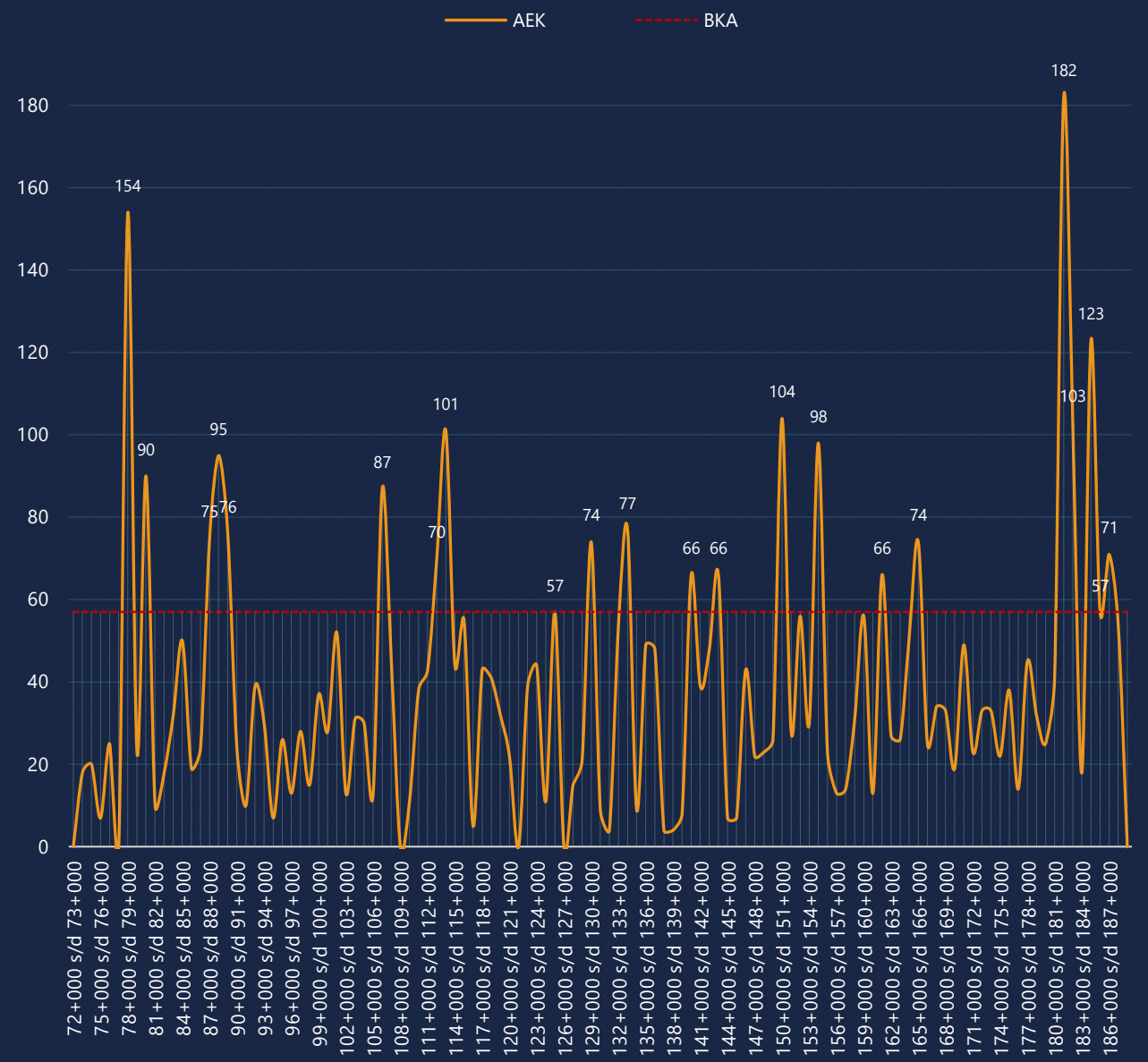
↓

Penentuan Lokasi Blackspot

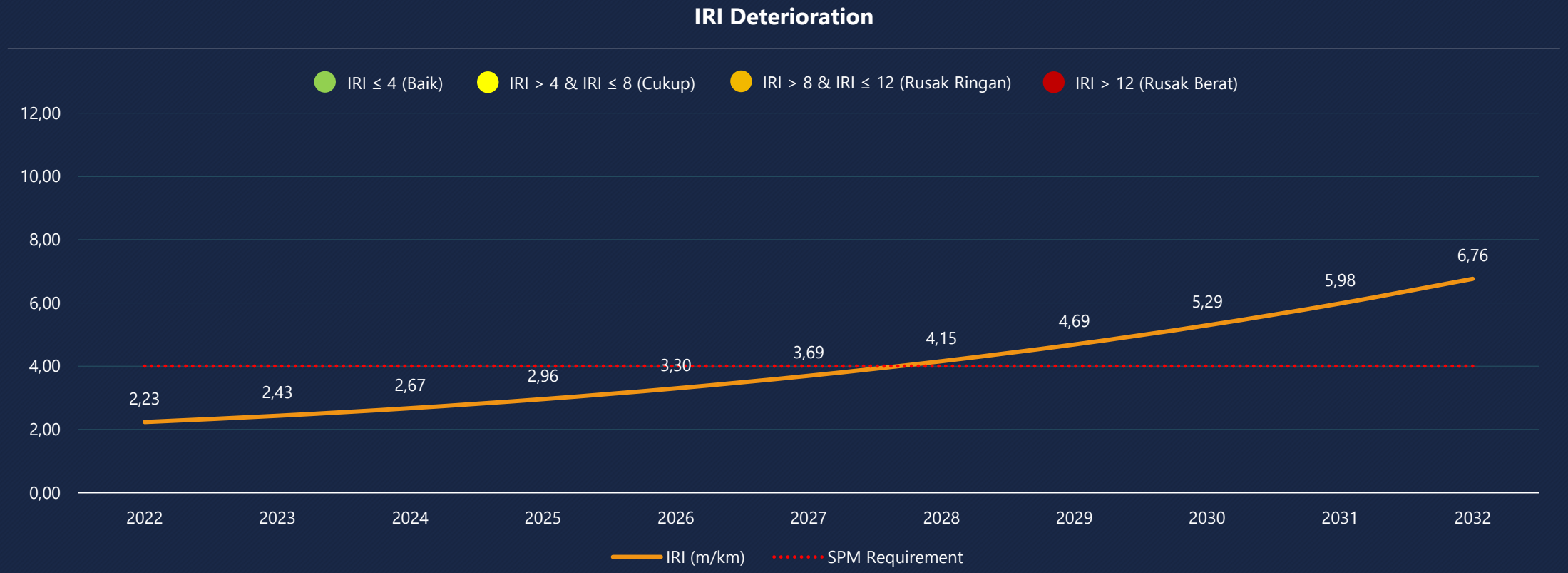
$$AEK > BKA$$



Lokasi Blackspot pada Jalan Tol ABC



ANALISIS PERTUMBUHAN NILAI IRI





Lokasi		Segmen	Tipe Perkerasan	CBR rep. (%)	SNsg	SNC	IRI (m/km)										
Awal	Akhir						2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
7,400	7,500	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,33	2,53	2,78	3,08	3,42	3,83	4,30	4,84	5,46	6,16	6,95
7,500	7,600	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,51	1,66	1,85	2,09	2,37	2,71	3,11	3,57	4,11	4,72	5,42
7,600	7,700	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,24	1,37	1,55	1,76	2,03	2,34	2,72	3,15	3,66	4,25	4,92
7,700	7,800	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,95	2,13	2,35	2,62	2,94	3,31	3,75	4,25	4,83	5,49	6,24
7,800	7,900	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,61	1,77	1,97	2,21	2,50	2,85	3,25	3,73	4,27	4,90	5,61
7,900	8,000	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	7,22	7,74	8,32	8,97	9,70	10,50	11,40	12,40	13,50	14,72	16,06
8,000	8,100	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	8,16	8,74	9,38	10,10	10,90	11,79	12,77	13,85	15,05	16,36	17,81

TERIMA KASIH



WORKSHOP

USING THE E-SPM APPLICATION AND ITS DEVELOPMENT

THE PROJECT FOR STRENGTHENING MANAGEMENT
CAPACITY OF TOLL ROAD DEVELOPMENT

JAKARTA, APRIL 25 - 26, 2024

KEMENTERIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA



ASSET MANAGEMENT OR MANAGING ASSETS

Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

Then, what is the Role of PUPR/BPJT/DGH in regard to toll road ?



Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performance

What is Role of BUJT ?





HIERARCHIAL MANAGEMENT CYCLE FOR TOLL ROAD OPERATION

Hierarchical Management Cycle for Toll Road Operation

Asset Management

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

Managing Assets

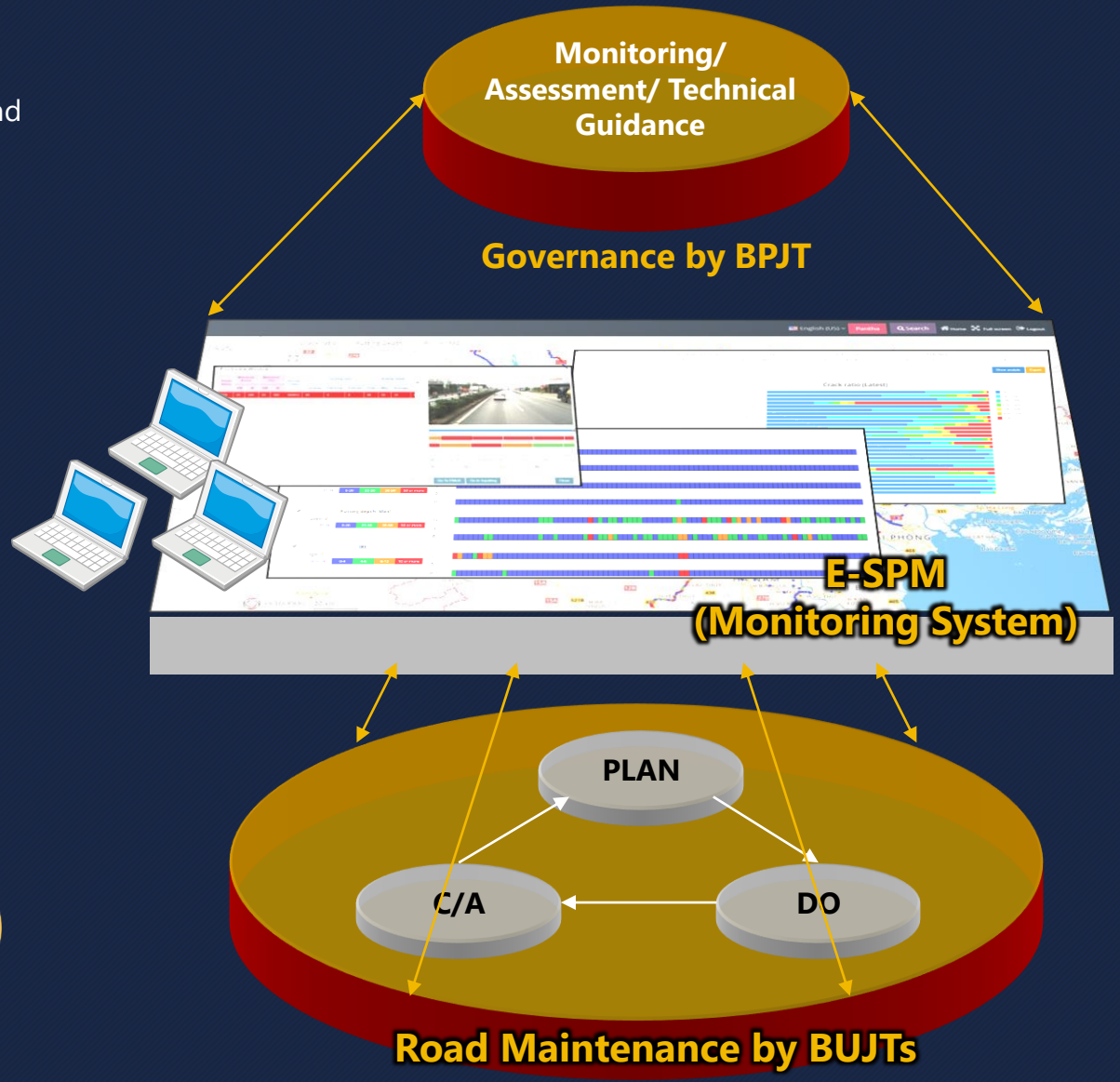
New action based on the direction from TOP Management

Report and data accumulation from O&M work









TOLL ROAD MONITORING & MANAGEMENT BY E-SPM UPGRADING

Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading



TROs (BUJT)

BUJT A





BUJT B

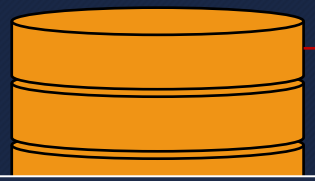




Data input/ import

Knowledge Sharing

BPJT / DGF (Bina Marga)



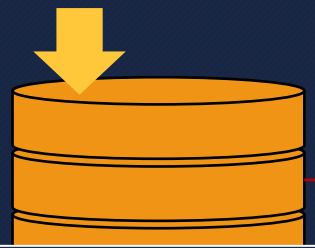
Data Base - SPM+

Integrated Time-series data for performance assessment



Data Analysis

- Bench-Marking Assessment
- Blackspot Analysis



Knowledge Data

web

Information disclosure

Road Users



Stakeholders



Dashboard

SPM Monitoring

OPERATIONAL TOLL ROADS IN INDONESIA



Length	+73%
Toll Roads	+55%

in the last 5 years,
starting from 2019 - 2023

History of developments in the number and length of operational toll roads in Indonesia in the last 5 years :

1978 - 2018

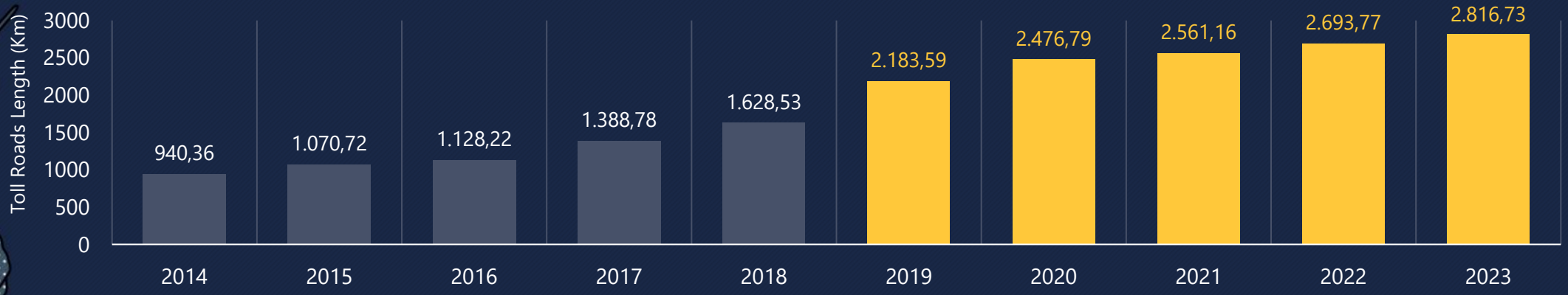
Number of Operational Toll Roads	:	47 toll roads
Length of Operational Toll Roads	:	1.628,53 km

2019 - 2023

Number of Operational Toll Roads	:	73 toll roads
Additions in The Last 5 Years	:	**+ 26 toll roads**
Length of Operational Toll Roads	:	2.816,73 km
Additions in The Last 5 Years	:	**+ 1.188,20 km**

Operational Toll Roads	Length	new toll roads
31		
33	+14%	**130,36 km**
34	+5%	**57,50 km**
42	+23%	**260,56 km**
47	+17%	**239,75 km**
54	+34%	**555,06 km**
60	+13%	**293,20 km**
64	+3%	**84,37 km**
69	+5%	**132,61 km**
73	+4%	**122,96 km**





MINIMUM SERVICE STANDARDS (SPM) FOR TOLL ROADS

Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

Article 1, Section 2

Toll Road Minimum Service Standards are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

Article 4, Section 1

Procedures for Measuring Minimum Service Standards for Toll Roads is a guide to measurement methods in achieving Minimum Service Standards for Toll Roads that must be carried out by each Toll Road Business Entity

Article 5

Toll Road Minimum Service Standards **must be fulfilled (mandatory)** by Toll Road Business Entities in order to provide services to toll road users

Article 6, Section 1 and 2

Toll Road Minimum Service Standards are **evaluated periodically** based on the results of monitoring functions and benefits

Toll Road Conditions	15 *indicators*
Average Travel Speed	1 *indicators*
Accessibility	2 *indicators*
Mobility	5 *indicators*
Safety	12 *indicators*
Rescue Unit and Services Ass ..	7 *indicators*
Environment	4 *indicators*
Rest Area	8 *indicators*

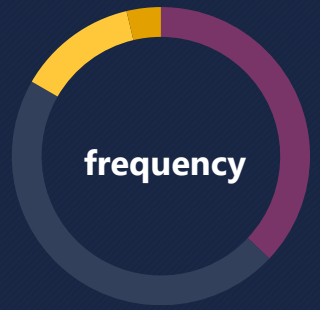
8 substances, 54 indicators



- fulfillment tolerance is not regulated/at any time (25 indicators) **46%**
- Fulfillment tolerance are regulated (29 indicators) **54%**



- daily (20 indicators) **37%**
- monthly (25 indicators) **46%**
- quarterly annually (7 indicators) **13%**
- annually (2 indicators) **4%**



- operation (22 indicators) **41%**
- maintenance (32 indicators) **59%**



MINIMUM SERVICE STANDARDS (SPM) FOR TOLL ROADS

Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

8 substances, 54 indicators

Minimum Service Standards (SPM)

are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

Toll Road Condition

1 Toll Road Conditions
(15 indicators)

Skid resistance, road roughness (IRI), potholes, rutting, cracks, sediment, drainage, kerb, MCB, guardrail, wire rope, potholes (shoulder), rutting (shoulder), cracks (shoulder), rounding

Average Travel Speed

2 Average Travel Speed
(1 Indicators)

Travel speed at normal condition

Accessibility

3 Accessibility
(2 Indicators)

Average transaction speed (toll gate), amount of vehicle queues

Mobility

4 MOBILITY
(5 Indicators)

Patrol observation area, from the information received to incident location, problem vehicles handling, police handling speed, tow handling speed

Safety

5 Safety
(12 Indicators)

Traffic sign, road marking, guide post, KM sign, HM sign, street lighting, anti glare, ROW fence, safety fence, accident handling, security and law enforcement

Rescue Unit and Service Assistance

6 Rescue Unit and Service Assistance
(7 Indicators)

ambulance, tow (truck), police, toll road patrol (operator), rescue, information system

Environment

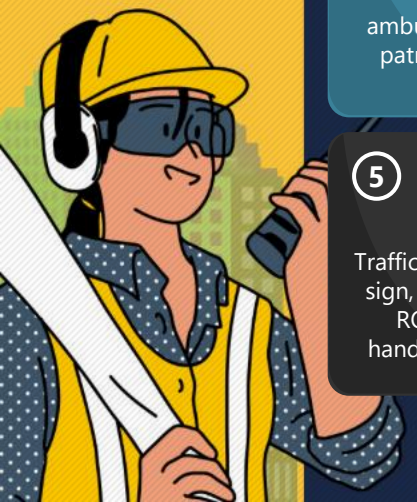
7 Environment
(4 Indicators)

Right of Way (ROW) cleanness, operation office and toll gates cleanness, plants in ROW, grass in ROW

Rest Area

8 Rest Area
(8 Indicators)

Road condition, on/off ramp, toilet, parking, lighting, gas station, garage, restaurants



MINIMUM SERVICE STANDARDS (SPM) FOR TOLL ROADS



Toll Road Condition

1	Skid Resistance (Main Road)	Annually
2	Road Roughness (Main Road)	Annually
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Drainage	Daily
7	Sediment	Daily
8	Kerb (Median)	Daily
9	Median Concrete Barrier	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

Mobility

1	Patrol Observation Area	Monthly
2	From Information Received ...	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

Accessibility

1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly

Average Travel Speed

1	Travel Speed (Normal Condition)	Monthly

Safety

1	Traffic Sign	3 Months
2	Road Marking	3 Months
3	Guide Post / Reflector	3 Months
4	Kilometer Sign	3 Months
5	Hectometer Sign	3 Months
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims	Monthly
11	Accident Vehicles	Monthly
12	Security and Law Enforcement	Monthly

Rescue Unit, Service Assistance

1	Ambulance	Monthly
2	Tow Truck	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Info and Communication	Monthly
7	Phone Number for Toll Info	Monthly

Environment

1	ROW Cleanness	Daily
2	Office and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Months
4	ROW Grass	3 Months

Rest Area

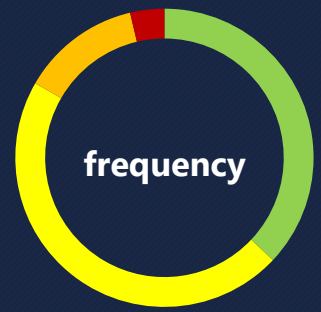
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

daily
(20 indicators) **37%**

monthly
(25 indicators) **46%**

quarterly annually
(7 indicators) **13%**

annually
(2 indicators) **4%**



MINIMUM SERVICE STANDARDS (SPM) FULFILLMENT



Conventional SPM Fulfillment

SPM Fulfillment Monitoring

- Issues were recorded manually using a survey form
- Recording of issues includes: issues indicators, location of issues (stationary, direction, lane), documentation / photo number, notes / description

Minutes / Reports of Monitoring Results

- Minutes / Monitoring Result Reports are created manually after site monitoring are completed

Repair by TRO

- The Minutes/reports are used as a reference by TRO in order to repair activities, repair duration is calculated after the Minutes are published
- Repair reports are prepared manually by TRO, and sent to ITRA when repairs have been completed
- Opportunities for manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- After the repair report by TRO was received by ITRA
- Repairs by TRO can only be rejected at this stage, if site review is not carried out
- Analysis is carried out as requirement by manually and separately

SPM Fulfillment Using e-SPM

SPM Fulfillment Monitoring

- Issues were recorded using the e-SPM application (Android based)
- Recording of issues includes everything in conventional methods and is equipped with automatic location coordinates and accuracy features
- On site mode and driving mode are available

Minutes / Reports of Monitoring Results

- Minutes / Fulfillment Reports can be generated automatically using the e-SPM application

Repair by TRO

- Every Issue is recorded in real time by e-SPM application, the repair duration is calculated automatically based on the time the issues data was collected
- Repairs can be reported using e-SPM and can be accessed by TRO and ITRA at any time without having to wait for repairs to be completed
- Minimize manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- Can be generated at any time according to requirement
- Repairs by TRO can be immediately rejected by ITRA. Review and comment features are available
- Several analysis features are available

IMPLEMENTATION OF E-SPM APPLICATION

Website

Web-based application developed to manage SPM fulfillment activities comprehensively. Intended for data processing, analysis and reporting.

User: ITRA/BM, TRO and TRO's Holding

Mobile App

Mobile-based application (currently Android) developed to collect data on the site.

User: Consultant or ITRA/BM Team, TRO Operation/Maintenance Team

Server

The e-SPM server is managed by PUSDATIN PUPR.

User: ITRA



PUSDATIN PUPR
E-SPM Server



DATABASE



E-SPM ITRA/TRO
Mobile Application (Android)



https://espm.bpjt.pu.go.id
Web Application





TRO's Holding
Holding / Head Office of Toll Road Operator



PUSDATIN PUPR
Data Center and Information Technology



TRO
Toll Road Operator



ITRA / BM
Indonesian Toll Road Authority / Bina Marga



Site Team Operation / Maintenance
Toll Road Operator

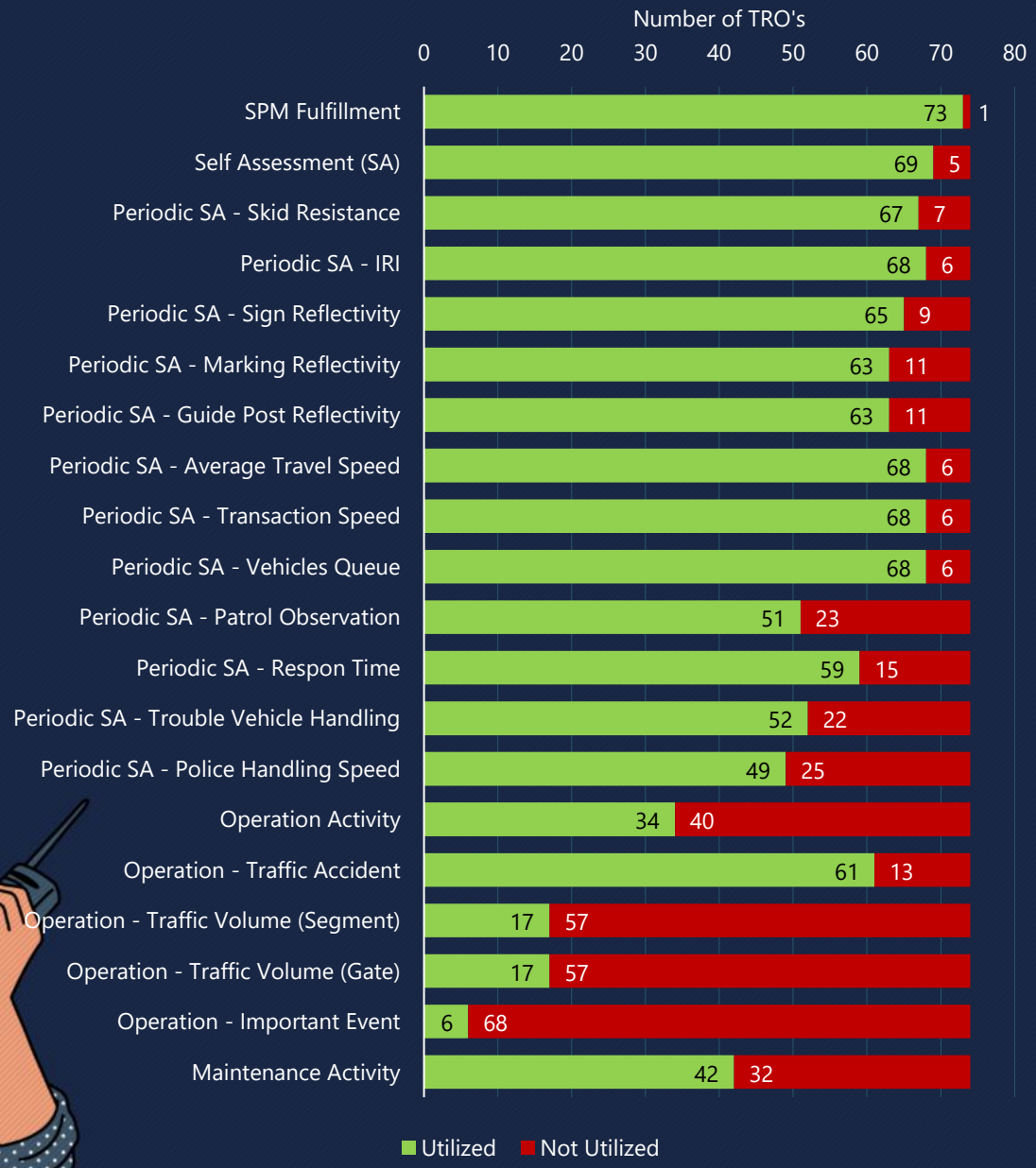


Consultant or ITRA / BM Team
Indonesian Toll Road Authority / Bina Marga

E-SPM UTILIZATION BY TRO'S

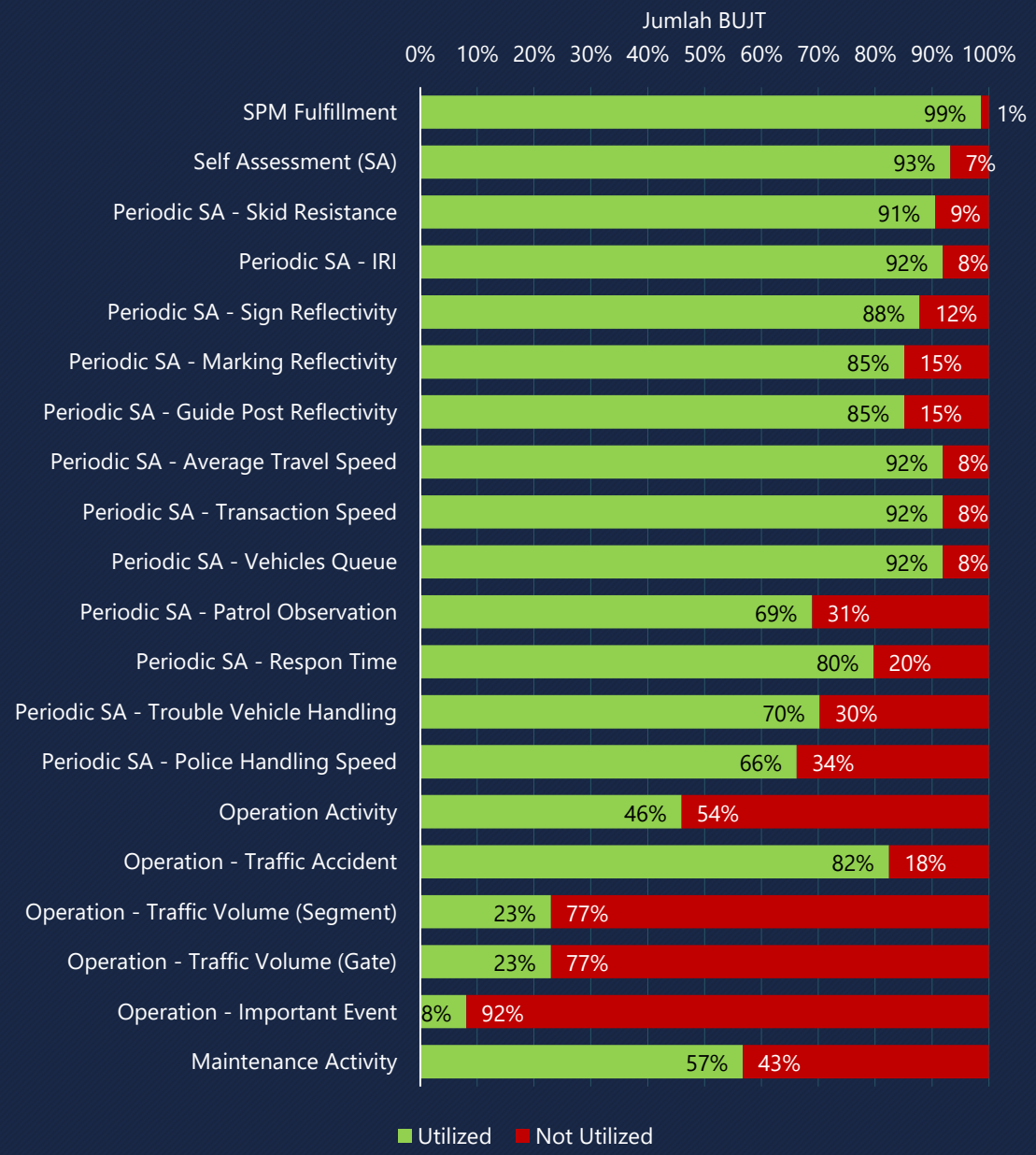
e-SPM Utilization by TRO's

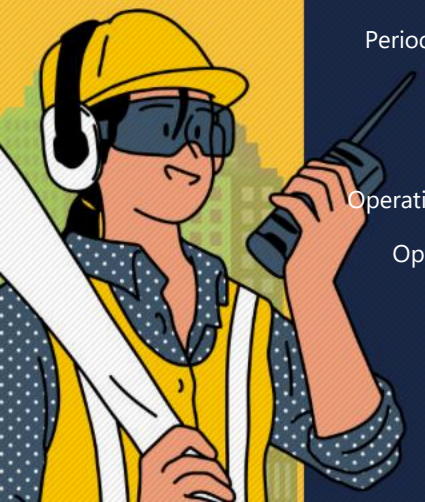
Last 3 Years (2021 - 2023)



Percentage of e-SPM Utilization by TRO's

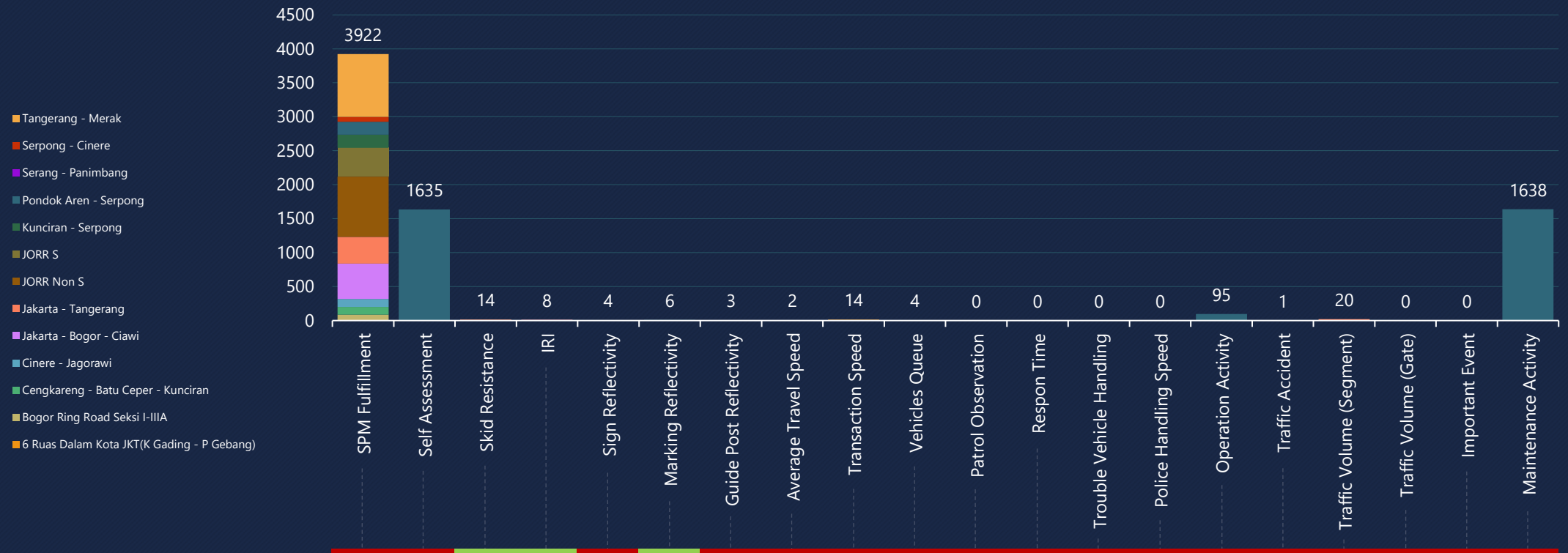
Last 3 Years (2021 - 2023)





E-SPM UTILIZATION BY TRO'S

History of e-SPM Utilization by TRO's (Team 1 - Jakarta) in 2021

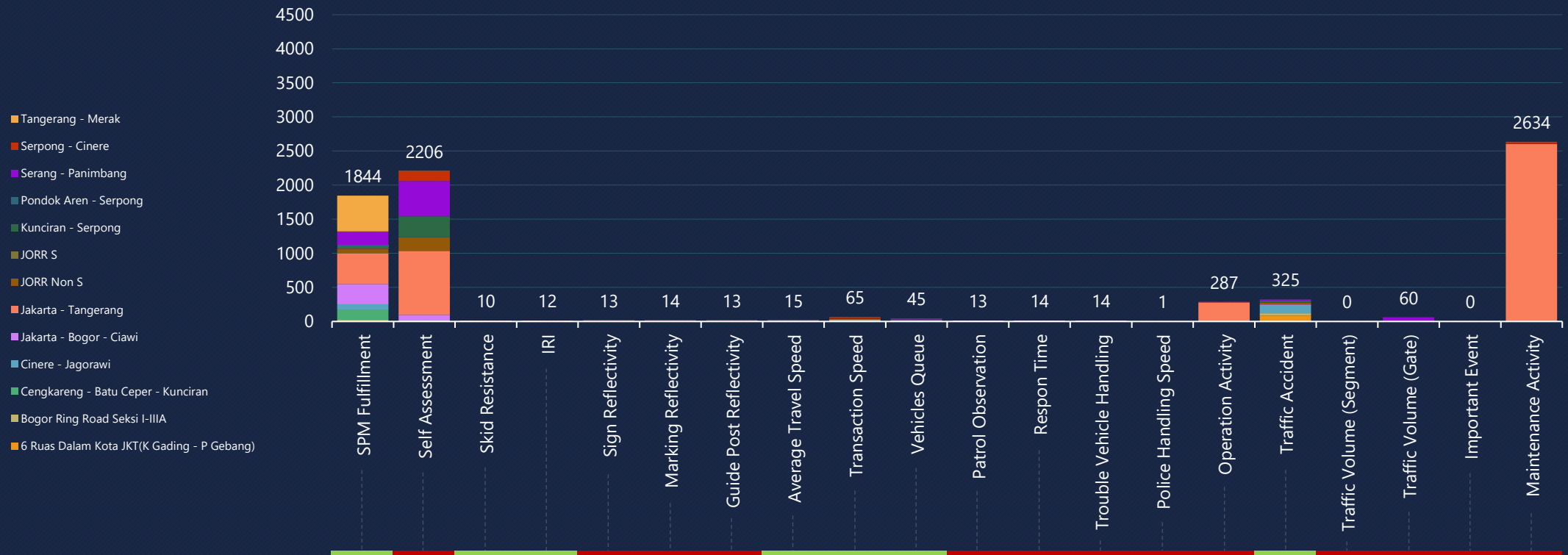


	SPM Fulfillment	Self Assessment	Skid Resistance	IRI	Sign Reflectivity	Marking Reflectivity	Guide Post Reflectivity	Average Travel Speed	Transaction Speed	Vehicles Queue	Patrol Observation	Respon Time	Trouble Vehicle Handling	Police Handling Speed	Operation Activity	Traffic Accident	Traffic Volume (Segment)	Traffic Volume (Gate)	Important Event	Maintenance Activity
6 Ruas Dalam Kota Jakarta	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bogor Ring Road Seksi I-IIIA	85	0	1	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	114	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cinere - Jagorawi	118	0	1	1	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0
Jakarta - Bogor - Ciawi	519	0	2	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Jakarta - Tangerang	396	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
JORR Non S	887	0	1	1	0	0	0	2	12	2	0	0	0	0	0	0	0	0	0	2
JORR S	424	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	191	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pondok Aren - Serpong	191	1635	1	1	1	1	1	0	0	0	0	0	0	0	95	0	0	0	0	1636
Serang - Panimbang	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serpong - Cinere	74	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tangerang - Merak	923	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0



E-SPM UTILIZATION BY TRO'S

History of e-SPM Utilization by TRO's (Team 1 - Jakarta) in 2022

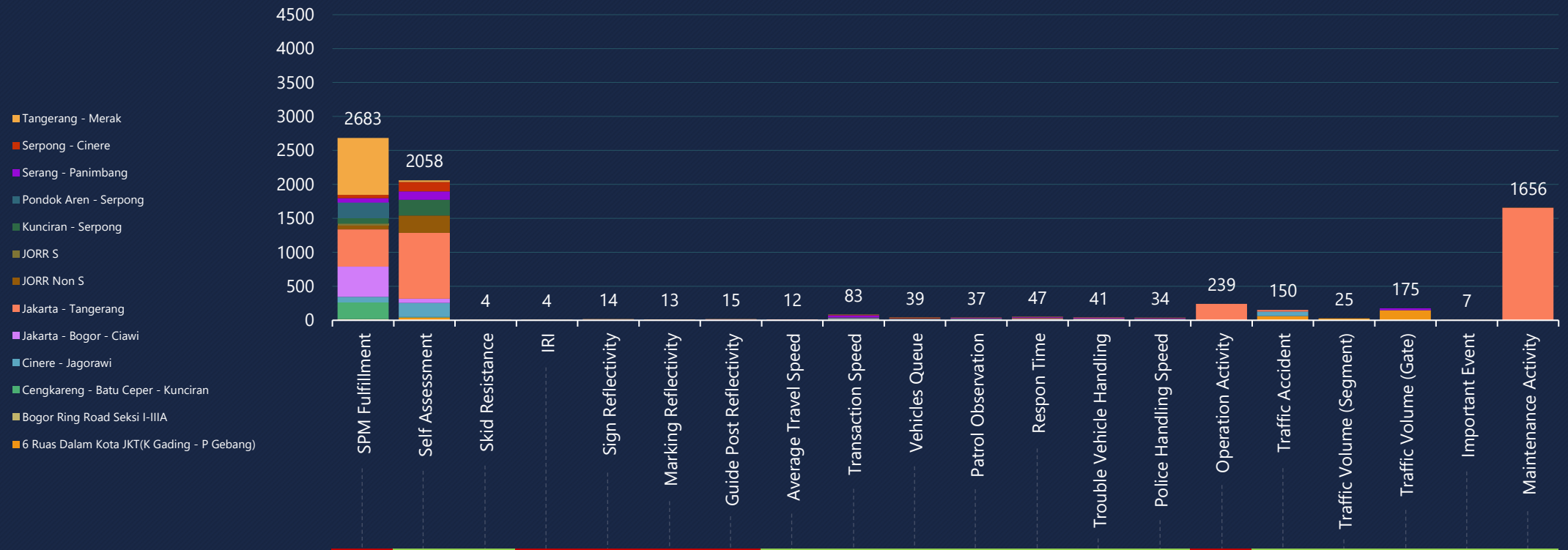


6 Ruas Dalam Kota Jakarta	14	0	1	1	0	0	0	1	3	3	0	0	0	0	0	85	0	0	0	0
Bogor Ring Road Seksi I-IIIA	8	13	1	0	1	1	1	2	7	7	1	2	2	1	0	36	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	154	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cinere - Jagorawi	74	1	1	1	1	1	1	2	3	3	0	0	0	0	0	108	0	0	0	0
Jakarta - Bogor - Ciawi	299	81	1	2	1	1	1	2	12	2	12	12	12	0	0	17	0	0	0	0
Jakarta - Tangerang	450	941	1	1	2	2	2	1	2	2	0	0	0	0	277	0	0	0	0	2602
JORR Non S	67	200	0	1	1	1	1	1	9	9	0	0	0	0	4	30	0	0	0	2
JORR S	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	19	307	1	2	1	1	1	2	5	5	0	0	0	0	0	29	0	0	0	0
Pondok Aren - Serpong	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serang - Panimbang	186	515	1	1	2	2	2	2	5	5	0	0	0	0	4	16	0	60	0	4
Serpong - Cinere	13	146	1	1	3	3	3	1	19	9	0	0	0	0	2	4	0	0	0	26
Tangerang - Merak	523	2	1	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0



E-SPM UTILIZATION BY TRO'S

History of e-SPM Utilization by TRO's (Team 1 - Jakarta) in 2023



6 Ruas Dalam Kota Jakarta	0	40	1	0	0	0	0	1	9	3	1	1	1	1	0	61	25	147	7	3
Bogor Ring Road Seksi I-IIIA	17	1	0	1	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	246	5	0	0	1	1	1	1	2	2	1	1	1	1	0	0	0	0	0	0
Cinere - Jagorawi	81	210	1	1	4	4	4	2	6	6	12	12	12	11	0	66	0	0	0	0
Jakarta - Bogor - Ciawi	447	61	0	0	1	0	1	1	6	4	3	4	3	0	0	0	0	0	0	0
Jakarta - Tangerang	547	970	1	1	2	2	2	2	2	2	1	11	5	3	239	23	0	0	0	1652
JORR Non S	60	256	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
JORR S	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kunciran - Serpong	82	230	0	0	1	1	1	1	9	5	4	4	4	4	0	0	0	0	0	0
Pondok Aren - Serpong	229	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serang - Panimbang	64	125	0	0	0	0	1	1	30	5	12	12	12	11	0	0	0	28	0	0
Serpong - Cinere	48	137	0	0	2	2	2	2	9	9	1	1	2	2	0	0	0	0	0	0
Tangerang - Merak	839	23	0	0	2	2	2	1	3	3	2	1	1	1	0	0	0	0	0	0



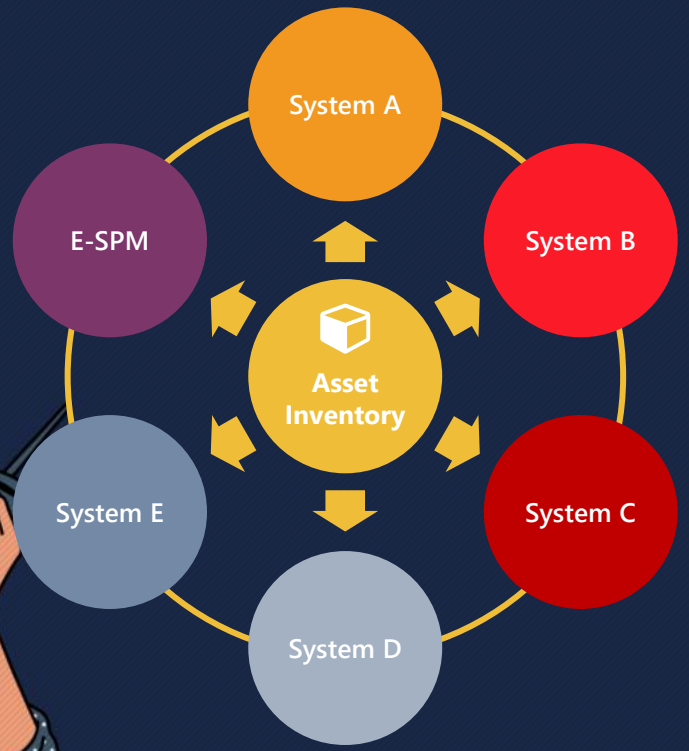
E-SPM DEVELOPMENT PLAN

E-SPM (Stand Alone)

e-SPM is currently applied and stands alone, not integrated with any system or application

Asset Management System (AMS)

e-SPM will be part of the toll road Asset Management System, integrated with each other and cannot stand alone





Item	E-SPM Existing	E-SPM (Part of AMS)
Orientation	**SPM Fulfillment (Ministry Regulation)** Developed and implemented in accordance with procedures for fulfilling SPM based on ministry regulations	**Toll Road Asset** Developed to be oriented towards "Asset Inventory" on the toll roads
Object (Example)	**Indicator, Location (KM, Location, Coordinate)** Issues in fulfilling SPM are identified based on attributes: issue indicators and location details. Example: **Issue on Road Sign/Street Lighting** Indicator : Road Sign/Street Lighting KM : 05+200 [input] Lane : Non-Lane [input] Direction : A Direction [input] Latitude (Deg) : -6.12345678 [automatic] * Longitude (Deg) : 120.12345678 [automatic] * * according to the data collection location	**Indicator, Asset ID** Issues in fulfilling SPM are identified based on asset data that has been inventoried and stored in the database Example: **Issue on Road Sign/ Street Lighting** Indicator : Road Sign/Street Lighting Asset ID : TS-262626 [select/search] **Asset Information (Automatically according to inventory data)** ↓ KM : 05+200 [automatic] Lane : Non-Lane [automatic] Direction : A Direction [automatic] Latitude (Deg) : -6.12345678 [automatic] Longitude (Deg) : 120.12345678 [automatic]
History, Trend (Example)	**Depending on Location** History of issues, repairs depending on location. For the same object, data collection errors may occur.	**Right on Target** History of issues and repairs is recorded precisely, minimizing errors because it is specifically based on inventory data

IMPROVEMENT OF E-SPM FEATURES



Previous Version of e-SPM	Expanded by JICA Project
Master Data	
▪ Toll Roads	▪ Asset Master
▪ Toll Road Operators (TRO) and Holding	▪ Asset Category
▪ Toll Road Groups	▪ Asset Distress
▪ Toll Road Segments	▪ Document Category (Regulation, Technical Guidelines, etc)
▪ Toll Gates	
▪ Substance and Indicators of Minimum Service Standard	
Data Inputting	
▪ Services Vehicles	▪ Asset Inventory - Rescue Station and Services Vehicles
▪ Traffic Volume (Segment and Gate)	▪ Asset Inventory - Rest Area
▪ Traffic Accident	▪ Asset Inventory - Bridges
▪ Maintenance Activity	▪ Maintenance Plan
▪ Operation Activity	▪ Document
Analysis	
▪ Minimum Service Standard (SPM) Summary	▪ Performance Evaluation of SPM Fulfilment by ITRA and TRO's
▪ Self Assessment by TRO's Summary	▪ Blacklisting Evaluation
▪ SPM Competition	▪ Blackspot Location (Traffic Accident Analysis)
▪ Traffic Accident Summary	▪ Deterioration Trend Analysis
	▪ Detailed Investigation
Reporting	
▪ Minutes of SPM Fulfilment and Repair	▪ Report of SPM Fulfilment

IMPROVEMENT OF E-SPM INFRASTRUCTURE

e-SPM Infrastructure Development

Category	Component	e-SPM 2019	e-SPM 2021	e-SPM 2023/2024
Network	Server	Cloud Server (Google)	Server PUSDATIN PUPR	Server PUSDATIN PUPR
Network	Domain	www.espmweb.varianglobal.tech	www.espmbpjt.pu.go.id	www.espm.bpjt.pu.go.id
Network	IP Server	auth-db364.hostinger.com	103.211.50.23	103.8.238.226
Network	API Server	Google Cloud API & Playstore	Google Cloud API & Playstore	Google Cloud API & Playstore
Hardware	Processor	VCPU 2 Core	Intel(R) Xeon(R) CPU E7-8870 v2	Intel(R) Xeon(R) Gold 6330H
Hardware	RAM	4 GB	8 GB	8 GB
Hardware	Storage	200 GB	500 GB	1.500 GB
Software	Operation System	Ubuntu Server 18.04 LTS	Ubuntu Server 18.04 LTS	Ubuntu Server 21.04 LTS
Software	Web Server	Apache 2 versi 2.4.29	Apache 2 versi 2.4.29	Apache 2 versi 2.4.46
Software	PHP	PHP 7.2	PHP 7.2	PHP 7.4
Software	DBMS	MySQL 5.7	MySQL 5.7	MySQL 8
Web Application	Framework	Laravel	Laravel	Laravel
Web Application	CMS	October CMS	October CMS	October CMS
Mobile Application	Framework	Native Android	Flutter 2.5	Flutter 3.7.9
Mobile Application	Backend Service	-	Firebase	Firebase
UI / UX Design	Tools	Corel Draw GraphicSuite 2020	Figma	Figma



INVENTORY DATA INPUTTING FEATURES

No	Inventory Data/ Data Inputting	Module Link	Data Attributes
1	Highway Segments	https://espm.bpjt.pu.go.id/v1-highwaysegment	▪ ID ▪ Highway ID ▪ Segment Code ▪ Segment Name ▪ Name of Start Ramp ▪ Name of End Ramp ▪ Direction ▪ Chainage of Start ▪ Latitude ▪ Longitude ▪ Chainage of End ▪ Latitude ▪ Longitude ▪ Construction Year ▪ Operation Year ▪ Right of Way Width ▪ Type of Median ▪ Number of Lanes ▪ Lane Width (*) ▪ Pavement Type (*) *(*) Details for each lane (shoulder, main lane and motorcycle lane)*
2	Toll Gates	https://espm.bpjt.pu.go.id/v1-tollgate	▪ ID ▪ Highway ID ▪ Gate Code ▪ Gate Name ▪ Gate Type ▪ Transaction Type ▪ Entrance Booth ▪ Exit Booth ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
3	Rescue Stations	https://espm.bpjt.pu.go.id/inventory-servicevehicle-dashboard	▪ ID ▪ Highway ID ▪ Station Name ▪ Direction ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Description
4	Services Vehicle	https://espm.bpjt.pu.go.id/inventory-servicevehicle-dashboard	▪ ID ▪ Highway ID ▪ Rescue Station ID ▪ Vehicle Code ▪ Vehicle Type ▪ Police Number ▪ Vehicle Number ▪ Description
5	Bridges	https://espm.bpjt.pu.go.id/inventory-bridge-dashboard	▪ ID ▪ Highway ID ▪ Bridge Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Bridge Type ▪ Bridge Position ▪ Road Width ▪ Bridge Length (m) ▪ Number of Span ▪ Type and Structure Configuration ▪ Construction Year ▪ Operation Year ▪ Description
6	Services Area	https://espm.bpjt.pu.go.id/inventory-restarea-dashboard	▪ ID ▪ Highway ID ▪ Rest Area Name ▪ Chainage (Km) ▪ Latitude (Deg) ▪ Longitude (Deg) ▪ Direction ▪ Rest Area Type ▪ Pavement Type



MAINTENANCE PLAN

Entity	Process	Document	Description
	Start		Maintenance plan must be reported by TRO's **annually**
 TRO	Preparation of maintenance plan Submit to BPJT	Maintenance plan submission letter	▪ Maintenance plan prepared only for **periodic maintenance** and **upgrading maintenance** ▪ Maintenance plan are classified in 3 categories, including: **Toll Road**; **Bridges**; **Services Area** (each category has several indicators) ▪ Each category is reported in the form of **damage details**, **repair plan**, **repair schedule**, and **strip map** (certain indicators)
 ITRA	Evaluation by BPJT No appropriate ? Yes	▪ Maintenance detail checklist ▪ Minutes of meeting	▪ The maintenance plan applies an **approval** system by BPJT ▪ The details of the maintenance plan will be reviewed by BPJT, BPJT will approve or reject **one by one the detailed data** that has been reported by the TRO
 ITRA	Synchronization of maintenance schedules for each toll road No appropriate schedule ? Yes	Maintenance plan schedule	Schedule synchronization by BPJT on the consideration of several programs such as: SPM fulfillment, rate adjustment, prohibition of work on holidays and new year, etc.
 Head of ITRA	Maintenance plan approved	Maintenance plan approval letter	The maintenance plan report that has been evaluated will be approved by the head of BPJT
	Finish		The approved maintenance plan will be used as a reference for BPJT to monitor and evaluate repair results (**repair activity must also be reported by TRO**)



MAINTENANCE PLAN

Maintenance Plan List

Toll Road	Period		Total Cost	Submitted Status	Approval Status
Akses Tanjung Priok	2024	IDR.	100.000.000.000,-	Submitted	Approved
Bakauheni - Terbanggi Besar	2024	IDR.	375.000.000.000,-	Submitted	Partial Approved
Balikpapan - Samarinda	2024	IDR.	150.000.000.000,-	Submitted	Waiting Approval
Bekasi - Cawang - Kampung Melayu	2024	IDR.	0,-	Not Submitted	-

Maintenance Plan Details

Toll Road	Period	Road Pavement	Drainage	Rounding	Road Sign	Guardrail	Landscape	Others
Akses Tanjung Priok	2024	9	2	2	7	2	5	3
Bakauheni - Terbanggi Besar	2024	4 1 1	2		4 1	2 4	2	1 5
Balikpapan - Samarinda	2024	8	4	9	7	7		4
Bekasi - Cawang - Kampung Melayu	2024							

Has been reviewed and approved by ITRA Not yet reviewed by ITRA Rejected by ITRA

Convert to Schedule / Calendar

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

All Toll Road 2024

Toll Road	Category	Asset Name	Distress Type	Location (Km)	Direction	Lajur	Jadwal	
Akses Tanjung Priok	Toll Road	Pavement	Rutting	10.000 - 11.200	A	Lane 1	May 2024, 22	View Details
Akses Tanjung Priok	Toll Road	Pavement	Rutting	08.400 - 09.800	B	Lane 1	May 2024, 10	View Details
Akses Tanjung Priok	Toll Road	Guardrail	Beam Damage	11.200 - 11.250	A	Non Lane	May 2024, 11	View Details
Bakauheni - Terbanggi Besar	Toll Road	Pavement	Divided Slab	03.100 - 03.110	A	Lane 1	May 2024, 20	View Details
Bakauheni - Terbanggi Besar	Toll Road	Rounding	Drop Off	24.100 - 24.150	B	Non Lane	May 2024, 25	View Details



SPM FULFILLMENT BY ITRA & TRO (MACRO ANALYSIS)



ITRA Verification

Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	06/05/2022	5
01/05/2022	06/05/2022	5
01/05/2022	09/05/2022	8
01/05/2022	09/05/2022	8
02/05/2022	09/05/2022	7
02/05/2022	10/05/2022	8
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	10/05/2022	6
04/05/2022	12/05/2022	8
04/05/2022	12/05/2022	8

TRO Reporting

Damage Found (Date)	Repair Date	Repair Duration (Days)
01/05/2022	07/05/2022	6
02/05/2022	07/05/2022	5
03/05/2022	07/05/2022	4
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
04/05/2022	09/05/2022	5
05/05/2022	09/05/2022	4
07/05/2022	10/05/2022	3
10/05/2022	11/05/2022	1
11/05/2022	13/05/2022	2
11/05/2022	13/05/2022	2

The analysis feature is to find out the comparison of SPM fulfilment by TRO, ITRA and Regulatory Provision.

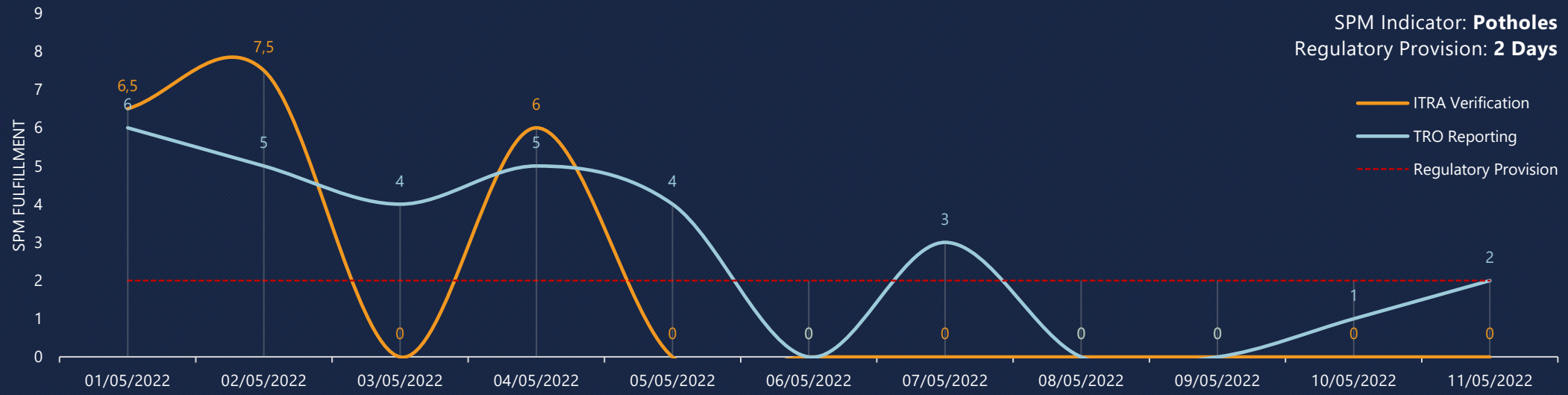
The technical approach will be described through this equation:

$$SPM = \frac{\sum_1^n rd - df}{n}$$

SPM : SPM fulfilment (daily)
n : Amount of damage in 1 day
rd : Repair Date of each damage (datetime format)
df : Issue Date/ Damage Found (datetime format)

Comparison Results

Date of SPM Fulfilment	ITRA	TRO
01/05/2022	6,5	6
02/05/2022	7,5	5
03/05/2022	0	4
04/05/2022	6	5
05/05/2022	0	4
06/05/2022	0	0
07/05/2022	0	3
08/05/2022	0	0
09/05/2022	0	0
10/05/2022	0	1
11/05/2022	0	2



PERFORMANCE EVALUATION (MACRO ANALYSIS)

SPM Fulfillment

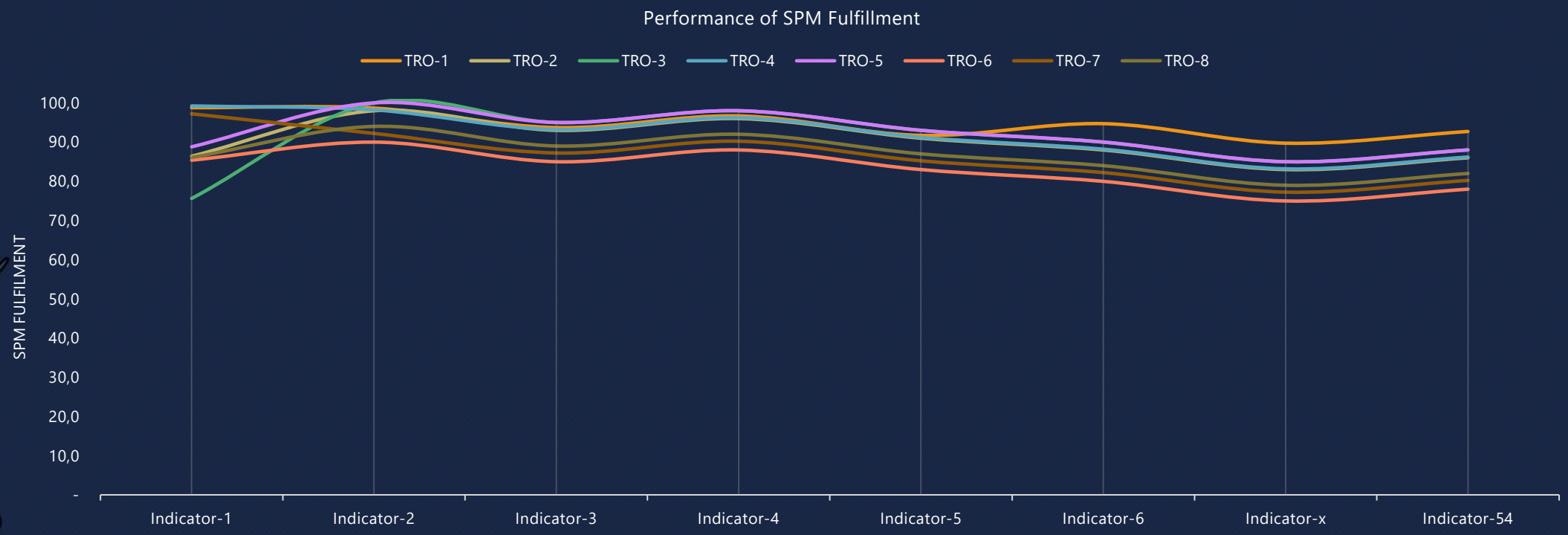
Indicators	TRO-1	TRO-2	TRO-3	TRO-4	TRO-5	TRO-6	TRO-7	TRO-8
Indicator-1	98,8	86,4	75,6	99,2	88,8	85,4	97,2	86,1
Indicator-2	98,7	98,0	100,0	98,2	100,0	90,0	92,2	94,0
Indicator-3	93,7	93,0	95,0	93,2	95,0	85,0	87,2	89,0
Indicator-4	96,7	96,0	98,0	96,2	98,0	88,0	90,2	92,0
Indicator-5	91,7	91,0	93,0	91,2	93,0	83,0	85,2	87,0
Indicator-6	94,7	88,0	90,0	88,2	90,0	80,0	82,2	84,0
Indicator-x	89,7	83,0	85,0	83,2	85,0	75,0	77,2	79,0
Indicator-54	92,7	86,0	88,0	86,2	88,0	78,0	80,2	82,0

The analysis feature is to determine the comparison of SPM fulfilment based on indicators for each toll road.

The technical approach will be described through this equation:

$$SPM_i = \frac{n_{finish}}{n} \times 100$$

SPM_i : SPM fulfilment per-indicators
n_{finish} : Amount of damage that has been repaired
n : Amount of damage/issue

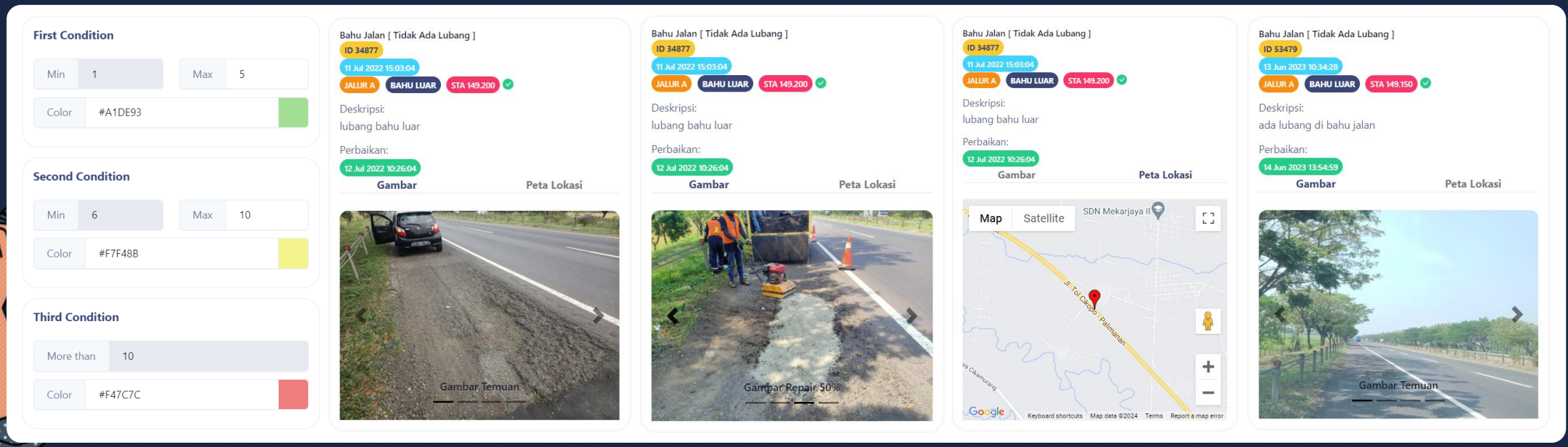




Map of Blackspot Locations and Traffic Accident Locations

An analytic module to recommend for the detailed investigation by analyzing the historical damage detection in the same location. A list with recommended detailed investigation based on the threshold of damages detected in the same location/area is shown. Also, upon double click of damage location point, a pop-up window will appears to show details of damages including damage photos.

Chainage		0.000	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800	2.000	2.200	2.400	2.600	2.800	3.000	3.200	3.400	...
Direction	ROW Fence																			
→	Drainage			2																
	Safety Fence																			
	Outer Shoulder																			
	Lane 1																			
	Lane 2																			
	Lane 3					3														
	Inner Shoulder																			
Median																				
	Inner Shoulder																			
	Lane 3																			
	Lane 2																			
	Lane 1						12													
	Outer Shoulder	8																		
	Safety Fence																			
←	Drainage																			
Direction	ROW Fence																			
Chainage		0.000	0.200	0.400	0.600	0.800	1.000	1.200	1.400	1.600	1.800	2.000	2.200	2.400	2.600	2.800	3.000	3.200	3.400	...



BLACKLISTING (MACRO ANALYSIS)

ITRA has developed an SPM competition system which is an assessment concept in order to create positive enthusiasm for each TRO to compete in providing the best service for road users. The system mechanism that is carried out is like a 'football league' competition, where after passing a period of time, the team with the highest points (win 3 points, draw 1 point, lose 0 points) will become the champion of the competition. If in football points are determined from the results of the match, the points earned in this SPM competition are determined based on the percentage and duration of repairs to damage referring to the tolerance time for repairs in accordance with Minister of Public Works Regulation Number No.16/PRT/M/2014. Each indicator and substance are also given a calculation weight as a multiplier, was obtained from previous ITRA studies.

Weighting of Substances

No	Substances	Weight (%)
1	Toll Road Condition	25.62
2	Average Travel Speed	12.75
3	Accessibility	11.07
4	Mobility	9.00
5	Safety	23.02
6	Rescue Units & Service Ass	10.47
7	Environment	3.40
8	Rest Area	4.67
	Total	100.00



iv : Indicator Value
a : Indicator-a
n : Amount of issue in 1 indicator
$jptw$: Number of repairs on time
iw : Indicator Weight
ipv : Indicator Percentage Value (%)
sv : Substance Value
54 : Total amount of indicators
b : Substance-b
sw : Substance Weight

Quantitative Calculations

- **Step 1**: Calculate the value of each indicator

$$iv_a = \frac{\sum_1^n jptw}{n} \times iw_a$$

- **Step 2**: Calculate the % value of each indicator

$$ipv_a = \frac{iv_a}{iw_a} \times 100$$

- **Step 3**: Calculate the value of each substance

$$sv_b = \sum_{a=1}^{54} iv_a \times sw_b$$

- **Step 4**: Calculate the % value of each substance

$$spv_b = \frac{sv_b}{sw_b} \times 100$$

- **Step 5**: Calculate the final score

$$fs = \sum_{b=1}^{8} spv_b$$

Final Score of SPM Fulfillment (Example)

No	TRO	Fulfilment Percentage by Substances **Minimum Score: 75** (Range 0 – 100)								Final Score	Category
		S-1	S-2	S-3	S-4	S-5	S-6	S-7	S-8		
1	TRO-4	99	100	100	98	100	96	100	100	99,15	
2	TRO-5	99	100	100	100	100	88	100	100	98,49	
3	TRO-6	98	100	100	98	100	96	100	89	98,38	
4	TRO-7	95	100	100	95	100	100	100	100	98,27	
5	TRO-8	99	100	100	96	100	98	100	80	98,24	
6	TRO-9	100	100	100	94	100	92	100	88	98,06	
7	TRO-10	95	100	100	90	100	96	100	100	97,40	
8	TRO-11	89	100	100	100	100	100	100	90	96,71	
9	TRO-12	89	100	100	88	100	100	94	85	95,20	
10	TRO-13	80	100	100	100	100	100	85	88	93,81	
11	TRO-14	85	100	100	100	90	100	100	75	92,69	
12	TRO-15	100	100	100	100	75	100	75	55	91,29	
...	TRO-...	100	100	100	100	10	100	100	35	76,25	
...	TRO-...	50	100	100	100	50	100	100	90	75,21	
61	TRO-61	50	100	100	100	35	70	100	90	68,62	Blacklist
62	TRO-62	87	45	65	68	55	66	70	95	67,73	Blacklist
63	TRO-63	58	66	67	100	45	55	86	45	60,83	Blacklist

TRAFFIC ACCIDENT ANALYSIS (BLACKSPOT)

Source: Indonesian Department of Settlement and Regional Infrastructure (Pd-T-09-2004-B)

Traffic Accident Data (Available in the current e-SPM)

Weighting by Fatality Rate

Fatality Rate	Weight
Deaths (Meninggal Dunia (MD) in Bahasa)	12
Serious Injuries (Luka Berat (LB) in Bahasa)	3
Minor Injuries (Luka Ringan (LR) in Bahasa)	3
Vehicles Involved (Kendaraan Terlibat (K) in Bahasa)	1

$$AEK = 12MD + 3LB + 3LR + 1K$$

AEK : Accident Equivalence Rate

Determining the Upper Control Limit (BKA)

$$BKA = C + 3\sqrt{C} \qquad C = \frac{AEK}{Road\ Length}$$

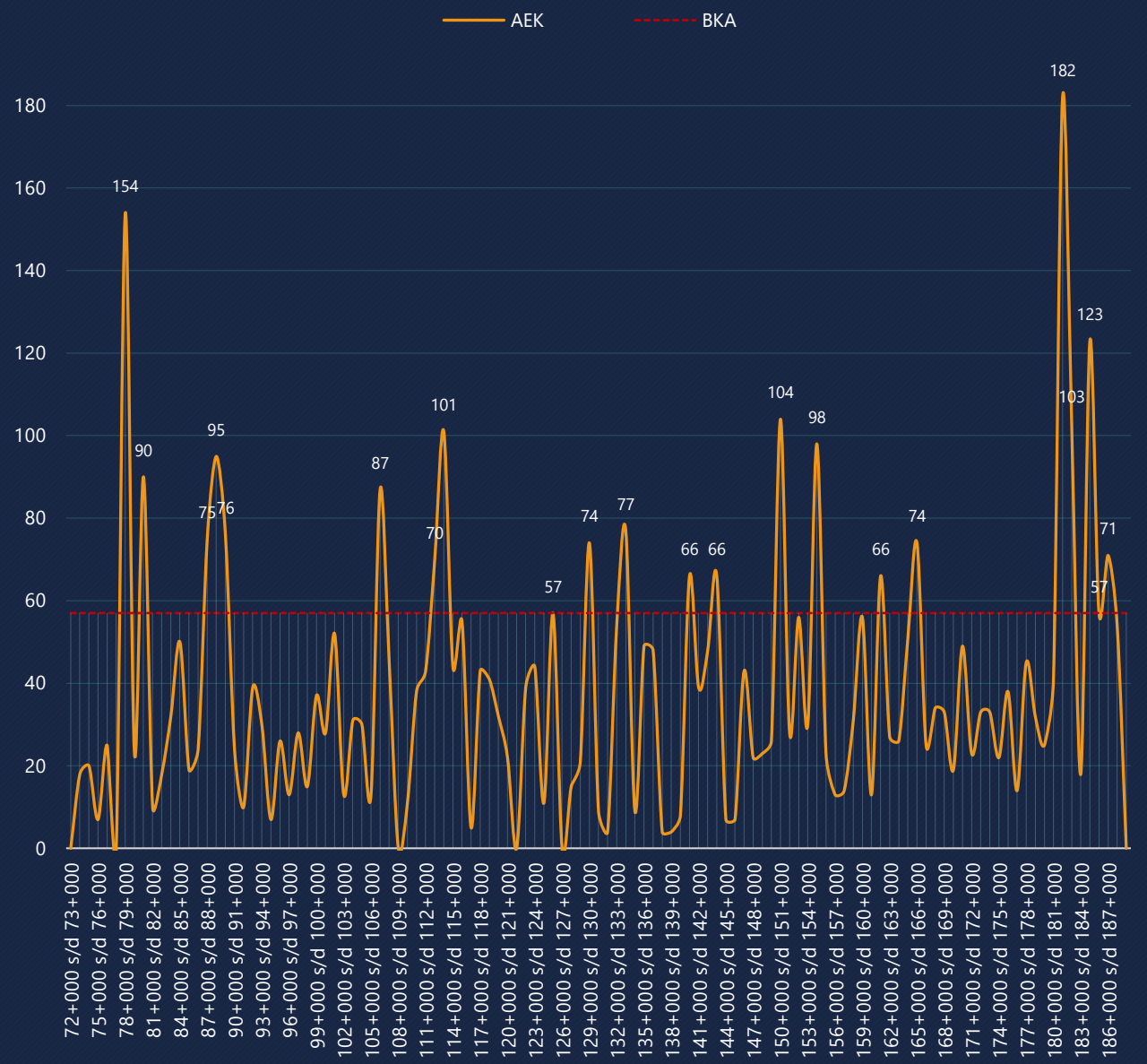
BKA : Upper Control Limit C : AEK Accident Rate

Determining Blackspot Location

$$AEK > BKA$$

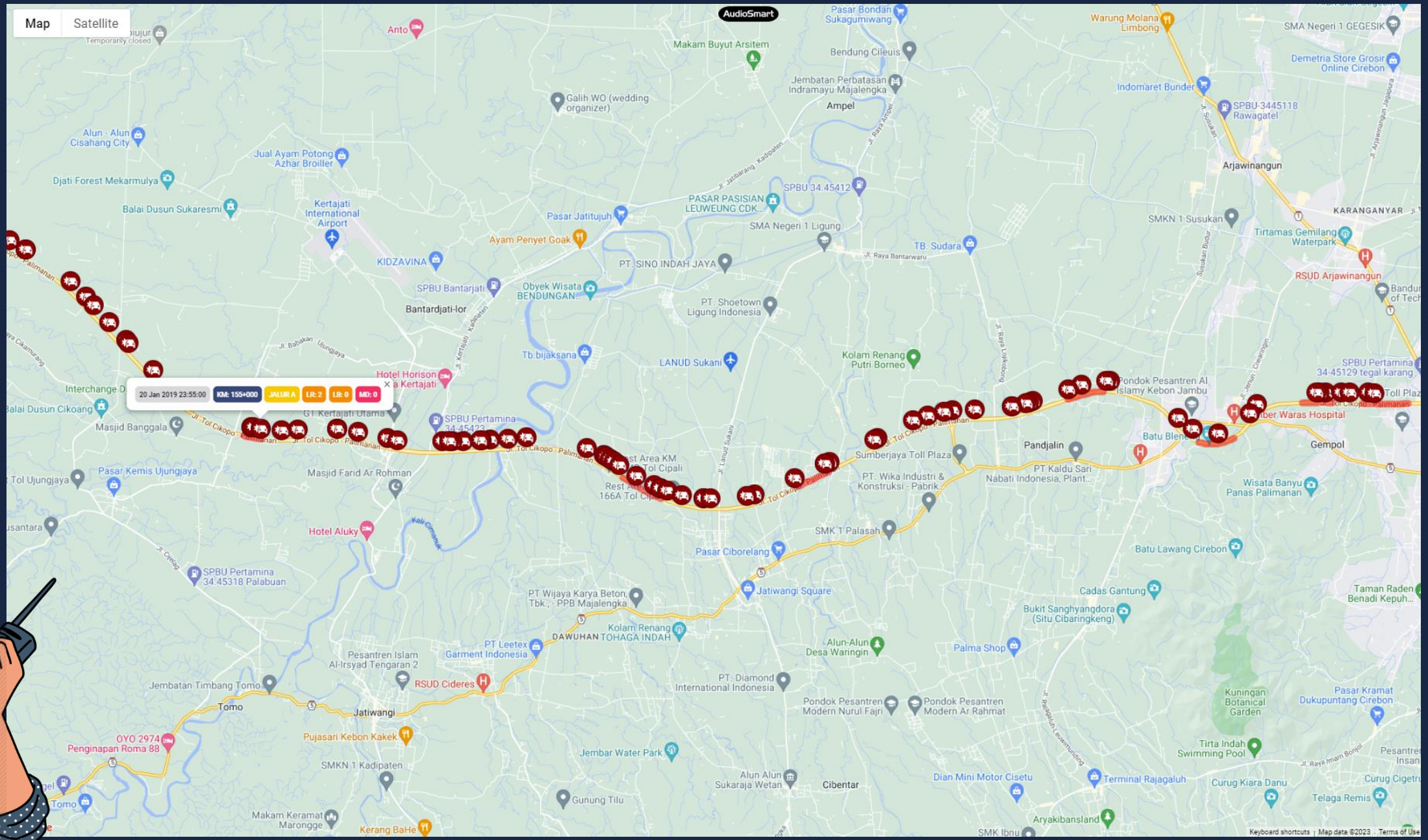


Blackspot Location on the ABC Toll Road



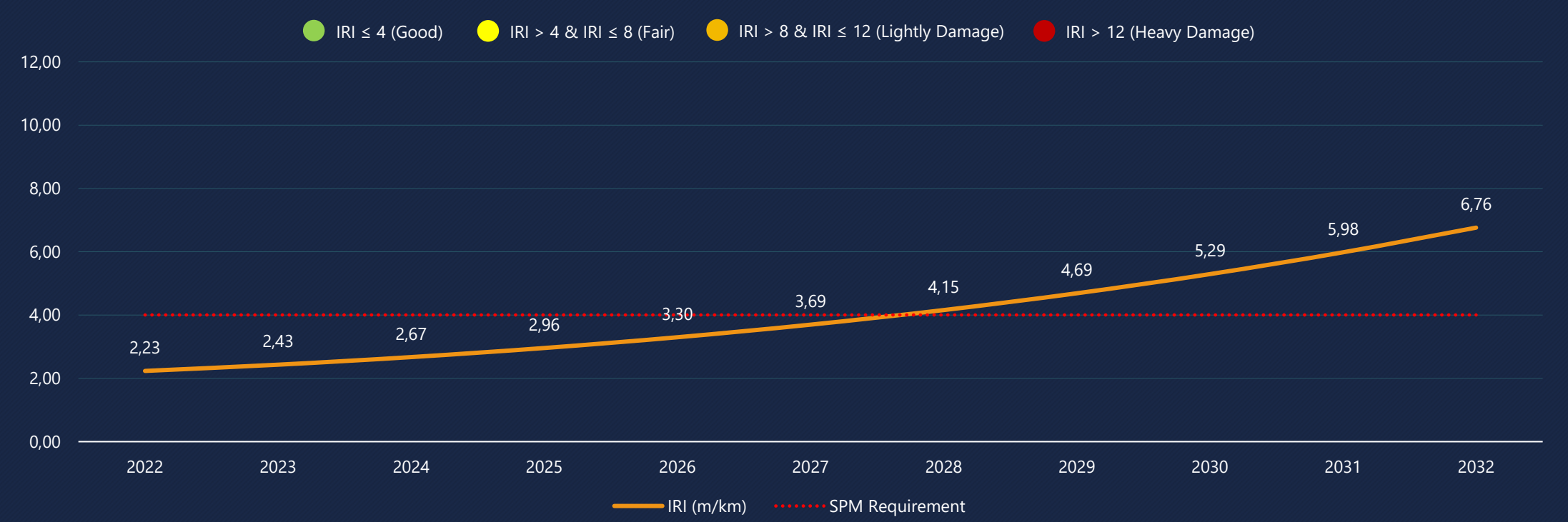
TRAFFIC ACCIDENT ANALYSIS (BLACKSPOT)

Map of Blackspot Locations and Traffic Accident Locations





IRI DETERIORATION (MICRO ANALYSIS)





Stationary		Section	Pavement Type	CBR rep. (%)	SNsg	SNC	IRI (m/km)										
Start	Finish						2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
7,400	7,500	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	2,33	2,53	2,78	3,08	3,42	3,83	4,30	4,84	5,46	6,16	6,95
7,500	7,600	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,51	1,66	1,85	2,09	2,37	2,71	3,11	3,57	4,11	4,72	5,42
7,600	7,700	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,24	1,37	1,55	1,76	2,03	2,34	2,72	3,15	3,66	4,25	4,92
7,700	7,800	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,95	2,13	2,35	2,62	2,94	3,31	3,75	4,25	4,83	5,49	6,24
7,800	7,900	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	1,61	1,77	1,97	2,21	2,50	2,85	3,25	3,73	4,27	4,90	5,61
7,900	8,000	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	7,22	7,74	8,32	8,97	9,70	10,50	11,40	12,40	13,50	14,72	16,06
8,000	8,100	Pondok Aren - Pamulang	Rigid	6,00	0,78	8,02	8,16	8,74	9,38	10,10	10,90	11,79	12,77	13,85	15,05	16,36	17,81

THANK YOU



KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA

Workshop on Evaluation of Utilization of e-SPM in SPM Monitoring and Asset Management

The Project for Strengthening Management Capacity of Toll Road Development

August 2024



Asset Management and Managing Assets are not alternatives.

Asset Management = Strategies and plans of the organization to derive value from those assets

- The purpose of your organization and what assets does it need – and why
- Value, purpose and long-term outcomes
- Risk and context e.g., markets / climate / regulation or what
- Holistic approach to different funding streams e.g., CAPEX and OPEX?
- Collaborative behaviors - breaking down silos both internal and supply chain?
- How assets contribute to organizational value

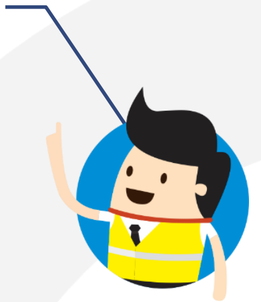
Then, what is the Role of PUPR/BPJT/DGH in regard to toll road ?



Managing Assets = Activities performed directly on the assets

- Lifecycle activities and asset care - availability, reliability, dependability and safety
- Asset location, condition, life extension and/or interventions
- Asset databases, systems (and IT) and performance
- People, skills and work management
- Budgets and key performance indicators (KPIs) / cost of maintenance and current performa

What is Role of BUJT ?





Hierarchical Management Cycle for Toll Road Operation

Asset Management

Find points to be improved from information analysis and give new direction for O&M

Summary of current situation and problem points on O&M based on the accumulated data

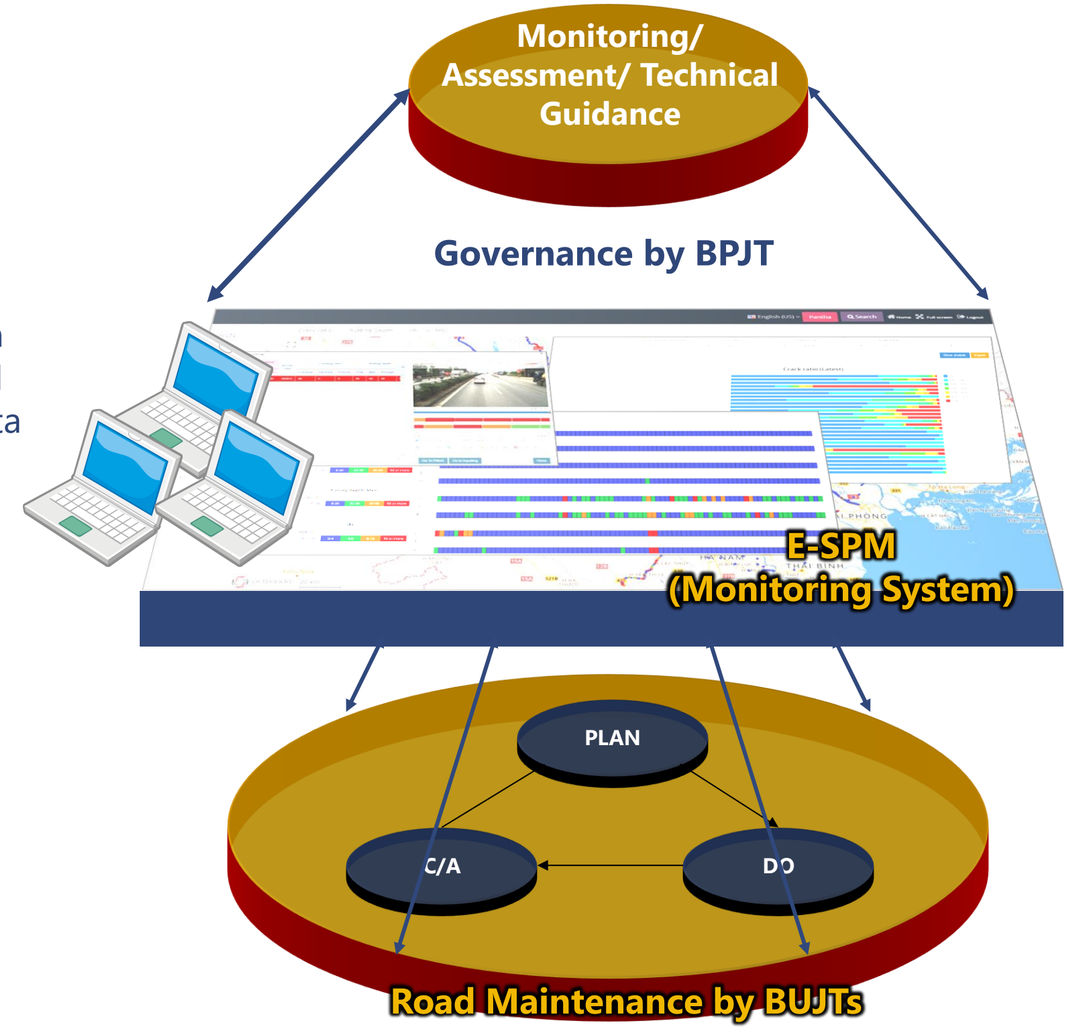
Managing Assets

New action based on the direction from TOP Management



Report and data accumulation from O&M work







Data Platform Concept for Toll Road Monitoring & Management by e-SPM upgrading

TROs (BUJT)

BUJT A

Mng. system

DB

e-SPM Mobile

BUJT B

Mng. system

DB

e-SPM Mobile

Data input/
import

Knowledge
Sharing

BPJT / DGF (Bina Marga)

Data Base - SPM+

Integrated Time-series data
for performance assessment

Data Analysis

- Bench-Marking Assessment
- Blackspot Analysis

Knowledge Data

web

Road Users



Information disclosure

Stakeholders

Dashboard

SPM Monitoring



Operational
Toll Roads
In Indonesia



Length +73%

Toll Roads +55%

in the last 5 years,
starting from 2019 - 2023

History of developments in the number and length of operational toll roads in Indonesia in the last 5 years :

1978 - 2018

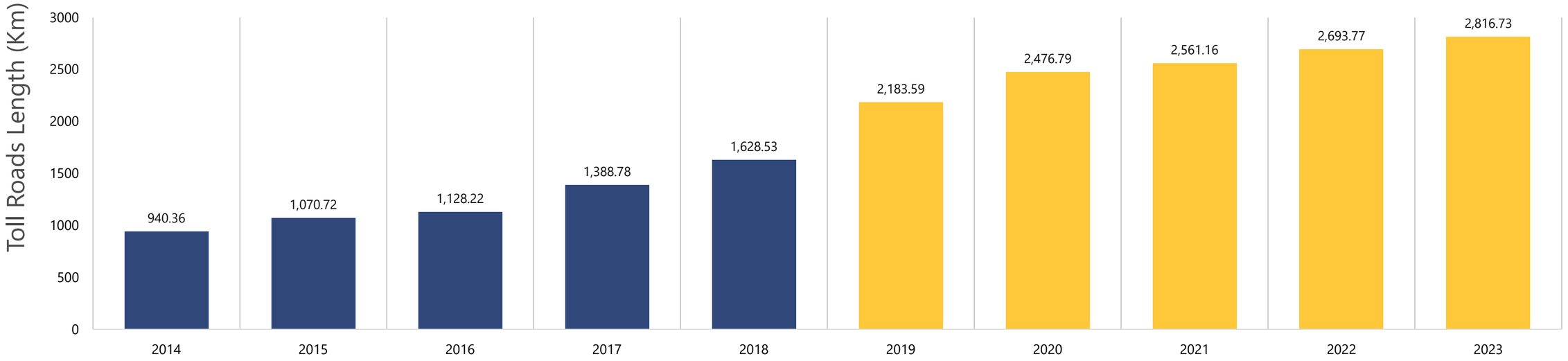
Number of Operational Toll Roads : 47 toll roads
Length of Operational Toll Roads : 1.628,53 km

2019 - 2023

Number of Operational Toll Roads : 73 toll roads
Additions in The Last 5 Years : **+ 26 toll roads**
Length of Operational Toll Roads : 2.816,73 km
Additions in The Last 5 Years : **+ 1.188,20 km**

Operational Toll Roads	Length	Additions in The Last 5 Years
31		
33	+14%	130,36 km new toll roads
34	+5%	57,50 km new toll roads
42	+23%	57,50 km new toll roads
47	+17%	239,75 km new toll roads
54	+34%	555,06 km new toll roads
60	+13%	293,20 km new toll roads
64	+3%	84,37 km new toll roads
69	+5%	132,61 km new toll roads
73	+4%	122,96 km new toll roads





Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

Article 1, Section 2

Toll Road Minimum Service Standards are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

Article 4, Section 1

Procedures for Measuring Minimum Service Standards for Toll Roads is a guide to measurement methods in achieving Minimum Service Standards for Toll Roads that must be carried out by each Toll Road Business Entity

Article 5

Toll Road Minimum Service Standards must be **fulfilled (mandatory)** by Toll Road Business Entities in order to provide services to toll road users

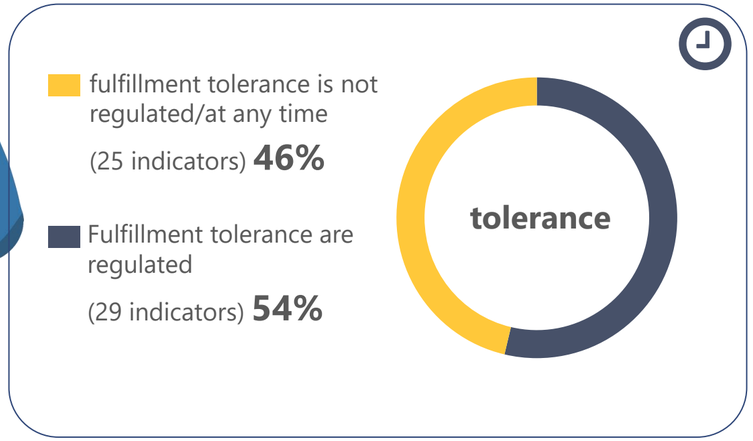
Article 6, Section 1 and 2

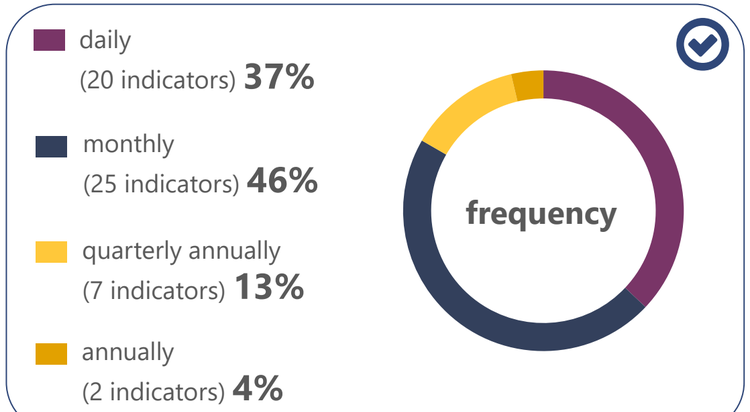
Toll Road Minimum Service Standards are **evaluated periodically** based on the results of monitoring functions and benefits

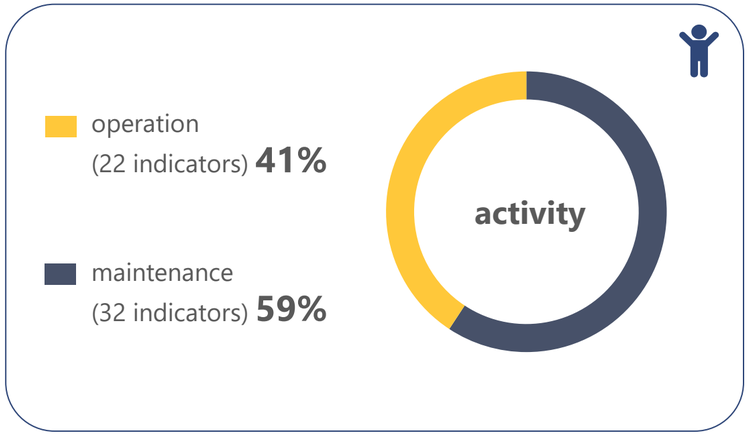


- Toll Road Conditions — 15 *indicators*
- Average Travel Speed — 1 *indicators*
- Accessibility — 2 *indicators*
- Mobility — 5 *indicators*
- Safety — 12 *indicators*
- Rescue Unit and Services Ass .. — 7 *indicators*
- Environment — 4 *indicators*
- Rest Area — 8 *indicators*

8 substances, 54 indicators







Minister of Public Works Regulations No. 16/PRT/M/2014

Regarding Minimum Service Standards for Toll Roads

8 substances, 54 indicators

Minimum Service Standards (SPM)

are a measure of the type and quality of basic services that must be achieved in the implementation of toll road operations

1 Toll Road Conditions
(15 indicators)

Skid resistance, road roughness (IRI), potholes, rutting, cracks, sediment, drainage, kerb, MCB, guardrail, wire rope, potholes (shoulder), rutting (shoulder), cracks (shoulder), rounding

2 Average Travel Speed
(1 Indicators)

Travel speed at normal condition

3 Accessibility
(2 Indicators)

Average transaction speed (toll gate), amount of vehicle queues

4 Mobility
(5 Indicators)

Patrol observation area, from the information received to incident location, problem vehicles handling, police handling speed, tow handling speed

5 Safety
(12 Indicators)

Traffic sign, road marking, guide post, KM sign, HM sign, street lighting, anti glare, ROW fence, safety fence, accident handling, security and law enforcement

6 Rescue Unit and Service Assistance
(7 Indicators)

ambulance, tow (truck), police, toll road patrol (operator), rescue, information system

7 Environment
(4 Indicators)

Right of Way (ROW) cleanness, operation office and toll gates cleanness, plants in ROW, grass in ROW

8 Rest Area
(8 Indicators)

Road condition, on/off ramp, toilet, parking, lighting, gas station, garage, restaurants



Minimum Service Standards (Spm) For Toll Roads

Toll Road Condition

1	Skid Resistance (Main Road)	Annually
2	Road Roughness (Main Road)	Annually
3	Potholes (Main Road)	Daily
4	Rutting (Main Road)	Daily
5	Cracks (Main Road)	Daily
6	Drainage	Daily
7	Sediment	Daily
8	Kerb (Median)	Daily
9	Median Concrete Barrier	Daily
10	Guardrail (Median)	Daily
11	Wire Rope (Median)	Daily
12	Potholes (Shoulder)	Daily
13	Rutting (Shoulder)	Daily
14	Cracks (Shoulder)	Daily
15	Rounding	Daily

Mobility

1	Patrol Observation Area	Monthly
2	From Information Received ...	Monthly
3	Problem Vehicle Handling	Monthly
4	Police Handling Speed	Monthly
5	Tow Handling Speed	Monthly

Accessibility

1	Average Transaction Speed	Monthly
2	Amount of Vehicle Queues	Monthly



Average Travel Speed

1	Travel Speed (Normal Condition)	Monthly

Safety

1	Traffic Sign	3 Months
2	Road Marking	3 Months
3	Guide Post / Reflector	3 Months
4	Kilometer Sign	3 Months
5	Hectometer Sign	3 Months
6	Street Lighting	Daily
7	Anti Glare	Daily
8	ROW Fence	Daily
9	Safety Fence	Monthly
10	Accident Victims	Monthly
11	Accident Vehicles	Monthly
12	Security and Law Enforcement	Monthly

Rescue Unit, Service Assistance

1	Ambulance	Monthly
2	Tow Truck	Monthly
3	Police	Monthly
4	Toll Road Patrol (Operator)	Monthly
5	Rescue	Monthly
6	Traffic Info and Communication	Monthly
7	Phone Number for Toll Info	Monthly

Environment

1	ROW Cleanness	Daily
2	Office and Toll Gate Cleanness	Monthly
3	ROW Plants	3 Months
4	ROW Grass	3 Months

Rest Area

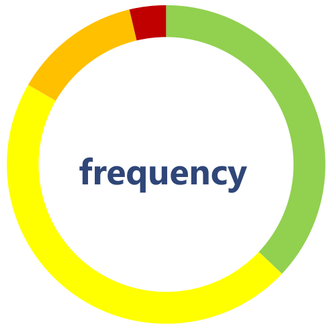
1	Road Condition	Daily
2	On/Off Ramp	Daily
3	Toilet	Daily
4	Parking	Monthly
5	Lighting	Monthly
6	Gas Station	Monthly
7	Garage	Monthly
8	Restaurants	Monthly

daily
(20 indicators) **37%**

monthly
(25 indicators) **46%**

quarterly annually
(7 indicators) **13%**

annually
(2 indicators) **4%**



Conventional SPM Fulfillment

SPM Fulfillment Monitoring

- Issues were recorded manually using a survey form
- Recording of issues includes: issues indicators, location of issues (stationary, direction, lane), documentation / photo number, notes / description

Minutes / Reports of Monitoring Results

- Minutes / Monitoring Result Reports are created manually after site monitoring are completed

Repair by TRO

- The Minutes/reports are used as a reference by TRO in order to repair activities, repair duration is calculated after the Minutes are published
- Repair reports are prepared manually by TRO, and sent to ITRA when repairs have been completed
- Opportunities for manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- After the repair report by TRO was received by ITRA
- Repairs by TRO can only be rejected at this stage, if site review is not carried out
- Analysis is carried out as requirement by manually and separately

SPM Fulfillment Using e-SPM

SPM Fulfillment Monitoring

- Pencatatan temuan dilakukan menggunakan aplikasi e-SPM berbasis mobile (Android dan iOS)
- Pencatatan meliputi semua yang ada di metode konvensional dan dilengkapi fitur koordinat lokasi dan akurasi secara otomatis
- Penyediaan mode pengambilan data standar dan berkendara

Minutes / Reports of Monitoring Results

- Minutes / Fulfillment Reports can be generated automatically using the e-SPM application

Repair by TRO

- Every Issue is recorded in real time by e-SPM application, the repair duration is calculated automatically based on the time the issues data was collected
- Repairs can be reported using e-SPM and can be accessed by TRO and ITRA at any time without having to wait for repairs to be completed
- Minimize manipulation of duration, location, quantity, and/match between issues and repair

Evaluation and Minutes of Repair / SPM Report

- Can be generated at any time according to requirement
- Repairs by TRO can be immediately rejected by ITRA. Review and comment features are available
- Several analysis features are available



Website

Web-based application developed to manage SPM fulfillment activities comprehensively. Intended for data processing, analysis and reporting.

User: ITRA/BM, TRO and TRO's Holding

Mobile App

Mobile-based application (currently Android) developed to collect data on the site.

User: Consultant or ITRA/BM Team, TRO Operation/Maintenance Team

Server

The e-SPM server is managed by PUSDATIN PUPR.

User: ITRA



PUSDATIN PUPR
E-SPM Server

DATABASE



E-SPM BPJT / BUJT
Mobile application (Android)



https://espm.bpjt.pu.go.id
Web application



TRO's Holding
Holding / Head Office of
Toll Road Operator



PUSDATIN PUPR
Data Center and
Information Technology



TRO
Toll Road Operator



ITRA / BM
Indonesian Toll Road Authority /
Bina Marga



Site Team
Operation / Maintenance
Toll Road Operator

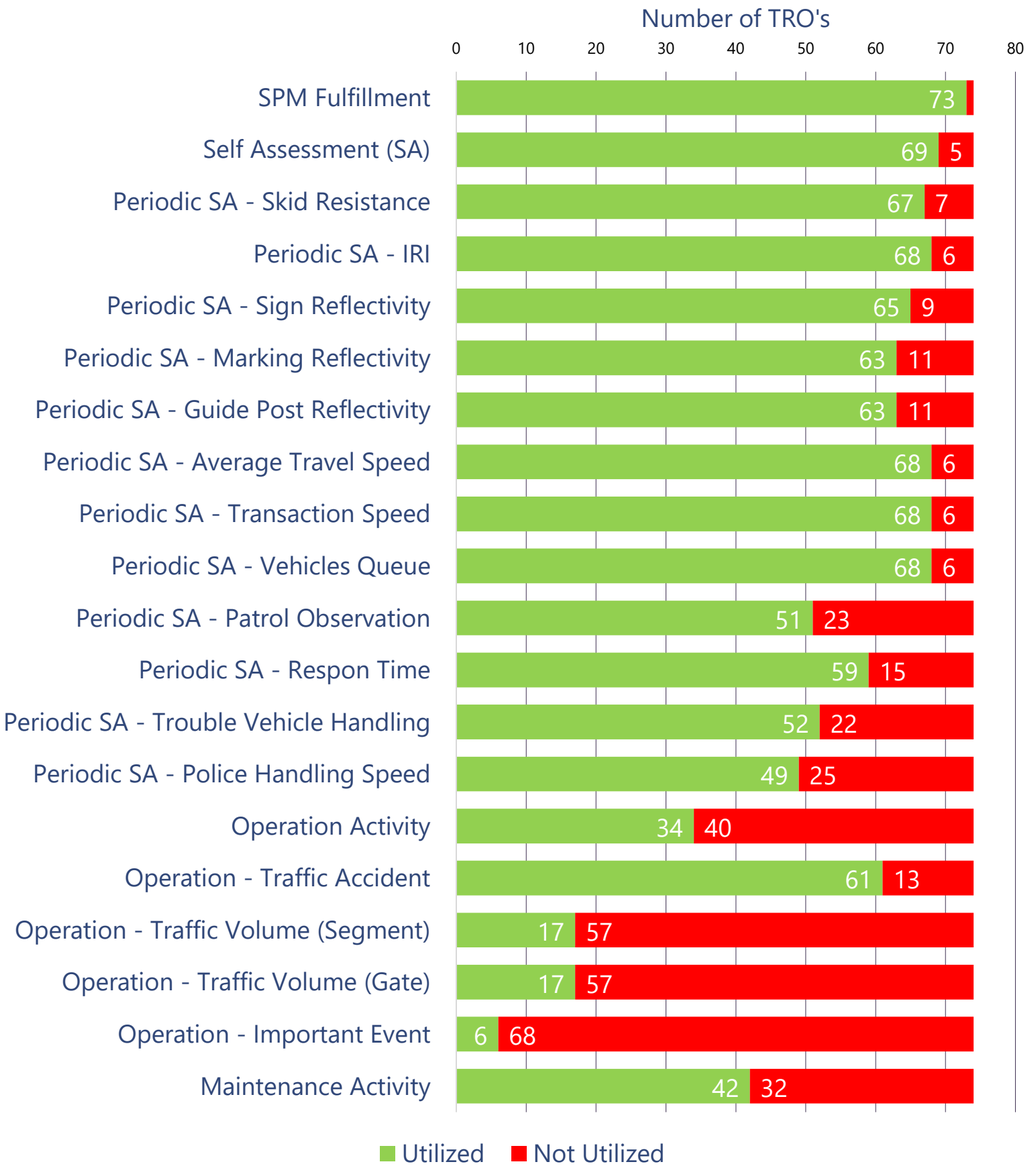


Consultant or
ITRA / BM Team
Indonesian Toll Road Authority /
Bina Marga



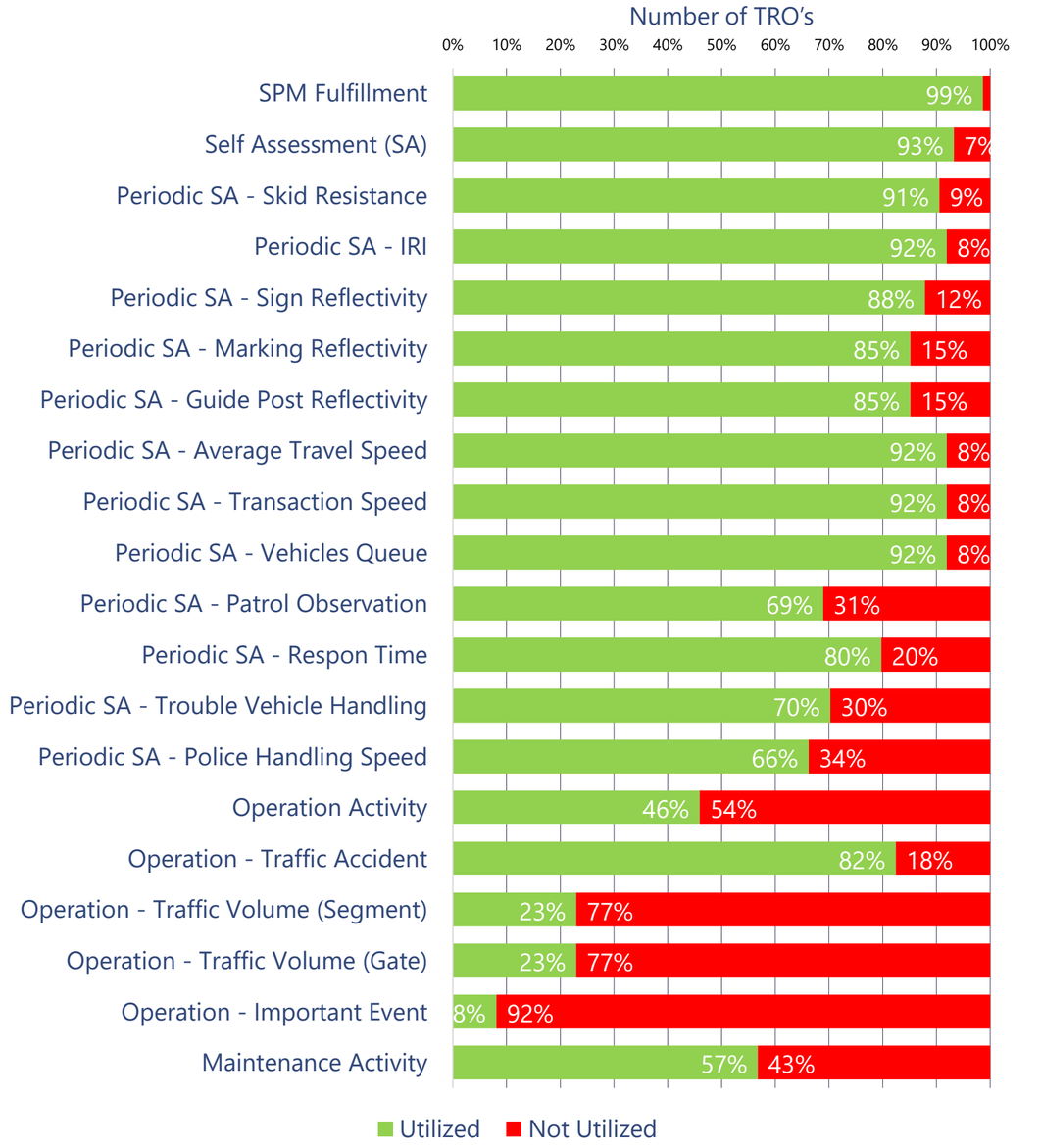
e-SPM Utilization by TRO's

Last 3 Years (2021 - 2023)



Percentage of e-SPM Utilization by TRO's

Last 3 Years (2021 - 2023)





Asset Inventory

	Jembatan	Rest Area	Pool Layanan	Kendaraan Layanan
Solo - Ngawi	6	0	0	32
Semarang - Batang	61	4	4	20
Pemalang - Batang	27	2	1	12
Semarang Seksi A,B,C	36	1	0	11
Semarang - Solo	0	0	34	58
Kanci - Pejagan	0	0	0	8
Pejagan - Pemalang	18	6	2	15
Semarang - Demak	13	None	1	8

Total Bridges
161
6 2

Total Rest Area
13
5 3

Total Rescue Station
42
5 3

Total Service Vehicle
164
8 0

User Penetration





	SPM	SA	SR	IRI	Sign	Road Markings	Reflector/Guide Post	Travel Speed	Transaction Speed	Vehicle Queue	Patrol Area	Respons Time	Handling of Crashed Vehicles	PJR Handling Speed	Operation	Maintenance	Accident	Traffic Segment	Traffic Gate	Incident
Pemalang - Batang	28	1538	1	1	2	2	2	1	21	6	6	6	6	7	0	2	17	0	606	1
Semarang - Batang	44	1506	1	2	2	2	2	0	6	5	0	0	0	0	3	60	29	0	2	4
Semarang Seksi A,B,C	111	1044	1	2	2	2	1	0	0	0	0	0	0	0	2	5	22	0	0	0
Solo - Ngawi	18	1005	1	2	2	2	2	0	0	1	0	1	1	0	8	35	1	0	0	0
Semarang - Solo	27	573	1	1	2	2	2	1	30	5	7	7	7	7	5	3	0	0	30	0
Pejagan - Pemalang	47	274	1	1	1	1	1	1	1	0	0	1	0	0	1	3	88	0	12	1
Kanci - Pejagan	324	263	1	2	2	2	2	2	12	6	0	0	0	0	0	0	0	0	0	0
Semarang - Demak	21	10	0	0	0	0	0	1	6	1	7	7	7	5	0	0	4	90	703	0

Current e-SPM Ranking

#55 / 73

PT Semesta Marga Raya

Kanci - Pejagan

KM 214.600 - KM 248.200 | INTERCITY | LENGTH : 35.00 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization August 12, 2024

Bridges — No bridge data has been inputted yet.

Rest Area — No rest area data has been inputted yet.

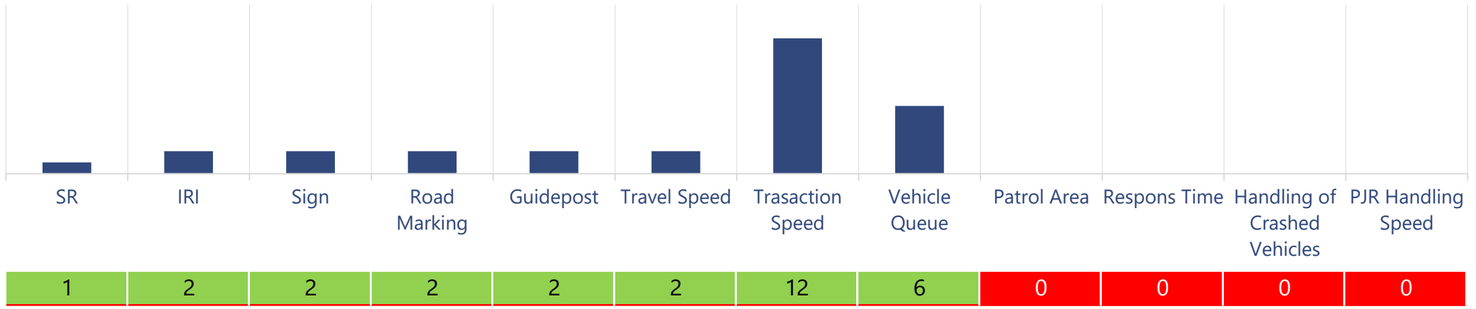
Rescue Station and Service Vehicle — No rescue station data has been inputted yet. | 8 Service Vehicles | Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

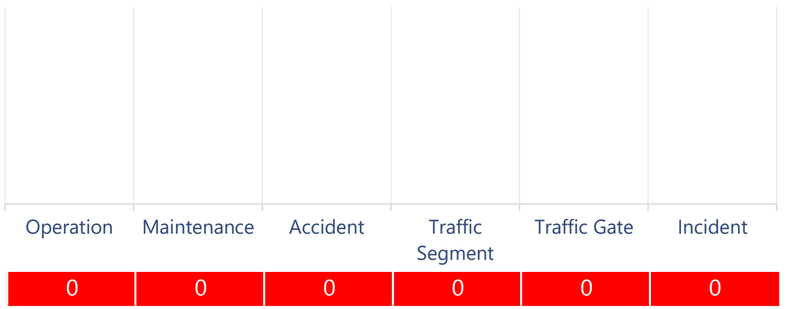


> This year, **1 – 2 Self-Assessment finding per day have been reported** by BUJT using e-SPM.

Utilization of e-SPM Indicators



Utilization of Other e-SPM Features



SR Valid Until **30 Dec 2024** | **IRI** Valid Until **4 Jul 2025** | **Sign. Ref** Valid Until **1 Oct 2024** | **Marking. Ref** Valid Until **1 Oct 2024** | **Guidepost. Ref** Valid Until **1 Oct 2024**

Suggestions in previous workshop

- No notes or information.



Current e-SPM Ranking

#21 / 73

PT Pejagan Pemalang Toll Road

Pejagan - Pemalang

KM 249.200 - KM 306.800 | INTERCITY | LENGTH: 57.50 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

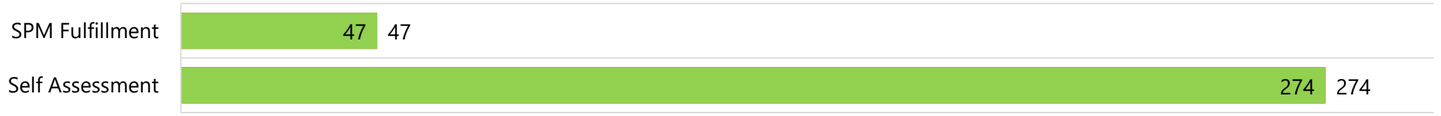
1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

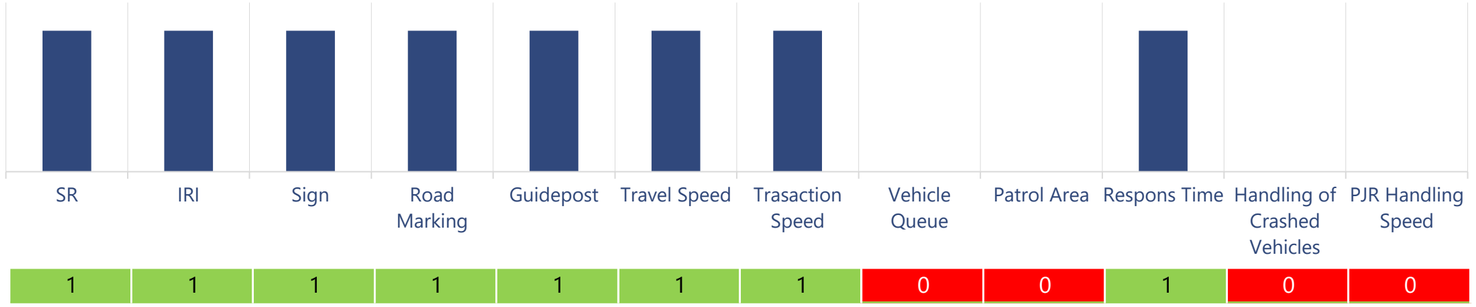
Bridges	18 Bridges	Input on **May 2024**
Rest Area	6 Rest Area	Input on **May 2024** and **June 2024**
Rescue Station and Service Vehicle	2 Rescue Station, 15 Service Vehicles	Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

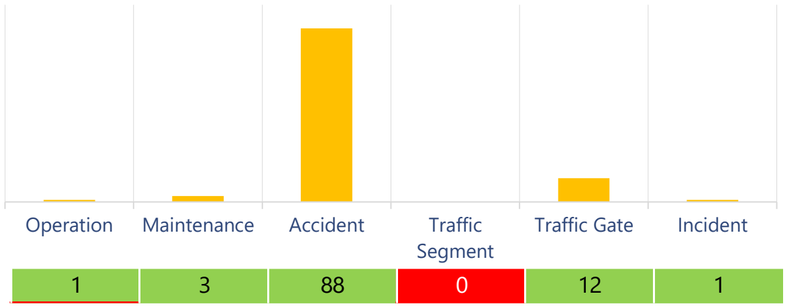


> This year, **1 - 2 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



Utilization of Other e-SPM Features



SR Valid Until **-**

IRI Valid Until **-**

Sign. Ref Valid Until **28 Jun 2024**

Marking. Ref Valid Until **28 Jun 2024**

Guidepost. Ref Valid Until **28 Jun 2024**

Suggestions in previous workshop

- No notes or information.

Current e-SPM Ranking

#15 / 73

PT Pemalang Batang Toll Road

Pemalang - Batang

KM 306.000 - KM 346.200 | INTERCITY | LENGTH: 39.20 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

Bridges

27 Bridges — Input on **May 2024**

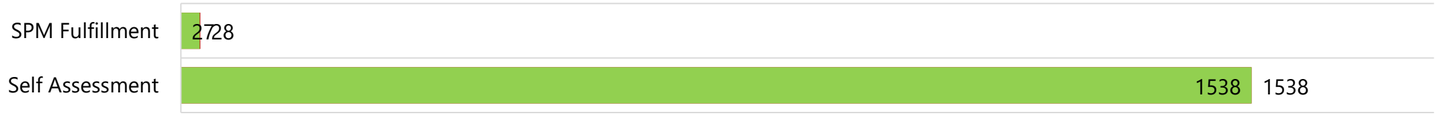
Rest Area

2 Rest Area — Input on **November 2023**

Rescue Station and Service Vehicle

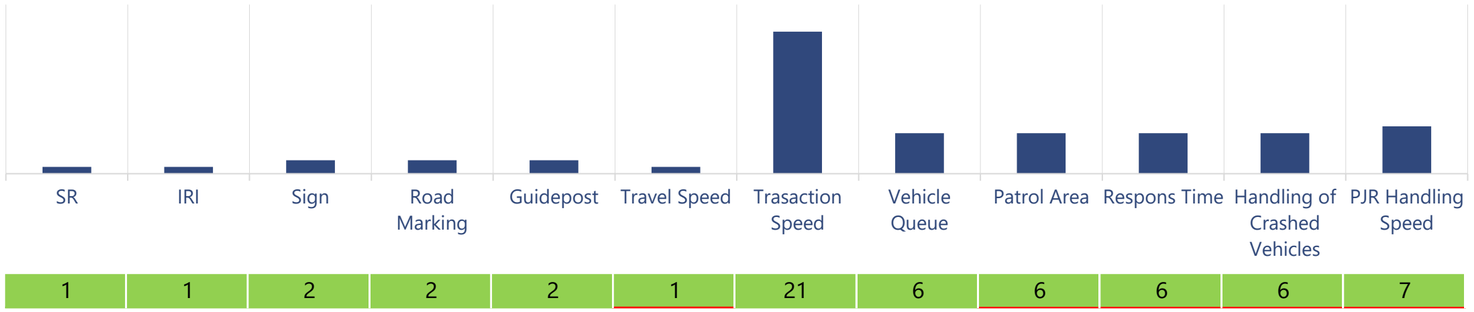
1 Rescue Station | 12 Service Vehicles — Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment



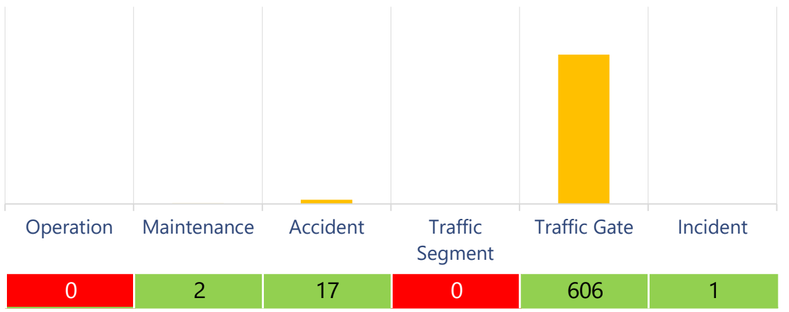
> This year, **7 - 8 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



SR Valid Until **2 Oct 2024** | **IRI** Valid Until **23 Sep 2024** | **Sign. Ref** Valid Until **11 Sep 2024** | **Marking. Ref** Valid Until **11 Sep 2024** | **Guidepost. Ref** Valid Until **11 Sep 2024**

Utilization of Other e-SPM Features



Suggestions in previous workshop

- Suggestion for BUJT to include Self Assessment as one of the parameters for improving ranking.

Current e-SPM Ranking

#22 / 73

PT Jasamarga Semarang Batang

Semarang - Batang

KM 346.200 - KM 420.200 | INTERCITY | LENGTH: 75.00 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

Bridges

61 Bridges — Input on **May 2024**

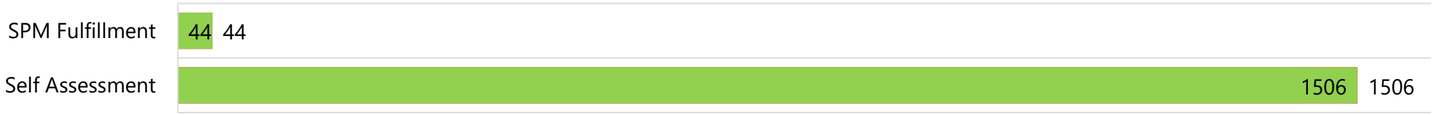
Rest Area

4 Rest Area — Input on **January 2023**

Rescue Station and Service Vehicle

4 Rescue Station | 20 Service Vehicles — Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

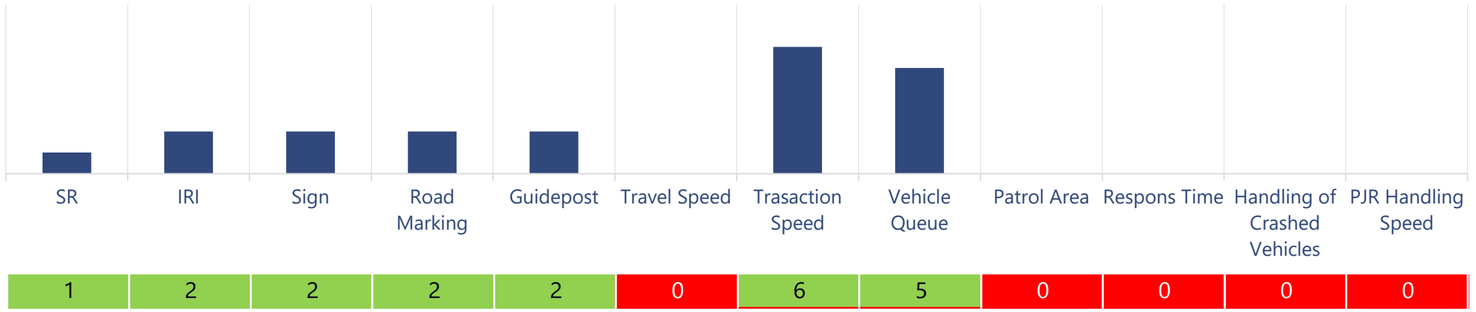


Repair **100%**

Repair **100%**

> This year, **7 - 8 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



SR	IRI	Sign	Road Marking	Guidepost	Travel Speed	Trasaction Speed	Vehicle Queue	Patrol Area	Respons Time	Handling of Crashed Vehicles	PJR Handling Speed
1	2	2	2	2	0	6	5	0	0	0	0

SR Valid Until **5 Oct 2024**

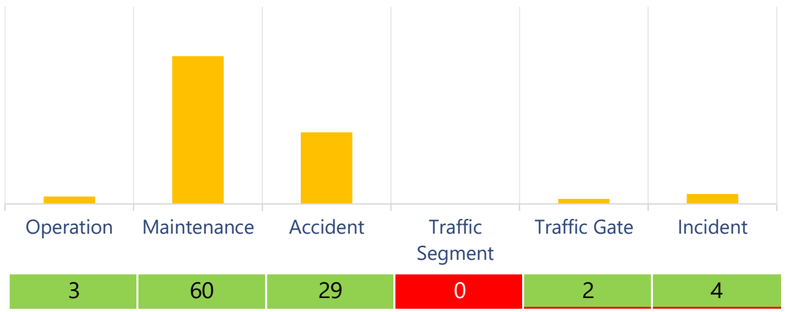
IRI Valid Until **14 Mar 2025**

Sign. Ref Valid Until **5 Sep 2024**

Marking. Ref Valid Until **5 Sep 2024**

Guidepost. Ref Valid Until **5 Sep 2024**

Utilization of Other e-SPM Features



Operation	Maintenance	Accident	Traffic Segment	Traffic Gate	Incident
3	60	29	0	2	4

Suggestions in previous workshop

- No notes or information.



Current e-SPM Ranking

#41 / 73

PT Jasamarga Transjawa Tol | Semarang ABC

Semarang Seksi A,B,C

KM 420.000 - KM 432.000 | INNERCITY | LENGTH: 24.75 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

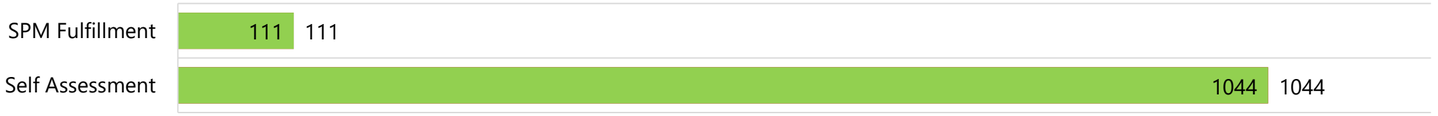
1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

Bridges	36 Bridges	Input on **July 2024**
Rest Area	1 Rest Area	Input on **July 2024**
Rescue Station and Service Vehicle	No rescue station data has been inputted yet. / 11 Service Vehicles	Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

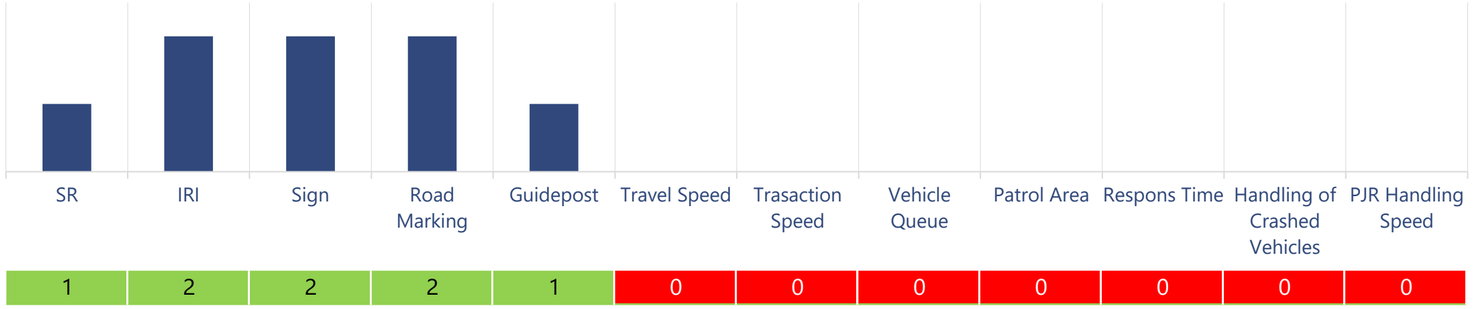


Repair **100%**

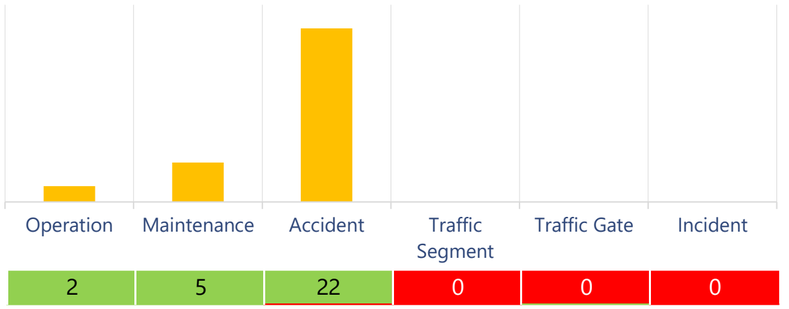
Repair **100%**

> This year, **5 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



Utilization of Other e-SPM Features



SR Valid Until **9 Oct 2024**

IRI Valid Until **16 Oct 2024**

Sign. Ref Valid Until **8 Aug 2024**

Marking. Ref Valid Until **13 Aug 2024**

Guidepost. Ref Valid Until **8 Aug 2024**

Suggestions in previous workshop

- Having issues saving data and asking for device specifications. The response highlighted the need for continued OS updates and promised to include minimum specifications in the user manual.



Current e-SPM Ranking

#14 / 73

PT Trans Marga Jateng

Semarang - Solo

KM 419.000 - KM 493.000 | INTERCITY | LENGTH: 72.95 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

Bridges

No bridge data has been inputted yet.

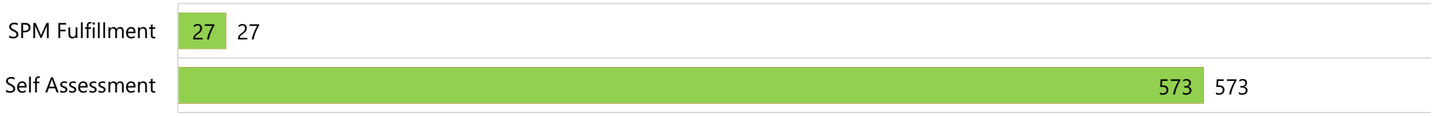
Rest Area

No rest area data has been inputted yet.

Rescue Station and Service Vehicle

34 Rescue Station | 58 Service Vehicles | Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

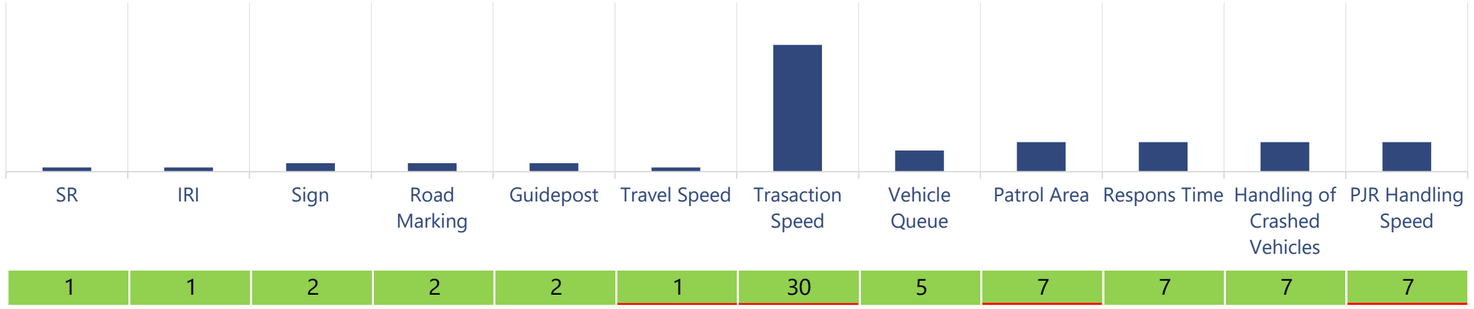


Repair **100%**

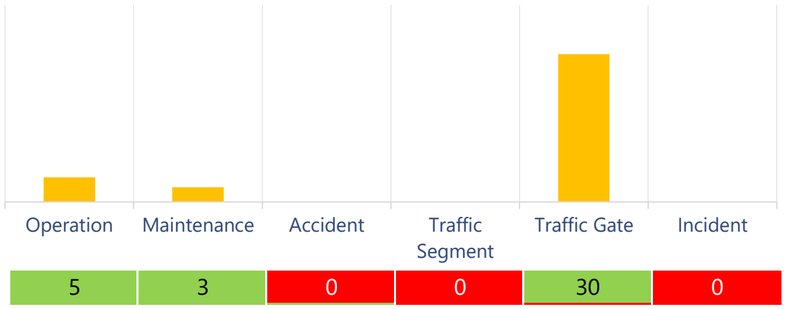
Repair **100%**

> This year, **2-3 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



Utilization of Other e-SPM Features



SR Valid Until **26 Feb 2025**

IRI Valid Until **24 Jul 2024**

Sign. Ref Valid Until **25 Sep 2024**

Marking. Ref Valid Until **27 Sep 2024**

Guidepost. Ref Valid Until **25 Sep 2024**

Suggestions in previous workshop

- Asking about the availability of the E-SPM application for iOS. The application is confirmed to be under development, currently only available for Android.



Current e-SPM Ranking

#10 / 73

PT Jasamarga Solo Ngawi

Solo - Ngawi

KM 493.000 - KM 580.000 | INTERCITY | LENGTH: 90.12 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

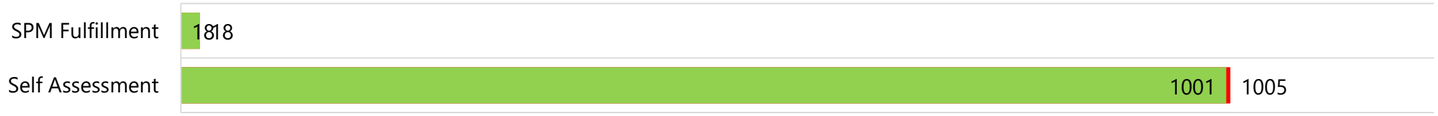
1 January 2024 — **Socialization of e-SPM Feature Development** May 14, 2024 — **Current Socialization** Aug, 12 2024

Bridges: 6 Bridges — Input on **November 2023**

Rest Area: No rest area data has been inputted yet.

Rescue Station and Service Vehicle: No rescue station data has been inputted yet. | 32 Service Vehicles — Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment

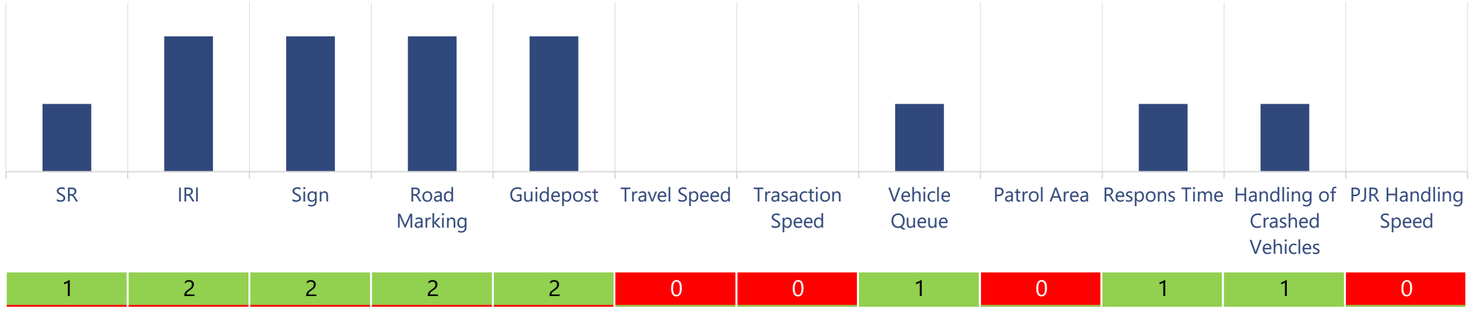


Repair **100%**

Repair **99.6%**

> This year, **4-5 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



SR Valid Until **21 Sep 2024**

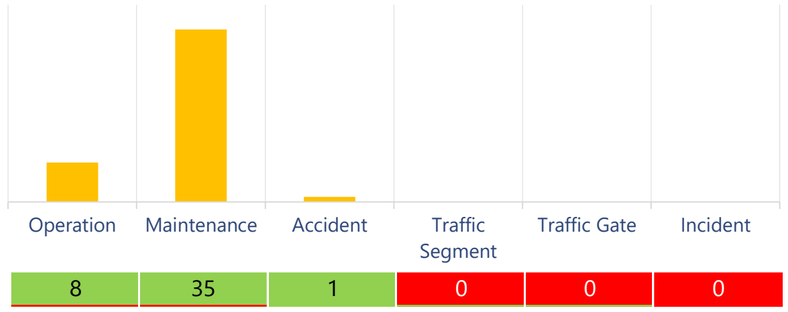
IRI Valid Until **27 Feb 2025**

Sign. Ref Valid Until **27 Sep 2024**

Marking. Ref Valid Until **27 Sep 2024**

Guidepost. Ref Valid Until **27 Sep 2024**

Utilization of Other e-SPM Features



Suggestions in previous workshop

- No notes or information.

Current e-SPM Ranking

#69 / 73

PT Pembangunan Perumahan Semarang Demak

Semarang - Demak

KM 0 - KM 0 | INTERCITY | LENGTH: 16.01 KM

Period

01 January 2024 – 29 July 2024

Toll Road Inventory

1 January 2024

Socialization of e-SPM Feature Development May 14, 2024

Current Socialization Aug, 12 2024

Bridges

13 Bridges — Input on **December 2023** and **Januari 2024**

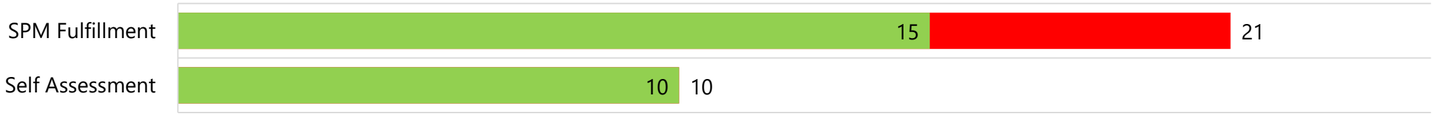
Rest Area

Rest Area not available

Rescue Station and Service Vehicle

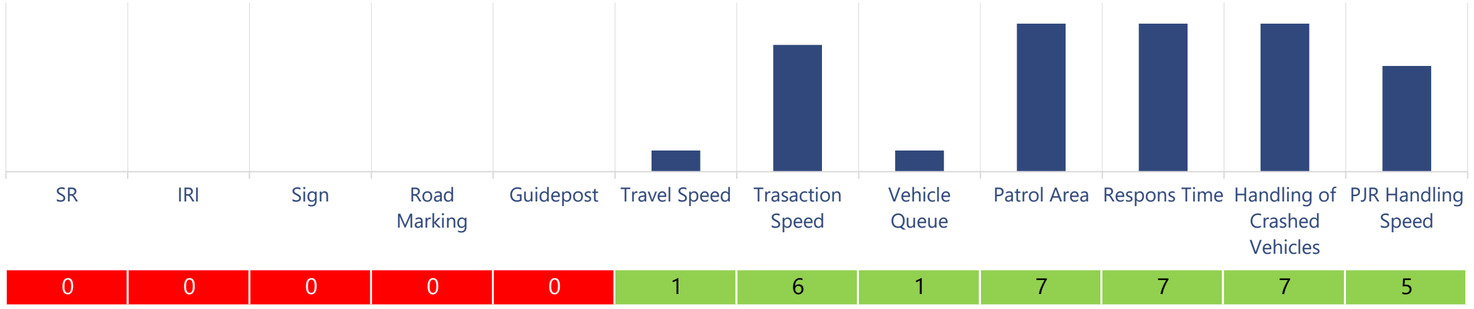
1 Rescue Station | 8 Service Vehicles — Not integrated with rescue station yet

SPM Fulfillment vs Self Assessment



> This year, **0.05 temuan Self Assessment per day have been reported by BUJT using e-SPM.**

Utilization of e-SPM Indicators



SR Valid Until -

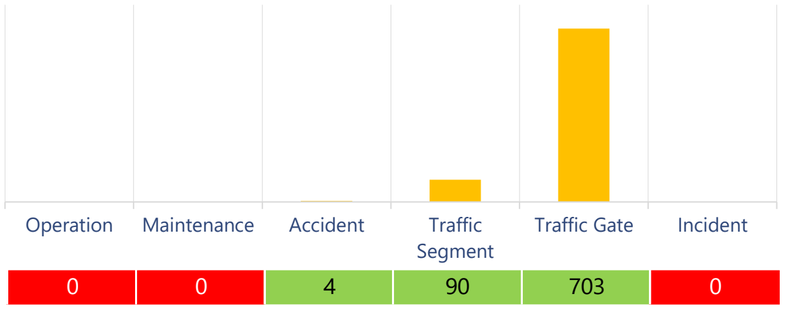
IRI Valid Until -

Sign. Ref Valid Until -

Marking. Ref Valid Until -

Guidepost. Ref Valid Until -

Utilization of Other e-SPM Features



Suggestions in previous workshop

- Asked about availability of video tutorial and suggested to prepare template for traffic volume data input. Confirmed that no video tutorial is available, but user guide can be downloaded. Template suggestion noted to accommodate.

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA

THANK YOU

Semarang, 12 August 2024



Workshop Evaluasi Utilization Sistem dan Aplikasi e-SPM

The Project for Strengthening Management Capacity of Toll Road Development

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA

Workshop Evaluasi Pemanfaatan Sistem dan Aplikasi e-SPM

The Project for Strengthening Management Capacity of Toll Road Development

Agustus 2024



Manajemen Aset (Asset Management) dan Pengelolaan Aset (Managing Asset)

Manajemen Aset = Strategi dan rencana organisasi untuk memperoleh nilai dari aset tersebut

- Tujuan organisasi Anda dan aset apa yang dibutuhkan – dan alasannya
- Nilai, tujuan, dan hasil jangka panjang
- Risiko dan konteks, misalnya pasar/iklim/regulasi atau apa
- Pendekatan holistik terhadap berbagai aliran pendanaan, misalnya CAPEX & OPEX?
- Perilaku kolaboratif – menghilangkan silo baik internal maupun rantai pasokan?
- Bagaimana aset berkontribusi terhadap nilai organisasi

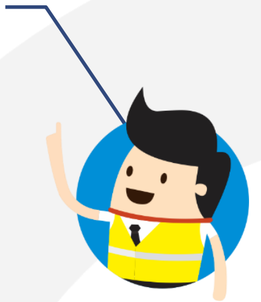
Lalu apa peran PUPR/BPJT/BM dalam kaitannya dengan jalan tol ?



Mengelola Aset = Aktivitas yang dilakukan langsung pada aset

- Aktivitas lifecycle dan pemeliharaan aset - ketersediaan, keandalan, ketergantungan, dan keamanan
- Lokasi aset, kondisi, perpanjangan umur dan/atau intervensi
- Database aset, sistem (dan IT) dan kinerja
- Orang, keterampilan dan manajemen kerja
- Anggaran dan key performance indicators (KPI) / biaya pemeliharaan dan kinerja saat ini

Apa Peran BUJT ?





Siklus Manajemen Hierarki dalam Pengoperasian Jalan Tol

Asset Management

Temukan poin yang perlu ditingkatkan dari analisis informasi dan berikan arahan baru untuk O&M

Ringkasan situasi saat ini dan poin permasalahan pada O&M berdasarkan histori data

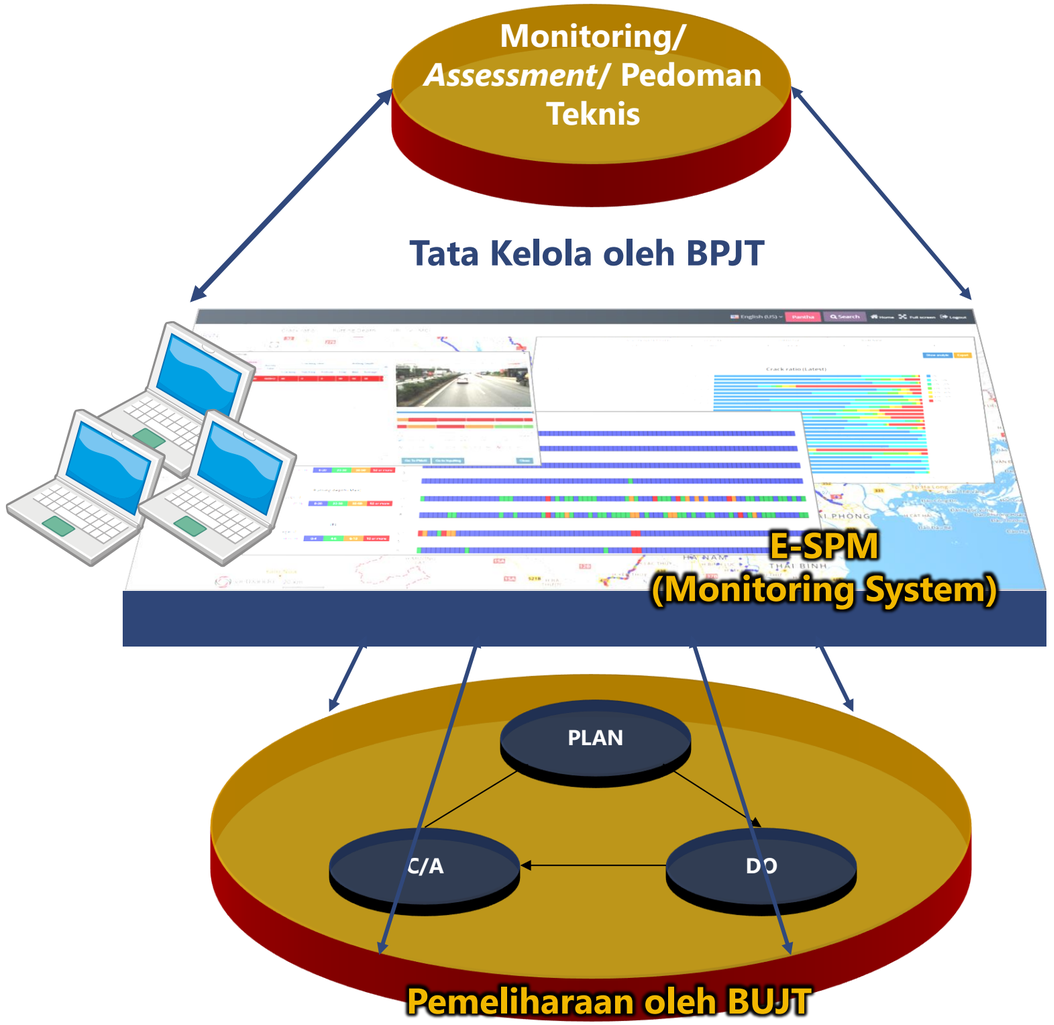
Managing Assets

Tindakan baru berdasarkan arahan dari TOP Management



Laporan dan histori data dari pekerjaan O&M







Konsep Platform Data untuk Pemantauan & Pengelolaan Jalan Tol melalui peningkatan e-SPM

BUJT

BUJT A

Mng. system

DB

e-SPM Mobile

BUJT B

Mng. system

DB

e-SPM Mobile

Data input/ import

Knowledge Sharing

BPJT / Bina Marga

Data Base - SPM+

Integrated Time-series data
untuk penilaian performa

Data Analysis

- Bench-Marking Assessment
- Blackspot Analysis

Knowledge Data

Pengguna Jalan



web

Keterbukaan Informasi

Stakeholders

Dashboard

SPM Monitoring





Panjang Tol +73%

Ruas Tol +55%

Dalam kurun 5 tahun Terakhir, terhitung tahun 2019 - 2023

Riwayat perkembangan jumlah dan panjang jalan tol operasi di Indonesia dalam 5 tahun terakhir :

1978 - 2018

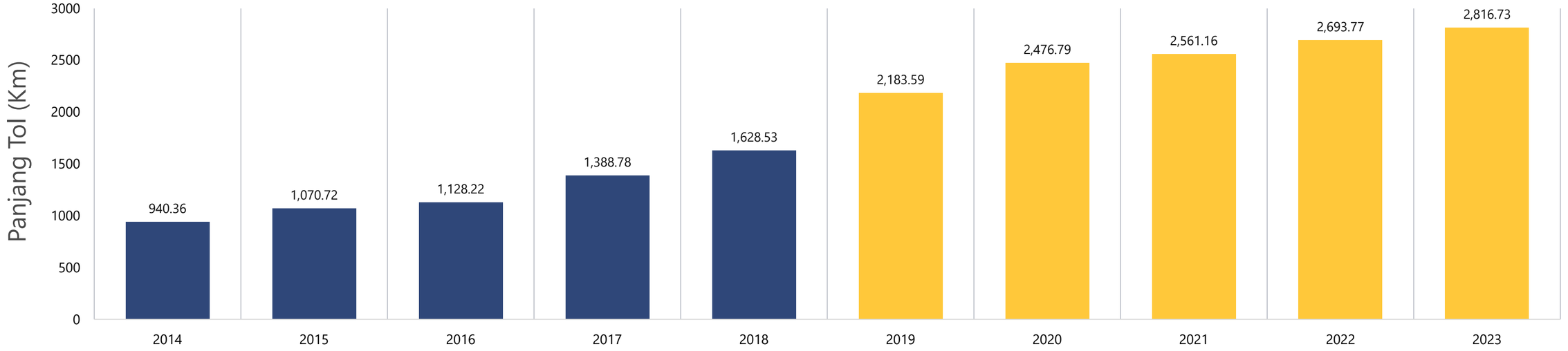
Jumlah Ruas Jalan Tol Operasi : 47 ruas
Panjang Jalan Tol Operasi : 1.628,53 km

2019 - 2023

Jumlah Ruas Jalan Tol Operasi : 73 ruas
Penambahan dalam 5 tahun terakhir : **+ 26 ruas**
Panjang Jalan Tol Operasi : 2.816,73 km
Penambahan dalam 5 tahun terakhir : **+ 1.188,20 km**

Ruas Tol Operasi	Panjang Tol	tol baru
31		
33	+14%	130,36 km
34	+5%	57,50 km
42	+23%	57,50 km
47	+17%	239,75 km
54	+34%	555,06 km
60	+13%	293,20 km
64	+3%	84,37 km
69	+5%	132,61 km
73	+4%	122,96 km





PERMEN PU No. 16/PRT/M/2014

Tentang Standar Pelayanan Minimal Jalan Tol

Pasal 1 Ayat 2

Standar Pelayanan Minimal Jalan Tol adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Pasal 4 Ayat 1

Tata Cara Pengukuran Standar Pelayanan Minimal Jalan Tol merupakan panduan metode pengukuran dalam pencapaian Standar Pelayanan Minimal Jalan Tol yang harus dilakukan oleh setiap Badan Usaha Jalan Tol

Pasal 5

Standar Pelayanan Minimal Jalan Tol **wajib dipenuhi oleh Badan Usaha Jalan Tol** dalam rangka pelayanan kepada pengguna jalan tol

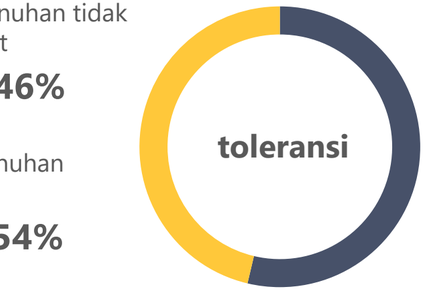
Pasal 6 Ayat 1 dan 2

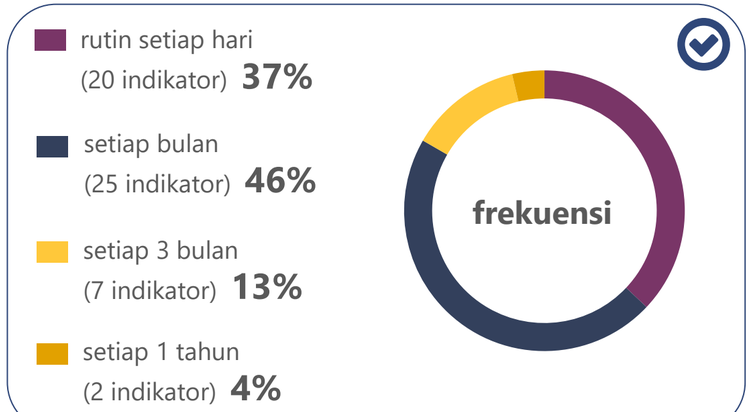
Standar Pelayanan Minimal Jalan Tol **dievaluasi secara berkala** berdasarkan hasil pengawasan fungsi dan manfaat

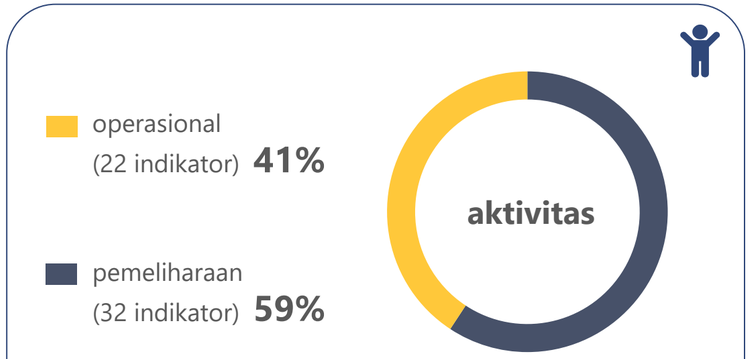


Kondisi Jalan Tol	15 *Indikator*
Kecepatan Tempuh Rata - Rata	1 *Indikator*
Aksesibilitas	2 *Indikator*
Mobilitas	5 *Indikator*
Keselamatan	12 *Indikator*
Unit Pertolongan / Penye ..	7 *Indikator*
Lingkungan	4 *Indikator*
TI dan TIP	8 *Indikator*

8 substansi, 54 indikator







PERMEN PU No. 16/PRT/M/2014

Tentang Standar Pelayanan Minimal Jalan Tol

8 substansi, 54 indikator

Standar Pelayanan Minimal (SPM) Jalan Tol

adalah ukuran jenis dan mutu pelayanan dasar yang harus dicapai dalam pelaksanaan penyelenggaraan jalan tol

Kondisi Jalan Tol

Kecepatan Tempuh Rata-Rata

Aksesibilitas

Mobilitas

Keselamatan

Unit Pertolongan/ Penyelamatan dan Bantuan Pelayanan

Lingkungan

Tempat Istirahat (TI) dan Tempat Istirahat dan Pelayanan (TIP)

1 Kondisi Jalan Tol
(15 indikator)

Kekesatan, ketidakrataan, lubang, rutting, retak, tidak ada endapan, penampang saluran, kerb, MCB, guardrail, wire rope, lubang (bahu jalan), rutting (bahu jalan), retak (bahu jalan), rounding

2 Kecepatan Tempuh Rata-Rata
(1 Indikator)

Kecepatan tempuh kondisi normal

3 Aksesibilitas
(2 Indikator)

Kecepatan transaksi rata-rata, jumlah antrian kendaraan

4 Mobilitas
(5 Indikator)

Wilayah observasi patroli, mulai informasi diterima sampai tempat kejadian, penanganan kendaraan mogok, kec penanganan PJR, kec penanganan derek

5 Keselamatan
(12 Indikator)

Perambuan, marka jalan, guide post, patok KM, patok HM, PJU, anti silau, pagar rumija, pagar pengaman, penanganan kecelakaan, pengamanan penegakan hukum

6 Unit Pertolongan/ Penyelamatan
(7 Indikator)

ambulance, kendaraan derek, PJR, patroli jalan tol (operator), kendaraan rescue, sistem informasi

7 Lingkungan
(4 Indikator)

Kebersihan dalam rumija, kebersihan kantor operasi dan gardu tol, tanaman dalam rumija, rumput rumija

8 TI dan TIP
(8 Indikator)

Kondisi jalan, on/off ramp, toilet, parkir kendaraan, penerangan, stasiun pengisian bahan bakar, bengkel umum, tempat makan dan minum



Kondisi Jalan Tol

1	Kekesatan (Jalan Utama)	Tahunan
2	Ketidakrataan (Jalan Utama)	Tahunan
3	Lubang (Jalan Utama)	Harian
4	Rutting (Jalan Utama)	Harian
5	Retak (Jalan Utama)	Harian
6	Tidak Ada Endapan (Drainase)	Harian
7	Penampang Saluran (Drainase)	Harian
8	Kerb (Median)	Harian
9	MCB (Median Concrete Barrier)	Harian
10	Guardrail (Median)	Harian
11	Wire Rope (Median)	Harian
12	Lubang (Bahu Jalan)	Harian
13	Rutting (Bahu Jalan)	Harian
14	Retak (Bahu Jalan)	Harian
15	Rounding	Harian

Mobilitas

1	Wilayah Observasi Patroli	Bulanan
2	Mulai Informasi Diterima ...	Bulanan
3	Penanganan Kendaraan Mogok	Bulanan
4	Kecepatan Penanganan PJR	Bulanan
5	Kecepatan Penanganan Derek	Bulanan

Aksesibilitas

1	Kecepatan Transaksi Rata-Rata	Bulanan
2	Jumlah Antrian Kendaraan	Bulanan



Kecepatan Tempuh Rata-Rata

1	Kecepatan Tempuh Rata-Rata	Bulanan

Keselamatan

1	Perambuan (Petunjuk Jalan)	3 Bulanan
2	Marka Jalan (Petunjuk Jalan)	3 Bulanan
3	Guide Post / Reflector (Petun..	3 Bulanan
4	Patok Kilometer (Petunjuk Jalan)	3 Bulanan
5	Patok Hektometer (Petunjuk ...	3 Bulanan
6	Penerangan Jalan Umum	Harian
7	Anti Silau	Harian
8	Pagar Rumija	Harian
9	Pagar Pengaman	Bulanan
10	Korban Kecelakaan	Bulanan
11	Kendaraan Kecelakaan	Bulanan
12	Pengamanan Penegakan Hukum	Bulanan

Unit Pertolongan/Penyelamatan

1	Ambulance	Bulanan
2	Kendaraan Derek	Bulanan
3	Polisi Patroli Jalan Raya (PJR)	Bulanan
4	Patroli Jalan Tol (Operator)	Bulanan
5	Kendaraan Rescue	Bulanan
6	Informasi dan Komunikasi ...	Bulanan
7	Nomor Telepon Info Tol	Bulanan

Lingkungan

1	Dalam Rumija Tol (Kebersihan)	Harian
2	Kantor Operasi dan Gardu Tol	Bulanan
3	Tanaman (Dalam Rumija Tol)	3 Bulanan
4	Rumput (Di Rumija Luar Rumaja)	3 Bulanan

TI dan TIP

1	Kondisi Jalan	Harian
2	On/Off Ramp	Harian
3	Toilet	Harian
4	Parkir Kendaraan	Bulanan
5	Penerangan	Bulanan
6	Stasiun Pengisian Bahan Bakar	Bulanan
7	Bengkel Umum	Bulanan
8	Tempat Makan dan Minum	Bulanan

Harian (20 indikator) **37%**

Bulanan (25 indikator) **46%**

3 Bulanan (7 indikator) **13%**

Tahunan (2 indikator) **4%**





Pemenuhan SPM Konvensional

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan secara manual menggunakan form survei
- Pencatatan temuan meliputi : indikator temuan, lokasi temuan (sta, jalur, lajur), dokumentasi / no foto, catatan / deskripsi

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Hasil Monitoring dibuat secara manual setelah kegiatan monitoring lapangan selesai

Tindak Lanjut Perbaikan

- Berita Acara dijadikan acuan oleh BUJT dalam rangka tindak lanjut perbaikan, kecepatan tindak lanjut dihitung setelah diterbitkannya Berita Acara
- Pelaporan tindak lanjut dikerjakan secara manual oleh BUJT, dan dikirimkan kepada BPJT apabila perbaikan telah selesai dilakukan
- Peluang manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan tindak lanjut perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Setelah BPJT mendapatkan laporan tindak lanjut BUJT
- Penolakan tindak lanjut perbaikan baru dapat dilakukan pada tahap ini jika tidak ada peninjauan ulang lapangan
- Analisis dilakukan sesuai kebutuhan secara manual dan terpisah

Penggunaan e-SPM

Monitoring Pemenuhan SPM

- Pencatatan temuan dilakukan menggunakan aplikasi e-SPM berbasis mobile (Android dan iOS)
- Pencatatan meliputi semua yang ada di metode konvensional dan dilengkapi fitur koordinat lokasi dan akurasi secara otomatis
- Penyediaan mode pengambilan data standar dan berkendara

Berita Acara / Laporan Hasil Monitoring

- Berita Acara / Laporan Pemenuhan dapat di-generate secara otomatis menggunakan aplikasi e-SPM

Tindak Lanjut Perbaikan

- Setiap temuan lapangan tersampaikan secara real time melalui aplikasi e-SPM BUJT, kecepatan tindak lanjut dihitung secara otomatis berdasarkan waktu temuan
- Pelaporan tindak lanjut secara otomatis oleh e-SPM dan bisa diakses oleh BUJT dan BPJT kapan saja tanpa harus menunggu perbaikan selesai sepenuhnya
- Meminimalisir manipulasi durasi, lokasi, kuantitas, dan / kesesuaian antara temuan dan perbaikan

Evaluasi dan BA Tindak Lanjut Perbaikan

- Dapat dilakukan kapan saja sesuai dengan kebutuhan
- Penolakan tindak lanjut perbaikan dapat langsung dilakukan oleh BPJT. Tersedia fitur ulasan dan komentar
- Tersedia beberapa fitur analisis

Website

Aplikasi berbasis *web-based* yang dikembangkan untuk mengelola kegiatan pemenuhan SPM secara menyeluruh. Diperuntukkan pengolahan data, analisis dan pelaporan.

User : BPJT/BM, BUJT dan Holding BUJT

Mobile App

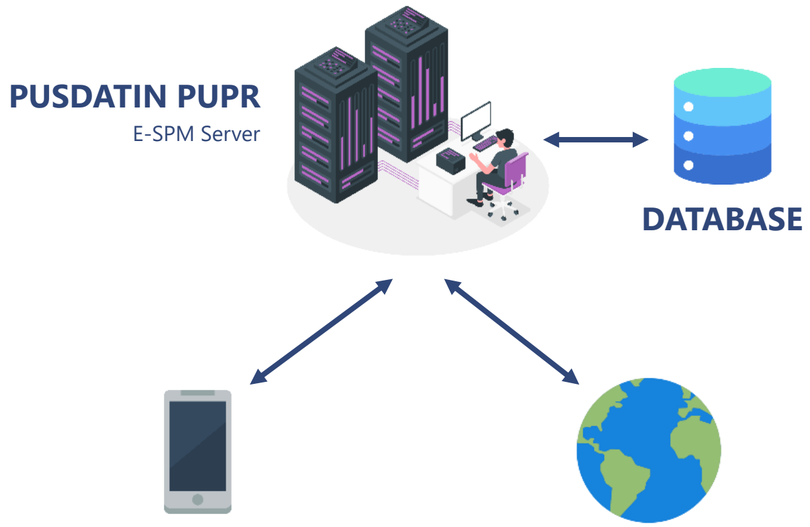
Aplikasi berbasis *mobile* (saat ini Android) yang dikembangkan dalam rangka pengambilan data-data di lapangan.

User : Tim/Konsultan BPJT/BM, Tim Operasi / Pemeliharaan BUJT

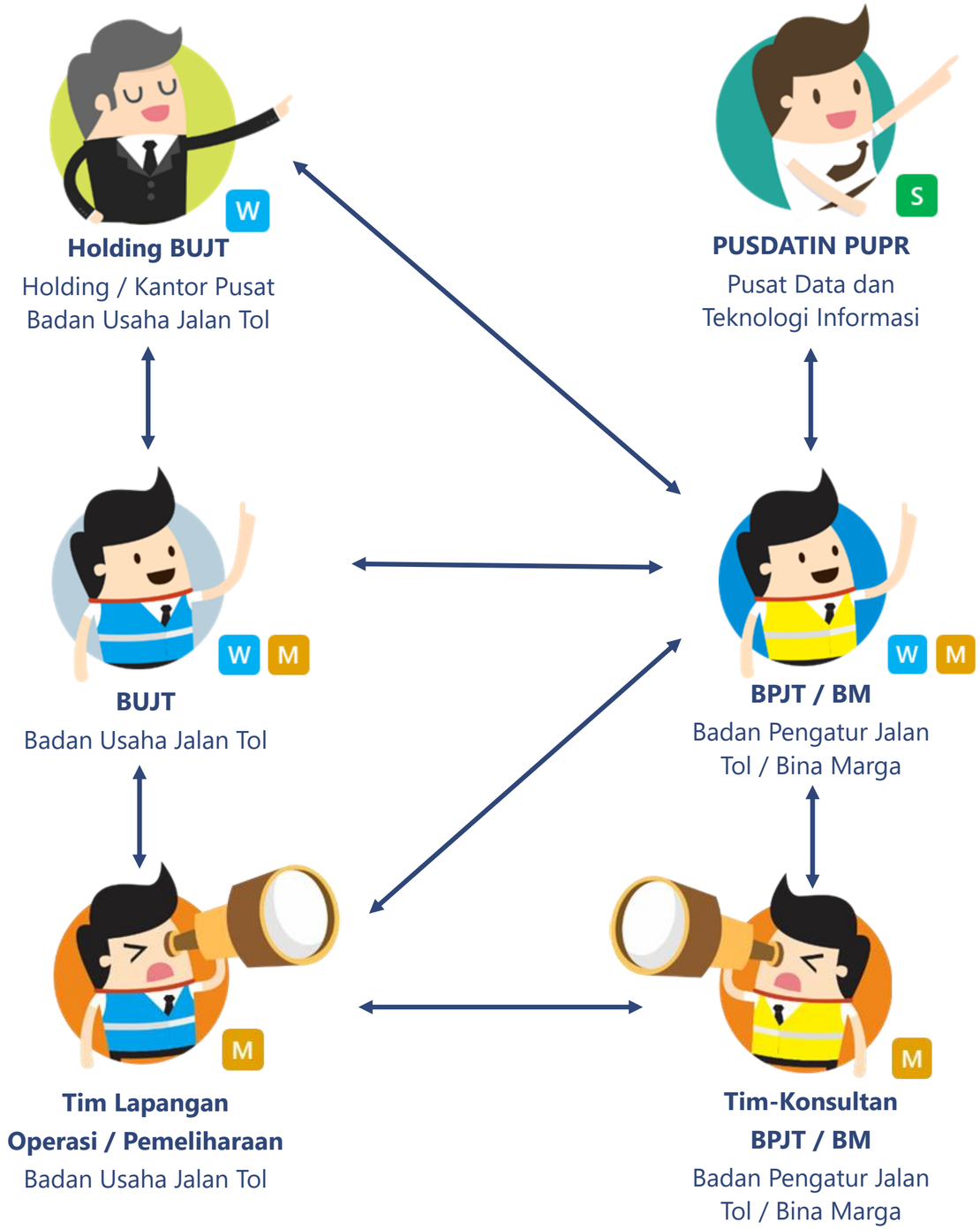
Server

Server e-SPM yang dikelola oleh PUSDATIN PUPR.

User : BPJT

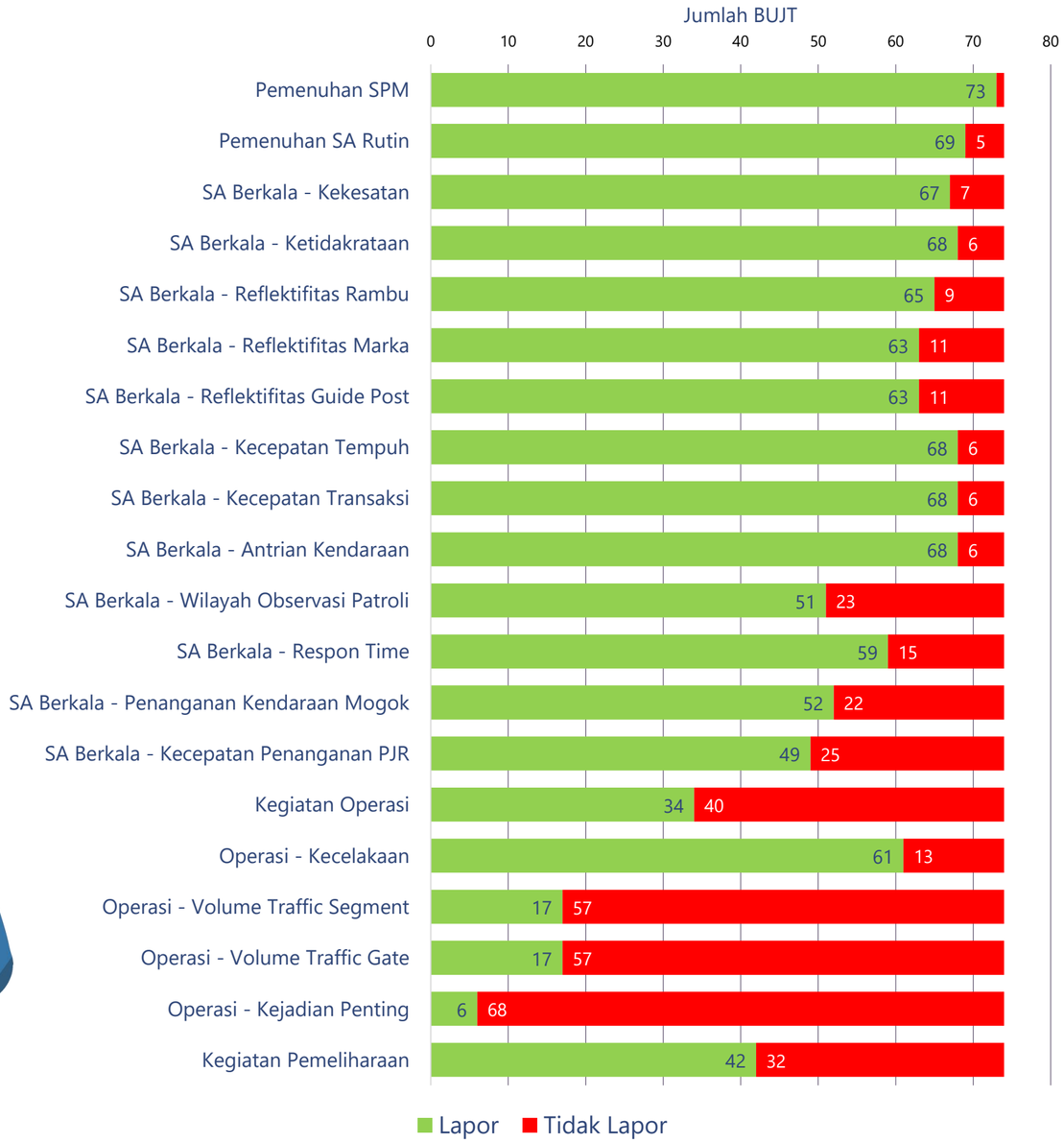






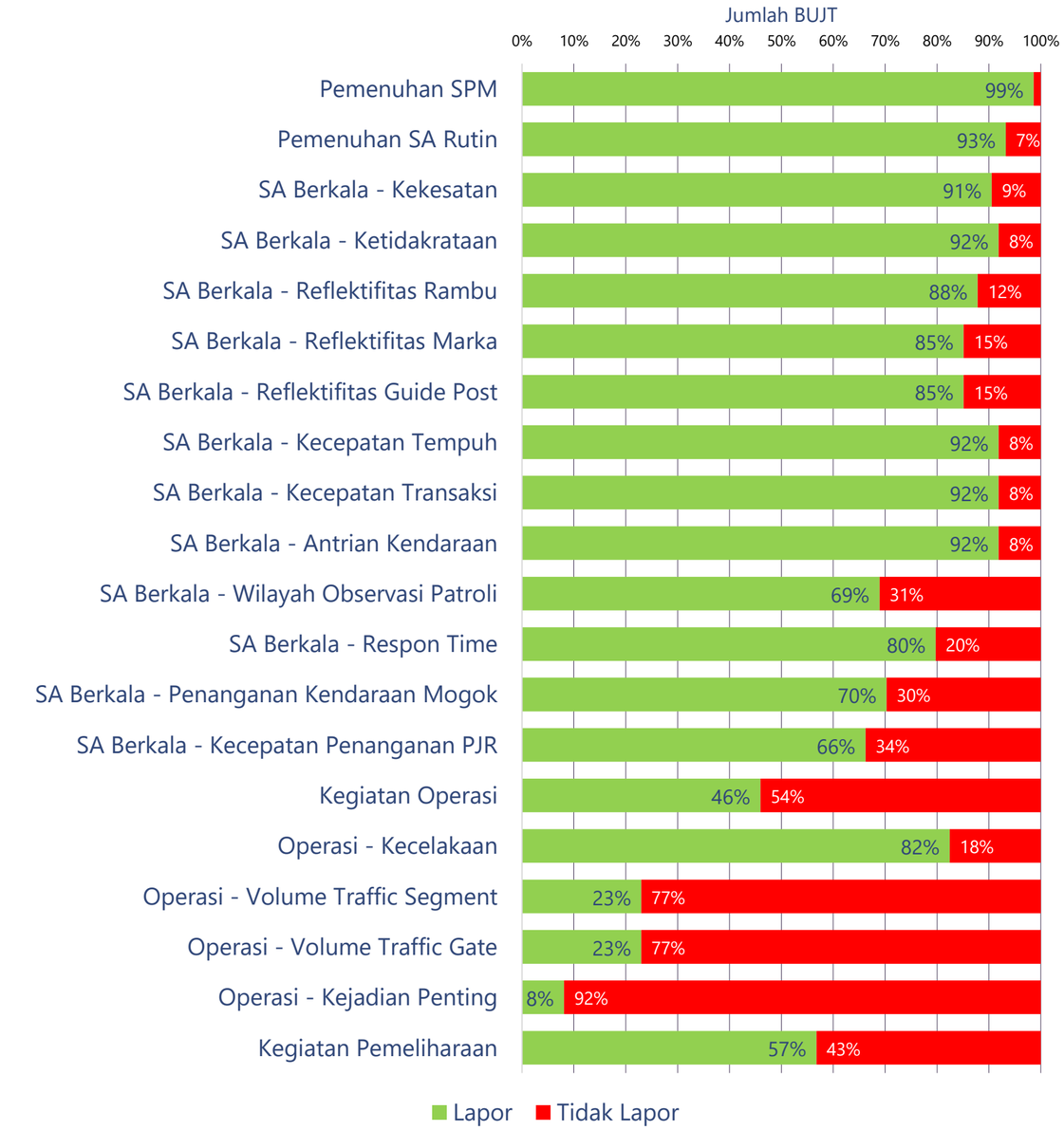
Penggunaan e-SPM oleh BUJT

3 Tahun Terakhir (2021 - 2023)



Persentase Penggunaan e-SPM oleh BUJT

3 Tahun Terakhir (2021 - 2023)





Asset Inventory

	Jembatan	Rest Area	Pool Layanan	Kendaraan Layanan
Pondok Aren - Serpong	12	1	1	8
Jakarta - Tangerang	0	0	1	14
Jakarta - Bogor - Ciawi	0	0	0	22
JORR Non S	0	None	0	0
Bogor Ring Road Seksi I-IIIA	0	None	0	6
Tangerang - Merak	0	4	0	30
JORR S	0	None	1	20
Cinere - Jagorawi	0	None	0	13
Kunciran - Serpong	37	None	0	7
Serpong - Cinere	1	None	0	10
Cengkareng - Batu Ceper - Kunciran	0	None	1	12
6 Ruas Dalam Kota JKT(Kelapa Gading - Pulo Gebang)	0	None	1	8
Serang - Panimbang	42	1	3	10

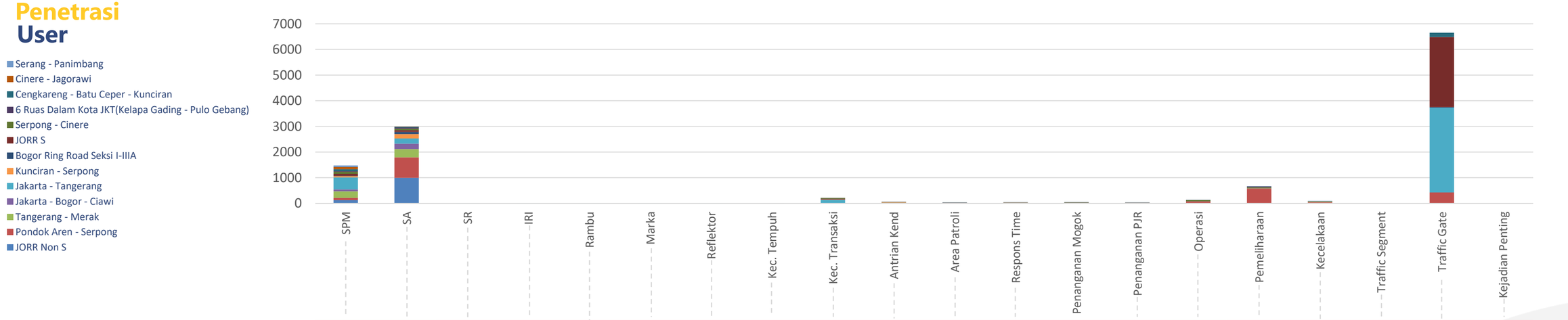
Total Jembatan
92
4 9

Total Rest Area
6
3 2

Total Pool Layanan
8
6 7

Total Kend. Layanan
160
12 1

Penetrasi User



	SPM	SA	SR	IRI	Rambu	Marka	Reflektor	Kec. Tempuh	Kec. Transaksi	Antrian Kend	Area Patroli	Respons Time	Penanganan Mogok	Penanganan PJR	Operasi	Pemeliharaan	Kecelakaan	Traffic Segment	Traffic Gate	Kejadian Penting
JORR Non S	123	997	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pondok Aren - Serpong	91	795	1	2	1	1	1	2	12	4	4	7	7	7	67	575	43	0	423	0
Tangerang - Merak	258	327	1	1	2	2	2	1	0	0	0	2	2	0	3	6	22	1	0	0
Jakarta - Bogor - Ciawi	69	208	0	0	1	1	1	0	0	0	0	0	0	0	1	2	0	0	0	0
Jakarta - Tangerang	472	204	1	1	1	1	1	2	127	18	7	6	6	6	0	0	0	0	3308	0
Kunciran - Serpong	46	168	1	1	0	0	0	1	16	16	6	6	7	4	0	5	0	0	0	0
Bogor Ring Road Seksi I-IIIA	14	88	1	2	1	1	1	1	1	1	1	0	2	0	0	4	0	0	23	0
JORR S	74	66	2	1	1	1	1	2	26	8	7	7	7	7	12	1	4	0	2730	1
Serpong - Cinere	88	55	1	1	2	2	2	2	28	8	6	5	8	6	39	34	15	0	0	1
6 Ruas Dalam Kota JKT(Kelapa Gading - Pulo Gebang)	20	46	1	1	2	3	2	1	5	4	6	6	6	6	6	38	0	0	0	0
Cengkareng - Batu Ceper - Kunciran	78	25	1	1	1	1	1	0	0	0	5	5	5	5	2	1	1	0	168	0
Cinere - Jagorawi	85	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Serang - Panimbang	60	11	1	1	1	1	1	0	0	0	0	0	0	0	0	1	13	0	0	0

Peringkat Klasemen e-SPM Saat ini

#33
/ 73

PT Marga Mandalasakti

Tangerang - Merak

KM 26.200 - KM 98.200 | ANTAR KOTA | PANJANG: 73.00 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

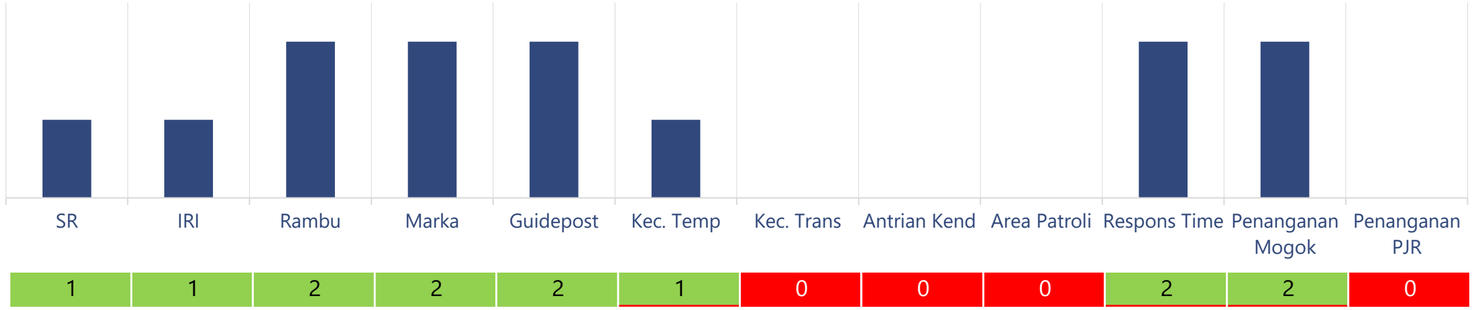
- **Jembatan**: Belum ada data Jembatan yang diinput
- **Rest Area**: 4 Rest Area — Diinput pada bulan **Juli 2024**
- **Pool dan Kendaraan Layanan**: Belum ada data Pool Layanan yang diinput | 30 Kendaraan Layanan — Belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment



> Pada tahun ini **terlaporkan 1 - 2 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR Berlaku hingga **23 Aug 2024**

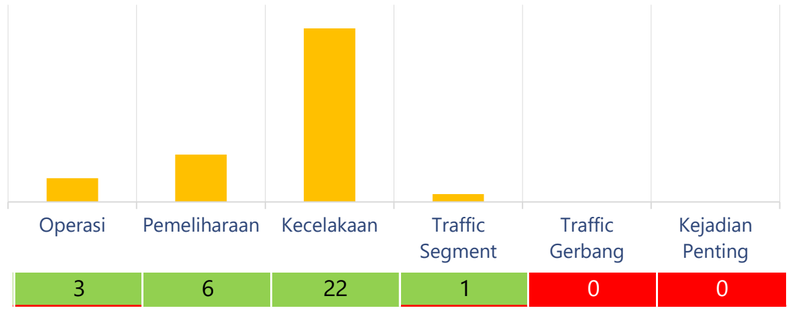
IRI Berlaku hingga **23 Aug 2024**

Ref. Rambu Berlaku hingga **5 Aug 2024**

Ref. Marka Berlaku hingga **5 Aug 2024**

Ref. Guidepost Berlaku hingga **5 Aug 2024**

Pemanfaatan Fitur Lain e-SPM



Catatan & Informasi

- Antisipasi integrasi seluruh proses jalan tol ke dalam satu sistem, termasuk SIMK dan E-SPM, diharapkan tahun depan.

Peringkat Klasemen e-SPM Saat ini

#46
/ 73

PT Wijaya Karya Serang Panimbang

Serang - Panimbang

KM 0.000 - KM 83.000 | ANTAR KOTA | PANJANG: 26.50 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

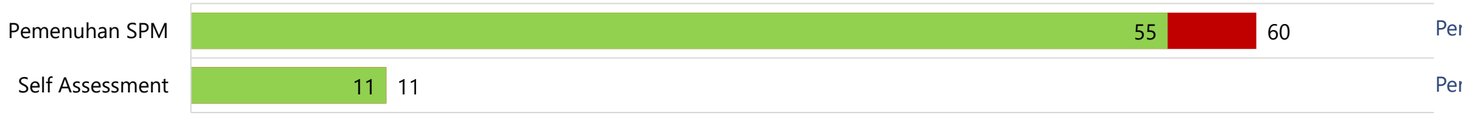
1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

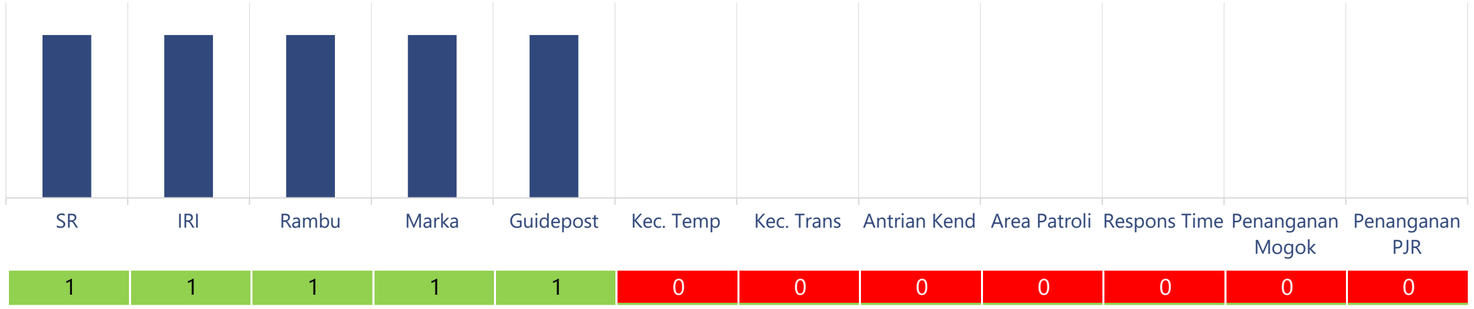
Jembatan	42 Jembatan	Diinput pada bulan **Mei 2024**
Rest Area	1 Rest Area	Diinput pada bulan **April 2024**
Pool dan Kendaraan Layanan	3 Pool Layanan, 10 Kendaraan Layanan	Diupdate pada bulan **April 2024**

Pemenuhan SPM vs Self Assessment

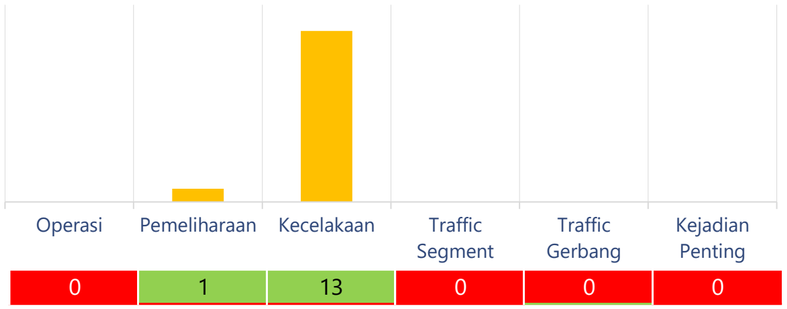


> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **8 Dec 2024**

IRI Berlaku hingga **8 Dec 2024**

Ref. Rambu Berlaku hingga **24 Jul 2024**

Ref. Marka Berlaku hingga **24 Jul 2024**

Ref. Guidepost Berlaku hingga **27 Sep 2023**

Catatan & Informasi

- Disarankan untuk menambahkan akun khusus bagi vendor dengan akses terbatas ke data SPM.
- Disarankan untuk membuat laporan TW/triwulan langsung dari data yang dimasukkan dalam sistem E-SPM.
- Menangani masalah terkait akurasi GPS dan menyarankan koordinasi dengan BUJT untuk konfirmasi lokasi sebelum penolakan.

Peringkat Klasemen e-SPM Saat ini

#69 / 73

PT Jasa Marga (Persero) Tbk | Jakarta - Tangerang

Jakarta - Tangerang

KM 0.000 - KM 26.400 | DALAM KOTA | PANJANG: 33,00 KM

Periode

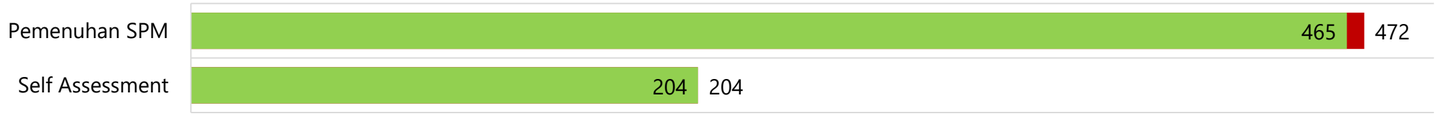
01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024 — **Sosialisasi Pengembangan Fitur e-SPM** 14 Mei 2024 — **Sosialisasi Saat Ini** 12 Agustus 2024

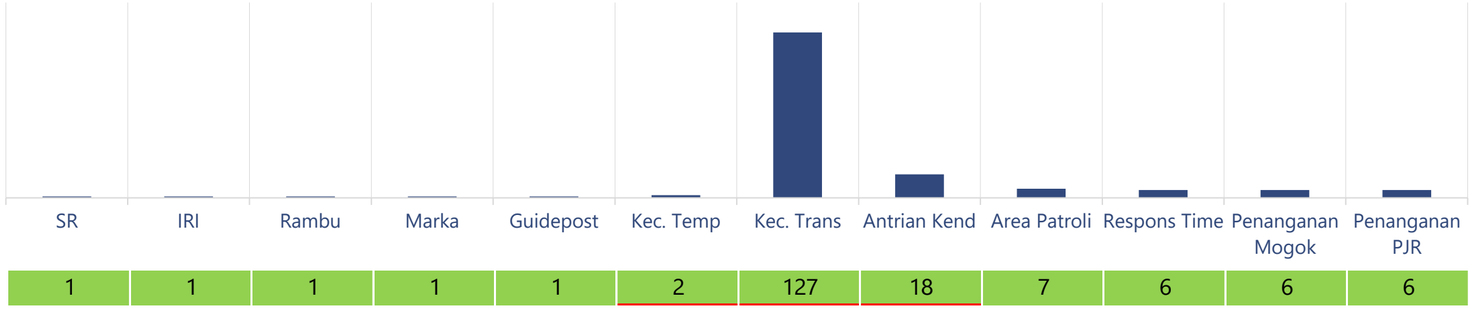
Jembatan	Belum ada data Jembatan yang diinput
Rest Area	Belum ada data Rest Area yang diinput
Pool dan Kendaraan Layanan	1 Pool Layanan; 14 Kendaraan Layanan — Diupdate pada bulan **April 2024**

Pemenuhan SPM vs Self Assessment

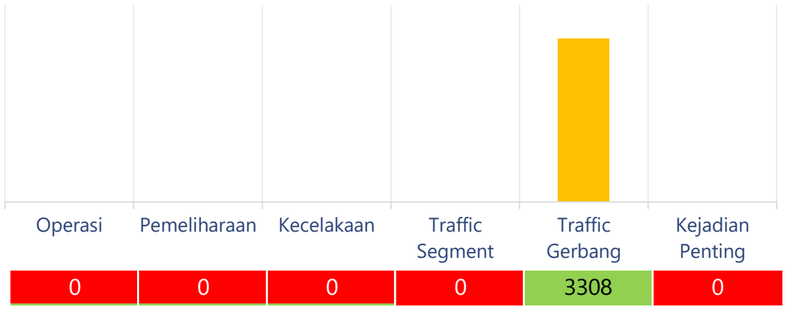


> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **3 Mar 2025** | **IRI** Berlaku hingga **22 Jun 2025** | **Ref. Rambu** Berlaku hingga **1 Oct 2024** | **Ref. Marka** Berlaku hingga **1 Oct 2024** | **Ref. Guidepost** Berlaku hingga **1 Oct 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#25
/ 73

PT Jasamarga Kunciran Cengkareng

Cengkareng - Batu Ceper - Kunciran

KM 0.000 - KM 14.100 | DALAM KOTA | PANJANG: 14.19 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

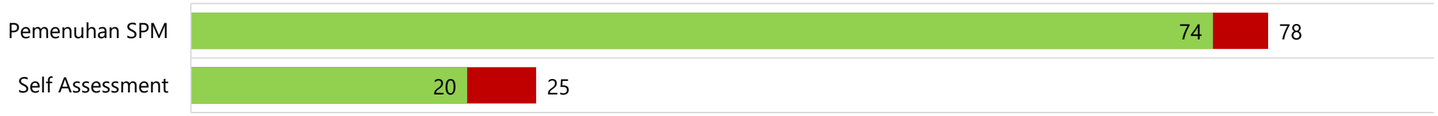
Sosialisasi Saat Ini 12 Agustus 2024

Jembatan — Belum ada data Jembatan yang diinput

Rest Area — Tidak ada Rest Area

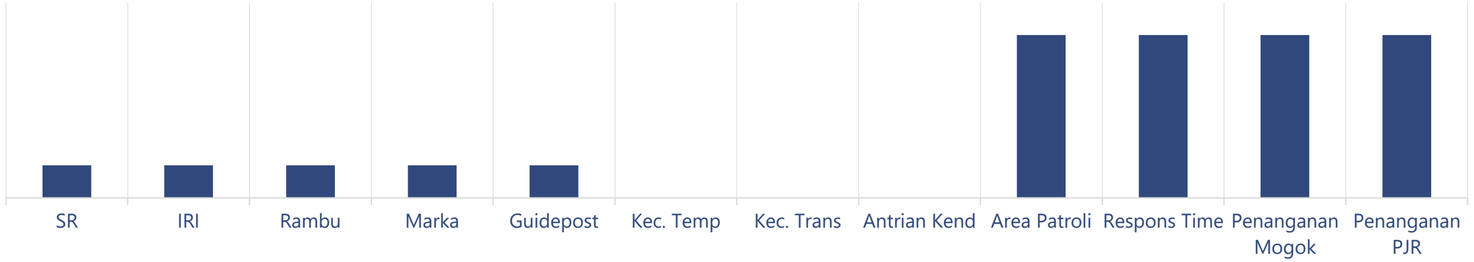
Pool dan Kendaraan Layanan — 1 Pool Layanan | 12 Kendaraan Layanan | Belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment



> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **13 Oct 2024**

IRI Berlaku hingga **22 Jun 2025**

Ref. Rambu Berlaku hingga **23 Jul 2024**

Ref. Marka Berlaku hingga **24 Jul 2024**

Ref. Guidepost Berlaku hingga **23 Jul 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#15 / 73

PT Marga Trans Nusantara

Kunciran - Serpong

KM 14.000 - KM 25.100 | DALAM KOTA | PANJANG: 11.14 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

Jembatan: 37 Jembatan — Diinput pada bulan **April 2024**

Rest Area: Tidak ada Rest Area

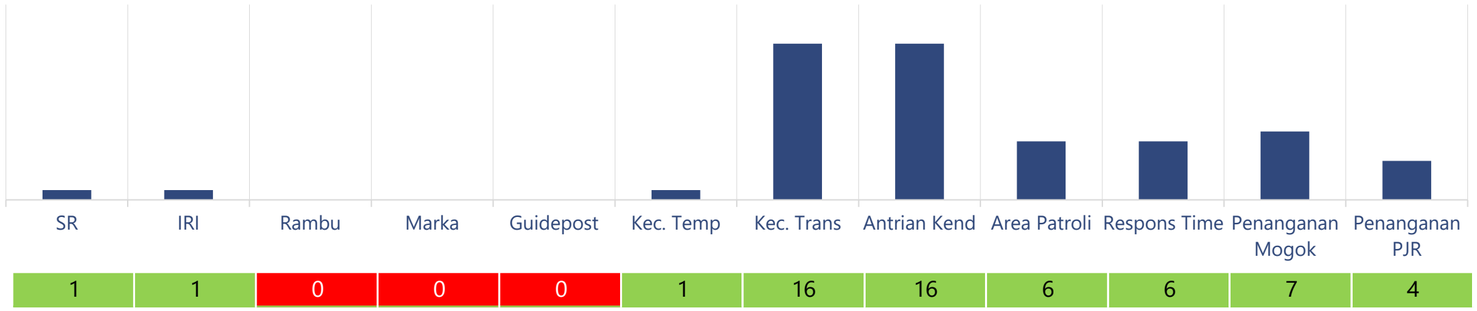
Pool dan Kendaraan Layanan: Belum ada pool layanan | 7 Kendaraan Layanan — Belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment

Pemenuhan SPM	46 / 46	Perbaikan **100%**
Self Assessment	168 / 168	Perbaikan **100%**

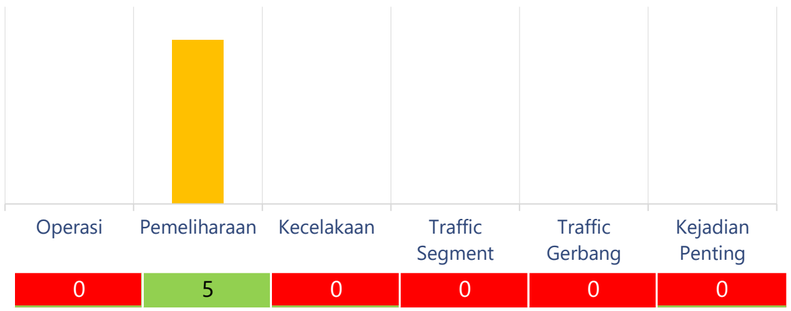
> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR	IRI	Rambu	Marka	Guidepost	Kec. Temp	Kec. Trans	Antrian Kend	Area Patroli	Respons Time	Penanganan Mogok	Penanganan PJR
1	1	0	0	0	1	16	16	6	6	7	4

Pemanfaatan Fitur Lain e-SPM



Operasi	Pemeliharaan	Kecelakaan	Traffic Segment	Traffic Gerbang	Kejadian Penting
0	5	0	0	0	0

SR Berlaku hingga **10 Oct 2024**

IRI Berlaku hingga **24 Oct 2024**

Ref. Rambu Berlaku hingga **15 Feb 2024**

Ref. Marka Berlaku hingga **11 Feb 2024**

Ref. Guidepost Berlaku hingga **9 Feb 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#28
/ 73

PT Cinere Serpong Jaya

Serpong - Cinere

KM 25.200 - KM 35.300 | DALAM KOTA | PANJANG: 10.14 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

Jembatan: 1 Jembatan — Diinput pada bulan **April 2024**

Rest Area: Tidak ada Rest Area

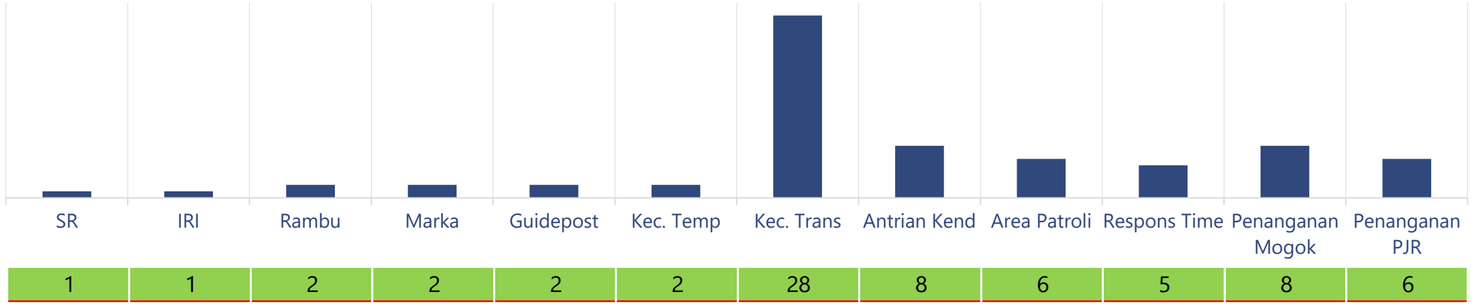
Pool dan Kendaraan Layanan: Belum ada pool layanan | 10 Kendaraan Layanan | 3 kendaraan belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment



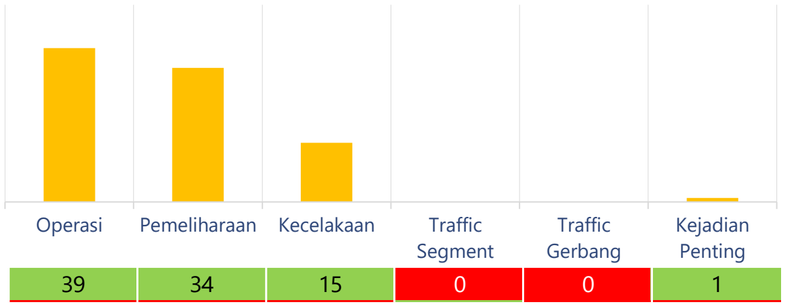
Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR	IRI	Rambu	Marka	Guidepost	Kec. Temp	Kec. Trans	Antrian Kend	Area Patroli	Respons Time	Penanganan Mogok	Penanganan PJR
1	1	2	2	2	2	28	8	6	5	8	6

Pemanfaatan Fitur Lain e-SPM



Operasi	Pemeliharaan	Kecelakaan	Traffic Segment	Traffic Gerbang	Kejadian Penting
39	34	15	0	0	1

SR Berlaku hingga **6 Feb 2025**

IRI Berlaku hingga **1 Aug 2024**

Ref. Rambu Berlaku hingga **11 Sep 2024**

Ref. Marka Berlaku hingga **11 Sep 2024**

Ref. Guidepost Berlaku hingga **11 Sep 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#63
/ 73

PT Trans Lingkar Kita Jaya

Cinere - Jagorawi

KM 14.700 - KM 23.900 | DALAM KOTA | PANJANG: 14.89 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

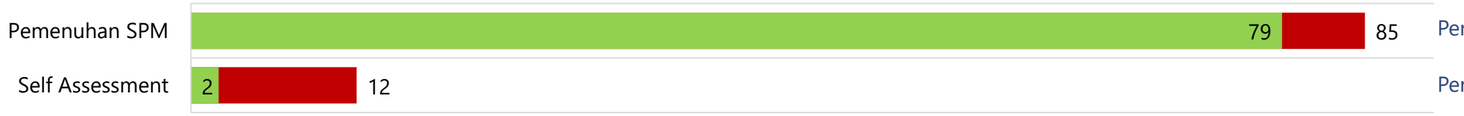
Sosialisasi Saat Ini 12 Agustus 2024

Jembatan: Belum ada data Jembatan yang diinput

Rest Area: Tidak ada Rest Area

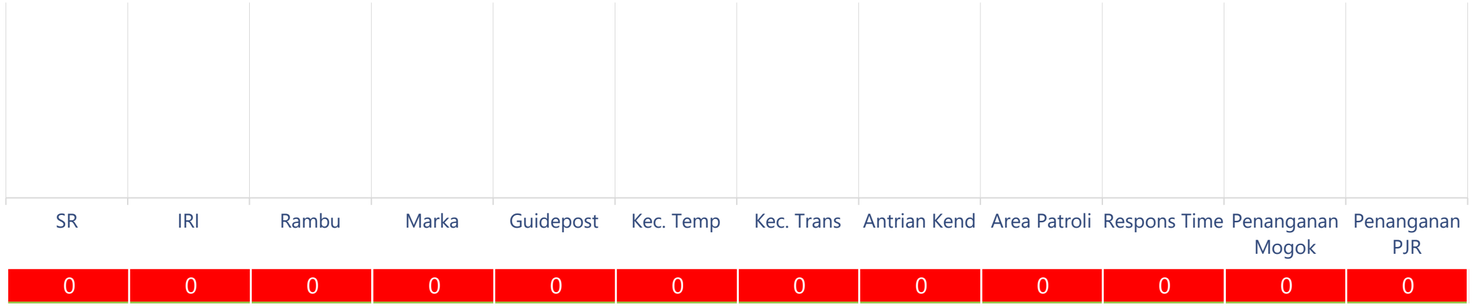
Pool dan Kendaraan Layanan: Belum ada pool layanan | 13 Kendaraan Layanan belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment

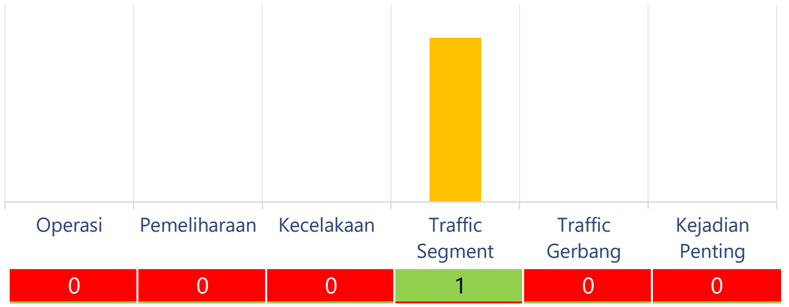


> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **14 Mar 2024**

IRI Berlaku hingga **29 Sep 2023**

Ref. Rambu Berlaku hingga **23 Jun 2021**

Ref. Marka Berlaku hingga **23 Jun 2021**

Ref. Guidepost Berlaku hingga **23 Jun 2021**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#43
/ 73

PT Hutama Karya (Persero) | JORR S

JORR S

KM 19.500 - KM 33.800 | DALAM KOTA | PANJANG: 14.25 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

Jembatan

Rest Area

Pool dan Kendaraan Layanan

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

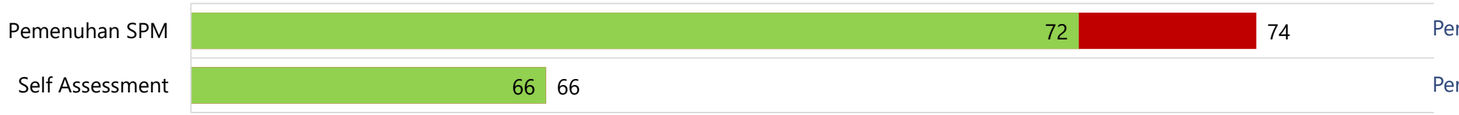
Sosialisasi Saat Ini 12 Agustus 2024

Belum ada data Jembatan yang diinput

Tidak ada Rest Area

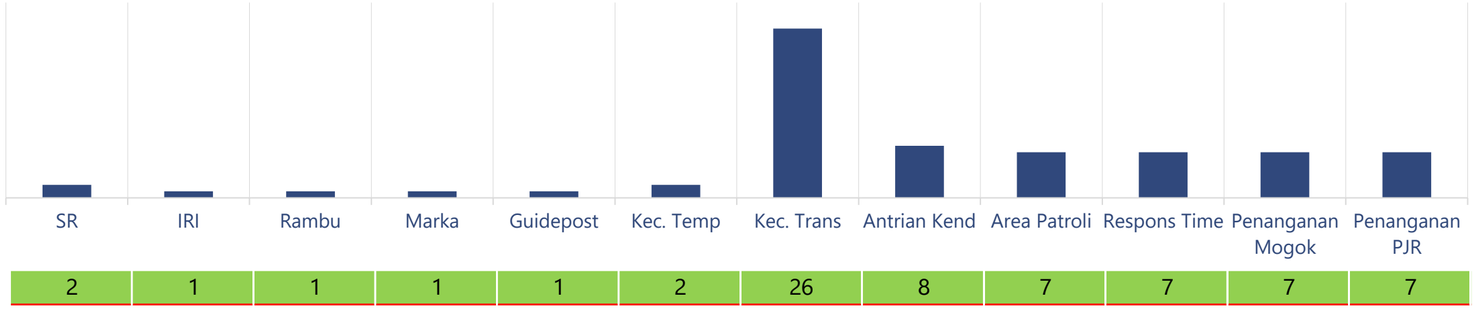
1 pool layanan | 20 Kendaraan Layanan | belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment

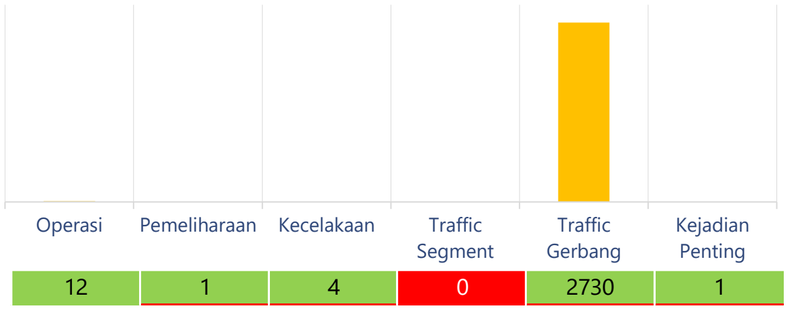


> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **1 Feb 2025**

IRI Berlaku hingga **11 Feb 2025**

Ref. Rambu Berlaku hingga **29 Mar 2025**

Ref. Marka Berlaku hingga **24 Aug 2024**

Ref. Guidepost Berlaku hingga **24 Aug 2024**

Catatan & Informasi

- Usulan penambahan label yang lebih jelas untuk penambahan rencana pemeliharaan.
- Disarankan untuk mempertimbangkan agar rencana pemeliharaan dapat diedit untuk mengakomodasi perubahan.
- Membahas kemungkinan membuat perubahan pada peraturan SPM terkait indikator alur.
- Diusulkan untuk mempertimbangkan penghapusan unit kendaraan yang tidak digunakan selama penggantian atau memperkenalkan status aktif dan tidak aktif untuk mencegah akumulasi.

Peringkat Klasemen e-SPM Saat ini

#30
/ 73

PT Jasa Marga (Persero) Tbk | JORR Seksi Non S

JORR Non S

KM 17.000 - KM 58.400 | DALAM KOTA | PANJANG: 31.18 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

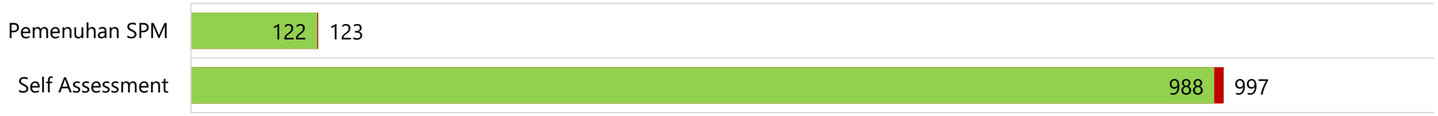
Sosialisasi Saat Ini 12 Agustus 2024

Jembatan — Belum ada data Jembatan yang diinput

Rest Area — Tidak ada Rest Area

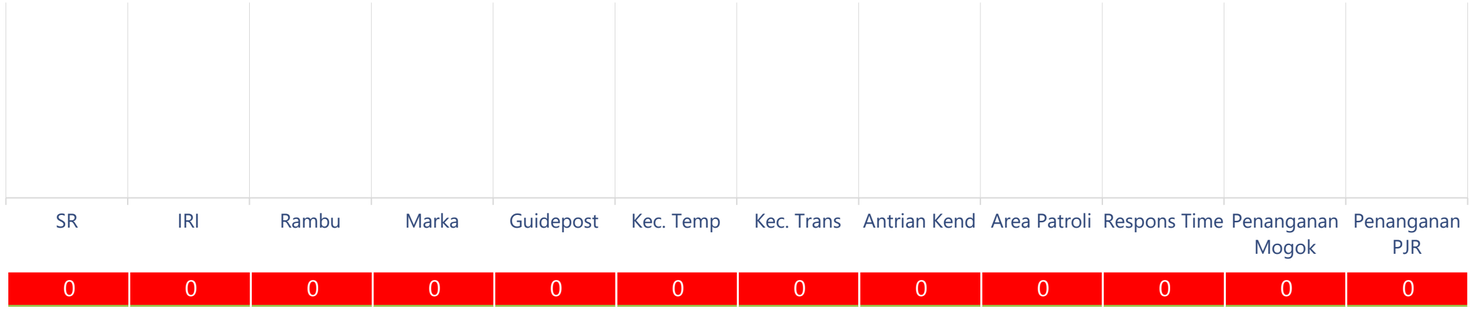
Pool dan Kendaraan Layanan — Belum ada data Pool Layanan | Belum ada data Kendaraan Layanan yang di update

Pemenuhan SPM vs Self Assessment



> Pada tahun ini **terlaporkan 4 - 5 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR Berlaku hingga **2 Dec 2023**

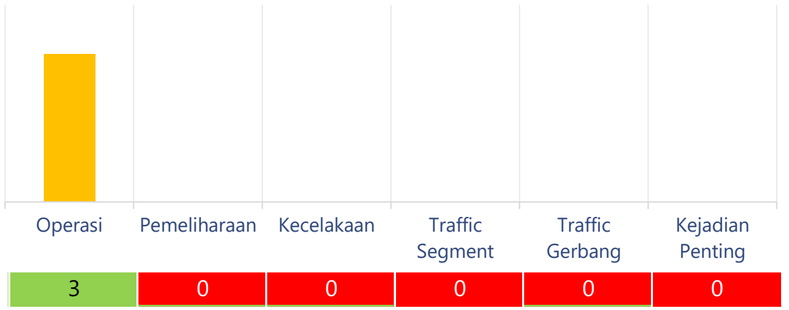
IRI Berlaku hingga **6 Jun 2023**

Ref. Rambu Berlaku hingga **27 Sep 2022**

Ref. Marka Berlaku hingga **27 Jun 2022**

Ref. Guidepost Berlaku hingga **27 Sep 2021**

Pemanfaatan Fitur Lain e-SPM



Catatan & Informasi

- Tidak ada catatan atau informasi

Peringkat Klasemen e-SPM Saat ini

#27
/ 73

PT Bintaro Serpong Damai

Pondok Aren - Serpong

KM 5.500 - KM 12.800 | DALAM KOTA | PANJANG: 7.24 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

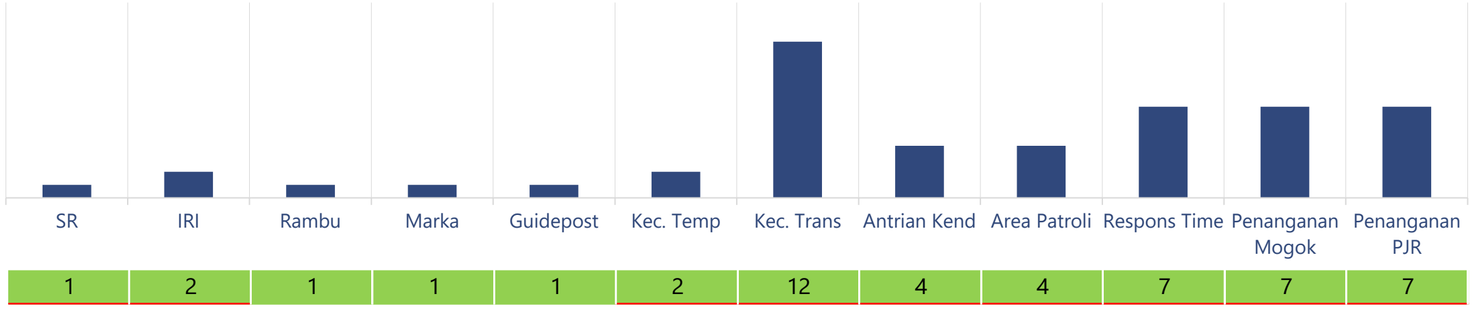
Jembatan		12 Jembatan — Diinput pada bulan **Juli 2024**
Rest Area		1 Rest Area — Diinput pada bulan **Juli 2024**
Pool dan Kendaraan Layanan	1 Pool Layanan — Diupdate pada bulan **April 2024**	8 Kendaraan Layanan — Diupdate pada bulan **Juli 2024**

Pemenuhan SPM vs Self Assessment



> Pada tahun ini **terlaporkan 3 - 4 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR	IRI	Rambu	Marka	Guidepost	Kec. Temp	Kec. Trans	Antrian Kend	Area Patroli	Respons Time	Penanganan Mogok	Penanganan PJR
1	2	1	1	1	2	12	4	4	7	7	7

SR Berlaku hingga **29 Jul 2024**

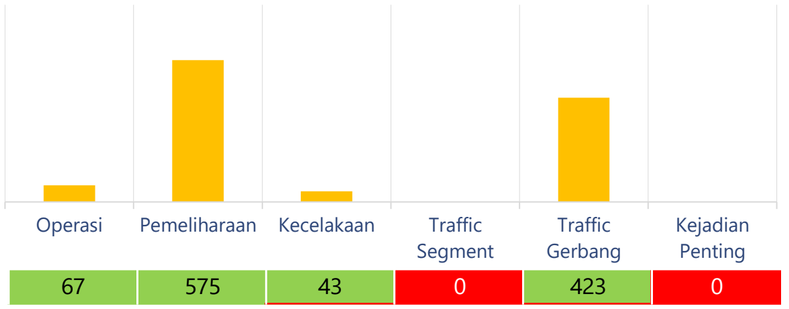
IRI Berlaku hingga **19 Mar 2025**

Ref. Rambu Berlaku hingga **31 Aug 2024**

Ref. Marka Berlaku hingga **31 Aug 2024**

Ref. Guidepost Berlaku hingga **31 Aug 2024**

Pemanfaatan Fitur Lain e-SPM



Operasi	Pemeliharaan	Kecelakaan	Traffic Segment	Traffic Gerbang	Kejadian Penting
67	575	43	0	423	0

Catatan & Informasi

- Tidak ada catatan atau informasi

Peringkat Klasemen e-SPM Saat ini

#24
/ 73

PT Jasa Marga (Persero) Tbk | Jakarta - Bogor - Ciawi

Jakarta - Bogor - Ciawi

KM 3.800 - KM 43.000 | DALAM KOTA | PANJANG: 59.00 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

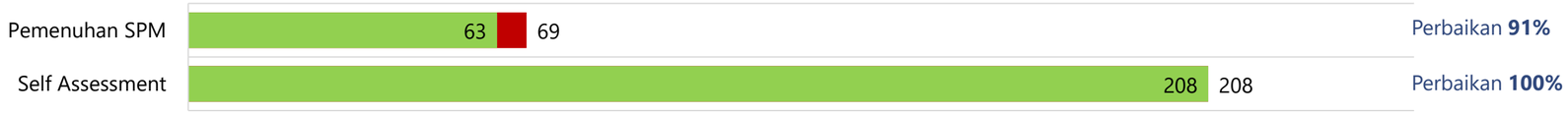
1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

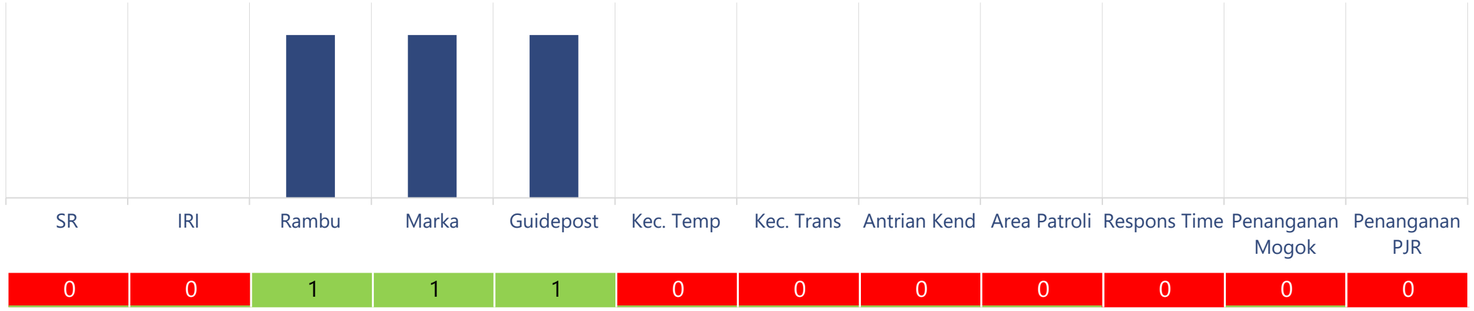
Jembatan	Belum ada data Jembatan yang diinput
Rest Area	Belum ada data Rest Area yang diinput
Pool dan Kendaraan Layanan	Belum ada data Pool Layanan; 22 Kendaraan Layanan belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment

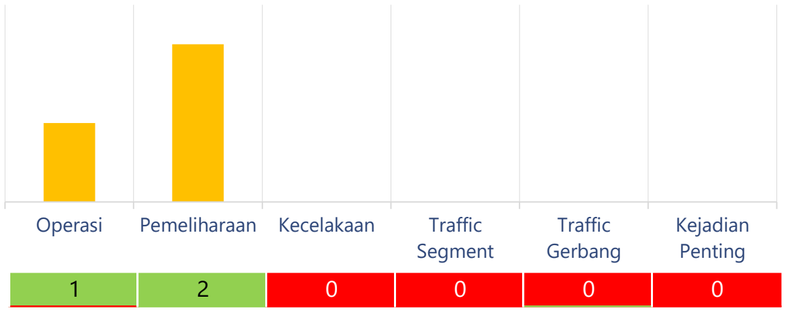


> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



Pemanfaatan Fitur Lain e-SPM



SR Berlaku hingga **26 Dec 2023**

IRI Berlaku hingga **21 Mar 2023**

Ref. Rambu Berlaku hingga **7 Sep 2024**

Ref. Marka Berlaku hingga **5 Sep 2024**

Ref. Guidepost Berlaku hingga **6 Sep 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#49
/ 73

PT Marga Sarana Jabar

Bogor Ring Road Seksi I-IIIA

KM 0.000 - KM 10.700 | DALAM KOTA | PANJANG: 11.30 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

Sosialisasi Saat Ini 12 Agustus 2024

Jembatan: Belum ada data Jembatan yang diinput

Rest Area: Tidak ada Rest Area

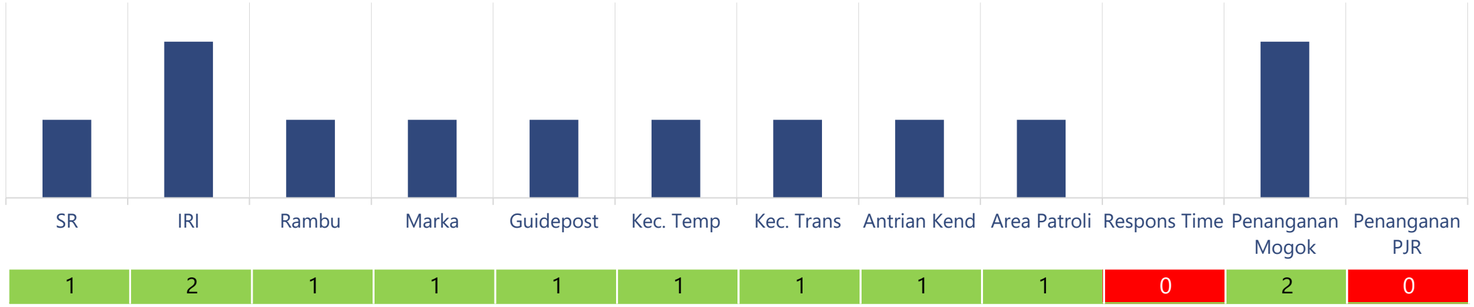
Pool dan Kendaraan Layanan: Belum ada data Pool Layanan | 6 Kendaraan Layanan belum terintegrasi dengan pool

Pemenuhan SPM vs Self Assessment



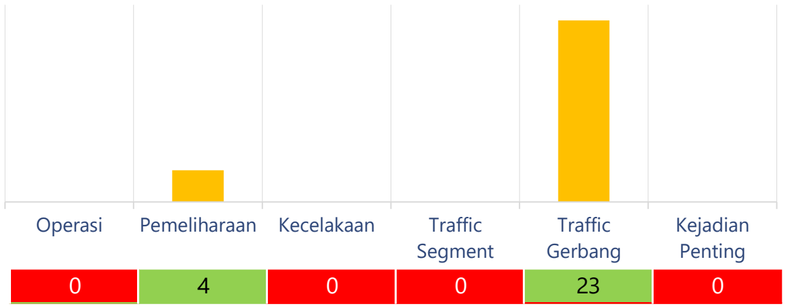
> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR	IRI	Rambu	Marka	Guidepost	Kec. Temp	Kec. Trans	Antrian Kend	Area Patroli	Respons Time	Penanganan Mogok	Penanganan PJR
1	2	1	1	1	1	1	1	1	0	2	0

Pemanfaatan Fitur Lain e-SPM



Operasi	Pemeliharaan	Kecelakaan	Traffic Segment	Traffic Gerbang	Kejadian Penting
0	4	0	0	23	0

SR Berlaku hingga **21 Sep 2024**

IRI Berlaku hingga **13 May 2025**

Ref. Rambu Berlaku hingga **13 Aug 2024**

Ref. Marka Berlaku hingga **13 Aug 2024**

Ref. Guidepost Berlaku hingga **13 Aug 2024**

Catatan & Informasi

- Tidak ada catatan atau informasi



Peringkat Klasemen e-SPM Saat ini

#51
/ 73

PT Jakarta Tollroad Development Jaya Pratama

6 Ruas Dalam Kota JKT(Kelapa Gading - Pulo Gebang)

KM 21.800 - KM 31.100 | DALAM KOTA | PANJANG: 9.29 KM

Periode

01 Januari 2024 – 29 Juli 2024

Toll Road Inventory

1 Januari 2024

Sosialisasi Pengembangan Fitur e-SPM 14 Mei 2024

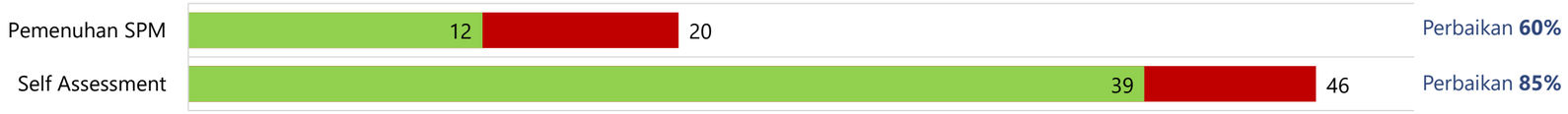
Sosialisasi Saat Ini 12 Agustus 2024

Jembatan: Belum ada data Jembatan yang diinput

Rest Area: Tidak ada Rest Area

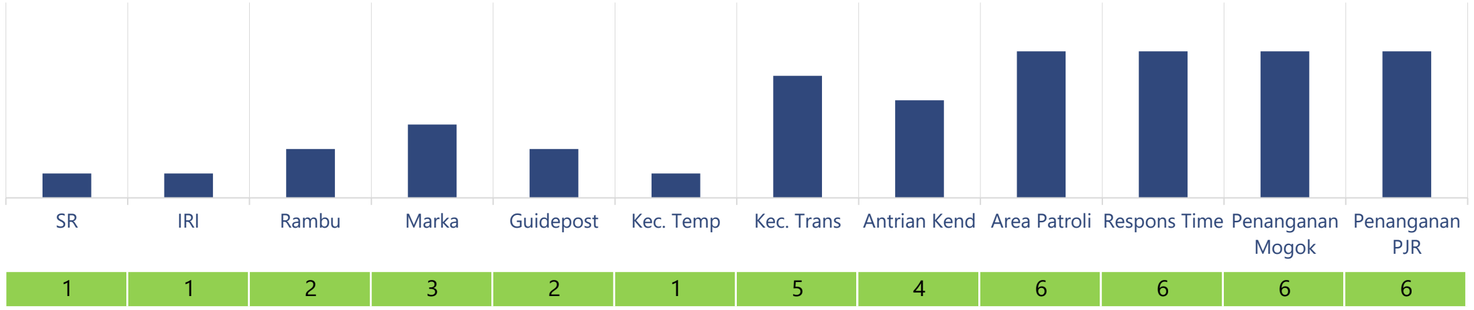
Pool dan Kendaraan Layanan: 1 Pool Layanan — Diinput pada bulan **April 2024**; 8 Kendaraan Layanan — Belum integrasi dengan pool layanan

Pemenuhan SPM vs Self Assessment



> Pada tahun ini **terlaporkan 1 temuan Self Assessment per-hari** oleh BUJT menggunakan e-SPM

Pemanfaatan Indikator e-SPM



SR Berlaku hingga **23 Aug 2024**

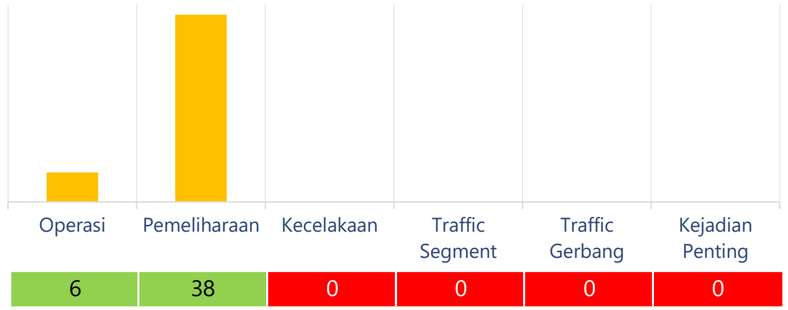
IRI Berlaku hingga **26 Sep 2024**

Ref. Rambu Berlaku hingga **12 Jul 2024**

Ref. Marka Berlaku hingga **11 Oct 2024**

Ref. Guidepost Berlaku hingga **12 Jul 2024**

Pemanfaatan Fitur Lain e-SPM



Catatan & Informasi

- Disarankan membuat templat unggah Excel untuk entri data volume lalu lintas harian guna menyederhanakan proses.

KEMENTRIAN PEKERJAAN UMUM DAN PERUMAHAN RAKYAT
BADAN PENGATUR JALAN TOL

JICA

Terima Kasih

Jakarta, 8 Agustus 2024



Workshop Evaluasi Pemanfaatan Sistem dan Aplikasi e-SPM

The Project for Strengthening Management Capacity of Toll Road Development

ANNEX 3

PDM

Project Design Matrix

Project Title: Project for Strengthening Management Capacity for Toll Road Development

Implementing Organization: ITRA, DGH, DGIF

Target Groups: ITRA, DGH, DGIF

Period of Project: 36 months (3 years)

Project Site: Jakarta, Project Site(s) of Case Studies

Version 0

Dated 13th October, 2020

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
The PPP toll road projects are implemented in an efficient and effective way in Indonesia.	**1.** Average duration of amendment procedure of the concession contract is less than XX months. **2.** Number of formulated FF based on related SOP is more than XX cases. **3.** Number of formulated concession contract by bidding based on related SOP is more than XX cases. **4.** Number of monitoring of toll road project at construction stage based on related SOP is more than XX cases. **5.** Number of toll road project with indicators of the asset management for the monitoring at maintenance stage is more than XX cases (only for concession contract).	Monitoring documents for the PPP road project			
Project Purpose					
Comprehensive management capacity to implement efficient PPP toll road project is enhanced.	Number of Road PPP projects implementing in accordance with the road PPP project strategy plan is more than XX cases.	Road PPP project strategy plan	**1.** National policy and strategy on road development by PPP scheme will not change drastically. **2.** Government finance for public portion of PPP will be secured.		

Outputs					
1. Institutional and organizational basis of Road PPP project implementation are strengthened.	**1.1** Newly prepared SOP **1.2** Retention rate of SOP revise works.	**1.1** Related SOP **1.2.1** Staff capacity assessment **1.2.1** Record of working process	Related bodies on PPP project implementation coordinate each other.		
2. Capacity of road PPP projects formulation is improved.	**2.1** Newly prepared SOP **2.2** Retention rate of SOP revise works. **2.3** Number of formulated road PPP project based on the newly prepared SOP/manual is at least 1 case.	**2.1** Related SOP **2.2.1** Staff capacity assessment **2.2.2** Record of working process **2.3** Record of PPP project			
3. Capacity of road PPP project procurement is improved.	**3.1** Newly prepared SOP **3.2** Retention rate of SOP revise works. **3.3** Prepared standard bidding document, including draft of contract. **3.4** Retention rate of standard bidding document, including draft contract preparation works.	**3.1** Related SOP **3.2.1** Staff capacity assessment **3.2.2** Record of working process **3.3** Standard bidding document **3.4.1** Staff capacity assessment **3.4.2** Record of working process			
4. Capacity of road PPP project management and monitoring at construction stage is improved.	**4.1** Newly prepared SOP **4.2** Retention rate of SOP revise works. **4.3** Number of implemented road PPP project management and monitoring at construction stage based on the newly prepared SOP/manual is at least 1 case.	**4.1** Related SOP **4.2.1** Staff capacity assessment **4.2.2** Record of working process **4.3** Record of PPP project			
5. Capacity of road PPP project management monitoring at O&M stage is improved.	**5.1** Newly prepared SOP **5.2** Retention rate of SOP revise works. **5.3** Number of implemented road PPP project asset management based on the newly prepared SOP/manual is at least 1 case.	**5.1** Related SOP **5.2.1** Staff capacity assessment **5.2.2** Record of working process **5.3** Record of PPP project			

Activities	Inputs	Important Assumption	Achievement	Remarks
Activities for Output 1 **1.1** Conduct Institutional and organizational assessment of road PPP projects (benchmarking) and identify issues.	**<Japanese Side>** **(a) Dispatch of Experts** 1) Chief Advisor/PPP Project Management 2) Legal Affairs/contract 3) Financial Analysis/Government Support System for PPP 4) Road Policy/Road Planning 5) Traffic Study 6) Road Asset Management /Data Base 7) Intelligent Transport Systems for Toll Road Operation 8) Construction Project Management 9) Construction Quality Management 10) Ability Training Planning 11) Project Monitoring **(b) Training** - Training in Japan or third country **(c) Expenses necessary for local activities planned by experts.** **<Indonesian Side>** **(a) Services of MPWH's counterpart personnel and administrative personnel** [ITRA] 1) JCC Chairperson 2) JCC Coordinator 3) Counterpart [Directorate of Freeway of DGH] 1) Counterpart [Directorate of Financing System and Strategy Development of DGIF] 1) Counterpart **(b) Suitable office space in MPWH premises with necessary equipment** **(c) Credentials or identification cards** **(d) Available data (including maps and photographs) and information related to the Project***	Necessary number of counterparts required for activities continuously is maintained.		
1.2 Conduct capacity assessment of road PPP projects (benchmarking) for relevant government officers and identify issues.				
1.3 Examine current financing and government support options for road PPP projects and make proposal for improvement including beneficiaries based financing related with spill over effects. Also, share the proposal among stakeholders.				
1.4 Review current business process of road PPP projects (both solicited and unsolicited projects) and make revision of existing SOPs and/or development of new SOPs as necessary.				
1.5 Hold a seminar, aiming to share information and knowledge obtained through the above-mentioned activities among private companies, financial institutions and other government organizations.				
Activities for Output 2		**Pre-Conditions**		
2.1 Review capacity and process of road PPP pipeline development and project formulation (such as preliminary study, OBC, FBC) and identify issues.		Economic situation in Indonesia will not deteriorate significantly.		
2.2 Develop SOP/Manuals for formulation of road PPP projects.				
2.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.				
2.4 Conduct OJT of road PPP project formulation.				
2.5 Revise SOP/Manuals customized as necessary based on OJT.				

Activities for Output 3 **3.1** Review capacity, existing bidding documents and process of road PPP project procurement (both solicited and unsolicited projects) are reviewed and identify issues.	**(e) Running expenses necessary for the implementation of the Project*** **(f) Facilitation of visa issuance and extension for JICA experts if necessary** **(g) Budget allocation for personnel, operation and activities for implementation of the Project* including, personnel costs, local traveling costs and daily subsistence allowance for counterpart personnel and other recurrent costs for the counterpart personnel and Indonesian stakeholder**s. *: the Project: Project for Strengthening Management Capacity of Toll Road Development			
3.2 Develop SOP/Manuals for procurement of road PPP projects (both solicited and unsolicited projects).		**<Issues and countermeasures>**		
3.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.				
3.4 Develop standard bidding documents, including a model concession agreement.				
3.5 Conduct OJT of road PPP project procurement (both solicited and unsolicited projects).				
3.6 Revise SOP/Manuals and standard bidding documents customized as necessary based on OJT.				
Activities for Output 4 **4.1** Review and confirm the current status and issues of construction management and monitoring.				
4.2 Develop SOP/Manuals for construction management and monitoring.				
4.3 Prepare the remediation plan of the project management and monitoring method by examination of introduction method of the pioneering project management and monitoring method.				
4.4 Conduct OJT of the construction management and monitoring.				
4.5 Revise SOP/Manuals as necessary based on OJT.				

Activities for Output 5				
5.1 Review and confirm the current status and issues of monitoring method of Minimum Standard of Service and its monitoring data.				
5.2 Develop SOP/Manuals for the monitoring of Minimum Standard of Service.				
5.3 Examine and establish the measurement/evaluation method, indicator/criteria and operation procedure of Minimum Standard of Service.				
5.4 Examine and establish the performance evaluation procedure of asset management activity of Toll Road Operators, by reviewing necessity information for performance evaluation of asset management activity of Toll Road Operators, such as finance, demand customer satisfaction and long-term maintenance and upgrading plan, etc.				
5.5 Prepare the upgrade plan of the database and management system for the performance evaluation of asset management activity of Toll Road Operators.				
5.6 Conduct OJT of the performance evaluation of asset management activity of Toll Road Operators, including monitoring of Minimum Standard of Service.				
5.7 Revise SOP/Manuals as necessary based on OJT.				
5.8 Review the current status and identify issues on ITS (Intelligent Transport Systems) for Toll Road Operation.				
5.9 Prepare the proposal of basic policy and methodology for information sharing related to toll road operations with Toll Road Operators on the basis of the system requirements for traffic and facility control.				
5.10 Convene the seminars on construction management and asset management for private companies and other government organizations.				

Notes:
ITRA: Indonesia Toll Road Authority
DGH: Directorate General of Highways
DGIF: Directorate General of Infrastructure Financing

Project Design Matrix

Project Title: Project for Strengthening Management Capacity for Toll Road Development **Version 1**
Implementing Agency: BPJT, DGH, DGIF **27-Apr-23**
Target Group: BPJT, DGH, DGIF
Period of Project: 45 months (from February 2021 to November 2024)
Project Site: Jakarta, projects site(s) of case studies **Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
The PPP toll road projects are implemented in an efficient and effective way in Indonesia.	Number of Road PPP projects implementing in accordance with the road PPP project strategy plan is more than 1 case.	Road PPP project strategy plan *(e.g. PPP project proposal (Proyek KPBU Yang Ditawarkan) issued by PUPR on annual basis)*			
Project Purpose					
Comprehensive management capacity to implement efficient PPP toll road project is enhanced.	1. The new SOP documents are revised, at least once, for further improvement. 2. At least one FS will be prepared based on the new SOP documents. 3. At least one BOT contract will be formulated through the bidding conducted based on the new SOP documents. 4. At least one toll road project at construction stage will be monitored based on the new SOP documents. 5. At least one toll road projects under BOT contract at operation stage will be monitored based on the asset management indicator set through the Project activities.	Monitoring documents for road PPP projects	1. National policy and strategy on road development by PPP scheme will not change drastically. 2. Government finance for public portion of PPP will be secured.		

Outputs					
1. Institutional and organizational basis of Road PPP project implementation are strengthened.	1.1 SOP or a document with relevant function is newly prepared	1.1 New SOP document	Related bodies on PPP project implementation coordinate each other.		
	1.2 New SOP document is reflected to the actual business practice.	1.2.1 Staff interview and capacity assessment 1.2.2 Observation of working process and records			
2. Capacity of road PPP projects formulation is improved.	2.1 SOP or a document with relevant function is newly prepared	2.1 New SOP document			
	2.2 New SOP document is reflected to the actual business practice.	2.2.1 Staff interview and capacity assessment 2.2.2 Observation of working process and records			
	2.3 Number of formulated road PPP project based on the newly prepared SOP/manual is at least 1 case.	2.3 Record of PPP projects			
3. Capacity of road PPP project procurement is improved.	3.1 SOP or a document with relevant function is newly prepared	3.1 New SOP document			
	3.2 New SOP document is reflected to the actual business practice.	3.2.1 Staff interview and capacity assessment 3.2.2 Observation of working process and records			
	3.3 Prepared standard bidding document, including draft of contract.	3.3 Standard bidding document			
	3.4 Retention rate of standard bidding document, including draft contract preparation works.	3.4.1 Staff capacity assessment 3.4.2 Record of working process			

4. Capacity of road PPP project management and monitoring at construction stage is improved.	4.1 SOP or a document with relevant function is newly prepared 4.2 New SOP document is reflected to the actual business practice. 4.3 Number of implemented road PPP project management and monitoring at construction stage based on the newly prepared SOP/manual is at least 1 case.	4.1 New SOP document 4.2.1 Staff interview and capacity assessment 4.2.2 Observation of working process and records 4.3 Record of PPP projects			
5. Capacity of road PPP project management monitoring at O&M stage is improved.	5.1 SOP or a document with relevant function is newly prepared 5.2 New SOP document is reflected to the actual business practice. 5.3 Number of implemented road PPP project asset management based on the newly prepared SOP/manual is at least 1 case.	5.1 New SOP document 5.2.1 Staff interview and capacity assessment 5.2.2 Observation of working process and records 5.3 Record of PPP project			

Activities	Inputs		Important Assumption	Achievement	Remarks
	The Japanese Side	The Indonesian Side			
Activities for Output 1 1.1 Conduct Institutional and organizational assessment of road PPP projects (benchmarking) and identify issues. 1.2 Conduct capacity assessment of road PPP projects (benchmarking) for relevant government officers and identify issues. 1.3 Examine current financing and government support options for road PPP projects and make proposal for improvement including beneficiaries based financing related with spill over effects. Also, share the proposal among stakeholders. 1.4 Review current business process of road PPP projects (both solicited and unsolicited projects) and make revision of existing SOPs and/or development of new SOPs as necessary. 1.5 Hold a seminar, aiming to share information and knowledge obtained through the above-mentioned activities among private companies, financial institutions and other government organizations.	(a) Dispatch of Experts 1) Chief Advisor/PPP Project Management 2) Legal Affairs/contract 3) Financial Analysis/Government Support System for PPP 4) Road Policy/Road Planning 5) Traffic Study 6) Road Asset Management /Data Base 7) Intelligent Transport Systems for Toll Road Operation 8) Construction Project Management 9) Construction Quality Management 10) Training Planning 11) Project Monitoring (b) Training - Training in Japan or third country (c) Expenses necessary for local activities planned by experts.	(a) Services of MPWH's counterpart officers and administrative officers 【BPJT】 1) JCC Chairperson 2) JCC Coordinator 3) Counterpart officers 【Directorate of Freeway of DGH】 1) Counterpart officers 【Directorate of Financing System and Strategy Development of DGIF】 1) Counterpart officers (b) Suitable office space in MPWH premises with necessary equipment (c) Credentials or identification cards (d) Available data (including maps and photographs) and information related to the Project* (e) Running expenses necessary for the implementation of the Project* (f) Facilitation of visa issuance and extension for JICA experts as necessary. (g) Budget allocation for officers, operation and activities for implementation of the Project* including, personnel costs, local traveling costs and daily subsistence allowance for counterpart officers and other recurrent costs for the counterpart officers and Indonesian stakeholders. *: the Project: Project for Strengthening Management Capacity of Toll Road Development	Necessary number of counterpart officers required for continuous activities is maintained.		

Activities for Output 2
2.1 Review capacity and process of road PPP pipeline development and project formulation (such as preliminary study, OBC, FBC) and identify issues.
2.2 Develop SOP/Manuals for formulation of road PPP projects.
2.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.
2.4 Conduct OJT of road PPP project formulation.
2.5 Revise SOP/Manuals customized as necessary based on OJT.
Activities for Output 3
3.1 Review capacity, existing bidding documents and process of road PPP project procurement (both solicited and unsolicited projects) are reviewed and identify issues.
3.2 Develop SOP/Manuals for procurement of road PPP projects (both solicited and unsolicited projects).
3.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.
3.4 Develop standard bidding documents, including a model concession agreement.
JICA Toll Road Project_PDMPO_22Dec.xlsx
3.6 Revise SOP/Manuals and standard bidding documents customized as necessary based on OJT.

Activities for Output 4
4.1 Review and confirm the current status and issues of construction management and monitoring.
4.2 Develop SOP/Manuals for construction management and monitoring.
4.3 Prepare the remediation plan of the project management and monitoring method by examination of introduction method of the pioneering project management and monitoring method.
4.4 Conduct OJT of the construction management and monitoring.
4.5 Revise SOP/Manuals as necessary based on OJT.
Activities for Output 5
5.1 Review and confirm the current status and issues of monitoring method of Minimum Standard of Service and its monitoring data.
5.2 Develop SOP/Manuals for the monitoring of Minimum Standard of Service.
5.3 Examine and establish the measurement/evaluation method, indicator/criteria and operation procedure of Minimum Standard of Service.
5.4 Examine and establish the performance evaluation procedure of asset management activity of Toll Road Operators, by reviewing necessity information for performance evaluation of asset management activity of Toll Road Operators, such as finance, demand customer satisfaction and long-term maintenance and upgrading plan, etc.

Pre-Conditions
Economic situation in Indonesia will not deteriorate significantly.
<Issues and countermesures> Once access restriction to PUPR, BPJT is lifted, JICA Consultant team should commence their on-site work activities.

5.5 Prepare the upgrade plan of the database and management system for the performance evaluation of asset management activity of Toll Road Operators.					
5.6 Conduct OJT of the performance evaluation of asset management activity of Toll Road Operators, including monitoring of Minimum Standard of Service.					
5.7 Revise SOP/Manuals as necessary based on OJT.					
5.8 Review the current status and identify issues on ITS (Intelligent Transport Systems) for Toll Road Operation.					
5.9 Prepare the proposal of basic policy and methodology for information sharing related to toll road operations with Toll Road Operators on the basis of the system requirements for traffic and facility control.					
5.10 Convene the seminars on construction management and asset management for private companies and other government organizations.					

Notes:
BPJT: Indonesia Toll Road Authority
DGH: Directorate General of Highways
DGIF: Directorate General of Infrastructure Financing

Project Design Matrix

Project Title: Project for Strengthening Management Capacity for Toll Road Development **Version 2**
Implementing Agency: BPJT, DGH, DGIF **7-Jul-23**
Target Group: BPJT, DGH, DGIF
Period of Project: 45 months (from February 2021 to November 2024)
Project Site: Jakarta, projects site(s) of case studies **Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
The PPP toll road projects are implemented in an efficient and effective way in Indonesia.	Number of Road PPP projects implementing in accordance with the road PPP project strategy plan is more than 1 case.	Road PPP project strategy plan *(e.g. PPP project proposal (Proyek KPBU Yang Ditawarkan) issued by PUPR on annual basis)*			
Project Purpose					
Comprehensive management capacity to implement efficient PPP toll road project is enhanced.	1. The new SOP documents are revised, at least once, for further improvement. 2. At least one FS will be prepared based on the new SOP documents. 3. At least one BOT contract will be formulated through the bidding conducted based on the new SOP documents. 4. At least one toll road project at construction stage will be monitored based on the new SOP documents. 5. At least one toll road projects under BOT contract at operation stage will be monitored based on the asset management indicator set through the Project activities.	Monitoring documents for road PPP projects	1. National policy and strategy on road development by PPP scheme will not change drastically. 2. Government finance for public portion of PPP will be secured.		

Outputs					
1. Institutional and organizational basis of Road PPP project implementation are strengthened.	1.1 SOP or a document with relevant function is newly prepared	1.1 New SOP document	Related bodies on PPP project implementation coordinate each other.		
	1.2 New SOP document is reflected to the actual business practice.	1.2.1 Staff interview and capacity assessment 1.2.2 Observation of working process and records			
2. Capacity of road PPP projects formulation is improved.	2.1 SOP or a document with relevant function is newly prepared	2.1 New SOP document			
	2.2 New SOP document is reflected to the actual business practice.	2.2.1 Staff interview and capacity assessment 2.2.2 Observation of working process and records			
	2.3 Number of formulated road PPP project based on the newly prepared SOP/manual is at least 1 case.	2.3 Record of PPP projects			
3. Capacity of road PPP project procurement is improved.	3.1 SOP or a document with relevant function is newly prepared	3.1 New SOP document			
	3.2 New SOP document is reflected to the actual business practice.	3.2.1 Staff interview and capacity assessment 3.2.2 Observation of working process and records			
	3.3 Prepared standard bidding document, including draft of contract.	3.3 Standard bidding document			
	3.4 Retention rate of standard bidding document, including draft contract preparation works.	3.4.1 Staff capacity assessment 3.4.2 Record of working process			

4. Capacity of road PPP project management and monitoring at construction stage is improved.	4.1 SOP or a document with relevant function is newly prepared 4.2 New SOP document is reflected to the actual business practice. 4.3 Number of implemented road PPP project management and monitoring at construction stage based on the newly prepared SOP/manual is at least 1 case.	4.1 New SOP document 4.2.1 Staff interview and capacity assessment 4.2.2 Observation of working process and records 4.3 Record of PPP projects			
5. Capacity of road PPP project management monitoring at O&M stage is improved.	5.1 SOP or a document with relevant function is newly prepared 5.2 New SOP document is reflected to the actual business practice. 5.3 Number of implemented road PPP project asset management based on the newly prepared SOP/manual is at least 1 case.	5.1 New SOP document 5.2.1 Staff interview and capacity assessment 5.2.2 Observation of working process and records 5.3 Record of PPP project			

Activities	Inputs		Important Assumption	Achievement	Remarks
	The Japanese Side	The Indonesian Side			
Activities for Output 1 1.1 Conduct Institutional and organizational assessment of road PPP projects (benchmarking) and identify issues. 1.2 Conduct capacity assessment of road PPP projects (benchmarking) for relevant government officers and identify issues. 1.3 Examine current financing and government support options for road PPP projects and make proposal for improvement including beneficiaries based financing related with spill over effects. Also, share the proposal among stakeholders. 1.4 Review current business process of road PPP projects (both solicited and unsolicited projects) and make revision of existing SOPs and/or development of new SOPs as necessary. 1.5 Hold a seminar, aiming to share information and knowledge obtained through the above-mentioned activities among private companies, financial institutions and other government organizations.	(a) Dispatch of Experts 1) Chief Advisor/PPP Project Management 2) Legal Affairs/contract 3) Financial Analysis/Government Support System for PPP 4) Road Policy/Road Planning 5) Traffic Study 6) Road Asset Management /Data Base 7) Intelligent Transport Systems for Toll Road Operation 8) Construction Project Management 9) Construction Quality Management 10) Training Planning 11) Project Monitoring (b) Training - Training in Japan or third country (c) Expenses necessary for local activities planned by experts.	(a) Services of MPWH's counterpart officers and administrative officers 【BPJT】 1) JCC Chairperson 2) JCC Coordinator 3) Counterpart officers 【Directorate of Freeway of DGH】 1) Counterpart officers 【Directorate of Financing System and Strategy Development of DGIF】 1) Counterpart officers (b) Suitable office space in MPWH premises with necessary equipment (c) Credentials or identification cards (d) Available data (including maps and photographs) and information related to the Project* (e) Running expenses necessary for the implementation of the Project* (f) Facilitation of visa issuance and extension for JICA experts as necessary. (g) Budget allocation for officers, operation and activities for implementation of the Project* including, personnel costs, local traveling costs and daily subsistence allowance for counterpart officers and other recurrent costs for the counterpart officers and Indonesian stakeholders. *: the Project: Project for Strengthening Management Capacity of Toll Road Development	Necessary number of counterpart officers required for continuous activities is maintained.		

Activities for Output 2
2.1 Review capacity and process of road PPP pipeline development and project formulation (such as preliminary study, OBC, FBC) and identify issues.
2.2 Develop SOP/Manuals for formulation of road PPP projects.
2.3 Provide training on PPP, including PPP general, legal, finance, risk analysis,traffic demand forecast, and technical subjects, to relevant government officers.
2.4 Conduct OJT of road PPP project formulation.
2.5 Revise SOP/Manuals customized as necessary based on OJT.
Activities for Output 3
3.1 Review capacity, existing bidding documents and process of road PPP project procurement (both solicited and unsolicited projects) are reviewed and identify issues.
3.2 Develop SOP/Manuals for procurement of road PPP projects (both solicited and unsolicited projects).
3.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.
3.4 Develop standard bidding documents, including a model concession agreement.
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3.6 Revise SOP/Manuals and standard bidding documents customized as necessary based on OJT.

Activities for Output 4
4.1 Review and confirm the current status and issues of construction management and monitoring.
4.2 Develop SOP/Manuals for construction management and monitoring.
4.3 Prepare the remediation plan of the project management and monitoring method by examination of introduction method of the pioneering project management and monitoring method.
4.4 Conduct OJT of the construction management and monitoring.
4.5 Revise SOP/Manuals as necessary based on OJT.
Activities for Output 5
5.1 Review and confirm the current status and issues of monitoring method of Minimum Standard of Service and its monitoring data.
5.2 Develop SOP/Manuals for the monitoring of Minimum Standard of Service.
5.3 Examine and establish the measurement/evaluation method, indicator/criteria and operation procedure of Minimum Standard of Service.
5.4 Examine and establish the performance evaluation procedure of asset management activity of Toll Road Operators, by reviewing necessity information for performance evaluation of asset management activity of Toll Road Operators, such as finance, demand customer satisfaction and long-term maintenance and upgrading plan, etc.

Pre-Conditions
Economic situation in Indonesia will not deteriorate significantly.
<Issues and countermesures> Once access restriction to PUPR, BPJT is lifted, JICA Consultant team should commence their on-site work activities.

5.5 Prepare the upgrade plan of the database and management system for the performance evaluation of asset management activity of Toll Road Operators.					
5.6 Conduct OJT of the performance evaluation of asset management activity of Toll Road Operators, including monitoring of Minimum Standard of Service.					
5.7 Revise SOP/Manuals as necessary based on OJT.					
5.8 Review the current status and identify issues on ITS (Intelligent Transport Systems) for Toll Road Operation.					
5.9 Prepare the proposal of basic policy and methodology for information sharing related to toll road operations with Toll Road Operators on the basis of the system requirements for traffic and facility control.					
5.10 Convene the seminars on construction management and asset management for private companies and other government organizations.					

Notes:
BPJT: Indonesia Toll Road Authority
DGH: Directorate General of Highways
DGIF: Directorate General of Infrastructure Financing

Project Design Matrix

Project Title: Project for Strengthening Management Capacity for Toll Road Development **Version 3**
Implementing Agency: BPJT, DGH, DGIF **3-Jul-24**
Target Group: BPJT, DGH, DGIF
Period of Project: 45 months (from February 2021 to November 2024)
Project Site: Jakarta, projects site(s) of case studies **Model Site:**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption	Achievement	Remarks
Overall Goal					
The PPP toll road projects are implemented in an efficient and effective way in Indonesia.	Number of Road PPP projects implementing in accordance with the road PPP project strategy plan is more than 1 case.	Road PPP project strategy plan *(e.g. PPP project proposal (Proyek KPBU Yang Ditawarkan) issued by PUPR on annual basis)*			
Project Purpose					
Comprehensive management capacity to implement efficient PPP toll road project is enhanced.	1. The new SOP documents are revised, at least once, for further improvement. 2. At least one FS will be prepared based on the new SOP documents. 3. At least one BOT contract will be formulated through the bidding conducted based on the new SOP documents. 4. At least one toll road project at construction stage will be monitored based on the new SOP documents. 5. At least one toll road projects under BOT contract at operation stage will be monitored based on the asset management indicator set through the Project activities.	Monitoring documents for road PPP projects	1. National policy and strategy on road development by PPP scheme will not change drastically. 2. Government finance for public portion of PPP will be secured.		

Outputs					
1. Institutional and organizational basis of Road PPP project implementation are strengthened.	1.1 SOP or a document with relevant function is newly prepared	1.1 New SOP document	Related bodies on PPP project implementation coordinate each other.		
	1.2 New SOP document is reflected to the actual business practice.	1.2.1 Staff interview and capacity assessment 1.2.2 Observation of working process and records			
2. Capacity of road PPP projects formulation is improved.	2.1 SOP or a document with relevant function is newly prepared	2.1 New SOP document			
	2.2 New SOP document is reflected to the actual business practice.	2.2.1 Staff interview and capacity assessment 2.2.2 Observation of working process and records			
	2.3 Number of formulated road PPP project based on the newly prepared SOP/manual is at least 1 case.	2.3 Record of PPP projects			
3. Capacity of road PPP project procurement is improved.	3.1 SOP or a document with relevant function is newly prepared	3.1 New SOP document			
	3.2 New SOP document is reflected to the actual business practice.	3.2.1 Staff interview and capacity assessment 3.2.2 Observation of working process and records			
	3.3 Prepared standard bidding document, including draft of contract.	3.3 Standard bidding document			
	3.4 Retention rate of standard bidding document, including draft contract preparation works.	3.4.1 Staff capacity assessment 3.4.2 Record of working process			

4. Capacity of road PPP project management and monitoring at construction stage is improved.	4.1 SOP or a document with relevant function is newly prepared 4.2 New SOP document is reflected to the actual business practice. 4.3 Number of implemented road PPP project management and monitoring at construction stage based on the newly prepared SOP/manual is at least 1 case.	4.1 New SOP document 4.2.1 Staff interview and capacity assessment 4.2.2 Observation of working process and records 4.3 Record of PPP projects			
5. Capacity of road PPP project management monitoring at O&M stage is improved.	5.1 SOP or a document with relevant function is newly prepared 5.2 New SOP document is reflected to the actual business practice. 5.3 Number of implemented road PPP project asset management based on the newly prepared SOP/manual is at least 1 case.	5.1 New SOP document 5.2.1 Staff interview and capacity assessment 5.2.2 Observation of working process and records 5.3 Record of PPP project			

Activities	Inputs		Important Assumption	Achievement	Remarks
	The Japanese Side	The Indonesian Side			
Activities for Output 1 1.1 Conduct Institutional and organizational assessment of road PPP projects (benchmarking) and identify issues. 1.2 Conduct capacity assessment of road PPP projects (benchmarking) for relevant government officers and identify issues. 1.3 Examine current financing and government support options for road PPP projects and make proposal for improvement including beneficiaries based financing related with spill over effects. Also, share the proposal among stakeholders. 1.4 Review current business process of road PPP projects (both solicited and unsolicited projects) and make revision of existing SOPs and/or development of new SOPs as necessary. 1.5 Hold a seminar, aiming to share information and knowledge obtained through the above-mentioned activities among private companies, financial institutions and other government organizations.	(a) Dispatch of Experts 1) Chief Advisor/PPP Project Management 2) Legal Affairs/contract 3) Financial Analysis/Government Support System for PPP 4) Road Policy/Road Planning 5) Traffic Study 6) Road Asset Management /Data Base 7) Intelligent Transport Systems for Toll Road Operation 8) Construction Project Management 9) Construction Quality Management 10) Training Planning 11) Project Monitoring (b) Training - Training in Japan or third country (c) Expenses necessary for local activities planned by experts.	(a) Services of MPWH's counterpart officers and administrative officers 【BPJT】 1) JCC Chairperson 2) JCC Coordinator 3) Counterpart officers 【Directorate of Freeway of DGH】 1) Counterpart officers 【Directorate of Financing System and Strategy Development of DGIF】 1) Counterpart officers (b) Suitable office space in MPWH premises with necessary equipment (c) Credentials or identification cards (d) Available data (including maps and photographs) and information related to the Project* (e) Running expenses necessary for the implementation of the Project* (f) Facilitation of visa issuance and extension for JICA experts as necessary. (g) Budget allocation for officers, operation and activities for implementation of the Project* including, personnel costs, local traveling costs and daily subsistence allowance for counterpart officers and other recurrent costs for the counterpart officers and Indonesian stakeholders. *: the Project: Project for Strengthening Management Capacity of Toll Road Development	Necessary number of counterpart officers required for continuous activities is maintained.		

Activities for Output 2
2.1 Review capacity and process of road PPP pipeline development and project formulation (such as preliminary study, OBC, FBC) and identify issues.
2.2 Develop SOP/Manuals for formulation of road PPP projects.
2.3 Provide training on PPP, including PPP general, legal, finance, risk analysis,traffic demand forecast, and technical subjects, to relevant government officers.
2.4 Conduct OJT of road PPP project formulation.
2.5 Revise SOP/Manuals customized as necessary based on OJT.
Activities for Output 3
3.1 Review capacity, existing bidding documents and process of road PPP project procurement (both solicited and unsolicited projects) are reviewed and identify issues.
3.2 Develop SOP/Manuals for procurement of road PPP projects (both solicited and unsolicited projects).
3.3 Provide training on PPP, including PPP general, legal, finance, risk analysis, and technical subjects, to relevant government officers.
3.4 Develop standard bidding documents, including a model concession agreement.
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3.6 Revise SOP/Manuals and standard bidding documents customized as necessary based on OJT.

Activities for Output 4
4.1 Review and confirm the current status and issues of construction management and monitoring.
4.2 Develop SOP/Manuals for construction management and monitoring.
4.3 Introduce effective and efficient project management and monitoring method in Japan.
4.4 Conduct OJT of the construction management and monitoring.
4.5 Revise SOP/Manuals as necessary based on OJT.
Activities for Output 5
5.1 Review and confirm the current status and issues of monitoring method of Minimum Standard of Service and its monitoring data.
5.2 Develop SOP/Manuals for the monitoring of Minimum Standard of Service.
5.3 Examine and establish the measurement/evaluation method, indicator/criteria and operation procedure of Minimum Standard of Service.
5.4 Examine and establish the performance evaluation procedure of asset management activity of Toll Road Operators, by reviewing necessity information for performance evaluation of asset management activity of Toll Road Operators, such as finance, demand customer satisfaction and long-term maintenance and upgrading plan, etc.

Pre-Conditions
Economic situation in Indonesia will not deteriorate significantly.
<Issues and countermesures> Once access restriction to PUPR, BPJT is lifted, JICA Consultant team should commence their on-site work activities.

5.5 Prepare the upgrade plan of the database and management system for the performance evaluation of asset management activity of Toll Road Operators.					
5.6 Conduct OJT of the performance evaluation of asset management activity of Toll Road Operators, including monitoring of Minimum Standard of Service.					
5.7 Revise SOP/Manuals as necessary based on OJT.					
5.8 Review the current status and identify issues on ITS (Intelligent Transport Systems) for Toll Road Operation.					
5.9 Prepare the proposal of basic policy and methodology for information sharing related to toll road operations with Toll Road Operators on the basis of the system requirements for traffic and facility control.					
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