

Application of WIM for Weight Enforcement

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AGÊNCIA NACIONAL DE
TRANSPORTES TERRESTRES



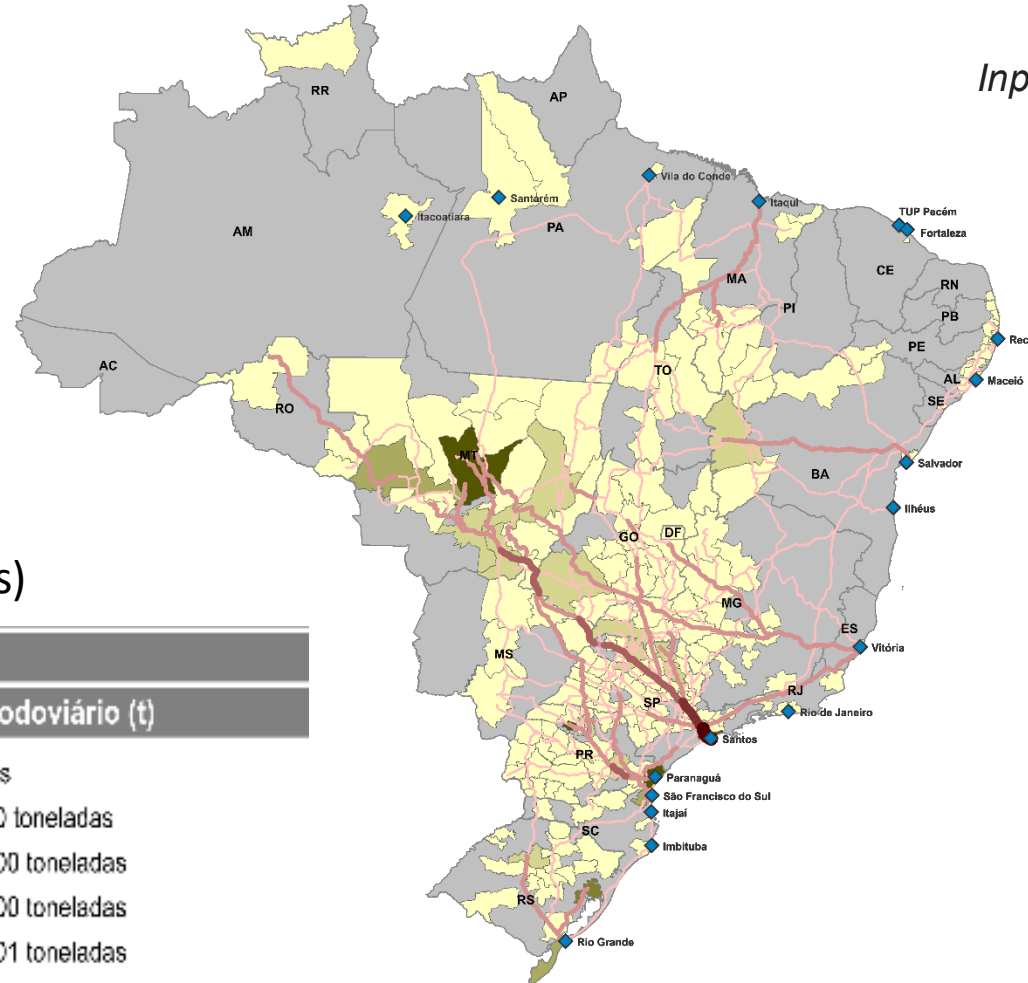
Deformação
de distensão
(contração)

Transport in Brazil

Main roadways and highways

Input - o exportation flux, ref. year 2014
Products: Sugar, Corn and Been, by grouped in microregions.
source: AliceWeb.

Volumes (tons)



Production (tons)



Application of WIM in Brazil

- ❑ Brazil has recently advanced the application of Weigh-In-Motion (WIM) technology to enforce weight regulations on federal highways.
- ❑ Two federal bodies responsible for enforcement activities:

- ❑ **National Department of Infrastructure and Transportation (DNIT)**, responsible for non-concession federal highway network



 **DNIT**
DEPARTAMENTO NACIONAL DE INFRAESTRUTURA DE TRANSPORTES

*DNIT
PIAF and UMO-D*

- ❑ **National Land Transport Agency (ANTT)**, responsible for concession federal highway network



 **ANTT**

*ANTT
HS-WIM
“Sandbox”*

Contran Resolution No. 882/2021

- ❑ Establishes the weight and dimension limits for vehicles traveling the roads of Brazil, ratifies CONTRAN Deliberation No. 246 of November 25, 2021:
 - ❑ Establishes the weight and dimension limits for vehicles and combinations subject to inspection (cargo and passenger vehicles)
 - ❑ Defines tolerance for enforcement
 - ❑ Addresses exceptions for vehicles in circulation (passenger transport, liquid cargo, AET - Special Transit Authorization, etc.)
 - ❑ Defines cargo vehicle combinations
 - ❑ Defines limits for vehicles on international trips, buses, and bi-articulated vehicles

Contran Resolution No. 902/2022

- Provides for the use of integrated automated systems for vehicle weight and dimensions enforcements, dispenses the physical presence of the traffic authority or its agent at the verification site:
 - The physical presence of the road authority or its agents in areas designated for inspection is not mandatory
 - Enforcements instruments must be subject to INMETRO inspection
 - Penalties apply for evading the weighing station
 - Penalties also apply for evading or exiting the designated weighing area
 - Violations and citations may be issued based on system records (including data and images)
 - Administrative procedures are required (GVW or/and axle overload)

- Approves the consolidated Metrological Regulation for WIM systems (both low and high speed), it includes:
 - Type approval
 - Initial and subsequent verification
 - Metrological supervision
 - Test procedure, types of vehicles

Maximum Permissible Error: GVW (Gross Vehicle Weight)

Percentagem do valor verdadeiro convencional da massa do veículo (7.6)		
Classes de exatidão	Aprovação de Modelo, verificação inicial e verificação subsequente (\pm)	Supervisão metrológica (\pm)
1	2,50%	5,00%
2	3,50%	7,00%
3	5,00%	10,00%

Maximum Permissible Error: Single Axle and Axles/Axle Groups

Percentagem da média corrigida da carga por eixo e conjunto de eixos (7.10)		
Classes de exatidão	Aprovação de Modelo, verificação inicial e verificação subsequente (\pm)	Supervisão metrológica (\pm)
A	4,00%	8,00%
B	6,00%	12,00%
C	8,00%	16,00%

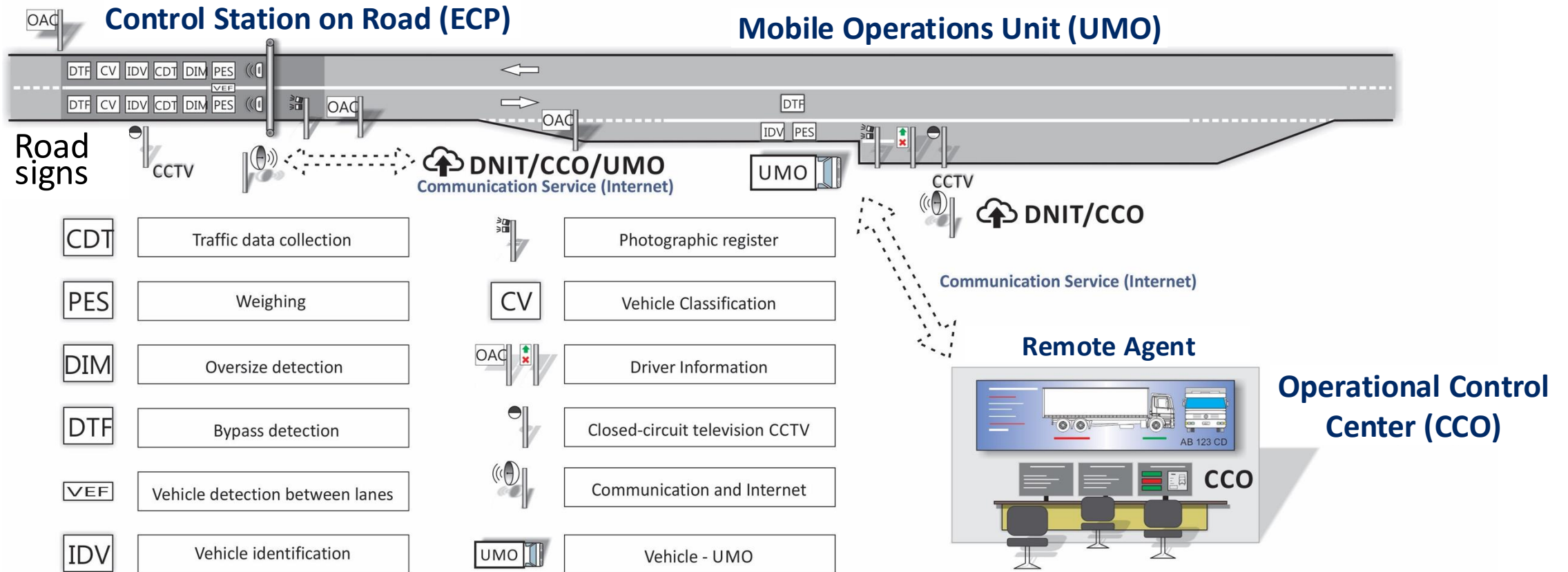
DNIT WIM Program

- ❑ DNIT has implemented the *Unidade Móvel Operacional* (UMO) program, which integrates High-Speed WIM (HS-WIM) technology with mobile enforcement units
 - ❑ Improve road safety and pavement performance on federal highways
 - ❑ Improve the performance of overload enforcement
 - ❑ Automate the pre-selection of overload enforcement
 - ❑ Optimize the activity of DNIT Traffic Agents with the help of technology
 - ❑ Allow free flow of trucks and buses without overload and reduce inspection time
- ❑ These units are equipped with both static portable scales (UMO-E) and dynamic portable scales (UMO-D), enabling versatile and mobile enforcement operations

DNIT WIM Program

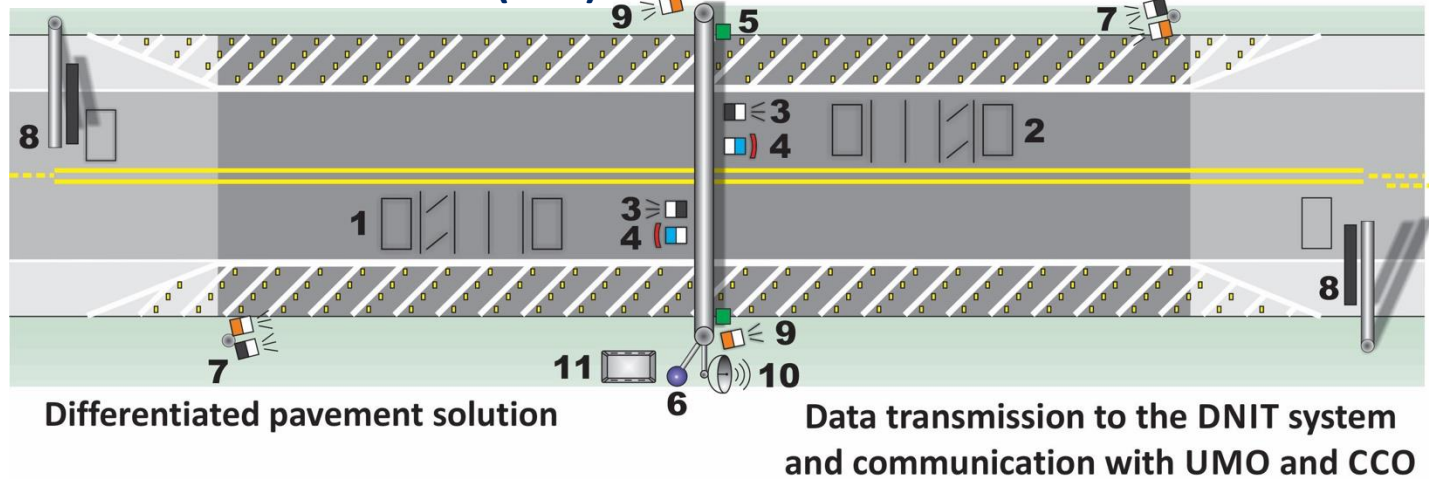
Model : HIGH-SPEED ECP, UMO and CCO

Mixed Weight Station – PPM
(Single Lane Model)



- The HS-WIM systems are certified by INMETRO

Control Station on Road (ECP)



- A 2017 national procurement led to the deployment of 15 UMO-D and 46 UMO-E across Brazil

	High performance pre-selection WIM with 4 lines, WIM Quartz or Strain Gage.
	Dimension detection, laser scanner.
	Inductive loop type presence detector, triggering devices and/or speed.
	Dual wheel and side position detector, Double WIM Polymer.
	Height detection, Laser Beam.
	Driver Orientation, VMS Variable Message Sign in Half-gantry.
	Photographic record with character reading.
	Overview photographic record, Camera.
	Closed Circuit TV, PTZ camera.
	Communication and Internet, fiber, cable, radio or GPRS
	Control System and Integration of Different Technologies.

DNIT WIM Program

- ❑ A dedicate Location Tool developed by LabTrans/UFSC was used to shouse the locations for implementing UMO
- ❑ The pavement design considered was COST-323 Class I for WIM (thick asphalt pavement)
- ❑ DNIT will provide a room for the Agents to monitor the inspection



DNIT LabTrans

Arranjoamento de Pré-Seleção 0

Plaf / Consultas

Consultas

Pré-seleção Pré-Seleção

Consultas

Lista 1 (Pré-seleção)

Plaf 1

14.01.2019

Atualização

Automática

Placa	Velocidade	Comprimento
ECM7J72	61 km/h	16,16 m

ECM7J72

42.686 kg
61 km/h
C754 (1 - 1 - 1)
6.650 - 9.380 - 27.237 kg

11.36.59

MNX703

11.798 kg
53 km/h
ONC2 (1 - 1)
4.976 - 6.788 kg

11.36.47

KK37F41

16.449 kg
56 km/h
ONC2 (1 - 1)
5.660 - 9.448 kg

11.36.52

0000000

16.589 kg
67 km/h
ONC2 (1 - 1)
5.976 - 6.708 kg

11.36.46

KJK6657

16.348 kg
54 km/h
C7 61 - 21
12.560 - 8.400 kg

11.34.36

Carregar mais resultados

Liberado

Placa: ECM7J72

Situação: 

Velocidade: 61 km/h

Comprimento: 16,16 m

Data de Pré-seleção: 03/01/2019

Classe do Veículo: C754 - Caminhão Trator - Semirreboque

Altura: 4,38 m

Largura: Não informado

11.36.59

Registros de Pré-seleção

Pré-seleção	Preço (R\$)	Taxa (R\$)	Out. (R\$)	Crit. (R\$)
PBT / PBTG	42.686	0	-	1 - 1 - 1
Grupo Eixo 1	6.650	0	0,00	I
Grupo Eixo 2	9.380	0	3,58	I
Grupo Eixo 3	27.236	0	7,48	III



Data de Consulta: 03/01/2019 11:36:19

ANTT WIM Program

- ❑ Concurrently, ANTT introduced Brazil's first HS-WIM for direct enforcement under a regulatory sandbox initiative
- ❑ In partnership with the ***Ecovias do Cerrado*** concessionaire on BR-364 and BR-365, the agency replaced four traditional weigh stations with HS-WIM systems



ANTT WIM Program

- ❑ ANTT Sandbox uses HS-WIM to direct enforcement, promoting fairness and reducing the social and environmental costs of overloaded transport



- INMETRO, as a partner in the project, tested and certified all four WIM sites in accordance with INMETRO ordinance No. 19

INMETRO verification Report	Dates
HS-WIM BR 365 km 640 Faixa 1	jun/25
HS-WIM BR 365 km 640 Faixa 2	set/24
HS-WIM BR 364 km 12 Faixa Leste	mai/25
HS-WIM BR 364 km 12 Faixa Oeste	mai/25
HS-WIM BR 365 km 649 Faixa 2	mai/25
HS-WIM BR 364 km 110 Faixa Leste	jun/25
HS-WIM BR 364 km 110 Faixa Oeste	jun/25

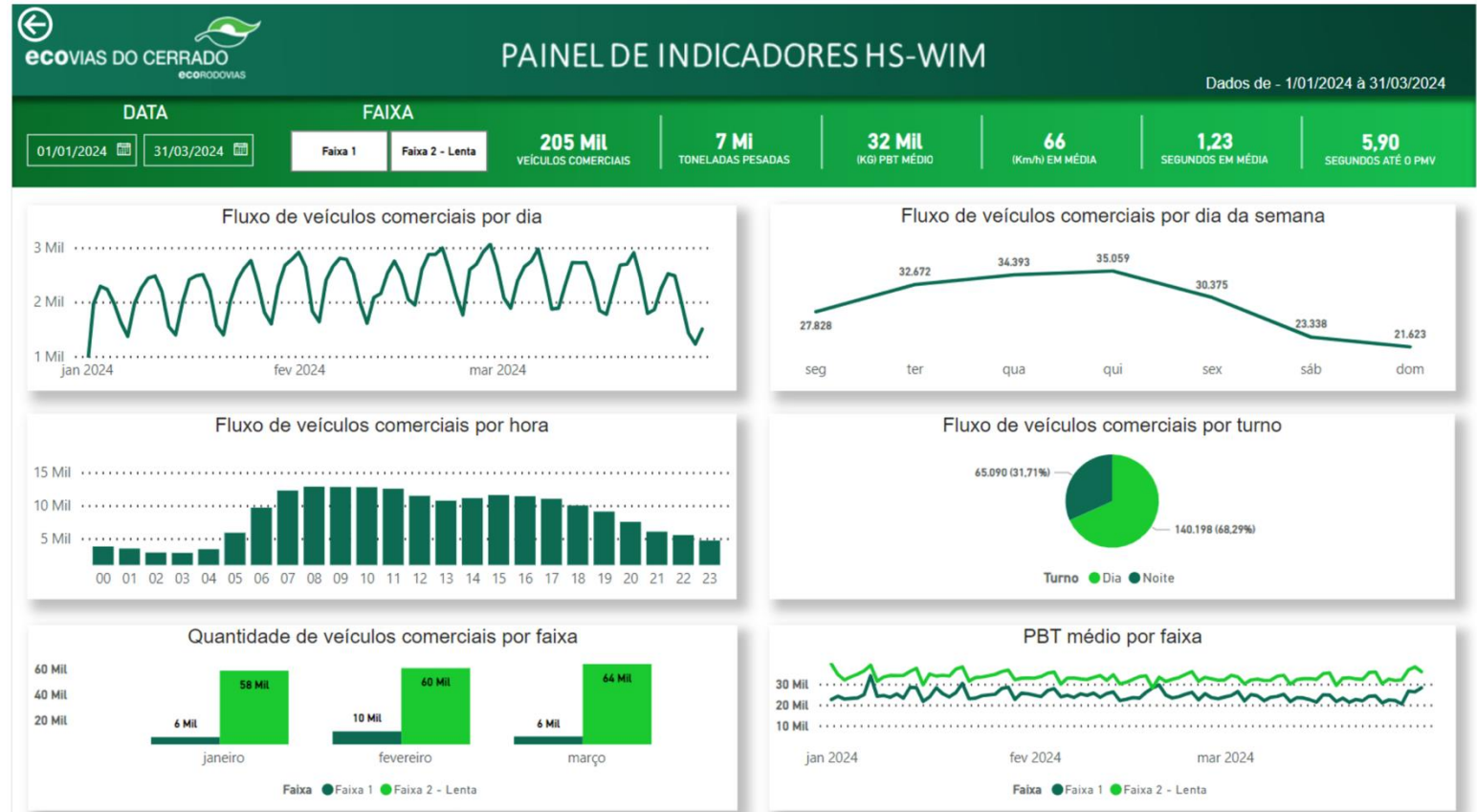
		Serviço Público Federal MINISTÉRIO DA ECONOMIA INSTITUTO NACIONAL DE METROLOGIA, QUALIDADE E TECNOLOGIA - INMETRO		
Verificação inicial, subsequente e supervisão metrológica de instrumentos de pesagem automáticos para veículos rodoviários em movimento				
Dados e Instruções		Registro de Medição IPEM-MG n° 13644455170625		
Dados do Requerente:	Razão Social: ECORODOVIAS CONCESSOES E SERVICOS S/A			
	CNPJ: 08.873.873/0001-10			
	Endereço: Rod. dos Imigrantes S/N KM 28,5 1 E 2 ANDAR	Bairro: Alvarenga		
	Cidade: São Bernardo do Campo	UF: SP	CEP: 09845-000	
	Contato: Bruno Araújo Silva	Telefone: (34)9 9935-8680	E-mail: Bruno.araujo@ecovias.com.br	
Local de instalação: Rodovia BR365 km 640 - Uberlândia-MG - Faixa 1				
Classes de Exatidão: 1	A	Parâmetros de ajuste:	** Fatores Observações	
Atividade do CML*: Verificação subsequente				
EMA (Massa do veículo):	2,5%			
EMA (Por eixo):	4%			
Nº Ident. Placa de Pesagem : 5204AC08				
**Identificação do software : 1CD1A11A / 13 de Junho de 2025 / 13:30 horas (ID Metrológico)				

Class 1A:

- 2,5% of the true value of GVW
- 4% of the axle weight

HS-WIM Dashboard – Commercial Vehicle Monitoring (Jan–Mar 2024)

Key indicators from the HS-WIM system on the *Ecovias do Cerrado* highway



KM 640 BR - 365/MG

Ecovias do Cerrado | Trimester Report | From January to Mars 2024

ANTT WIM Program

- ❑ Overloaded vehicle detections increased, reaching 17.07% of all commercial traffic in December 2024
- ❑ GVW reduces to 2,54% in Dec. 2024, while Axle increases to 5,47%

Overload type	Qty (Jul 24)	%	Qty (Oct 24)	%	Qty (Dez 24)	%
Axle only	2.821	1,50%	7.947	6,09%	13.072	5,47%
GVW only	11.880	6,50%	1.433	1,10%	6.069	2,54%
Both axle and GVW	3.505	1,90%	4.285	3,28%	21.655	9,06%
TOTAL	18.206	9,90%	13.655	10,90%	40.796	17,07%

KM 640 BR - 365/MG
Ecovias do Cerrado | Trimester Report

Conclusions

- ❑ These efforts demonstrate Brazil's commitment to modernizing freight transport regulation through innovative, scalable, and sustainable WIM technologies
- ❑ It took a long period for Brazil to implement the regulatory and technical changes needed to allow high-speed WIM for direct enforcement
- ❑ Both DNIT and ANTT are playing complementary roles:
 - ❑ DNIT, through the UMO program, deploying HS-WIM systems on federal highways
 - ❑ ANTT, through concession contracts, is incorporating HS-WIM as a contractual requirement for highway concessions
- ❑ The convergence of these two projects (ANTT and DNIT) are improving road safety, reducing pavement damage, and enhancing transport efficiency

*Thank you !!!
Baie dankie!*

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