

# Bridge Traffic Simulation and Fatigue Monitoring Report

Report Generated on April 27, 2025, 03:50 PM

## Live Traffic Snapshots

	timestamp	Fatigue Score	Estimated Density	Live Shockwave Speed
2025-04-27 15:50:47.682234	20.0	0.2	-23.08	
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## Simulation Summary

- Fatigue Score Stats → Min: 96.65 | Max: 103.32 | Mean: 99.88 | Std Dev: 1.46
- Shockwave Speed Stats → Min: -84.60 m/s | Max: 76.83 m/s | Mean: -4.22 m/s

## Random Forest Model Metrics

- R<sup>2</sup> Score: 0.836
- MAE: 0.49
- RMSE: 0.59

## Feature Importance

	Feature	Importance
initial_density		0.372468
shockwave_speed		0.247819
alpha		0.232580
v_max		0.085497
sensor_interval		0.061636

## Vehicle Composition

Vehicle Type	Percentage
Cars	80.0%
Trucks	15.0%
Buses	5.0%

## Initial Traffic Simulation Settings

- Input Density: 0.15
- Lane 1 Initial Density: 0.10
- Lane 2 Initial Density: 0.10
- Lane 1 Max Speed: 80 km/h
- Lane 2 Max Speed: 80 km/h
- Jam Induced Lane 1: No
- Jam Induced Lane 2: No
- Frozen Lane 1: No
- Frozen Lane 2: No
- Structural Alpha: 0.00005

## Predicted Maintenance Recommendation

**Predicted Fatigue Score:** 100.42

**Safety Status:** Safe Operation