

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

- R² 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