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Innovation Report

Company

EGIS Infrastructure Management Kazakhstan

Author(s)

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Contents

Project Description

BAKAD – Big Almaty Ring Road

Importance : First and the one road O&M project managing by private sector in Kazakhstan

O&M Contract : 15 years 10 months (until 2038) – *started 26th June 2023*

Scope :

- ITPS (Intelligent Transport Payment System) O&M
- M&E Systems O&M
- Traffic Management
- Routine Maintenance
- Winter Maintenance
- RFID Tag Distribution
- Project Call Center

Total Length : 66 km Motorway (52,5km 2x3, 13,5km 2x2)

Features : 7 Interchanges, 12 Free-Flow Toll Collection (32 lanes), Designated with ITS equipment, 1 OMC and 1 Satellite Salt Depot

EXECUTIVE SUMMARY

Innovation Maturity Level: High,Commercial Solutions can be purchased -> (7-8)

Name of the innovation

Secondary Power Supply for ITS Equipment Using a Cell System

Images

Project Manager(s) Ali Ayaz

Project Team: EIMK M&E Team

Activity: Road

O&M themes: ITS Supervision

Target Beneficiaries: Both

Description of the context (problem to be solved):

In the event of an electricity outage, ITS equipment — including traffic monitoring cameras — becomes non-operational.

Description of the solution:

The cell-based backup system can keep the ITS equipment operational for up to 48hrs. In total 60 ITS roadside cabinets are equipped with a fully autonomous 48 V DC power and monitoring system that ensures high reliability for on-site devices.

Technical prerequisites (to set up the solution)***:***

Dedicated space for the secondary cabinet installation for cell-system, compatibility with ITS power specifications.

Costs & Savings

Main Benefit: Other

Comments:

No intervention required in case of electricity outage.
Performance criteria are met, and customer claims are solved.

Investment (Total €):	193,000.00€
Set up Costs	193,000.00€
Licence Costs	000000.00€
Savings (Total €): Every year	250,000.00€
Maintenance Cost	100,000.00€
Performance Criteria Penalties	100,000.00€
Customer Claims	50,000.00€

Key Partner(s): CellSystem, KZ

Partner description Cellsystem.kz

Intellectual property: Design Rights

Results

It is already implemented only for traffic monitoring cameras. Thanks to this secondary energy supply, all traffic monitoring cameras are continuously working up to 48 hours in case of electricity outage.

Next steps

Actions:

In next step, it can be implemented for other ITS equipment such as VMS, VTS, etc.

Is it Populated/Published No

Innovation hub (link): Insert your information here

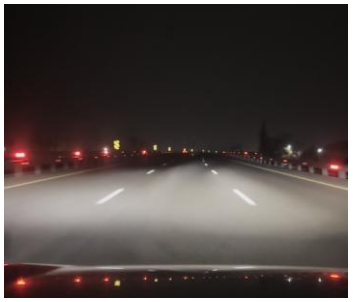
EXECUTIVE SUMMARY

Innovation Maturity Level: High,Commercial Solutions can be purchased -> (7-8)

Name of the innovation

Solar-Powered LED Flashing Cat-Eye Reflectors on Guardrails

Images



Project Manager(s) Mustafa Zandarov

Project Team: EIMK TS & Maintenance Team

Activity: Road

O&M themes: Incidents management

Target Beneficiaries: Operations

Description of the context (problem to be solved):

In low-visibility conditions such as night-time, fog, and winter weather, standard reflective elements on guardrails become difficult for drivers to detect, increasing the risk of accidents. This solution helps to improve visibility.

Description of the solution:

Solar-powered LED flashing cat-eye reflectors installed on guardrails provide continuous, automatic illumination without external power. They enhance driver visibility and road delineation by flashing in low-light conditions, improving safety with minimal installation and maintenance.

Technical prerequisites (to set up the solution)***:***

Exposure to sunlight, suitable mounting surface, weather-resistant fixing material

Costs & Savings

Main Benefit: Other

Comments:

Increased visibility of the edge of the road, positive impact to decrease the number of accidents at critical sections

Investment (Total €):	17,000.00€
Set up Costs	17,000.00€
Licence Costs	000000.00€
Savings (Total €):	250,000.00€
Maintenance Cost	100,000.00€
Performance Criteria Penalties	100,000.00€
Customer Claims	50,000.00€

Key Partner(s):

Partner description -

Intellectual property: Design Rights

Results

Solar LED reflectors provide additional warning at dark and critical sections on motorway. Thanks to this, number of accidents are decreased and therefore, cost of traffic management and maintenance cost are also decreased.

Next steps

Actions:

It is already implemented solution. It can be installed other critical sections which will be determined during operation of the motorway.

Is it Populated/Published Select an item.

Innovation hub (link): Insert your information here

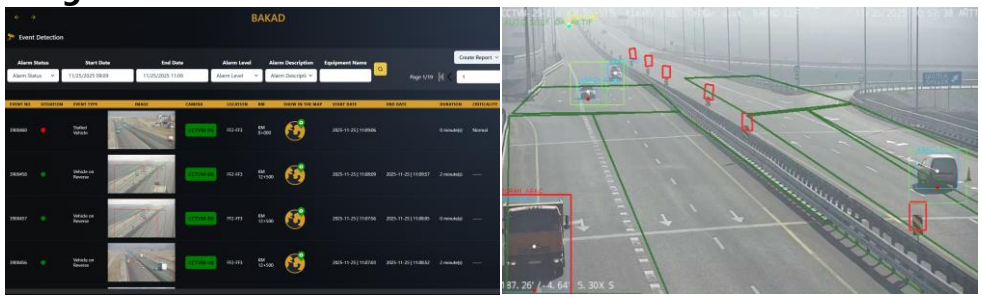
EXECUTIVE SUMMARY

Innovation Maturity Level: High,Commercial Solutions can be purchased -> (7-8)

Name of the innovation

Incident Detection with Traffic Monitoring Cameras

Images



Project Manager(s) Ali Ayaz

Project Team: EIMK M&E Team

Activity: Road

O&M themes: ITS Supervision

Target Beneficiaries: Operations

Description of the context (problem to be solved):

Continuous, reliable monitoring is essential for high-speed motorways, to detect abnormal events early and ensure rapid operator response. OASIS is a software for this purpose and selected for BAKAD.

Description of the solution:

OASIS software uses machine learning and camera analytics to detect incidents like stopped vehicles, wrong-way driving, pedestrians, animals, and hazards, sending instant alerts to operators.

Technical prerequisites (to set up the solution)***:***

High-quality cameras, stable power and network, sufficient lighting, and server/edge computing resources for AI processing and integration.

Costs & Savings

Main Benefit: Time Savings

Comments:

Detecting incidents and accidents in real time while eliminating the human factor.

Investment (Total €):	50,000.00€
Set up Costs	30,000.00€
Licence Costs	20,000.00€
Savings (Total €):	150,000.00€
Maintenance Cost	50,000.00€
Performance Criteria Penalties	50,000.00€
Customer Claims	50,000.00€

Key Partner(s): Intetra, TR

Partner description intetra.com.tr

Intellectual property: Copyright

Results

Insert your information here

More than 95% of incident can be detected by this integrated software and most of incidents can be automatically detected.

Next steps

Actions:

It is already implemented solution. It can be developed to warn the operator with pop-up type alarm system which can be occurred on the videowall in control room.

Is it Populated/Published No

Innovation hub (link): Insert your information here

EXECUTIVE SUMMARY

Innovation Maturity Level: High,Commercial Solutions can be purchased -> (7-8)

Name of the innovation

Rainwater Harvesting

Images

Project Manager(s) Ali Ayaz

Project Team: EIMK M&E and Road Maintenance Team

Activity: Road

O&M themes: ESG

Target Beneficiaries: Operations

Description of the context (problem to be solved):

All rainwater in the OMC facility can be collected and used for routine maintenance activities.

Description of the solution:

All rainwater in the OMC facility is directed to an underground reservoir and, after filtration during the summer season, transferred to the water tanks dedicated to the brine production units, which are not in use during summer. The collected rainwater is used for various activities under routine maintenance works.

Technical prerequisites (to set up the solution)***:***

All drainage system of the OMC is connected to the underground depot. Therefore, it is necessary to make small investment by installing pipes and small pump to transfer the water.

Costs & Savings

Main Benefit: Costs savings

Comments:

With a very small investment, rainwater can be collected and used for maintenance works that require water.

Investment (Total €):	1,000.00€
Set up Costs	1,000.00€
Licence Costs	000000.00€
Savings (Total €):	50,000.00€
Water consumption	50,000.00€
-	000000.00€
-	000000.00€

Key Partner(s): in house solution

Partner description -

Intellectual property: No Intellectual Property

Results

Sustainable water source, reduced operational cost, environmental impact reduction, maintenance efficiency, operational resilience.

Next steps

Actions:

It is already implemented solution and in next step additional depots can be considered.

Is it Populated/Published No

Innovation hub (link): Insert your information here

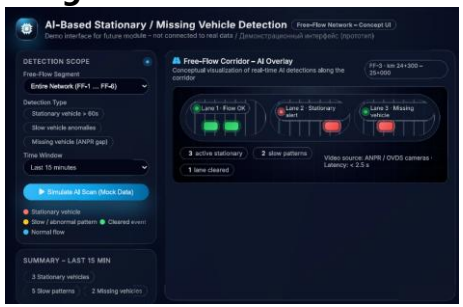
EXECUTIVE SUMMARY

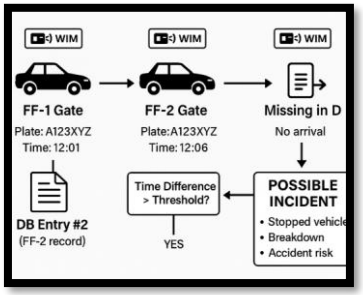
Innovation Maturity Level: Medium, Testing Stage, not available in the market -> (4-6)

Name of the innovation

AI-Based Detection of Stopped Vehicles on the Free-Flow Network

Images





Project Manager(s) Ali Ayaz

Project Team: EIMK M&E Team

Activity: Road

O&M themes: Incidents management

Target Beneficiaries: Operations

Description of the context (problem to be solved):

The BAKAD motorway operates as a high-speed, free-flow corridor where stopped or slow-moving vehicles create severe safety risks and potential secondary accidents. An automated system is required to ensure real-time awareness and faster reaction times.

Description of the solution:

The solution uses AI-powered video analytics integrated with existing CCTV cameras to automatically detect stopped or abnormally slow vehicles on the motorway.

Technical prerequisites (to set up the solution)***:***

Existing CCTV infrastructure with sufficient coverage, stable power and network connectivity to transmit continuous video streams.

Costs & Savings

Main Benefit: Other

Comments:

Real time detection on blind spots, faster reaction, improved traffic management.

Investment (Total €):	000000.00€
Set up Costs	000000.00€
Licence Costs	000000.00€
Savings (Total €):	250,000.00€
Maintenance Cost	100,000.00€
Performance Criteria Penalties	100,000.00€
Customer Claims	50,000.00€

Key Partner(s): in house solution

Partner description -

Intellectual property: No Intellectual Property

Results

Stopped vehicles detected within seconds instead of minutes, higher situational awareness in the TCC, especially during low-visibility or nighttime conditions, data logs that support trend analysis, safety reporting, and long-term safety improvements.

Next steps

Actions:

Pilot deployment along a selected section of BAKAD to validate detection accuracy, fine-tuning of AI detection thresholds based on traffic patterns and field observations.

Is it Populated/Published No

Innovation hub (link): Insert your information here

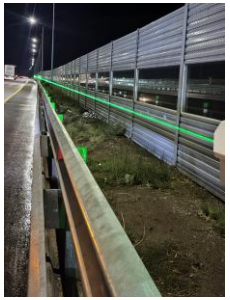
EXECUTIVE SUMMARY

Innovation Maturity Level: High,Commercial Solutions can be purchased -> (7-8)

Name of the innovation

Laser Beacon System for Fog-Prone Areas

Images



Project Manager(s) Ali Ayaz

Project Team: EIMK M&E and Road Maintenance Team

Activity: Road

O&M themes: Incidents management

Target Beneficiaries: Operations

Description of the context (problem to be solved):

Motorways in fog-prone areas face drastically reduced visibility, making it difficult for drivers to distinguish the road edge and stay within the safe corridor.

Description of the solution:

Laser Beacon Systems consist of laser light devices mounted on poles mechanically connected to guardrail posts along the road. These devices project a continuous or pulsed laser line onto/along the guardrail, visually marking the road edge so drivers can follow a clear guidance line even under low-visibility fog conditions.

Technical prerequisites (to set up the solution)***:***

Optical & safety design, power & control, infrastructure to install devices.

Costs & Savings

Main Benefit: Other

Comments:

Provides clear visual guidance to drivers during fog, significantly improving road-edge visibility, reduces the likelihood of accidents in low-visibility situations.

Investment (Total €):	5,000.00€
Set up Costs	5,000.00€
Licence Costs	000000.00€
Savings (Total €):	250,000.00€
Maintenance Cost	100,000.00€
Performance Criteria Penalties	100,000.00€
Customer Claims	50,000.00€

Key Partner(s): Project Nanotech, KZ

Partner description -

Intellectual property: No Intellectual Property

Results

It is implemented at KM.36-38 section where was identified most fog-prone section. This system increased visibility of road edges during fog events.

Next steps

Actions:

Evaluate laser intensity, alignment, and performance in real fog conditions, integrate with weather and visibility sensors for automated activation, plan a phased rollout to all identified high-risk fog zones.

Is it Populated/Published No

Innovation hub (link):