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South-Eastern Finland
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Business case “Intelligent transport systems”

Saint Petersburg State University of Architecture and Civil Engineering (SPbGASU)

Expert board:

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Age group: students of secondary professional education





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General information about the business case

Creation of an intelligent transport system on the "Scandinavia" road section

- Highway A-181 (E-18) "Scandinavia" is a section of the road connecting Russia with Finland. The road passes through St. Petersburg, Vyborg, and ends at the Torfyanovka checkpoint. Refers to state highways of federal importance. A-181 is part of one of the main routes of the international Asian network - AH8 - from the border of Finland to Iran; and the European route E18, which combines motorways with sea traffic from Northern Ireland to St. Petersburg.
- The road was built according to the standards of the II category and had only 2 traffic lanes with a width of 3.75 m each, many intersections at one level. Since the beginning of the 2000s, the traffic intensity on the A-181 "Scandinavia" highway has increased 3 times. The road has ceased to cope with the flow of vehicles and there is a need for its reconstruction. Due to a large number of trucks, the lack of dividers, low light on the road, tragic accidents regularly occur. Residents called the route "the road of death".



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General information about the business case

Creation of an intelligent transport system on the "Scandinavia" road section

- The reconstruction of the road began at the beginning of 2015 on the section from 44 to 65 km. It was planned to fully complete the work carried out in two stages by the fall of 2019. However, the contractor completed them 10 months ahead of schedule. The federal road using crushed stone-mastic asphalt concrete was expanded to six lanes of 3.75 m each. Transport interchanges, two overpasses, about 40 culverts, an elevated pedestrian crossing were built, a bridge over the Sestra River was reconstructed, barrier fences were installed, and noise protection screens were installed in the residential area; the track was also equipped with an outdoor lighting system.
- Currently, reconstruction is underway on the section from 65 to 100 km. After the reconstruction of the road, the number of lanes will increase from two to six, the roadbed will be expanded from 15 to 35 m. In addition, it is planned to reconstruct four interchanges in two levels, build three overhead pedestrian crossings, and install lighting and automated traffic control systems throughout the section.



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Creation of an intelligent transport system on the "Scandinavia" road section

In the future, the A-181 will be equipped with a modern intelligent transport system (ITS) and rightfully called a “smart road”. Thanks to the information partnership between Russia and Finland, using mobile services and applications, drivers will be able to cross the border with detailed information about the traffic situation, weather conditions, traffic jams, and transfer hubs. Also, a part of cash payments for tourists and transport companies will be transferred online to a non-cash basis.

For more information, please follow the links:

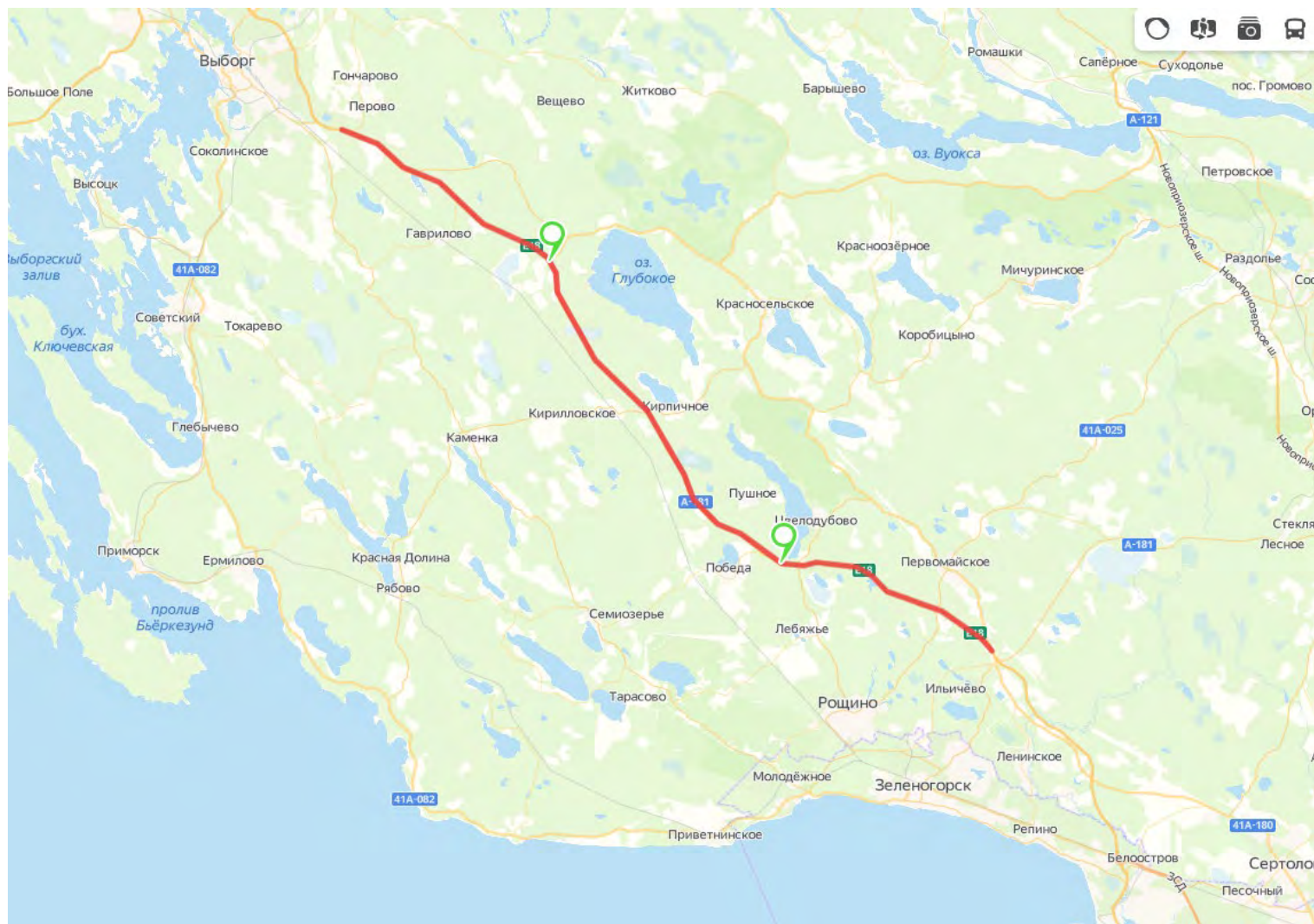
- <http://nwroads.ru/rekonstrukciya-skandinavii/>
- <https://avtorosdor.ru/trassa-a181-skandinaviya/>

as well as on the Internet at the request of “Scandinavia Highway”, “Reconstruction of the “Scandinavia” Highway.



General information about the business case

Reconstructed section of the "Scandinavia" highway





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Intelligent transport systems

- An intelligent transport system is a control system that integrates modern information and telematic technologies and is designed for automated search and acceptance for implementation of the most effective scenarios for managing the transport and road complex of a region, a specific vehicle, or a group of vehicles to ensure given mobility of the population, to maximize indicators of road use. network, increasing the safety and efficiency of the transport process, comfort for drivers and users of transport (Intelligent Transport System, ITS). (GOST R 56829-2015 Intelligent transport systems. Terms and definitions).
- An intelligent transport system (ITS) provides for the integration into a single hardware and software complex of existing and future information and control systems in transport, automation, and centralization of the collection, transmission, and processing of information about the functioning and current state of all components of transport systems, the exchange of this information, its delivery, both to the participants in the transport process, and to the management structures, and use in the automatic and automated mode when optimizing all transport processes.



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Intelligent transport systems

Due to its complexity, coverage of many areas of transport activities, the development of ITS contributes to the solution of a variety of problems characteristic of transport systems in modern conditions.

Innovate experience

Currently, ITS is beginning to be actively implemented in the construction and reconstruction of highways and high-speed roads in Russia and abroad.

Examples of such highways are:

- road M-11 Moscow - St. Petersburg,
- "Western High-Speed Diameter" in St. Petersburg,
- sections of the E-18 highway, which were reconstructed in Finland.



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Intelligent transport systems

Tasks for the development of ITS on the high-speed road A-181 (E-18) "Scandinavia"

To create a modern ITS that provides a solution to the entire range of traffic control tasks on a high-speed road with a high level of comfort and traffic safety, full information support for traffic participants. When creating an ITS, provide for the possibility of using separate sections of the road for testing autonomous ("unmanned") connected vehicles, and in the future, the movement of autonomous connected vehicles along with it.

In particular, the solution of the following main tasks must be ensured:

- traffic flow control while driving;
- highway entrance control;
- management of the transport and operational state of the highway;
- control and management of the transportation of special cargo.



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Intelligent transport systems

Tasks for the development of ITS on the high-speed road A-181 (E-18) "Scandinavia"

Requirements for traffic management on highways:

- the need to maintain the continuity of movement;
- maintaining a speed limit corresponding to the status of the road;
- accounting for meteorological conditions;
- automated detection of congestion, road accidents, queues;
- automated control of entrances;
- allocation of lanes for the movement of special vehicles, convoys, etc .;
- control and management of the transportation of special cargo.



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Statement of the problem

Preparation of proposals for the development of ITS on the reconstructed section of the A-181 (E-18) "Scandinavia"

1. Determine the set of functions performed by the ITS.
2. Determine the composition of ITS peripheral equipment.
3. Arrange ITS peripheral equipment.
4. Give proposals for the introduction of innovative technologies.
5. Conduct an expert assessment of the expected functional effects from the implementation of LITS.



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Materials for solving the problem

Materials for solving the problem (given to all teams at the first meeting):

1. Presentation of a lecture on the ITS course “ITS on highways”
2. GOST R ISO 14813-1-2011. Intelligent Transport Systems. Scheme of building the architecture of intelligent transport systems. Part 1. Service domains in the field of intelligent transport systems, service groups and services.
3. Evstigneev I.A. Fundamentals of the creation of intelligent transport systems on the federal highways of Russia. M. 2016.
4. Drawings of tender documentation for the reconstruction of the road section, km 65 - 100.
5. *At the request of the participants, other GOSTs on ITS can be provided.*



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Business case solution format

- 6-8 PowerPoint presentation slides.
- The total time for the presentation of the case should not exceed 10 minutes.