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MODERNIZATION OF THE LOCAL ROAD NETWORK IN BĂNIȚA COMMUNE, HUNEDOARA COUNTY

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ted the modernization process of the local road network in n the context of sustainable rural development. However, the al conditions and natural resources of the area pose specific modernization, as well as in ensuring the long-term durability re, road infrastructure plays a critical role in the economic accessibility, safety and quality of life. The project is made urveys and technical design solutions in accordance with verw made five road sections and vicinal streets, totaling 7. ational road DN 66 (E79) was modernized. Works included ruction of the road structure, foundation stabilization with stormwater drainage installation, implementation of safety over the Crevedia stream. Also, it was done the rehabilitation ibute to the economic development of the area, to stimulate y.

odernization, technical design, geotechnical study, rural ent, socio-economic growth.

esents a fundamental element for the sustainable uring mobility, accessibility, and a high quality of life. al roads has a direct impact on economic, social, and the reduction of disparities between urban and rural environments.

Site Description

The commune of Bănița is located in the Western Region of Romania, within Hunedoara County, in an entirely mountainous area with an average elevation exceeding 600 meters and slopes steeper than 20%. The total area of the commune is 78.16 km², classifying it among the medium-sized communes.

The commune is composed of three main villages: Crivadia, Merișor, and Bănița, all traversed by the national road DN 66 (E79).

- Crivadia is the settlement located at the lowest altitude.
- Merișor is the middle settlement, featuring a higher number of households.
- Bănița is the largest and lies at the highest elevation.

The analyzed road network totals 7,192 meters and consists of five streets and local access roads connected to DN 66 (E79). All these roads belong to the public domain of the commune and are administered by the Bănița Local Council. Due to their inadequate technical condition, and in accordance with standards NE 021-2003 and CD 155-2001, the urgent modernization of the infrastructure is required.

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ocation of Bănița Commune

County is predominantly mountainous, covering
Bănița Commune is part of the mountainous zone of
, with altitudes ranging between 500 and 800 meters.
ural drainage towards the Bănița stream.

temperate-continental climate, with an average annual
ild winters, and moderate summers without excessive

between 600–1000 mm.

- The design temperature is −18°C for winter and +22°C for summer.
- The reference wind pressure is 0.4 kPa, while the snow load is 1.5 kN/m².

Geology and Seismicity

The Bănița Commune is located in a low-seismicity area (grade 6 on the macroseismic scale). The soil is stable, with no significant risk of major landslides. According to Normative P100-1/2013, the design ground acceleration (ag) is 0.10 g, and the control period (Tc) is 0.7 seconds.

Utility Networks and Connections

During construction works, all utility networks (water supply, sewerage, gas, and electricity) will be protected. The commune is road-connected via DJ 666 (Vulcan – Merișor) and DN 66 (E79), providing direct access to the cities of Petroșani, Hațeg, Hunedoara, Deva, and other important urban centers.

Additionally, the area is traversed by the CFR Main Railway Line 202, which includes three stations: Crivadia, Merișor, and Bănița.

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MATERIAL AND METHODS

Technical Characteristics and Specific Parameters of the Investment

The local roads analyzed in this documentation fall under importance category C (normal importance) and importance class III (medium), in accordance with Law no. 10/1995 on Construction Quality and Government Decision no. 766/1997.

[redacted]egal requirements regarding:

[redacted]d stability under static and dynamic loads;

[redacted]tal protection.

[redacted]tment, five main roads and streets in Bănița Commune [redacted]characteristics:

Table 1

[redacted] and Specific Parameters of the Investment

[redacted]Crividia	Vicinal Road Merisor DN66-Sipot	DN66 Street-Firma	Vicial Road Crividia DN66 Station CFR Crividia
[redacted]75 m	990 m	1,872 m	535 m
[redacted]	V	[redacted]	V
[redacted]0 m	3,50 m	4,00 m	3,5 m
[redacted]0 m	4,50 m	5,00 m	4,5 m
[redacted],50 m	2 x 0,50 m	2 x 0,50 m	2 x 0,50 m
[redacted]km/h	25 km/h	25 km/h	25 km/h

[redacted]vestment Implementation

The project's objective is the modernization of the local road network in Bănița Commune, with all proposed works designed in compliance with Normative NE 021-2003, which defines the technical quality requirements for road infrastructure.

The main construction works include:

- Excavation and preparation of the road foundation;
- Scarification and re-profiling of the carriageway;
- Laying and compaction of ballast and crushed stone layers;
- Application of an asphalt concrete pavement (BAPC 16 type);
- Construction of a rainwater collection and drainage system;
- Embankment stabilization and slope protection;
- Construction of a new bridge at km 0+039 on the Crivadia DN 66 – CFR Crivadia Station local road, crossing the Crevedia Stream.

The new bridge will feature a reinforced concrete prefabricated beam superstructure, 12 meters in length, ensuring continuity of traffic along the local road.

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In parallel, rehabilitation works will be carried out on the existing bridge on "DN 66 – Crivadia Street," with a total length of 17 meters. This bridge currently exhibits surface deterioration of the wooden deck and safety railings, while maintaining its structural stability. According to STAS 2924-91, only the damaged elements will be replaced to bring the structure up to current technical standards.

[redacted]

s will be performed by authorized personnel using
he activity will take place in the presence of the
ased on the site plans, longitudinal profiles, and cross-
cumentation. This stage is essential for ensuring the
ion and the compliance with the project's design

s and Materials

ng the executed works and materials lies entirely with
sure proper storage, guarding, and preservation of all
struction period.

ective measures shall be implemented:
eterioration;

work areas;

conditions and unauthorized access.

ut within the built-up area of Bănița Commune, site
t difficulties. Temporary facilities will be arranged for:

of personnel;

on activities.

The excavated soil will be transported and leveled in areas designated by the beneficiary, avoiding accumulation near the roadway. The contractor is obliged to comply with environmental protection regulations, minimizing the impact on soil, water, and air. Upon completion, an ecological restoration of the construction site will be performed.

The contractor shall take all necessary measures to protect adjacent properties, public utilities, and existing infrastructure (fences, poles, cables, road signs, etc.), while also reducing dust and noise emissions.

Occupational Safety and Health Regulations

All works will be carried out in compliance with the occupational safety and health standards, as stipulated by the following legislative acts:

- Government Decision no. 300/2006 – Minimum safety requirements for temporary or mobile construction sites;
- Law no. 319/2006 – Occupational safety and health;
- Government Decision no. 1048/2006 – Personal protective equipment;

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- Government Decision no. 1051/2006 – Manual handling of loads;
- Government Decision no. 1091/2006 – Minimum requirements for workplaces;
- Government Decision no. 1146/2006 – Use of work equipment;
- [redacted] eneral fire prevention and firefighting regulations.

[redacted]

ON

[redacted]

al access roads are public property of Bănița Commune cil/City Hall.

cludes five sectors, totaling 7,192 meters, all connected irect access to households and public facilities such as etery, cultural center, playground, and the CFR railway

ccess route to the hamlets or areas of Rusești, Crivadia,

npacted gravel surfaces; narrow and irregular road); medium-to-steep longitudinal gradients; absence or ictured intersections; lateral accesses obstructing water ctures.

21-2003 and CD 155-2001 standards ⇒ urgent need for

ll be maintained within the public domain limits, with a g to STAS 863-1985.

In mountainous terrain, minimum or recommended curve radii will be applied. On sections with geometric or spatial constraints, exceptional design provisions will be implemented in accordance with OMT 1296/2017, Chapter 5, allowing localized width reductions without compromising traffic safety.

Table 2

Capabilities adopted

Name road	L [m]	Roadway width [m]	Surface [m²]	City
Str. DN 66 – Rusești	2.720	3,5	9.911	Bănița
Str. DN 66 – Crivadia	1.075	4	5.656	Crivadia
DV Merișor DN 66 – Șipot	990	3,5	3.730	Merișor
Str. DN 66 – Firma	1.872	4	7.805	Bănița
DV Crivadia DN 66 – Stația CFR	535	3,5	1.850	Crivadia
Total	**7.192**	—	**28.952**	—

For single-lane roads with two-way traffic, passing bays will be provided at intervals of no more than 300 meters, in compliance with AND 582-02.

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b) Longitudinal Profile

The road sections are located in mountainous terrain, characterized by medium to steep longitudinal gradients. In certain areas, slopes may exceed the usual limit of 7%, while maintaining vertical curve transitions compliant with a design speed (Vp) of 25 km/h.

Reference parameters:

[redacted] m (exceptionally 25 m);

[redacted] eptionally 9%);

[redacted] : concave – 300 m, convex – 500 m.

[redacted] ane configuration (3.50–4.00 m) with two shoulders of [redacted] 296/2018 (rural road standards).

[redacted] inantly mixed (short cut and fill sections).

[redacted] geway), 4% (shoulders)

[redacted] flexible pavement solution (PD 177-01), consisting of [redacted] ollows:

[redacted] – 6 cm;

[redacted] carification/reprofiling of existing gravel).

[redacted] tion local road (weak existing gravel foundation):

[redacted] – 6 cm;

- Ballast 20 cm;
- Formation layer 20 cm (coarse stone block).
- Shoulders: ballast 20 cm thick, 0.50 m wide, with stabilization near protected drainage ditches.
- Verification parameters include CALDEROM 2000 (115 kN), fatigue, and freeze–thaw resistance, as per STAS 1709/1-2.

e) Drainage System

Works include reprofiling and cleaning of roadside ditches, installation of concrete-lined channels, weep holes (barbacanes), and culverts with a minimum diameter of 600 mm, which will be repaired or replaced as required. In intersections and access areas, paved gutters will be provided.

On DN 66 – Rusești Street, a prefabricated reinforced concrete frame culvert type P1 (length 6 m, span 1 m) will be constructed at km 1+630.

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At the railway underpass (km 1+994–2+010), the stream channel will be enclosed using prefabricated concrete frames with retaining walls (H = 1.40 m) to ensure clearance and roadbed protection.

Concrete classes are in accordance with NE 012/1-2007 and CP 012/1-2007.

f) Bridges

[redacted]on Local Road — NEW BRIDGE

[redacted]ng the Crevedia Stream

[redacted]h 12.00 m)

[redacted]oncrete girders with bonded tendons, type G⊥52-12,

[redacted]ncrete deck slab (C25/30),

[redacted] C25/20 – 6.20×2.50×2.50 m; elevation C25/30 –

[redacted] concrete (BAP 16).

[redacted]

- Curbs and pedestrian parapets;
- Approach ramps with the same pavement structure as the road.

Bank protection:

- Gabion walls, H = 3.00 m, with upstream and downstream lengths as per detailed drawings.

2) DN 66 – Crivadia Street — EXISTING BRIDGE

- Location: km 0+317–0+334
- Length: 2 × 8.50 m

Structure: reinforced concrete substructure, metal deck (IPE 450) with deteriorated wooden deck and damaged parapet.

Planned interventions:

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- Replacement of the deck with a double-layer oak timber solution (structural and wearing layers) in accordance with STAS 1349-78.

- A new oak parapet will be installed, consisting of a handrail, 1.20 m vertical posts, horizontal rails, and bracing members.

[redacted]achieved through dry underpinning (as per NP 103-04), [redacted]mm, as detailed in the project documentation. During [redacted] will be provided to ensure a dry working environment.

[redacted] the bridge will be 3.50 m, with oak wheel guards

[redacted]gabions in good condition will be maintained, while [redacted] slope instability or bank erosion poses a risk, ensuring

[redacted]y Roads

[redacted]led using the same pavement structure as the main road, [redacted] STAS 10144/3-1991, OMT 1296/2017, and OMT

[redacted]to intersections with DN 66 (E79) and DJ 666.

[redacted]w, with no heavy vehicle circulation.

[redacted]ce evenness and load-bearing capacity were below

[redacted]ge will comply with SR 1848/1-3,7, using 15 cm

[redacted]ND 593-2012, including semi-rigid metal guardrails, [redacted]ing bays every ≤300 m (AND 582-2002).

k) Materials

Only approved construction materials will be used, in accordance with Government Decision no. 766/1996 and Law no. 10/1995, harmonized with EU standards.

l) Quality Control

Quality assurance will follow the designer's control program and technical specifications, with final acceptance in accordance with Government Decision no. 1303/2007 and Standard C56-2002.

CONCLUSIONS

The modernization project for local roads in Bănița Commune has produced direct and measurable improvements in mobility and quality of life.

Accessibility and connectivity between the component villages have been substantially enhanced, facilitating the daily movement of people and goods, and improving integration with major transport networks (DN 66, DJ 666).

The benefits for residents include:

- Reduced transportation costs,

- Improved road safety,
- Faster access to public services,
- Encouraged private investment,
- [redacted]and agricultural activities.

[redacted]d careful financial management and close coordination [redacted]munity, overcoming the challenges inherent to the [redacted]traints.

[redacted]was prioritized: technical solutions and materials were [redacted]ility principles, ensuring both the resilience of the [redacted]natural environment.

[redacted]lity, it is recommended to:

[redacted]iodic maintenance program (for ditches, culverts, [redacted]

[redacted]itoring of road safety and drainage efficiency;

[redacted]rnization works to the remaining road segments.

[redacted]nsolidate the achieved outcomes and support the [redacted]mune in the long term.

[redacted]019). Possibilities of using the UAV photogrammetry in the [redacted]dastral documentation.
[redacted] INFRASTRUCTURII RUTIERE – CNAIR. (2021). Raport anual [redacted]rumurilor publice. București: CNAIR.
[redacted]Planul de dezvoltare județeană 2021–2027. Deva.
[redacted]ADERMACHER, L. (2019). Îndrumar de proiectare și aplicații [redacted]Petroșani: Editura Universitas. ISBN 978-973-741-653-7.
[redacted]e de arhitectură – Îndrumător de laborator. Petroșani: Editura Universitas. ISBN 978-973-741-356-7.
EUROPEAN COMMISSION. (2020). EU rural development and infrastructure: Policy overview 2021–2027. Brussels: Publications Office of the European Union.
HERBEI, M., & SALA, F. (2016). Classification of land and crops based on satellite images Landsat 8: case study SD Timisoara.
HERBEI, M. V., HERBEI, R. C., & RADULOV, I. (2015). Topology of spatial data. International Multidisciplinary Scientific GeoConference: SGEM, 2(2), 1175-1181.
ISTRATE, M., & DINU, R. (2017). Dezvoltarea infrastructurii de transport rutier în mediul rural din România. Revista de Transporturi și Infrastructură, 12(3), 45–58.
LUPU, D. (2016). Drumuri și poduri: Elemente de proiectare și execuție. Iași: Editura Performantica.
MINISTERUL TRANSPORTURILOR. (2019). Normativ privind proiectarea și executarea drumurilor de interes local – AND 540-2019. București: Editura MT.
NISTOR, C. M. (2022). Explozivi industriali. Petroșani: Editura Universitas. ISBN 978-973-741-846-3.
NISTOR, M. C. (2014). Căi de comunicații – Îndrumător de laborator. Petroșani: Editura Universitas. ISBN 978-973-741-373-4.
NISTOR, M. C. (2014). Căi de comunicații – Note de curs. Petroșani: Editura Universitas. ISBN 978-973-741-372-7.
POPESCU, I., & GEORGESCU, A. (2018). Ingineria drumurilor: proiectare, construcție și întreținere. București: Editura Matrix Rom.

http://doi.org/10.59463/RJAS.2025.3.12

ŞMULEAC, A., POPESCU, C., BĂRLIBA, L., CIOLAC, V., & HERBEI, M. (2017). Using the GNSS technology tothicken geodesic network in Secaș, Timiș county, Romania. Research Journal of Agricultural Science, 49(3).