

ZRMK INSTITUT

Gradbeni inštitut ZRMK

Building and Civil Engineering Institute

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2009

2012

2020

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Gradbeni inštitut ZRMK

Building and Civil Engineering Institute

Gradbeni inštitut ZRMK (Building and Civil Engineering Institute ZRMK) celebrates its 60th anniversary. Despite the great changes in organisation, human resources and other areas, ZRMK has throughout all these years pursued the basic tasks outlined in 1949 according to the company's development and economic needs. These tasks involve research work, technological development and applications in civil engineering and construction material sector.

Today ZRMK, organized as a holding company, connects several companies and is the legal successor of the Building and Civil Engineering Institute Ljubljana established in 1949. The core of the group is Gradbeni inštitut ZRMK (GI ZRMK), today a modern and a development-oriented institute, operating in the field of materials, constructions, the indoor environment, building physics, energy in buildings, geotechnics, engineering geology, traffic routes and infrastructure.

We play the role as the leading technological institute in the field of construction by performing the activities which presents the continuation of the ZRMK tradition within the fields of research and development, the acquisition and dissemination of knowledge and also new developments within the construction industry. On the basis of participation in national and international projects we have established connections with numerous partners and institutions within Slovenia and in Europe.

We realize that personnel and their knowledge is what enables the growth of professionalism and business development of the Institute. GI ZRMK employs 60 highly educated and specialised experts in various fields and of various orientations, who in addition to construction research and development also perform professional tasks such as in-depth analyses and expert studies, expert technical and technological consulting and engineering services, including design and revisal of plans, construction supervision and quality related tasks in construction. The Institute employs seven employees holding doctorates in science, ten employees holding masters degrees in science, a few dozen university graduates in engineering, and other experts operating in seven centres involved in different activities and are also based at the Maribor Business Unit.

We invest continuously in our employees' knowledge. Currently, 13 employees are enrolled in postgraduate studies, of whom eight are taking doctorate studies and five in taking masters studies. We actively participate in various expert events and thus follow innovations and development orientations in the industry and at the same time ensuring that such forms of knowledge is transferred to construction practices.

We have been successfully co-operating in numerous domestic and international projects under various programmes: Intelligent Energy – Europe, 7th Framework Programme, COST, EUREKA, etc.

We offer business partners comprehensive solutions for complex non-standard problems. In the past decade, we participated in nearly all the highly demanding and prominent construction projects in Slovenia; in the construction of infrastructural facilities, such as railways, motorways, hydrotechnical structures, new housing and industrial developments, as well as public, office and residential buildings and also engineering works. As part of our work ethic we use state-of-the art software and research equipment.

We participate in the construction of the Slovenian motorway cross, where we are the provider of geological and geotechnical research, we provide quality control of earthworks, road construction, asphalt coating, cement concretes and damp proofing and perform other tasks in the field of construction, maintenance and renovation of transport and public infrastructures.

We possess extensive experience and are highly qualified for crisis engineering in eliminating the consequences of natural disasters affecting buildings and the natural environment, such as earthquakes, floods, landslides and storms. We are specialised in the restoration of older buildings, particularly those with demanding facilities, i.e. in the renovation and strengthening of architectural heritage buildings, and in the design and implementation of antiseismic protection for older buildings. We proved this by completing the post-earthquake restoration in the Posočje region after the earthquake in 1998, which received the highest recognitions both from general public and those involved in the profession itself.

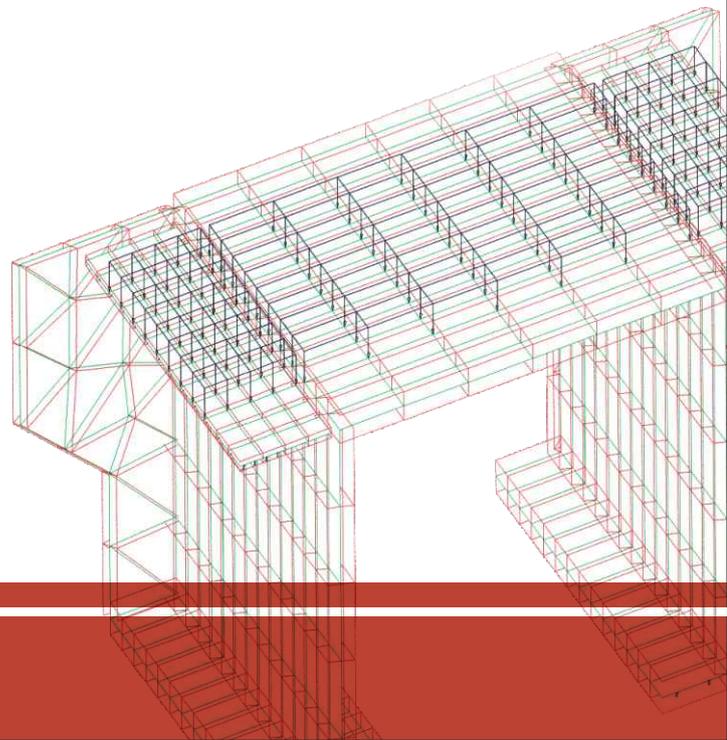
A special professional challenge is the introduction of efficient ways to use energy in buildings and related environmental protection, wherein we conduct demanding and highly specialised research, developmental and professional tasks in environmental assessment and the sustainable construction of buildings, building physics, thermal response and the energy performance of buildings, low-energy and passive houses.

An important segment of our work is aimed at construction quality – quality assurance and certification, analysis and tests, consulting engineering, dissemination of good construction practices, as well as the acquisition and forwarding of new and up-coming knowledge. A special project, which has been on-going for 16 years, is the quality assessment of products and services within construction and awarding of the Quality Mark in Civil Engineering.

We are committed to long-term co-operation with our customers, professionalism and the highest quality of our products and services, timely implementation and fostering within the internal culture of the company. To this end we have been developing a modern management and quality assurance method with the introduction of the ISO 9001 standard. We are independent and impartial!

Our past comprises of over 60 years of work, extensive knowledge and numerous successful projects, whereas our future brings new challenges and also new opportunities.

Igor Janežič, univ. dipl. inž. grad.
President of the Management Board



Centre for Materials and Constructions

The Centre for Materials and Constructions deals with research, analyses, development and design of all forms of building structures and engineering facilities it studies the characteristics of construction materials and develops new materials and methods. The Centre's activity encompasses also the design of demanding construction details related to damp proofing and the thermal insulation of buildings.

We are specialised mainly in demanding facilities and tasks as well as in the renovation and reconstruction of older buildings. We possess extensive experience in the restoration of architectural heritage sites and in the design and implementation of antiseismic protection of older buildings. Within the scope of these activities, we conduct research and development projects in the field of construction materials and structures, examine structures and materials and provide diagnostics for facilities by determining the status of load-bearing constructions and materials. In co-operation with other centres of the Institute, we prepare comprehensive programmes for building renovations.

We possess extensive experience and are highly qualified for crisis engineering in eliminating the consequences of natural disasters afflicting buildings, such as earthquakes, floods, landslides and storms.



Service Range

RESEARCH AND DEVELOPMENT

- Constructions and renovations of buildings
- Materials and technologies for construction

STATIC AND SEISMIC ANALYSIS AND PROPOSALS FOR CONSTRUCTION REINFORCEMENT

- Producing studies, analyses and expert opinions on material-technical and construction status of facilities and on causes of damage
- Implementing the most demanding static and seismic analyses, determining and assessing the actual load-bearing capacity and seismic resistance of existing buildings with guidelines for strengthening
- Preparing proposals, concept solutions and studies for static and earthquake resistance strengthening, as well as construction and technical measures related to the durability and reliability of structures
- Engineering, design, control, super control

DESIGN AND TECHNICAL CONSULTING

- Design reconstructions and renovations of all types of structures by means of the latest methods and materials available and the related technical consultation methods for solving demanding construction detail designing and consulting with regards to earthquake resistance strengthening measures
- Detail design and consulting on earthquake resistance strengthening measures
- Revising plans for all forms of civil engineering structures
- Inspecting and designing of flat and slanted roofs, façades and other building envelope structures

ANALYSES AND EXPERT OPINIONS

- Opinions on material-technical and construction status of facilities and on the causes of damage
- Determining and assessing the actual load-bearing capacity and seismic resistance of existing buildings with guidelines for reinforcement
- Opinions on the quality of materials and construction

TECHNOLOGICAL SOLUTIONS AND CONSULTING

- Formulating technological solutions
- Consulting on the use of special construction materials and procedures

QUALITY CONTROL AND MONITORING

- Testing and assuring the quality of construction materials and procedures
- Control and super control over renovations works
- Control inspections of construction and engineering works
- Monitoring the impact on facilities next to construction sites

Projects of the Centre for Materials and Constructions

RESEARCH AND DEVELOPMENT

- FP7 Perpetuate, „Performance-based approach to the earthquake protection of cultural heritage in European and Mediterranean countries”(2010-2013)
- FP7 Trans-IND, “New Industrialised Construction Process for Transport Infrastructures Based on Polymer Composite Components” (2009-2013)
- CRP MIR M4-0207 –Production and Demonstration of the Model for Planning the Preservation of Art-Historic Heritage in War, financed by the Ministry of Defence (2007-2009)
- Design of the quality monitoring system for maintenance works on national roads, client: DRSC (2007)
- FP6 e-NVISION – A new vision for the participation of European SMEs in the future e-Business scenario (2006-2008)
- Basic research project MHEST: Study on efficiency of advanced methods for the rehabilitation of masonry buildings (2001-2004)
- Implementation of the DRSC strategic development project: Methodology for monitoring the quality of implemented works (2004)

POST- EARTHQUAKE RESTORATION OF THE POSOČJE REGION

- Post – earthquake restoration of the Posočje region: engineering, design, control

STATIC AND SEISMIC ANALYSIS AND PROPOSAL FOR CONSTRUCTION REINFORCEMENT

- Static and seismic analysis of numerous buildings of public importance and of trade buildings: National Gallery Ljubljana, the Government of the RS building, Zavarovalnica Triglav Insurance Company, Globus Kranj, Maximarket Ljubljana, Secondary School of Trade and Commerce Ljubljana, Gimnazija Nova Gorica
- Static and seismic analysis and the project for reconstruction of cultural heritage buildings: St. Peter's Church in Ilirska Bistrica, Church of Minorite Monastery in Maribor, Žiže Monastery, arch of the Ljubljana Cathedral, Coronini Mansion in Šempeter pri Gorici, Brežice Castle, Snežnik Castle, Goričane Castle, Turjak Castle, Minorite Monastery MB, Vipolže Villa, Rajhenburg Castle, St. Anton's Church in Kobarid
- Projects for the reconstruction of foreign protocol representative offices: the building of the Embassy of the Federal Republic of Germany in Ljubljana, the residence of the British Embassy in Ljubljana
- School buildings: Borovnica, Šentvid, Ig, Oplotnica, Tomaj, several schools in Ljubljana and Maribor
- industrial facilities: Merkur Kranj, Krka Novo mesto, Energetika Ljubljana, Sežana treatment plant, Tovarna dušika Ruše

EXPERT OPINIONS

- Expert opinion on fire-proof plaster at the Šentvid Tunnel in Ljubljana
- Expert opinion on the Puh Bridge in Ptuj
- Expert opinion on the status of facilities of GP Trojane with proposals for rehabilitation and cost estimate 2007

PROJECTS FOR RENOVATION OF PLATFORMS AND FAÇADES

- Platform and façade of Maximarket Ljubljana, platform of the building on Slovenska c. 54-58

CONTROL INSPECTIONS OF FACILITIES

- Regular and main inspections of facilities on regional roads in Slovenia, managed by the DRSC
- Regular inspections of facilities on motorways and other facilities in Slovenia, managed by DARS
- Monitoring impact of the Markovec Tunnel excavation on buildings and surfaces above

TECHNICAL AND TECHNOLOGICAL SOLUTIONS

- Monolithic thin-layered non-shrinkable concrete pavement in the monolithic single-stroke application 10,000 m² – NOTOL Krka
- Technology of implementation and supervision over concreting of 38 cm thick monolithic floor concrete slab of 7,000 m² in two phases only, SUPERNOVA OBI, Koper
- Development and technological project for producing façade panels from polymer-modified concrete – Hotavlje
- Technological solutions in the construction of the Celje – Tremerje central treatment plant
- Super control over renovation works for restoring the façade of the Bavarski dvor multi-storey building,
- Technological solutions and consulting on the construction of the Aqualand pool complex

Centre for the Indoor Environment, Building Physics and Energy

Our research and development work encompasses the efficient use of energy and related environmental protection, building physics, thermal response of buildings, renewable energy sources, microclimate in residential, public and cultural heritage buildings, indoor comfort, environmental assessment and sustainable construction and also the renovation of buildings. We are introducing new and innovative technologies and approaches to efficient energy use and renewable energy sources within buildings and to their technical and environmental assessment.

An important part of our activities is related to co-operation with ministries, governmental bodies and other public institutions with respect to the preparation of national technical regulations (rules, guidelines and standards) on the construction of buildings and on the efficient use of energy.

We support designers, investors and building owners in the planning of passive and nearly-zero energy buildings, in preparation of project documentation on building physics and efficient energy use for construction and renovation, and in the identification of causes for defects and damage related to building physics problems.

The Centre has been continuously involved in projects through various international programmes: Intelligent Energy Europe, 6th and 7th Framework Programme, COST, EUREKA, and others.



Service Range

RESEARCH AND DEVELOPMENT

- Transposition of the EPBD directive into Slovenian legislation (cooperation with Ministries on the drafting of rules, guidelines, and standards)
- Development of green procurement criteria for the public and private sector
- Development of low-carbon and sustainable construction indicators
- Assessment of technical quality and sustainability of buildings
- Transfer of new technologies, materials and approaches for the efficient use of energy in buildings into national construction practices
- Monitoring and control of microclimate parameters for preventive conservation of cultural heritage buildings
- Energy efficiency in cultural heritage buildings

ENSVET – Energy Advisory Scheme for the General Public, since 1993



NON-DESTRUCTIVE INSPECTIONS AND MEASUREMENTS

- Infrared thermography of buildings, building details and mechanical and electrical installations
- Airtightness inspections: Blower door tests, anemometer
- Monitoring of microclimate conditions (temperature and relative humidity levels) and CO₂
- Contact measurements of moisture within building structures

SOFTWARE ANALYSES AND SIMULATIONS

- Simulations of temperature phenomena within buildings; thermal bridges and details (PHYSIBEL)
- Water vapour diffusion
- Hourly simulation of thermal response of buildings under real conditions; energy use and indoor comfort assessment (IDA, WUFI PLUS)
- Life cycle costs analyses (LCC)
- Environmental assessment of buildings based on life cycle analyses (LCA) and environmental product declarations (EPD) of construction materials
- Passive house planning and assessment (PHPP)

EXPERT OPINIONS AND STUDIES

- Building physics reports on efficient use of energy
- Studies on energy use, thermal protection and protection against moisture; compliance of project plans with specified regulation requirements
- Design, optimisation, construction and installation of building structural components and products
- Damage and deterioration related to building physics: moisture, condensation and mould
- Thermal bridges and airtightness
- Biogenic defects on building exterior surfaces
- Insulation and shading of buildings

Projects of the Centre for the Indoor Environment, Building Physics and Energy

SELECTED PROJECTS FROM INTERNATIONAL AND NATIONAL RESEARCH AND DEVELOPMENT PROGRAMMES

7th Framework Programme (FP7)

- OPEN HOUSE, CLIMATE FOR CULTURE



Intelligent Energy Europe (IEE)

- **Support to the transposition of the Energy Performance of Buildings Directive:** Concerted Action EPBD I, II and III, ENFORCE, TABULA, DATAMINE, Sentro, BUDI, E-Tool, BUILD UP Skills, E-seaP, Come2CoM
- **Green procurement:** Energy Labels, Green Labels Purchase, Buy Smart, Buy Smart+
- **Energy renovation of existing buildings – consulting and planning:** REFURB, EffCoBuild, SErENADE, ClearSupport, AFTER
- **Low-energy construction, new approaches to design:** KeepCool II, Coolregion, LCC DATA
- **Efficient use of energy in social housing:** EI-Education, SHARE
- **Efficient use of energy in households:** Energy Neighbourhoods2, YAECI
- **Contemporary technologies in public lighting (ESOLi) and transport (CleanDrive)**

COST Programme

- COST C25 – Sustainability of Constructions, COST C23 – L – Cube



National research

- CRP L2-0873 – Optimised approach to planning of sustainable measures for the preservation of historical and architectural heritage buildings, 2008-2010
- Comparative analysis of thermal comfort parameters and life-cycle costs analysis, client: CBS Institute, 2006

SELECTED ENERGY AUDITS (EA), FEASIBILITY STUDIES AND LOCAL ENERGY CONCEPTS (LEC)

- EA: primary schools in the Municipalities of Ormož and Domžale, selected public buildings in the Municipalities of Gornja Radgona and Pivka, multi-apartment buildings in the Municipality of Jesenice, Dobrna health resort buildings, the buildings of the Jožef Stefan Institute in Ljubljana and Podgorica, selected buildings of the University Rehabilitation Institute and the old Pediatric Clinic in Ljubljana
- Feasibility study for the comprehensive energy renovation in passive technology and plans for two buildings of the Manko Golar Kindergarten in Gornja Radgona
- LEC: Municipalities of Trebnje, Kamnik, Gorenja vas – Poljane, and Ljubljana

ENERGY PERFORMANCE CERTIFICATION OF BUILDINGS

- Pilot energy performance certificates for over 100 private and public buildings
- Drafting of rules on the methodology of construction and the issuance of building energy certificates
- Training of independent experts for the energy certification of buildings by appointment of the appropriate Ministry



DRAFTING OF NATIONAL TECHNICAL RULES AND GUIDELINES

- Rules on Thermal Insulation and Efficient Energy Use in Buildings (2002)
- Rules on Minimum Technical Requirements for Residential Buildings for Temporary Purposes (2003)
- Rules on Distribution and Calculation of Costs of Heat in Residential and Other Buildings with More than One Consumer (2003)
- Rules on Protection of Buildings Against Moisture (2004)
- Rules on Maintenance of Apartment Buildings and Apartments (2004)
- Rules on Day lighting of Buildings (2004)
- Rules on Energy Performance of Buildings (2007)
- Rules on Methodology of Construction and Issuance of Building Energy Certificates (2007)
- Guidelines for Renovation and Replacement of Windows in Cultural Heritage Buildings (2008)

Centre for Geotechnics and Geology

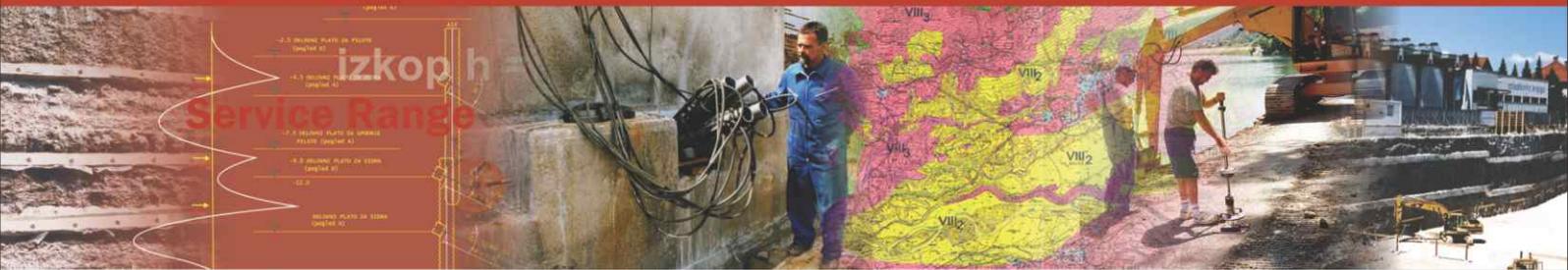
The Centre for Geotechnics and Geology is engaged in research and development, expert analyses and appraisals, and also technical and technological consultations. We deal with geological-geotechnical research and field measurements as well as design and prepare geomechanic reports covering the following expert areas:

- engineering geology
- hydrogeology
- geomechanics
- monitoring equipment, construction products
- engineering facilities
- research and rehabilitation of landslides
- geotechnical field measurements
- quality control and monitoring

We are involved in specific tasks related to civil engineering, geology and ecology during the different phases of construction of new facilities and facility rehabilitation. We take part in extensive and demanding projects, such as the construction of infrastructural facilities: railways, roads, and hydrotechnical facilities, the development of new residential and industrial built-up areas, as well as the construction of individual business, residential, and engineering facilities.

We possess extensive experience and are highly qualified for crisis engineering in eliminating the consequences of natural disasters afflicting facilities, such as earthquakes, landslides and floods.

The Centre links civil engineering, geology and other related disciplines. We use modern research methods and contemporary information technologies.



Service Range

RESEARCH AND DEVELOPMENT in geotechnics, geology and hydrogeology

GEOLOGICAL-GEOTECHNICAL AND HYDROGEOLOGICAL RESEARCH

- Motorways, main roads and regional roads
- Construction and reconstruction of railway routes
- Hydrotechnical facilities

HYDROGEOLOGICAL REPORTS

- Water permits for drinking and technological water
- Heating purposes, geothermal wells
- Risk analysis for water pollution and pollutant transportation and hydrogeological modelling

GEOMECHANICAL REPORTS

- Defining conditions for foundations of new construction and restoration of buildings and civil engineering structures
- Protection of deep excavations
- Rehabilitation of landslide risk areas
- Rehabilitation of waste disposal sites and landfills

DESIGN AND TECHNICAL CONSULTING

- Geotechnical constructions – foundations
- Protection of deep excavations
- Rehabilitation of landslide risk areas and waste disposal sites
- Reviews the geological and geotechnical reports for projects with regard to landslides

FIELD MEASUREMENTS AND MONITORING

- Inclinommetrical, piezometrical, geodetic and geophysical measurements
- Monitoring water leakage from dams (earth, concrete)
- Geotechnical (eurocode 7) measurement for determining soil characteristics (load bearing capacity, density, shear..)
- Quality control of earthworks and geotechnical works

MEASUREMENTS EQUIPMENT, CONSTRUCTION PRODUCTS

- Representation and technical consulting for geotechnical and structural monitoring equipment
- Research, production, technical consulting, sales of ground anchors CA-TI ZRMK

Projects of the Centre for Geotechnics and Geology

RESEARCH AND DEVELOPMENT

- Upgrading of existing information system for subsoil data in the area of Municipality of Ljubljana

GEOLOGICAL-GEOTECHNICAL RESEARCH

- Motorways, main roads and regional roads in Slovenia: motorways A5 Maribor - Pince, Lešnica - Kronovo, Pluska - Hrastje, Šentvid - Koseze, Podtabor - Naklo, Kozina - Klanec-Srmin, Arja vas - Trojane - Blagovica, Razdrto - Vipava, Draženci - Gruškovje
- Construction and reconstruction of the railway routes Pragersko - Hodoš and Divača - Koper
- Hydrotechnical facilities at the Vrhovo HPP, Moste HPP, Hydro Power Plant on the Soča river
- Solid waste landfill of Bukovžlak by Celje
- Hazard mapping of geologically conditioned processes for the Municipality of Jesenice

HYDROGEOLOGICAL RESEARCH AND STUDIES

- For EU project Income (Life+), Novi Klošter castle, business building Bisol, solid waste landfill Bukovžlak...
- For approving exportation license of geothermal water for the Municipality of Zagorje
- Monitoring of groundwater flow and leakage for the Blanca hydropower plant

GEOMECHANICAL REPORTS

- Civil and structural engineering facilities for Krka (Novo mesto), Tuš shopping centres, Spar shopping centres
- Protection of deep excavation for Dimičeva 16 (Ljubljana) building
- Rehabilitation of landslide areas on the motorway Razdrto - Vipava, landslide Stože
- Defining foundation conditions for new buildings in the earthquake active area of Posočje

DESIGN AND TECHNICAL CONSULTING

- Geotechnical constructions Krka (Novo mesto), protection of deep excavations: business building Stekleni dvor (Ljubljana), Pediatric clinic Ljubljana
- Rehabilitation Acroni and Barje landfill
- Reviews for geological - geotechnical report and elaborates on landslide rehabilitation as a result of heavy flooding

FIELD INVESTIGATIONS

- Investigations with static cone penetrometer (SIST EN ISO 22467-1:2005, SIST EN ISO 22467-12:2005) and super heavy dynamic penetrometer (SIST EN ISO 22467-2:2005) for the second railways Divača - Koper and Pragersko - Hodoš, the motorway Draženci - Gruškovje
- Inclinomeric measurements for the motorways: Razdrto - Vipava, Spodnja Senarska - Cogetinci, Kornovo - Lešnica and the second railway Divača - Koper
- Ground penetrating radar (GPR) measurements on the Pluska - Hrastje motorway and the second railway Divača - Koper

MONITORING

- Monitoring of surface and buildings above the Trojane, Mačkovec and Markovec tunnels
- Geotechnical, hydrogeological and technical monitoring impacts of the underground garage construction at Kongresni trg (Ljubljana), reconstruction of the extension of the SNG Opera (Ljubljana)
- Quality control of earth and geotechnical works on hydropower plants, structural buildings, infrastructure (pipelines, waterways, sewage), landfills
- Water leakage monitoring of the earth dam at the Blanca hydropower plant

MEASUREMENT EQUIPMENTS, BUILDING PRODUCTS

- Representation, technical support and installation of measurement equipment RocTest, SMartec, Telemac (HPP Blanca, railway embankment Metlika, ...)
- Development, production, technical support, designing and sales of geotechnical anchors CA - TI ZRMK

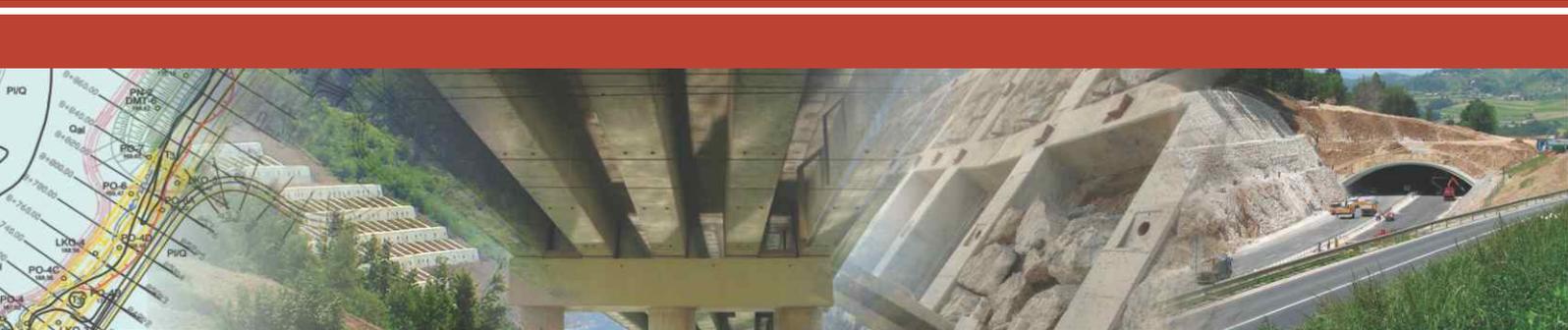
Centre for Traffic Routes and Infrastructure

At the Centre for Traffic Routes and Infrastructure we are dealing with:

- Research and development, studies, analysis and expertise within the field
- Provision and quality control (field and laboratory testing and measurement)
- Design, technical and technological advice
- Construction supervision in building (construction), maintenance and renovation of transport and public infrastructure

We are independently producing or collaborating in the production of expert documents for the preparation of strategic plans for the transport infrastructure development, manufacture of the research study and technical expert reports in order to increase economic efficiency and the quality of construction, extension of life span, increasing the safety and usefulness of expanded transport infrastructure and reducing negative environmental impacts and use of energy.

We actively participate in the construction of the motorway network (DARS), state roads (DRSC), hydroelectric power plants on the lower Sava river (INFRA, HESS). For investors, we perform external quality control of earthworks, pavement construction, cement concrete, pipes, facilities inspections, waterproofing, geosintetics and stone lining. In addition to the external quality control of works on state and local roads, we also carry out construction supervision for our investors. We also conducted an internal quality control and expert advice to a contractor.



Service Range

RESEARCH AND DEVELOPMENT

In the areas of traffic infrastructure, development of research manufacturing and development projects aimed at increasing economic efficiency and quality construction, durability and improvements to the safety and usefulness of the transport infrastructural system as a whole

QUALITY CONTROL AND CONSTRUCTION SUPERVISION

- Internal/external quality control on different pavements (roads, railways, airports) and public infrastructures
- Construction supervision with an external quality control of materials, construction products and the execution of works
- Representing investors in managing investments, i.e. consulting engineering
- Technical and technological advice and quality assurance in the construction of roads
- Preparation of expert opinions, analyses and expert assessments on the status of existing main roads with an estimate of the status and reasons for damage and deterioration

DESIGN AND TECHNICAL CONSULTING

- Design project documentation on roads
- Elaborate /pavement design with review of the existing road and laboratory investigations
- Making recovery documentation for roads
- Monitoring of roads and infrastructure
- Assessment of damage to pavements using methodology MSI
- Strategy for road maintenance using methodology HDM-4
- Expert analysis and opinions

OTHER

- Participation in the making of strategic plans for the development of road, rail and motorway networks
- Technical analysis and testing of construction materials and execution of works
- Preparation of environmental impact studies for the construction and use of roads and traffic studies of energy efficiency as a basis for strategic decisions on transport infrastructure development
- Participation in elaboration of standards, technical legislation and building codes

Projects of the Centre for Traffic Routes and Infrastructure

RESEARCH AND DEVELOPMENT

Preparation and production of research and development projects in the field of stone materials, asphalt and concrete, with the aim of increasing economy and quality construction, durability and improvements to the safety and usefulness of the transport infrastructural system

QUALITY CONTROL AND CONSTRUCTION SUPERVISION

- External quality control for DARS, the investor on highway sections in the Republic of Slovenia
 - motorway Lešnica - Kronovo
 - motorway Maribor - Lenart, III. stage
 - motorway Lenart - Spodnja Senarska, I. stage
 - motorway Lendava - Pince, part B
 - motorway Lendava - Pince, part C
 - motorway Beltinci - Lendava
 - motorway Ponikve – Hrastje (in total length of over 40 km)
- External quality control for the DRSC investor (over 100 km)
- Internal quality control on the state of local roads for different contractors (over 50 km)
- Internal quality control on railway system for ŽGP (Poljčane – Ponikve, station Kidričevo, station Cirkovce, Pragersko – Ormož, station Nova Gorica, Košana – Gornje Ležeče)
- External/internal quality control on infrastructure facilities (HE Boštanj, HE Blanca, HE Krško, NEK)
- Construction supervision on the roads in the municipality of Železniki, Škofja Loka, Vuzenica ...
- Construction supervision on the pipeline network Malečnik M1 subscriber GEOPLIN
- Expertise in the field of earthworks, asphalt and concrete for various clients
- Supervision in the reconstruction of residual fuel oil tanks 1. and 2. phase TOŠ (Energy Ljubljana)

DESIGN AND TECHNICAL CONSULTING

- Design: creating a report on the status of roadway construction / consolidation and the study of roadway construction for DARS investor. Sections in the last few years: resting area on the highway: Lopata - N and S, Highway Vransko - Trojane, highway Kranj - Vodice, highway Sežana - Ferneti, highway Unec - Postojna
- Design: creating a report on the status of roadway construction / consolidation and the study of roadway construction for DRSC investor. Sections in last few years: Črna – Koprivnik bridge through Zabrežnik, Ljutomer – Ormoška cesta, Soteska – Črmošnjice, Pesje – Gorenje, Spodnja Idrja – Dolenja Trebuša, Selo – Nova Gorica, ...
- Project documentation for cycle route in the Municipality of Vuzenica
- Project documentation for reconstruction of roads in the Municipality of Vuzenica
- A plan to rebuild local roads in the Municipality of Železniki and Kostanjevica ...
- Assessment of damage to roads and maintenance strategy in Kamnik
- Counselling the commission of the building on Boštanj and Blanca
- Monitoring of roads and facilities, inspections on the roads in the Republic of Slovenia for investors INFRA, DARS,
- Review of road conditions and the proposed rehabilitation of damage after floods in the town of Železniki

OTHER

- Expert and professional opinions regarding the recovery of the runway at the Jože Pučnik - Brnik airport (MZP)

Technological Centre

The ZRMK Technological Centre is an infrastructural developmental centre – technological centre in the construction industry. It is organised as an independent unit of the ZRMK Institute, where research and developmental tasks are conducted on a project by project basis. All research staff and experts of GI ZRMK participate in the tasks, if necessary.

The mission of the Technological Centre is to develop the Slovenian civil engineering branch, based on knowledge and innovation, modern technologies and the principles of sustainable development. On the basis of participation in national and international projects, we have established connections with numerous partners and institutions within Slovenia and all around Europe.

There are four research groups operating within the reach of the centre:

- Materials and Construction Technologies
- Civil Engineering Structures
- The Indoor Environment and Energy in Buildings
- Geotechnics and Traffic Routes



Service Range

- Research and technological development in the field of materials and structures, building physics and the Indoor environment, energy in buildings, geotechnics and geology, earthworks and traffic routes, quality and IT
- Cooperation with international RD organisations and the transfer of research and development achievements, innovations and information needed for the technological development in the field of construction and industrial construction material
- Rental, lease, joint use of research, testing and other equipment needed for technological development
- Development, purchase, sales, marketing, consulting, engineering in the field of technologies, methodologies, intellectual property, software for joint use of companies (all or groups of clients)
- Consulting, financial, organisational, IT and technical services in preparing and implementing domestic and foreign R&D and technological projects
- Cooperating in examinations, measurements, tests and assessments of the status of structures and works
- Establishing quality assurance systems
- Assistance in forming and managing networks – parallel or supplementary to associations or cluster centres
- Promotion and publication of knowledge and good construction practices, preparing criteria for assessment for the Quality Mark in Civil Engineering
- Information services, establishment of an Internet platform for exchange of new achievements in development and good practice (technological stock exchange, Quality Mark in Civil Engineering project and development of good construction practices)
- Technological consulting, training in new technologies and new processes

ZRMK Laboratory

In the ZRMK Laboratory we perform testing of construction materials:

- concrete, mortars and binders
- aggregates, soils and asphalt

We conduct laboratory and field tests for the needs of construction supervision, quality control and/or to determine the status of existing buildings.



The test laboratory is accredited by the Slovenian Accreditation no. LP-096, in accordance with the requirements of SIST EN ISO / IEC 17025:2005 for the following tests:

- SIST EN 933-1:1999 Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method
- SIST EN 933-9:2009 Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test
- SIST EN 13286-2:2005 Unbound and hydraulically bound mixtures - Part 2: Test methods for the determination of the laboratory reference density and water content - Proctor compaction
- SIST EN 1744-1:2010 Tests Item 15.1 Tests for chemical properties of aggregates - Part 1: Chemical analysis, determination of humus content
- SIST EN 445:2008 point 4.3.1 Grout for prestressing tendons: Test methods (without point 4.6!)"
- SIST EN 12390-2:2009 Testing hardened concrete - Part 2: Making and curing specimens for strength tests
- SIST EN 12390-3:2009 Testing hardened concrete - Part 3: Compressive strength of test specimens
- SIST EN 12390-8:2009 Testing hardened concrete - Part 8: Depth of penetration of water under pressure
- TSC 06.711:2001 paragraph 7.1.2 Measuring density and moisture content with isotope gauge
- TSC 06.720:2003 points 422, 5221, 5231, 61, 621 Measuring static deformation modulus E_{vs}
- SIST EN 12350-1:2009 Testing fresh concrete - Part 1: Sampling
- SIST EN 12350-2:2009 Testing fresh concrete - Part 2: Slump test
- SIST EN 12350-6:2009 Testing fresh concrete - Part 6: Density
- SIST EN 12350-7:2009, except Section 4 Testing fresh concrete - Part 7: Air content - Pressure methods

In the future we intend to expand our range of accredited work to the testing of asphalt.

Maribor Business Unit

In August 2006, the Building and Civil Engineering Institute ZRMK opened a business unit in Maribor, which carries out the Institute's activities in the following fields: materials and technology, constructions, construction and renovation of buildings, the indoor environment and energy in buildings, building physics, geotechnics and geology, construction and maintenance of traffic routes.

The unit in Maribor enables the Building and Civil Engineering Institute ZRMK a direct connection and even a greater degree of communication with the clients in North-Eastern Slovenia. The staff of the Building and Civil Engineering Institute ZRMK, operating in Ljubljana also participate in individual projects.

The business unit is located in the new office building located at Jezdarska ulica 3 at Tabor in Maribor.



Projects of the Maribor BU

CONSTRUCTIONS AND RENOVATIONS

- Main examinations of bridges in the Maribor district (2010)
- Report on the construction assessment and preliminary tests of load-bearing structures of Veliki vrh 6 and proposed measures for strengthening (2010)
- Assessment of static and seismic risk of the Primary School Hajdina (2011)
- Assessment of static and seismic risk of the Primary School Videm (2011)
- Assessment of static and seismic risk of the Primary School Makole (2011)
- Study of detailed examination of ceiling, lighting and electrification of the gymnasium at the Bilingual Primary School Lendava I in Lendava (2011)
- Study of detailed examination of ceiling, lighting and electrification of the small gym at the Bilingual Primary School Lendava I in Lendava (2011)
- Expert assessment on quality of executed works and examination of completed technical documentation for the Senior citizens home at Kidričevo with tests on load-bearing structures and guidelines for strengthening (2009)
- Report on construction assessment and preliminary tests of load-bearing structures at the Parking house Glavni trg 25 in Maribor, with expertise on safety and proposed measures for strengthening (2010)
- Report on construction assessment of damages, performed measurements and proposed measures for strengthening of 11 buildings at main road R2-435/1431 MB-Ruše in Limbuš (2010)
- Report on assessment of damages to buildings in the region of Brode in Vransko, damaged in the landslide (2010)
- Report on construction assessment and preliminary tests of load-bearing structures of Stara steklarska, Ptuj and expertise on safety and the possibility of strengthening of highly damaged construction (2010)
- Report on construction assessment and preliminary tests of load-bearing structures of »ELEKTROLIZA« TALUM and expertise on safety and possibility of further exploitation (2011)
- Report on construction assessment and preliminary tests of load-bearing structures of the Hostel of Postgraduate Students and Visiting Professors in Maribor and proposed measures for strengthening (2010)
- Report on construction assessment of load-bearing structures of Belačeva 6 in Maribor and proposed measures for strengthening with estimated costs (2011)
- Report on construction assessment of load-bearing structures of Vojašniški trg 7 in Maribor and proposed measures for strengthening with estimated costs (2011)
- Regular and main examinations of main and regional roads and bridges in regions KR, CE, PT, MB, MS (2009)
- Regular and main examinations of main and regional roads and bridges in regions LJ, NM, GO, KP (2010)
- Regular and main examinations of main and regional roads and bridges in regions KR, CE, PT, MB, MS (2011)

Building centre



The BUILDING CENTRE is an informational, consulting and training centre for civil engineering, offering its services to professionals and the general public. Its basic activities are training and education, informing and consulting on civil engineering.

Through training and educational programmes we forward the innovations and developmental trends of the construction industry, we ensure the transfer of good construction practices, and the participants can acquire special know-how and skills. The Building Centre also comprises of consulting offices, where we provide professional and independent consulting on construction, maintenance and the renovation of buildings, efficient energy use in buildings and households and on obtaining of required administrative building permits.

The basic services of the Building Centre are supplemented by the Quality Mark in Civil Engineering, which is as a project of national importance, carried out in co-operation with experts from the ZRMK Institute and external institutions and also with the support of various ministries. We also established a product and service quality assessment system. The purpose of the project is to encourage improved quality and competitiveness of products and services within the Slovenian construction industry and at the same time offering buyers information about quality products and services available on the Slovenian market.

The Quality Mark in Civil Engineering is an optional certification mark and a brand-trademark for marking the best products and services within the construction industry in Slovenia. The system for preparing the criteria and the assessment procedure has been developed by the ZRMK Institute since the mid 1990s. The products and services must fulfil a high level of requirements, which have been set by experts and are internationally comparable, and the manufacturer or contractor must also provide high quality in the development and technological process as well as business excellence. The award goes to certain products and services, while during the assessment procedure, achieve the prescribed threshold, and to those who lag behind the best within a ten percent range.

The Quality Mark in Civil Engineering project is aimed at encouraging manufacturers and contractors, and directing them towards a high degree of quality and also to ensure investor and user satisfaction and thus to business success and excellence.



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