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**Abstracting and Indexing**



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**Abstracts of  
Acta Technica Napocensis: Civil Engineering & Architecture, Vol. 51, 2008**

**STUDY ON ESTIMATION OF SOME FOUNDATIONS' DURABILITY**

A. Bacso, I. Bucur-Horvâth, I. Popa

**ABSTRACT**

The paper presents a procedure of evaluation of the lifetime for some important parts of the supporting structure of an electric energy installation. The evaluation was a special faze in the process of deciding to intervene on foundations that serve the installation specific for the transportation of electric energy. The modernization of some power station 100/20 kV, meaning the totally changing of some lines, cells and devices, have asked some decisions related to the infrastructure, with direct impact on this process of modernization. At first sight, the solution of demolishing the old foundations and making new ones seemed to be the best one. Examining closer the problem became obvious that the construction of new foundation has some inconvenient: the long time and the high costs generated by the neutralizing of the electric line for a relatively long time, while the construction work would last. The task of finding a technical solution for an execution as short as possible (in order to minimize the "lack of power on the line"), with a time of service of the infrastructure at least double as the amortization time of the new machinery, is of real interest for the beneficiary and it is also a professional challenge for the specialized designer. For the acceptance of the beneficiary to rehabilitate the existing foundations one has to determine the durability of the foundations before and after the rehabilitation-modernizing intervention. The process of evaluating the durability, presented in the paper, is a quasi-empiric method. Its essence consists of quantifying the parameters and the performance criteria of the structure.

**Keywords:** *foundation, structural deficiencies, rehabilitation, durability;*

**Full bibliographic reference:**

**MIXTURE OPTIMIZATION OF POLYMER CONCRETE WITH SILICA FUME**

M. Barbuta, D. Lepadatu, P. Mihai

**ABSTRACT**

The aim of this paper is the optimization of mix proportion of polymer concrete with silica fume content by using the statistical techniques. The experimental studies were realized on polymer concrete prepared with epoxy resin, silica fume in different dosages and aggregates of two sorts. The experimental mix combinations were designed based on the mixture design of experiments concept for the minimum content of resin. The predicted values of mechanical characteristics were theoretically determined and they were compared with experimentally results using Response Surface Methodology (RSM). The effect of each variable on the response was analyzed by this advanced method. The optimization method includes two phases. The first involve the objective function prediction using mixture design of experiments and response surface method, while the second is an optimization process using a Generalized Reduced Gradient algorithm. The optimum combination is given for the best values of flexural strength or split tensile strength.

**Keywords:** *epoxy resin, polymer concrete, filler, mixture design of experiment;*

**Full bibliographic reference:**

**REHABILITATION OF EXISTING REINFORCED CONCRETE STRUCTURES SUBJECTED TO EXTREME CONDITIONS**

C. Bob, S. Dan, C. Badea, L. Iures, A. Gruin

**ABSTRACT**

Existing structures built before the 1970s were designed for gravity loads with inadequate lateral load resistance because earlier codes specified lower levels of seismic loads. Many of these structures are still in service beyond

their design life. Also, some deterioration of component parts of buildings is encountered in old structures due to the actions of different hazard factors. This paper discusses the following aspects: characteristics of existing structures under extreme conditions like deterioration due to reinforcement corrosion, seismic action and gas explosion; three case studies. Rehabilitation of different types of existing structures is described: two reinforced concrete framed structures that suffered local damages caused by action of carbon dioxide and/or chloride ions and reinforcement weakness; a building affected by a gas explosion. The rehabilitation took into account the increase in strength, stiffness and ductility. The rehabilitation techniques consisted of coating beams, columns and joints by using reinforced concrete, steel profiles or carbon fibres.

**Keywords:** *existing reinforcement concrete structures, reinforcement corrosion, seismic action, gas explosion, assessment and rehabilitation, structural analysis, strengthening solutions;*

**Full bibliographic reference:**

## **TECHNICAL EXPERTISE OF STRUCTURES WITH THIN REINFORCED CONCRETE SHELLS**

A. Cătărig, L. Kopenetz

### **ABSTRACT**

The thin-walled reinforced concrete structures are structural components having in general the shape of curved surfaces at which the ratio between the thickness of the wall and any principal curvature radius of the median surface range between 0.001 and 0.05. Usually the structural shape follows the rule that the stress resultant in every point must be situated in the tangential plan at the median surface. It is assumed that membrane theory is respected. At the majority of these structures, the coincidence achievement between the pressure surface shape and the structural shape were not be possible, for a diversity of actions, since bending moments may occur. The occurring bending moments are absorbed either correctly or incorrectly by the provided reinforcement that can lead to structural degradation. Other typical causes that can create dangerous degradation of the structural concrete could be due to: incorrectly foundation design, sulphur and chlorine attack of structural concrete, the quality of the concrete and the structural work erection. Bearing in mind that these structures often cover large spaces or deposit huge quantities of liquids, any weaknesses of structural safety could have very dangerous consequences. The paper concerns structural expertise aspects and also presents several state-of the art concepts related to structural consolidation problems using modern textile membrane, carbon fiber and steel lamellae.

**Keywords:** *cracking, thin reinforced concrete, shrinkage, shells;*

**Full bibliographic reference:**

## **EXPERIMENTAL STUDIES ON DUCTILITY INCREASING FOR REINFORCED CONCRETE COLUMNS**

C.A. Daescu, V. Stoian, T. Nagy-Gyorgy, D. Dan, I. Demeter

### **ABSTRACT**

The entire research program contains an experimental study on the reinforced concrete columns retrofitted using composite materials. The goal is to clarify some of the aspects regarding the ductility of these types of elements. The part of the study presented here wants to establish the type of interaction between two methods of consolidation: laterally applied bars for bending and fibre wrap for confinement. The actual codes present only the computational methods for each individual situation, but not for the superposition of the two retrofitting methods.

**Keywords:** *retrofitting, RC columns, bending, confinement;*

**Full bibliographic reference:**

## **ANALYTICAL AND NUMERICAL MODELS FOR PREDICTING THE BEHAVIOUR OF IN-PLANE LOADED PRECAST RC WALL PANEL EXPERIMENTAL ELEMENTS**

I. Demeter, T. Nagy-Gyorgy, V. Stoian

### **ABSTRACT**

Eight scaled precast reinforced concrete wall panel (PRCWP) experimental specimens were constructed with the aim of assessing their behaviour when subjected to in-plane, pseudoconstant vertical and cyclic horizontal forces. The analytical and numerical models were used to predict the shear capacity, the failure mode and to design the test

set-up. Parameters included in this study were: the value and variation of the vertical loadings, the horizontal force increments and the supporting conditions. Comparing the obtained data the influence of the varied parameter on the behaviour mode could be observed and undesired ranges could be excluded. Assuming that the supporting conditions are realized as in the models, it was possible to determine the studied parameters in order to generate shear failure in the experimental specimens.

**Keywords:** *precast reinforced concrete wall panels, analytical models, numerical models, shear failure, seismic loading conditions;*

**Full bibliographic reference:**

### **RC SLABS STRENGTHENED WITH FRP COMPOSITES – CASE STUDIES**

D. Diaconu, T. Nagy-Gyorgy, V. Stoian, S.C. Florut

#### **ABSTRACT**

The paper begins with a short presentation of Fiber Reinforced Polymer (FRP) composites, with their advantages and disadvantages of construction using. Few RC slabs strengthening cases using FRP composites are detailed, cases in which our research team from Civil Engineering Department of Construction Faculty of Timisoara was involved in their examination, design and even in execution for some of the proposed strengthening solutions. Those are just a few situations when research data obtained in our lab was implemented in real cases.

**Keywords:** *FRP composites, slab, strengthening, reinforced concrete;*

**Full bibliographic reference:**

### **INVESTIGATION UPON PRESTRESSED BRIDGES IN ROMANIA**

C. Enyedi, C. Mircea

#### **ABSTRACT**

Early and accelerated degradation of prestressed concrete structures is a delicate problem for the owners and administrators of built stocks, due to the need of financial resources, often insufficient, to be allocated for maintenance, repairs and rehabilitation. The paper consists in a brief presentation of a survey performed on a limited bridge stock made of prestressed concrete in Romania. The survey was done within a project launched by INCERC Cluj-Napoca Branch in 2003 in the frame of a national research program. The first stage of the survey, performed through a visual inspection program, was extended on 123 prestressed concrete bridges located in continental and marine environment. The second stage of the survey was done on 8 bridges presenting extended damages, to which more detailed investigations were performed.

**Keywords:** *prestressed concrete, bridge, condition survey, degradation;*

**Full bibliographic reference:**

### **STRENGTHENING OF A HOLLOW CORE PRECAST SLAB USING FRP COMPOSITE MATERIALS - TESTING AND RATING**

S.C. Floruț, T. Nagy-Gyorgy, V. Stoian, D. Diaconu

#### **ABSTRACT**

This paper presents some aspects regarding a test on a hollow core precast slab. The slab was tested before and after flexural strengthening with fiber reinforced polymers (FRP). The aim of this research was to determine whether strengthening a hollow core slab for flexure with FRP represents a viable solution or not.

**Keywords:** *prestressed concrete, slab, FRP composite materials;*

**Full bibliographic reference:**

### **INFLUENCE OF E-GLASS WASTE ON THE CONCRETE PROPERTIES**

M. Gheorghe, N. Saca, L. Radu

#### **ABSTRACT**

The paper presents experimental data referring to valorize of E glass industrial waste, considered a byproduct, as

aggregate substitute in concrete. The necessity to valorization of E glass wastes, drops and fibers, was determined by quantity of approximately 60 tons/month, from which 30 tons/month is landfilled, with 2 Euro/ton expenses. It was studied the expansion evolution due to the alkali silica reaction ASR of the reference mortar bars and of those with E glass and packing glass waste, particles under 0,5mm, up to 360 days. The E glass admixture mortar 360 days-expansion was of 0.24 mm/m. The compression strength of samples with 33% E glass was 21, 26 and 30 % higher than of control sample at age of 28, 90 and 360 days. The bending strengths were higher than control sample with 3, 8 and 10% at age of 28, 90 and 360 days. The mechanical strength increasing can be justified by pozzolanic character of fine glass particle. The concrete workability decreases with increasing of glass amount and due of fibrous shape of E-glass particles. Based on the obtained results one can affirms that 0.5mm particle size fine aggregate substituting by E glass, is beneficial for concrete compression and bending strengths. The industrial E glass waste is considered a valorous byproduct by it capacity to inhibit ASR expansion due to pozzolanic character of fine particles.

**Keywords:** *glass waste, ASR, length change, mechanical strength, workability, concrete;*

**Full bibliographic reference:**

### **DEFORMABILITY AND LOADING CAPACITY OF BEAMS REALIZED WITH HIGH STRENGTH / HIGH PERFORMANCE CONCRETE**

B. Heghes, C. Magureanu, D. Moldovan

#### **ABSTRACT**

The paper presents an overview of the research on flexural behaviour of HSC members. The study has resulted in identification of factors that affect the flexural behaviour and design of reinforced concrete members made of HSC. The paper also identifies relevant design issues to extend the current concrete compressive strength limit of about to 85 MPa in the Romanian [9] code and EC2 [7, 8] design specification.

**Keywords:** *shrinkage beam, flexural members, high strength concrete;*

**Full bibliographic reference:**

### **SELF-COMPACTING CONCRETE MIXTURE PROPORTIONING PROCEDURE**

A. Ioani, H. Szilágyi

#### **ABSTRACT**

The paper presents a mixture proportioning procedure for self-compacting concrete based on technical literature survey and respectively results obtained in the frame of a national research program developed at the Technical University of Cluj-Napoca in cooperation with specialists from INCERC Cluj-Napoca Branch, in order to implement self-compacting concrete in the Romanian precast concrete industry. Mixes for C50/60, C40/50 and C30/37 strength classes with cement CEM I 52.5R, cement and silica fume or cement and limestone filler have been designed and tested, and properties in fresh and hardened state have been evaluated. In each strength class were studied parameters such as: cement content (from 510 to 330 kg of cement/m<sup>3</sup>), types and quantity of additions, types and quantity of admixtures (HRWRA, VMA), water amount, aggregate grading and the mix robustness.

**Keywords:** *self-compacting concrete, mixture proportioning, aggregate grading curve, strength classes;*

**Full bibliographic reference:**

### **DYNAMIC CONTROL OF CONCRETE PILES**

C. Kegyés, G. Lorincz

#### **ABSTRACT**

In this paper the authors want to publish the test method of the integrity of concrete structures, and the applied procedure. This is suitable for monitoring of the continuity along concrete piles built in the place. Four accelerometers have been adjusted at the cross sides on the head of the pile. The excitation was given by an impulse-hammer with a known mass and with a built-in accelerometer. The *in*-and *out*- acceleration-responses have been measured on the hammer, as well as on the head of the pile. They were compared to each other and the possible defects of the concrete as well as the defect in the continuity were able to be determined upon the occurring alteration of the responses in the course of the processing.

**Keywords:** *dynamic control, integrity of concrete, piles, structural mechanics, concrete structures, bridges, quality test;*

**Full bibliographic reference:**

### **CRACKING BEHAVIOR AT BENDING AND MECHANICAL PROPERTIES OF HIGH STRENGTH/HIGH PERFORMANCE CONCRETE**

L.C. Letia

#### **ABSTRACT**

In Romania high strength concrete is very often considered a high-tech material. Knowing that high strength concrete is largely used world wide this paper analysis the different characteristics of concrete having the compressive strength over 60MPa. This paper summarizes the research findings of the characteristics of high strength concrete(HSC) for flexural cracks of reinforced concrete girders. A number of 11 HSC beams with different percentage of  $p$  (reinforcement ratio) cast and incrementally loaded under bending. During the test, the strain on the concrete in compression and tension zone and the tension bars and also the cracks width and deflection at different points of span length were measured up to failure. Based on the obtained results, the serviceability and cracks width of the HSC members are more deeply reviewed. Also a comparison between theoretical and experimental results are reported here. Concerns, however, are expressed regarding the adequacy of the equations to evaluate the cracking moment and moment of inertia under service loads. On the other hand, this paper summarizes the latest equations to evaluate the mechanical properties of HSC such as: the modulus of elasticity, the tensile splitting strength, the direct tensile strength, the modulus of rupture, the compressive strength of HSC and the factors that have a direct influence on this mechanical properties . A comparison between different Code equations to evaluate the mechanical properties of HSC and test results are also presented here. The mechanical properties of HSC were tested on several prism and cubes. The test results showed that not all equations used to evaluate the different mechanical properties and cracking behavior of normal concrete can be applied to HSC. In some cases, the difference between test results and theoretical results is quite important. The 11 reinforced HSC beams, prism and cubes were cured and tested at the Laboratory of Reinforced Concrete Department, of the Technical University of Cluj - Napoca.

**Keywords:** *high strength concrete, crack width, direct tensile strength, splitting tensile strength, modulus of rupture, compressive strength;*

**Full bibliographic reference:**

### **THE SEISMIC BEHAVIOUR OF MULTISTORIED STRUCTURES OF REINFORCED CONCRETE. COMPARISON BETWEEN THE EUROPEAN AND ROMANIAN CODES**

Gy. Matyas, I. Bucur

#### **ABSTRACT**

The multistoried buildings represent a distinctive category of construction, not only from the aesthetic and functional point of view, but from the structural one, as well. The state of strength, which appears in the elements of these structures, presents a series of specific aspects and represents the object of many studies and researches. The study tries to put into evidence the main rules of structural design of multi-storied reinforced concrete structures emphasizing the role of slabs in transmitting horizontal forces. The paper presents a short history of the EUROCODES evolution and emphasizes the basis of design and general concept of the structures especially under earthquake loading. In the present transition period of adopting of the European codes it is very interesting to compare the valuable Romanian norms and that Europeans. In this respect a comparison between EC2 - STAS 10107/0-90 and between EC8 - P100-1-2006 are performed.

**Keywords:** *role of slabs, reinforced concrete structures, EUROCODES evolution;*

**Full bibliographic reference:**

### **SAND POWDER CONCRETE MIXTURES**

C. Magureanu, C. Negrutiu, O. Corbu, I. Sosa

#### **ABSTRACT**

This research paper presents aspects regarding concrete mixtures with ultra fine sand and quarts powders (0-

1200^m), with and without the addition of silica fume or flying ashes. These aspects will later set up the base for new mixtures of ultra high performance fiber made concrete. This study is concerned with the mixtures and the strengths of these types of concrete.

**Keywords:** *Concrete mixture, quartz powders, compressive strength, splitting tensile strength, flexural tensile strength, modulus of elasticity, bond strength;*

**Full bibliographic reference:**

#### **ULTRA-HIGH PERFORMANCE CONCRETE**

C. Magureanu, I. Sosa

##### **ABSTRACT**

One of the breakthroughs in concrete technology is ultra-high performance concrete with steel fibers with compressive strength of up to 200 N/mm<sup>2</sup> to 250 N/mm<sup>2</sup>, high flexural strength, low porosity and a remarkable increase in durability which allows for solutions with smaller elements. A wide range of new concrete formulations has been developed to cover an increasing number of applications. The paper will report on the state of research on material, presents principles of the material design and design aspect of ultra high performance concrete.

**Keywords:** *ultra-high performance concrete, reactive powder, steel fiber;*

**Full bibliographic reference:**

#### **CAUSES OF CONCRETE PAVEMENTS IMPERFECTIONS**

A.T. Mircea

##### **ABSTRACT**

The paper presents the main causes of imperfections established by an investigation performed at the request of the contractor of the concrete pavement made at the platform of an industrial company. The platform covers around 200 000 m<sup>2</sup>, and was built in 2002. Since than, numerous maintenance works were done, especially by replacing the damaged panels. The quality of concrete in slabs on ground is often affected by conditions over which the designer and contractor have little control. The purpose of the investigation was to identify the causes that led to an unacceptable performance of the concrete pavement claimed by the owner, and to recommend measures in order to ensure the future normal service of the pavement.

**Keywords:** *maintenance, concrete quality, structural and functional performance;*

**Full bibliographic reference:**

#### **MORE THAN JUST SURFACES TO WALK ON - ESSENTIAL REQUIREMENTS FOR FLOORINGS**

A.T. Mircea

##### **ABSTRACT**

A floor covering is more than just a surface to walk on - it is an important part of the interior design and style of our buildings. Before selecting a new floor covering it is imperative to establish what the flooring options are, what maintenance is involved with each flooring type, and how each type of floor covering should be installed. Choosing the right installer is one of the most important aspects of flooring purchase. A proper installation is critical to create the desired look, and in helping to make sure it stays that way for years to come. The selection of the material for floor coverings is influenced by factors such as aesthetics, endurance, noise insulation, physical comfort, cleaning effort, costs and many others. The paper presents the essential requirements for floorings, nowadays when flooring materials are more varied than ever before, offering a special combination of fashion and function. All these requirements must be fulfilled for an economically reasonable working life of the products subjected to normal maintenance.

**Keywords:** *floor covering, flooring system, essential requirements;*

**Full bibliographic reference:**

#### **SERVICE TESTS ON PC BEAMS OF TRANSYLVANIA MOTORWAY BRIDGES**

C. Mircea, M. Filip

#### **ABSTRACT**

The paper presents aspects from the testing of full scale PC prefabricated bridge girders, to be used at the new Transylvania Motorway. The tests were performed by INCERC Cluj-Napoca, at the order of Bechtel International Inc., general contractor and producer of the prefabricated units. The paper aims to offer to the specialists valuable experimental data, obtained through state of the art testing techniques. After a brief introductory part, presenting the general frame and testing conditions, the paper continues with a comprehensive presentation of the tested PC girders, based on the design documentation, a non-linear evaluation and records of the producer. After the description of the testing procedure and the equipment, results are emphasized in a synthetic manner, based on graphical figures resulted from digital processing, and commentaries. The paper ends with the final remarks and the acknowledgement bring to the supporting colleagues from the general contractor and Spectromas Ltd.

**Keywords:** *prestressed concrete, beam, bridge, testing, service;*

**Full bibliographic reference:**

#### **ASSESSMENT OF FIRE AFFECTED RC STRUCTURES**

C. Mircea, H. Maniu

#### **ABSTRACT**

The paper refers to the fire resistance of RC structures, based on an investigation performed upon an old RC structure building affected by a severe fire in 9 of January 2007. After a brief presentation of the fire effect upon RC structures, the paper presents the steps of the investigation based on the ACI 216R-89 [1] guide and AICI 216.1-97/TMS 0216.1-97 [2] standard. The investigation started with the study of the official reports, and continued with a comprehensive program to find out the material properties and the reinforcing systems of the affected structural elements. Based on non-destructive tests, semi-destructive tests and experimental results given by the above references, numerical and analytical assessments were made in order to assess the residual ultimate capacities and bearing capacities of the exposed structural members. Compared with the internal forces induced by the standard loads, objective conclusions could be drawn in respect with the measures to be taken in order to ensure the future service of the building. These emphasized losses of bearing capacities up to 39 % at the beams of the slab systems and partial destruction of the slabs, which were directly exposed to fire for significant time intervals, and thus the necessity of rehabilitation works for these elements.

**Keywords:** *fire, bearing capacity, reinforced concrete, ultimate capacity, bearing capacity, temperature, effect, materials;*

**Full bibliographic reference:**

#### **RESEARCH RESULTS ON DAPPED BEAM ENDS STRENGTHENED WITH FRP COMPOSITES**

T. Nagy-Gyorgy, V. Stoian, C. Dăescu, D. Diaconu, D. Dan

#### **ABSTRACT**

The strengthening with FRP composites is a method widely used for retrofitting or for increasing the load bearing capacity of the structural elements and can be applied in a variety of domains. In this paper studies made on dapped beam ends strengthened in different modes are presented. In the first part of the research theoretical investigation was done by using the finite element analysis programs and the strut-and-tie models. The experimental investigations were made on four full scale beam ends. One of the specimens was tested prior to failure, while the others up to the plastic limit, then all of them were strengthened and retested up to the failure. The objectives were to investigate the load bearing capacity of the beam support zone and the effectiveness of the FRP strengthening used.

**Keywords:** *dapped beam end, FE models, experimental tests, strengthening with FRP;*

**Full bibliographic reference:**

#### **INFLUENCE OF AGGRESSIVE ENVIRONMENTAL EFFECTS ON HIGH -STRENGTH CONCRETE**

C. Negrutiu, C. Magureanu

#### **ABSTRACT**

Chemical attack poses a serious problem for concrete structures in aggressive environments. This investigation deals

with exposure of high strength/high performance concrete to sulfate attack in controlled environments. Experimental tests consisted in measuring the compressive and tensile strength, modulus of elasticity and bond strength after 28, 56 days and after 3 years of exposure to corrosive conditions. Furthermore, embedded reinforcement was tested for corrosion, after 6 years and 2 months of exposure. Also, investigation deals with the exposure of high - strength concrete to freezing and thawing in a controlled environment. Experimental tests consisted of measuring splitting tensile and compressive strength after 100 cycles of freezing and thawing.

**Keywords:** *high strength concrete, high performance concrete, sulfate attack, compressive strength, tensile strength, modulus of elasticity, bond strength, freezing and thawing, corrosion;*

**Full bibliographic reference:**

## **RESEARCH REGARDING HIGH PERFORMANCE CONCRETE**

T. Oneț, H. Szilagyi, A. Urdă, R. Olar

### **ABSTRACT**

The technical, economical and ecological advantages of high performance concrete (HPC) justified the special interest in the last decades regarding to this new building material. For a long period of time, concrete was considered a material, for which the most important characteristic was its strength. Today, we know that we can expand significant not only the strength range, but we can control other properties of concrete like workability, ductility, sensitivity for environmental conditions, by modifying the concrete mixture and by adopting new technological procedures. The paper presents the research results on HPC made for three doctor degree thesis, focused on: self compacting concrete, interesting for the precast concrete industries; high performance concrete used for rigid pavements; the beneficial effects of high performance concrete used for multistoried frame building design in accordance to the rules of EC2.

**Keywords:** *self-compacting concrete, high performance concrete for rigid pavements, high performance concrete beams and columns;*

**Full bibliographic reference:**

## **MIXED STRUCTURAL ELEMENTS GENERATED BY STRENGTHENING**

A. Pasca-Hedes, I. Bucur-Horvath

### **ABSTRACT**

The process of rehabilitation of the constructions is necessary to be based on complex, many-sided knowledge. The paper presents, at first, some general considerations about rehabilitation and durability of the constructions. Secondly, technical solutions of strengthening reinforced concrete beams and columns are presented. Repair and retrofitting procedures should be able to provide increased load-carrying capacity and extended service life at reasonable cost. There are mixed elements of structures as a result of the strengthening: reinforced concrete - reinforced concrete, reinforced concrete - steel, reinforced concrete - FRP, etc.

**Keywords:** *strengthening, durability, reinforced concrete;*

**Full bibliographic reference:**

## **NEW TYPES OF CORROSION INHIBITORS FOR PROTECTION AND REHABILITATION OF REINFORCED CONCRETE STRUCTURES**

I. Popenar

### **ABSTRACT**

Corrosion inhibitors are chemical substances that prevent or retard corrosion of steel in concrete, in the presence of aggressive agents, increasing thus the durability of new and existing reinforced concrete structures. They may be added in the fresh concrete, in paints for the reinforcement, in repair mortars or may be applied at the concrete surface. The paper presents a synthesis of the research on the protection of steel in concrete by means of traditional corrosion inhibitors (anodic) and of the new types of migrating inhibitors based on amino-alcohols (MCI, SIKA) and monofluorophosphate (MFP). A critical evaluation of the corrosion inhibitors to be used on reinforced concrete structures, regarding concentration dependence, durability, measurement and control of inhibitor action, are also presented.

**Keywords:** *corrosion inhibitors, reinforced concrete, reinforcing steel, durability, protection;*  
**Full bibliographic reference:**

## **REINFORCED CONCRETE STRUCTURAL SYSTEMS FOR TALL BUILDINGS IN BUCHAREST**

T. Postelnicu, D. Zamfirescu

### **ABSTRACT**

The accelerated economical and urban development of the last years in Romania, favored a significant height increase for the office and condominiums buildings, due to the high prices of the land. In Bucharest, several buildings having 25-30 floors are in construction or have already been built. The construction of tall buildings imposed in many aspects of the esthetical, functional, structural and equipment design, a qualitatively different approach. The paper presents the main aspects of the structural design and the types of structural systems specific to this category of buildings. The dimensional limitations combined with the fulfillment of stiffness, strength, energy dissipation and structural control conditions for the seismic design, lead to optimal solutions based on concentrating cores structural system, or, alternatively, interior core connected to perimeter frames through strong and stiff radial and perimetral beams. The influence of several conformation parameters on the seismic structural response is discussed. The main problems for the infrastructure and foundations layout and design are investigated, also. Finally, the structural design of several 25 stories buildings in construction in Bucharest is presented for exemplification.

**Keywords:** *tall buildings, reinforced concrete structures, tubular structures;*

**Full bibliographic reference:**

## **ROMANIAN CODE FOR ASSESSMENT OF EXISTING BUILDINGS CONCEPTS AND METHODS**

Tudor Postelnicu, Dan Zamfirescu

### **ABSTRACT**

The paper presents the concepts and methods of the next Romanian Code for the assessment of seismic performance of existent buildings. After the occurrence of the 1994-1995 earthquakes, consistent seismic evaluation codes were promptly developed in USA, New Zealand, Japan and Europe. The current EC8-3 devoted to the assessment and retrofit of buildings provides coherent assessment evaluation methodologies. However, some of the proposed principles can create confusions and difficulties for the practical application. The Romanian Code for Assessment and Retrofitting of existing structures whose elaboration is in process follows mainly EN 1998-3 with some adjustments concerning the limit states, methods of analysis and the models for the RC elements capacities. For the evaluation of the building's expected performance more attention was given to the fulfilment of the rules for proper conformation. In order to estimate the seismic safety of the analyzed existing building, three indices have to be quantified. They reflect the structural system adequacy, the damage state and the strength capacity of the building.

**Keywords:** *codes, existing structures, assessment, methods for seismic evaluation;*

**Full bibliographic reference:**

## **STRUCTURAL RECOVERY OF PELICAN POLYCLINIC - FRAME STRUCTURE**

M. Prada, A. Mancia, O. Groza

### **ABSTRACT**

The present paper analyses the reinforcement solutions for a concrete frame structure. Because the owner intended to change the destination of this building, it must be multi-storied and refitted. The existing construction is made up of three buildings with ground floor and two floors arranged in the form of H letter. The pillars' foundations are insulated type on prefab piles. Rearranging the building implies the levels' repartition and redoing all the finishing. Building one more level will be done on light metallic structure with pillars that will be set in the existing reinforced concrete posts. The analysis is based on modeling with finite elements, the determination of the vibration modules and the load status, a study that allowed tracing the weak zones and the choice of the consolidation solution. The vibration methods analysis of the established solution has shown their efficiency in eliminating the weak zones and also the risk zones. Finally the authors propose some necessary measures with an active view on the efficient seismic design of the multi-storied building. The consolidation solution is the classic one, through the modification

of the building scheme. This means the creation on the lines of some transversal frameworks of the ground floor, some structural walls made of reinforced concrete, which preferably would cover the existing pillars.

**Keywords:** ;

**Full bibliographic reference:**

### **ASPECTS REGARDING THE STRENGTHENING SOLUTION APPLIED TO THE UNIVERSITY HOSPITAL "CF WITTING"**

A. Preterian, R. Vierescu, D. Stoica

#### **ABSTRACT**

The hospital was built in 1918 and presently has the status of historical monument category "B". From the seismic behaviour viewpoint, it belongs to the first importance class and hence, must remain fully functional during and after the occurrence of any expected seismic event. The vertical structure consists of brick masonry walls, without any reinforcement, being originally designed to resist gravity loads only. The floors are made of reinforced concrete joists cast on infilled hollow ceramic blocks, in certain zones; the floors consist of slabs directly supported on the masonry walls. The foundation system includes continuous footings made of plain concrete that support masonry walls. The computational analysis reveals in many cases tendencies of brittle failure in diagonal tension of masonry walls. The proposed solution of strengthening essentially consists in creating a new structural subsystem made of reinforced concrete walls jacketing certain existing brick masonry walls -either on their exterior (case of gable walls) or on their interior face - conveniently located to generate closed contours or even cores.

**Keywords:** *masonry, walls, ductility, models, gravity, earthquake;*

**Full bibliographic reference:**

### **THE EXPERT'S APPRAISAL OF THE IERNUT FORCED DRAUGHT COOLING TOWERS**

P. Rus, M. Petrina, Adina Lăpuște, Aliz Mathe

#### **ABSTRACT**

This scientific paper debates the problem of damages in the structural element of forced cooling towers in Iernut. It's illustrated the determination of the structural element's and the buildings' examined by experts technical state and also the elements' types of specific damages, the development and the degree of damage. Another aspect followed in this study is the analysis of the damages on the structure's bearings strength. The internal forces are the computed after they are first loaded with usage forces. The degree of bearings strength reduction of the structural element is being established in the last part of the study.

**Keywords:** *forced cooling towers, technical expertise, structural rehabilitation;*

**Full bibliographic reference:**

### **PURSUIT OF BEHAVIOUR IN A PERIOD OF TIME OF THE BUILDINGS PART OF IERNUT THERMAL POWER STATION**

P. Rus, M. Petrina, Adina Lăpuște, Aliz Mathé

#### **ABSTRACT**

The present study analyses the special and hydrotechnical buildings' technical state in Iernut Thermal Power Station and the results of the 2006 inquiry. For every objective of which technical state has been analyzed have been used dates given by topographical-geodezical measurements on fixed and mobile references and also dates concerning the technical state's evolution in time, compared to the past inquiries. During the surveillance procedure have been determined deflections and deformations, the distress state, phenomena of corrosion in concrete and steel, the general technical state of the building. There has been established at the same time the process of subsidence and vibration.

**Keywords:** *time survey, quality assurance system, special survey;*

**Full bibliographic reference:**

### **DETERMINATION OF THE BENDING MOMENT CAPACITY FOR SHEAR WALLS**

N. Socaciu, B. Petrina, C. Ciplea

**ABSTRACT**

This paper presents the determination of the bending moment capacity value for shear walls, knowing the section geometry, the reinforcement placement, the materials properties and the axial force value. The determination of the bending moment capacity is made using the "general method", by admitting Navier-Bernoulli's plane sections hypothesis and some  $\sigma$ - $\epsilon$  diagrams for concrete and steel. Taking in consideration the large number of calculations that need to be made, a software application has been designed. This computer program divides the given section in very small elements, for which it can be assumed a constant stress variation. The final step to obtain the bending moment capacity is the integration of the stresses on the entire section. The software application that was elaborated is useful in structural design. Using this computer program we can also determine the cracking moment, the yielding moment, the ultimate bending moment and the curvature ductility factor of the shear wall section.

**Keywords:** *shear walls, bending moment capacity, cracking moment, yielding moment, ultimate bending moment, curvature ductility factor;*

**Full bibliographic reference:**

**STUDIES IN MINING SUBSIDENCE PHENOMENA**

D. Stoica, S. Majewski

**ABSTRACT**

Mining subsidence is planned in the case of mining methods that incorporate the caving-in of the created cavities as work proceeds ("cavingin" method in coal mines, for example). On the other hand, mining subsidence is of a highly accidental nature when it takes place over mines and quarries that use methods based on abandoned rooms and pillars. Indeed, in the latter case, the operator has deliberately left in place natural or artificial pillars sized to withstand the weight of the overburden. As long as the ground movements are imparted to the structure integrally, a geotechnical engineer can inform a civil engineer of the predicted importance of such movements. The latter can then apply these movements to the foundations of a structure in order to assess their impact. If, on the other hand, there is strong interaction between the ground and the structure, neither the geotechnical engineer nor the civil engineer can assess the structure loading.

**Keywords:** ;

**Full bibliographic reference:**

**SELF-COMPACTING CONCRETE FOR R/C PRECAST ELEMENTS**

H. Szilagyi, A. Ioani

**ABSTRACT**

The paper presents a portion of a large research program developed at The Technical University of Cluj-Napoca for self-compacting concrete (SCC) implementation into the Romanian precast concrete industry. The presented mixes were designed to satisfy requirements of SCC in both the fresh and hardened states for R/C precast elements: good flowability and passing ability, adequate viscosity, high segregation resistance, high-quality surface finishes and proper compressive strength for C30/37 strength class. The experimental program parameters were: paste volume, powder content, types and quantity of admixtures (high range water reducing admixtures - HRWR and viscosity modifying admixture - VMA), water amount, mix robustness and aggregate grading. The designed concrete mixes properties in fresh and hardened state have been evaluated.

**Keywords:** *self-compacting concrete, limestone filler, experimental program parameters;*

**Full bibliographic reference:**

**PRECAST ELEMENTS OF SELF-COMPACTING CONCRETE WITH LIMESTONE FILLER**

L. Terec, H. Szilagyi, J. Domsa, A. Mircea

**ABSTRACT**

In this paper some of the results of an AMTRANS research programme, developed by INCERC Cluj-Napoca Branch, Technical University of Cluj-Napoca and the precaster SC ASA CONS ROMANIA SRL Turda, in order to

implement the self-compacting concrete in the precast industry, are selected and discussed. A part of the objectives of the research programme were to assess the properties of fresh and hardened SCC and to study the behaviour of SCC elements subjected to different loads. The fresh SCC properties were evaluated through: slump flow test, L-box test, V-funnel test and sieve segregation resistance test. Although the study of the compositions and properties of self-compacting concrete has considered the requirements for several concrete classes, this paper presents just the results regarding concrete classes for which structural tests and in situ tests were performed. Full-size precast prestressed floor elements and beam elements were realized in the factory. The main studied parameters in the structural tests were the ultimate load, the load-deflection response and the typical cracking patterns. The principal objective of the in-situ tests was to evaluate the variation of the compressive strength along the length of beams.

**Keywords:** *self-compacting concrete, precast concrete, prestressed floor elements, structural tests, in-situ tests.*

**Full bibliographic reference:**

## **POST-ELASTIC ANALYSIS OF REINFORCED CONCRETE FRAMED STRUCTURES**

O.F. Tepes

### **ABSTRACT**

The design current activity is to determine seism forces by the methods of normative P100/2006 and the application of these static forces by overlap with its own weight. The seism forces are applied by the two plan directions. The level of the seism forces depends on a ductility coefficient that represents the capacity of energy dissipation. The analysis proposes for the framed structures, the level of the seism forces, for that, the structure passes from the static indeterminacy structure, in mechanism in graduated plastic articulations. A solution obtained by the finite element method, whatever is the problem, is approximately. The structure is meshed and the real function variation is replaced with the local variation, on the elements, depending on nodal values. The convergence is made only if the estimate functions are satisfied by certain conditions.

**Keywords:** *reinforced concrete, mesh, static equivalent forces, plastically articulations;*

**Full bibliographic reference:**

## **SHORT-SPAN RAILWAY BRIDGES OF HEAVY PLATES**

D. Boldut, R. Bancila, E. Petzek

### **ABSTRACT**

The last decades have been characterised by strong achievements and developments in the field of steel industry. Structural plates and heavy steel plates with a superior combination of mechanical properties and weldability are the result of a synergistic effect of microalloyed low carbon equivalent composition plus sophisticated thermomechanical control process variants or heat treatment during production in the plate mill. The paper presents the most important characteristics and the available range of dimensions of modern heavy plates made by high-strength steel grade. In bridge construction during the last several years more and more heavy plates have been applied. Depending on plate width, the small span bridges can be built using a single or two heavy plates, with thickness up to 250 mm may be reached depending on the loading and the deflection criteria used. Some characteristic constructive details and design rules of this bridge type are presented. The main advantage of this bridge type is the easy manufacturing process and the small traffic interruption period during erection. It can already be said that the nearly unlimited range of dimensions and steel grades in which heavy plates will be delivered facilitates an optimised design of bridges, which also take into account economic and aesthetic aspects.

**Keywords:** *steel, TM-process, high-strength steel, heavy plates, short span steel bridges;*

**Full bibliographic reference:**

## **THE CRACKING DEVICE WITH TEMPERATURE CONTROL-LABORATORY TESTING EQUIPMENT FOR EXPLOITATION PERFORMANCES OF THE ROAD MATERIALS**

M. Dicu, C. Răcănel, A. Burlacu, C. Murgu, I. Bălan

### **ABSTRACT**

The simulation of the events at a reduced scale for the laboratory research of the road materials performances in roads wear in time, has become a practice of the high research in all the specialities. An application of this

desideratum in the domain of the roads infrastructure is the utilization of CRACKING DEVICE WITH TEMPERATURE CONTROL, which has the possibility to anticipate the fatigue behaviour on road layers stabilised with binder. At the same time allows the anticipation of crack propagation from inferior frayed layers into superior protection asphaltic layers, as an image for performances of the solutions for rehabilitation at the road way.

**Keywords:** *cracking, temperature, device;*

**Full bibliographic reference:**

### **DYNAMIC CONTROL OF BRIDGES WITH SLENDER PIERS**

D. Foti, P. Monaco

#### **ABSTRACT**

In this paper a vibrational method for in situ investigations is described. The method has been applied to a bridge viaduct of about 800 m in length, with slender piers, a continuous deck and supports with a viscoelastic behavior. Three techniques of excitation of the structure have been utilized. The modes of vibration of the deck and the piers have been found with two techniques of excitation. The dynamic inputs for in situ tests have been produced by an artificial generator of vibrations (REM). The structural response has been measured with accelerometers. The spectral analysis of the environmental noise (wind) has been applied and the vibrational modes of the taller piers in the low frequency range have been determined. In this paper the bridge has been modeled with a finite element program and the dynamic behavior of the structure has been numerically determined. Then its vibrational modes have been compared with the ones experimentally obtained. The plots of the Power Spectral Densities (PSD) induced by the wind furnished more information on the vibration modes of the structure in the field of low frequencies. These information filled the lacks determined in this range performing the dynamic tests with the artificial generator of vibrations.

**Keywords:** *testing, vibration measurement, vibration control, bridge stochastic response, viscoelastic restraints;*

**Full bibliographic reference:**

### **STRUCTURAL HEALTH MONITORING THROUGH DYNAMIC IDENTIFICATION TECHNIQUES: NUMERICAL SIMULATION OF A DAMAGE SCENARIO**

D. Foti, M. Mongelli

#### **ABSTRACT**

Damage detection in civil engineering structures using changes in measured modal parameters is an area of research that has received notable attention in literature in recent years. This paper compares two different experimental techniques for predicting damage location and severity: the Change in Mode Shapes Method and the Mode Shapes Curvature Method. The comparison is established with reference to a simply supported finite element bridge model in which damage is simulated by reducing opportunely the flexural stiffness EI. The results of this study indicate that change in modal curvature is a significant damage indicator, while indexes like MAC and COMAC -widely right for FE model updating- lose their usefulness in order to damage detection.

**Keywords:** *damage detection, dynamic identification, modal shapes, modal curvatures;*

**Full bibliographic reference:**

### **FATIGUE PHENOMENON ANALYSIS OF THE STEEL BRIDGES**

S.I. Gutiu, P. Moga, G. Kollo

#### **ABSTRACT**

This paper presents the fatigue checking methodology of the steel bridge members according to Romanian norm SR 1911-98 and EC 3. A comparative analysis regarding the fatigue checking of the main girders of a 30 m span steel railway bridge is made. The concluding remarks and observations are useful in the design activity of this type of structures.

**Keywords:** *steel bridges, fatigue analysis, Eurocode 3, Romanian codes;*

**Full bibliographic reference:**

## **MACHINE CONTROL AND GUIDANCE FOR EARTHWORKS**

G. Hoda, V. Chiorean

### **ABSTRACT**

Machine control and guidance is a fusion of mechanics, automation and topography that has the purpose of improving productivity and quality of earthworks. Earthmoving is the most laborious and massive part of new roads construction, productivity and accuracy enhancements delivers shorter terms and cost reduction. The study presents the benefits of machine control and guidance in roads construction and shows a productivity test conducted on two roads sections.

**Keywords:** *Global Positioning System, machine control and guidance, earthworks;*

**Full bibliographic reference:**

## **TRAFFIC FLAWS IN CLUJ-NAPOCA AND NEIGHBOURING AREAS**

G. Hoda, C. Oltean

### **ABSTRACT**

This paper presents aspects referring to some problems of carriageway surfacing and traffic signing in Cluj-Napoca municipium and the main coming ins/going outs from the city to Turda and Floresti. These issues regard a defective traffic signing that is due to roundabouts with marks that are not adapted to the plane path of the road, a vertical signaling not adapted to this vertical position, repair works not performed in due time, insertion of directing parapets etc. All the aspects above have been put into operation to diminish the traffic speed and the number of accidents, but the additional consequence was that the traffic congested significantly so that sometimes it paralyses the entire traffic in the area. The presents paper aims at highlighting all these negative aspects, of presenting them to the road administrations in question and to propose some arrangements and remedial actions to provide for fluency and safety in road traffic.

**Keywords:** *roundabout, crossroad, accident, safety, traffic;*

**Full bibliographic reference:**

## **CONSIDERATION UPON THE DECONGESTION OF URBAN TRAFFIC**

M. Iiescu, D. Barbînta

### **ABSTRACT**

This paper aims at making a presentation of the modern systems for public transportation, of some control systems for the urban traffic and to analyse the consequences of their implementation. The role of the modern systems of public transportation lies in improving the efficiency of the transportation services and the capacity to satisfy the demands coming from the users. As for the traffic control systems, results will be shown for some of the programmes used in various cities. In general, such systems are designed so as to adapt automatically to the fluctuations in the traffic. The goal of the paper lies in emphasising the need to implement the traffic management systems in some of the cities in our country that exhibit a more and more crowded traffic.

**Keywords:** *comfort, safety, information, technology, time, decongestion;*

**Full bibliographic reference:**

## **CONSIDERATIONS REGARDING THE APPLICATION OF THE STABILIZATION TECHNOLOGY IN SITU , COLD POURING, OF THE LOCAL ROADS IN CLUJ DISTRICT**

M. Iiescu, L. Bota

### **ABSTRACT**

The present paper treats the applicability of the stabilization technology in situ, at cold ,with bituminous binders and/or hydraulic binders of paved roads from Cluj district, using the WR-2500 recycling machine. There are stated the main stages of the stabilization process, as well as the investigations which are performed in laboratories in order to find the adequate dosage. Based on the experience gathered between the years 2001-2007 are presented some of the technical recommendations which are necessary to a proper application of this technology. At the end are enumerated the main advantages of the used technology along with the resulted conclusions of its applicability in

this seven years.

**Keywords:** *stabilization, technology, recycling, binders;*

**Full bibliographic reference:**

## **OBSERVATIONS REGARDING THE USE OF IT MANAGEMENT SYSTEMS FOR THE ESTABLISHMENT OF A MAINTENANCE STRATEGY OF THE URBAN ROADS NETWORK**

M. Iliescu, S. Naş

### **ABSTRACT**

The expansion on the horizontal of the urban roads network is not possible for the majority of the cities, and its reconstruction being too expensive, the priority for the moment remains the development of the maintenance strategy for the existing one. Setting up an efficient management of the urban roads' maintenance constitutes a priority for the road administrators. An efficient solution in this respect is the creation and the implementation of IT (information technology) management systems. The IT management systems are designed to become a working tool in the decision process that aims at discovering realistic intervention strategies, pertinent ones and in accordance with the administrator's politics. Therefore, the users of these systems represent decision factors at different levels. This approach diminishes to the minimum the average costs, considering the infrastructural expenses and the users' expanses, for the entire network and for the future covering works.

**Keywords:** *roads, urban roads, urban roads management, railroads;*

**Full bibliographic reference:**

## **APPLYING A MANAGEMENT PROGRAM BASED ON TRAFFIC PARAMETERS FOR TRAFFIC MONITORING**

M. Iliescu, V. Roib

### **ABSTRACT**

Most of the displacements are done on the road network which offers greater freedom for organizing the trip or the transport but with negative consequences in what concerns traffic safety and comfort. To solve such problems traffic surveys are necessary and an adequate management based on new technologies for the collection, organization and transmission of information related to the infrastructure and traffic status. The complexity of the issues which need to be approached by such traffic surveys and the great number of factors which influence traffic require the collection and the processing of a huge volume of data and the performance of multiple calculations to determine optimal solutions. All these are carried out with the aid of computer software and of certain advanced traffic management systems. In order to optimize the traffic, a data processing program was created. The designation of the main traffic indices is accomplished by gathering and adjusting the traffic data in the programme created. In order to prove the utility of this programme, traffic data gathered during a fixed period of time from Motilor Avenue in Cluj-Napoca Municipality was adjusted. The results of the processed data basis of computer software program have a special importance by the information sent related to traffic conditions, and for the decisions related to traffic optimizing.

**Keywords:** *traffic, data base, to monitor, computer software, management program;*

**Full bibliographic reference:**

## **STRENGTHENING OF THE INFRASTRUCTURE IN AN OPERATIONAL BRIDGE**

C. Jiva

### **ABSTRACT**

The paper presents the strengthening technology required by the abutments and piles of the existing operation reinforced concrete bridge on DN57B, km 55+070, across the Nera River at Bozovici, Caras-Severin County. The existing operational bridge across the Nera River at Bozovici was built in 1958 and dimensioned for the I loading class, calculation trains A<sub>1,3</sub> and S<sub>60</sub>. The strengthening of the piles and abutments of the bridge will be realized by a 100\_200mm thick reinforced concrete lining for the pile and abutment elevations, 500mm thick respectively for the foundations. The cooperation between the existing concrete in the elevations and infrastructure foundations and the new lining is realized with the help of steel-concrete connectors placed in holes filled with rapid thickening cement

mortar. The infrastructure of the existing operation bridge was calculated to resist useful loadings given by the E loading class, calculation trains  $A_{30}$  and  $V_{80}$ . The calculations and verifications were realized based on the sizes of the elevations and infrastructure foundations measured on the site after stripping. The paper synthetically presents data concerning the calculations and verifications realized on the bridge infrastructure. The infrastructure of the bridge will thus acquire a higher bearing capacity, a longer life span and improved safety and operation.

**Keywords:** *strengthening, abutment, pile, elevation, foundation, lining, reinforced concrete;*

**Full bibliographic reference:**

### **STRENGTHENING OF THE SUPERSTRUCTURE OF THE BRIDGE ON DN 57B, KM 55+070, OVER THE NERA RIVER, AT BOZOVICI**

C. Jiva

#### **ABSTRACT**

The paper presents the strengthening technology required by the superstructure of the existing operation reinforced concrete bridge on DN57B, km 55+070, across the Nera River at Bozovici, Caras-Severin County. The existing operational bridge across the Nera River at Bozovici was built in 1958 and dimensioned for the I loading class, calculation trains  $A_{13}$  and  $S_{60}$ . The strengthening of the main beams and the crossbeams will be realized by pouring a reinforced concrete plate with the reinforcement on supports required to take over the moments, and to ensure the required clearance for a IV technical class two lane national road. The main beams and crossbeams will be strengthened by unequal lining at the bottom, where the reinforcement required to take over the additional moments is placed, respectively 10cm thick on the sides. The cooperation between the old and new concrete is realized with the help of steel-concrete connectors placed in holes filled with rapid thickening cement mortar. The superstructure of the bridge was calculated to resist useful loadings given by the E loading class, calculation trains  $A_{30}$  and  $V_{80}$ . The paper presents the values of the moments in the openings and on the supports as well as the quantity of reinforcement required. The superstructure of the bridge will thus acquire a higher bearing capacity, a longer life span and improved safety and operation.

**Keywords:** *strengthening, main beams, crossbeams, concrete plate, lining, reinforced concrete;*

**Full bibliographic reference:**

### **COMPOSITE STEEL-CONCRETE BRIDGE PYLONS**

P. Moga, Gutiu, C. Moga

#### **ABSTRACT**

This paper presents the design of composite bridge pylons built-up using the solution of concrete-filled rectangular and circular hollow sections, subjected to axial compression and compression with bending, in accordance with Eurocode 4. The working example given in this paper regarding the verification of the load carrying capacity of a composite footbridge pylon facilitates the design methodology understanding and can be useful in the design activity of such members.

**Keywords:** *composite bridge pylons, concrete-filled sections, Eurocode 4;*

**Full bibliographic reference:**

### **TOPOGRAPHICAL WORKS CONCERNING THE MODERNIZATION OF THE COMMUNICATIONS INFRASTRUCTURE - CASE STUDY IN CIUGUD COUNTY**

S. Naş, C. Oltean

#### **ABSTRACT**

The topographical works concerning the modernization of the communications infrastructure impose the creation of a supporting network which needs to be integrated to the national geodesic network. For its fulfillment, the GPS technology is the one used according to the static method of measurements. The raising network is made up of roads held at their ends by the points of the supporting network. From these points, all the details necessary for the establishment of the topographical plan, of the crossing and lengthwise profiles are settled. The field observations in roadworks are carried out with electronic tachometers "equipment used to measure the speed at which the engine of a vehicle turns"] of high precision (full station of the type LEICA TC 1100, LEICA TC 805L and LEICA TCA

1103).

**Keywords:** *Roads, Urban roads, Urban roads management, Railroads;*

**Full bibliographic reference:**

### **AN OVERVIEW ON THE BLCCA - BRIDGE LIFE CYCLE COST ANALYSIS**

A.M. Nicuta

#### **ABSTRACT**

The bridge management must take into consideration the structure of life cycle cost analysis in order to provide an optimal resource allocation. The main purpose is to consider the cost-effective decisions referring on how to build, preserve, and improve a bridge in order to minimize its life cycle cost but in the same time to achieve a satisfactory level of service over a bridge life time. FHWA has started a powerful campaign in introducing the LCC analysis for highways and BLCC analysis for bridges in order to improve and facilitate the technical projects economic evaluation process. The present research identifies the LCCA information with reference to bridges in order to formulate the cost model mostly used in the world. It shall be presented the contradiction between different countries approaches on the bridge life cycle cost. It shall also be presented the importance of a reliable maintenance for a bridge life time. Considering the findings in the paper, there will be suggested the actions implemented to achieve a unitary model for bridge costs analysis. More and more states in the last few years have recognized the need to see beyond the bridge initial costs and have started the steps towards the BLCCA implementation in bridge management. Even though this is a positive thing there still are several challenges to exceed in order to improve the process. The experts have identified the lack of complete and quality information as an obstacle to the BLCCA applications. Considering the fact that the bridge management systems use mostly information from the experts in the bridge area this study provides complementary information by presenting a new economic analysis tool.

**Keywords:** *LCCA, costs, bridge, economic analysis, agency.;*

**Full bibliographic reference:**

### **SUSPENDED METALLIC CONSTRUCTIONS FOR CROSSINGS OVER WATER COURSES**

E. Popa

#### **ABSTRACT**

The first part of this paper presents some notes on the necessity of building suspended metallic constructions, mainly the increased need for short and efficient ways of infrastructure networks. This type of construction is also a solution in those cases when it is supposed to serve small or very small human communities, which live isolated by a significant water flow, and for which the building of a bridge of a larger standard size and resistance is not justifiable. The second part develops on the building conception and the method of computation for this type of buildings, stressing their advantages in comparison to those made of massive concrete. Finally, we present 3 examples of buildings realized in Romania by using this method: a 198 m waterpipe crossing (Ø800 mm) over river Aries in the dwelling of Cheia, a bridge for pedestrians and light traffic (convoy A4, according to the Romanian standard 3221-52) over Aries in the town of Turda, and a bridge for pedestrians and light traffic (convoy A8, according to the Romanian standard 3221-52) at Lozna, Salaj county.

**Keywords:** *rigidity, deformation, sag, carrying cables, safety cables, tension cables, anchorage blocks;*

**Full bibliographic reference:**

### **SOME INVESTIGATIONS PERFORMED FOR THE BRIDGE OVER JIU AT ANINOASA**

I.R. Racanel, M. Daraban, R. Stanescu

#### **ABSTRACT**

The carrying structure of the bridge over the Jiu River at Aninoasa consists in two parallel concrete arches with variable height of the cross section, sustaining a concrete deck through vertical concrete hangers. In the time period passed since the bridge was erected, some structural elements shown damages. In order to establish the technical state of the bridge, a technical appraisalment was performed and according to this, the most exposed elements to the risk of failure are the hangers. The purpose of this paper is to present briefly both, the method used to test the actual bridge carrying capacity in situ and the finite element model developed for the static and dynamic analysis of the

structure. In order to estimate the state of the structural elements, two ways were followed. In the first stage, a test project was carried out and in the second stage, a complete 3D finite element model was developed to analyze the bridge structure. The test project has foreseen the loading of the bridge by heavy unloaded trucks, disposed in some positions on the deck and the measurements of the deck and arches displacements. The positions of the trucks were established in order to obtain the maximum values both for arches transverse displacements and vertical displacements of the deck. Using electro-resistive transducers the hangers elongations and strains values on their cross section were also measured. These measured values were compared with those obtained from the numerical calculations performed by using the complete finite element model. By means of the finite element model, also the response of the structure following the dynamic action of vehicles was investigated.

**Keywords:** *bridge, cracks, hangers, deck, grillage, reinforcing bars;*

**Full bibliographic reference:**

### **A MANAGEMENT SYSTEM FOR IMPROVING THE URBAN INFRASTRUCTURE IN CLUJ-NAPOCA CITY**

V. Roib, G. Cora

#### **ABSTRACT**

Cluj-Napoca City is one of the main urban centres of Romania by its political, administrative, industrial, commercial and cultural functions. In order to comply with the requirements regarding safe, quick, comfortable and economical traffic, it is necessary to implement a management system to improve the urban infrastructure, which includes the modernizing of urban roads and facilities network. The paper presents the intervention modes, the works performed and propose on types of activities, the local planning for maintenance, repairs and modernization of urban roads and facilities network in Cluj-Napoca City. The management system for improving the urban infrastructure, assures:

- the satisfaction of the public utilities requirements and needs of the local community;
  - the continuous raise of standards and performance ratios of the services provided;
  - the development and modernization of the municipal-urban infrastructure;
  - protection and preservation of natural and built environment;
- maintenance of sanitary conditions in accordance with the hygiene and public health norms.

**Keywords:** *urban infrastructure, management system, maintenance, repairs, modernization;*

**Full bibliographic reference:**

### **STUDY OF ASPHALT MIXTURES USED IN THE WEARING COURSE**

C. Romanescu, C. Răcănel, A. Burlacu, C. Murgu, I. Bălan

#### **ABSTRACT**

The fatigue of the asphalt mixtures submitted to repeat bending represents an important factor in the design of pavements. Because of the continuous increase of the vehicles number and also the wheel loading, roads with flexible and mixed structures are damaging and one of the main distress is the fatigue of the asphalt layers that requires significant costs. This paper refers to the study of asphalt mixtures fatigue, used in the wearing course and has the goal to obtain values for the stiffness modulus and the phase angle in certain conditions of loading, using the four points bending test. This fatigue test is made using the new fatigue equipment acquired inside the Roads Laboratory of the Technical University of Civil Engineering, on three types of asphalt mixtures: a classic asphalt mixture BA16, a rough asphalt mixture BAR16 and an asphalt mixture with fiber, MASF16. This test is made according to the European Norms EN 1269726 and EN 12697-24.

**Keywords:** *asphalt mixture, fatigue, four points bending test, stiffness modulus, phase angle;*

**Full bibliographic reference:**

### **INVESTIGATION REGARDING THE USE OF BISTEX GEOCOMPOSITE IN ROAD STRUCTURES**

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#### **ABSTRACT**

The present work, that constitutes the object of the contract concluded between UTCB -Department of Roads and Railways and B2B CONSPROD, named "Research regarding the use of Geocomposite Bistex Geocomposite in road

structures", contains the results of the lab studies effectuated on many samples with compositions and different dimensions, regarding the characteristics of the use of Bistex geocomposite in the asphalt road layers. The producer intends to use the product on a larger scale and implicitly, needs a confirmation of its performances in the assembly of asphalt layers.

**Keywords:** *geocomposite, road structures, asphalt layers;*

**Full bibliographic reference:**

#### **WORKS FOR ENVIRONMENTAL PROTECTION AND REDUCING OF POLLUTION IN THE INFRASTRUCTURE PROJECTS ELABORATED BY S.C. CONSILIER CONSTRUCT S.R.L.**

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##### **ABSTRACT**

The paper will present the environmental evaluation procedure, a very important procedure followed when developing infrastructure projects, elaborated by S.C. CONSILIER CONSTRUCT S.R.L., from the perspective of national and European regulations, as well as submitted in the environment protection principals like: sustainable development, ecological risks and damages anticipation and biodiversity conservation. The procedure for environmental impact assessment will be presented in this paper, according with environmental protection legislation and based on real situations in the S.C. CONSILIER CONSTRUCT activity. Measures for avoiding direct impact or reducing it when avoiding is impossible will also be included. Another aspect treated in the paper will be evaluating direct or indirect impact on protected areas included in the Natura 2000 network, a network recognized by law this year also in Romania. The importance of monitoring in applying the measures for environmental protection, reduction of pollution and works of ecological reconstruction, measures proposed in the environmental impact assessment study will be underline, as without actually applying those measures environmental protection is only a statement and not a real thing.

**Keywords:** *environment, evaluation, infrastructure;*

**Full bibliographic reference:**

#### **PRECAST PRESTRESSED CONCRETE BEAM FOR ROAD BRIDGE SUPERSTRUCTURES**

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##### **ABSTRACT**

Nowadays a very reduced range of precast prestressed beams are manufactured for bridges in our country, from the point of view of the cross section shape and from the point of view of the beam length. The beams which are being used are Iptana beams, with concrete slab over the adjoining beams with adherent cables. The diversification of the beam range is a permanent preoccupation of the specialists. In this respect, the paper presents the results of a study elaborated on a road bridge superstructure of 26.0 m length, simply supported, on 6 beams with "T" section disposed at 1.90 m between axes. The monolithic slab between the main beams is 17 cm thick and it is concrete on precast thin slabs in order to avoid the encasement. The stresses in the beams of the superstructure have been determined using the PROKON and ROBOT programs. It has been studied the effect of building the superstructure with and without diaphragm beams and the monolith slab at the superior flange of the beams has been modeled in different ways.

**Keywords:** *concrete, beams, reinforced, precast, prestressed, adherent cables, supestructures, cross section, programs;*

**Full bibliographic reference:**