

COMPLEX MONOGRAPH ON ENGINEERING GEODESY

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Abstract. An original work called – complex monograph is presented, consisting of 5 books (the last two published at the end of 2022; a total of 2870 computer pages), each of which is defined as a system of monographs in the Bulgarian language. It is printed analogically and an electronic version is available at the electronic bookstore bibllio.bg. Two more books have been uploaded to the Internet, representing a summary presentation of the complex monograph, respectively in English and Bulgarian (~120 pages each, <https://joom.ag/Em6d> – EN; <https://joom.ag/Dm6d> – BG, free access). Each of the five books of the complex monograph has a brief presentation in English as well (title page, abstract, preface, table of contents, authors' biographies). Essentially, the work systematizes, summarizes, and comprehensively presents the main aspects of the construction activity, architecture, the layout of the territories and the place, and the role of geodesy – Engineering geodesy in their implementation, with the application of space and geospatial technologies. There is no analog in the literature. Own financing.

Keywords: complex monograph, system of monographs, engineering geodesy, construction, architecture, spatial planning of the territories, space and geospatial technologies, systematization, summary, complex presentation

1. GENERAL PROVISIONS

After nearly nine years the work "Applied Geodesy – Part 1. Engineering Geodesy" – a complex monograph was completed and published. It consists of 5 books (the last two published in 2022; a total of 2870 computer pages), each of which is a system of monographs. In 2023, two more books were uploaded to the Internet,

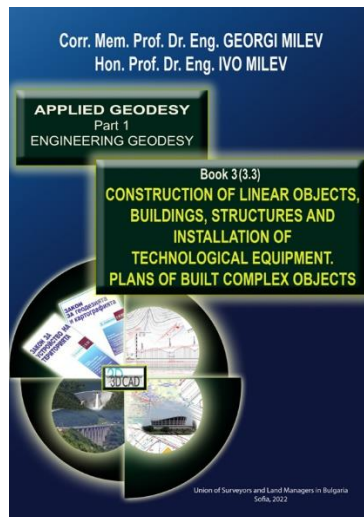
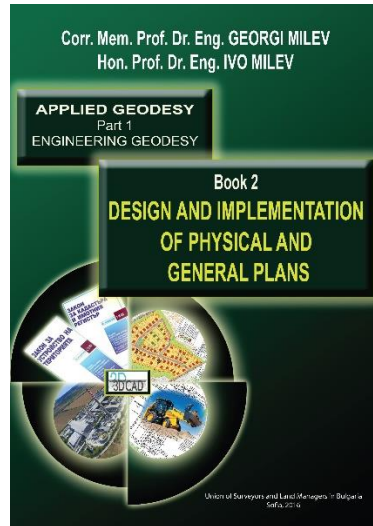
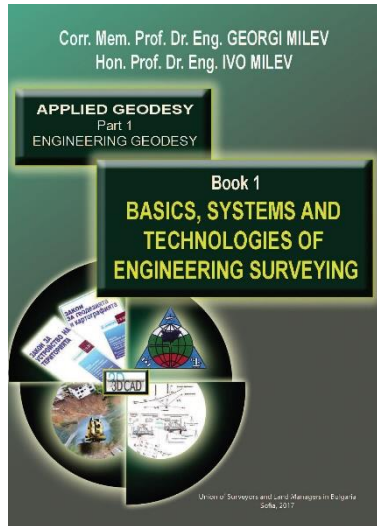
representing a summarized presentation of the Complex Monograph, respectively in English and Bulgarian. The paper is part 1. Engineering geodesy of the authors' Applied Geodesy project.

Essentially, the work systematizes, summarizes, and comprehensively presents the main aspects of the construction activity, architecture, the spatial planning of the territories and the place, and the role of geodesy – Engineering geodesy in their implementation, with the application of space and geospatial technologies.

In this way, for the first time in literature, these areas and activities are presented in an original way, together from an interdisciplinary position, with Engineering Geodesy as an irrevocable element of them, in which other specialists have an indisputable role.

Along with this, emphasis in the considered books is also placed on the application of Geospatial systems, equipment, methods, and technologies in construction, architecture, and structural planning through Applied – respectively Engineering Geodesy.

The scope, volume, division, structure, and content of the individual books are summarized here. A general overview, analysis, and evaluation of the problems in the field of Engineering Geodesy has been made. The original solutions are presented in the system of monographs and relevant generalized complex literature. Practically, the complex monograph – 5 books (each of which is a system of monographs) is a unique digital whole, with the uniform numbering of content, text, formulas, figures, tables, and literature (Fig. 1). Such an analog publication is missing in the world's literature. The same applies to the digital edition, to which two more digital books (EN and BG, Fig. 2) have been added, summarizing the complex monograph of the 5 books.



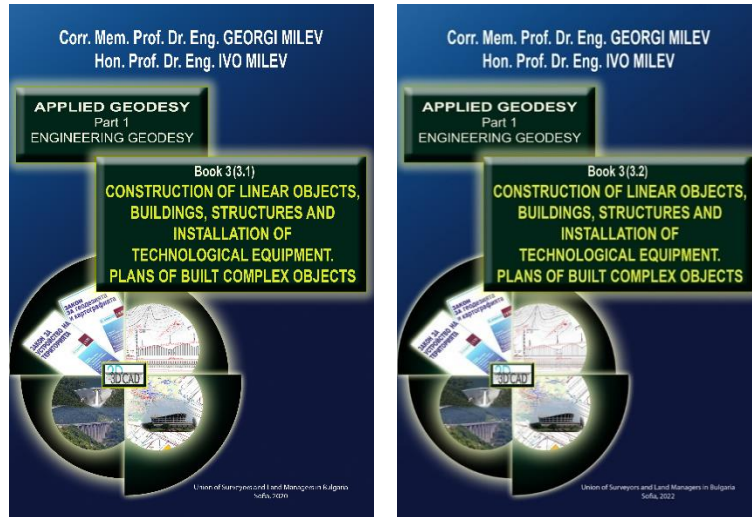


Fig. 1. The five books from the complex monographs on Engineering Geodesy

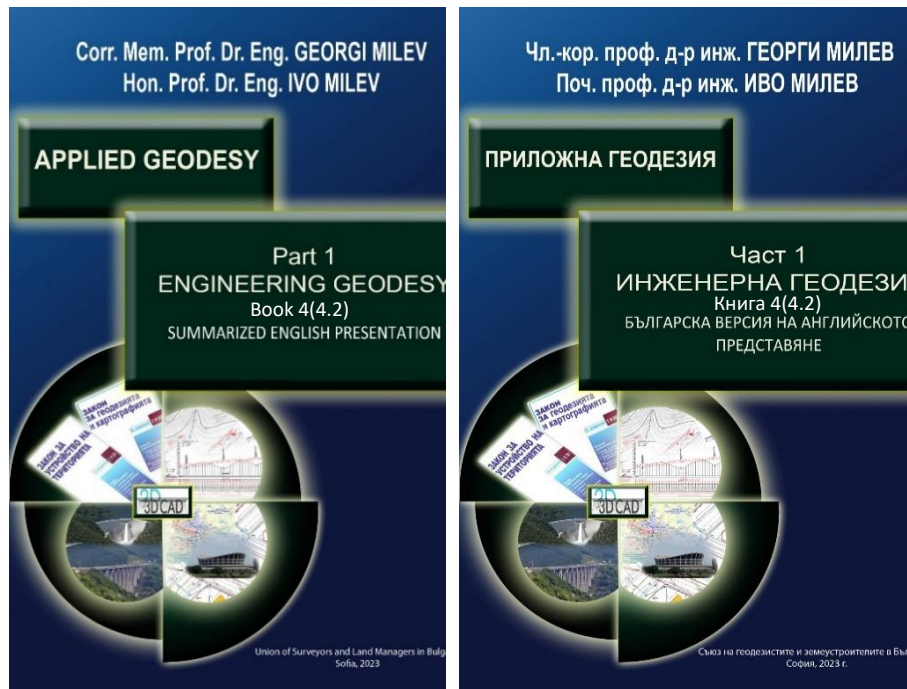


Fig. 2. The summarized English/Bulgarian presentation Books 4(4.1), (4.2)

2. MULTILATERAL DEVELOPMENT AND APPLICATION OF GEOSPATIAL SYSTEMS, METHODS, AND TECHNOLOGIES

Geospatial systems, apparatus, methods, and technologies are an important prerequisite and means and are of particular importance in many areas of modern knowledge and its application. They are based on the modern achievements of mathematics, physics, mechanics, informatics, electronics, electrical engineering, instrument-, apparatus- and instrument-making, creation of systems and software for measurement and processing, and many others. They are widely used in the various stages related to the study, design, construction, and operation of engineering objects and their complexes. They are also used to document, survey, evaluate, study, and counteract dangerous geodynamic processes from the Natural Science aspect of geodesy and many others. In summary, the technologies are:

1. Space and air Geospatial technologies

- Global Navigation Satellite Systems – (GNSS). Including the differential – (Differential Global Navigation Satellites Systems – DGNSS);
- Satellite systems for remote studies – photogrammetric, laser, radar, radar interferometry, DInSAR, etc.;
- Photogrammetric, laser, and other sensor systems and technologies for aerial photography, including oblique photos (Pictometry), aerial laser scanning of terrestrial and underwater surfaces, and other applications; aerial digital cameras and scanners, GNSS receivers, and inertial navigation systems are used;
- Geospatial information systems;
- Spatial visualization and modeling of urban areas (BlomUrbex) – server.

2. Terrestrial Geospatial Technologies

- Freely chosen station – spatial photograph and tracing with an electronic tachymeter;
- Geodetic robots – photographing, tracing, control, and management of construction machines;
- Integrated systems – electronic tachymeter + GNSS;
- Laser scanning – photo, documentation, control;
- Other specialized technologies, e.g. based on the use of sensors and sensor systems.

3. Collection, processing, and presentation of information through the mentioned and other directions in the form of information systems.

4. Of particular importance here is the use of Specialized software.

5. Combined technologies.

3. PROJECT DATA AND BOOKS

3.1. Project data and general book data

The "Applied geodesy" project of the authors – G. Milev and I. Milev consists of three parts:

1. Engineering geodesy
 2. Application of Geodesy in Earth Sciences
 3. Other (non-engineering and natural science aspects) applications of Geodesy
- The three parts together treat the comprehensive application of Geodesy.

Part 1. Engineering geodesy is a complex monograph and consists of five printed books (Fig. 1):

1. Basics, systems, and technologies in Engineering Geodesy;
2. Design and implementation of the development and master plans;
3. Construction of linear objects, buildings, facilities, and installation of technological equipment. Plans of the built complex objects. Due to its large volume, over 1500 pages, book 3 is separated into three books 3(3.1), 3(3.2), and 3(3.3).

Each of the five books of the complex monograph has a short introduction in addition to Bulgarian and English (title page, annotation, preface, contents, and biographies of the authors).

There are separate posters for books 1 and 2 and common posters for books 3(3.1), 3(3.2), 3(3.3), and for all 5 books in Bulgarian and English.

The books of the Complex Monograph are designed as a complete whole. They contain uniform text numbering, formulas, tables, black-and-white and colour figures and are in A4 format. They are printed in "Avangard" Ltd and can be found in the bookstores of the University of Architecture, Civil Engineering and Geodesy and Civil Engineering Bookstori. They are published by USLMB with the support of BAS and the Space Research and Technologies Institute -BAS. In digital form, the books have been uploaded to the <http://biblio.bg> server of the biblio.bg electronic bookstore in pdf format. General information and the beginning of books up to 22 pages are available directly through "Georgi Milev". Accessible information is also available at – <https://tinyurl.com/wmbqz5c>; <https://tinyurl.com/ums3dfv>. They are also uploaded to the servers of SRTI-BAS (http://space.bas.bg/bg/publishing_activity/books_and_journals.html) and (<http://www.dgk.badw.de/meldungen.html>), DGK, Germany. Summerized english presentations: EN (<https://joom.ag/Em6d>), and in Bulgarian - BG (<https://joom.ag/Dm6d>).

3.2. Bibliographic description and posters of the books

The description is as follows:

Milev, G., I. Milev. Applied Geodesy Part 1, Engineering Geodesy. Book 1. Basics, systems, and Technologies in Engineering Geodesy. S. USLMB. Vanguard. 2017. 498 – <https://tinyurl.com/wmbqz5c>;

Milev, G., I. Milev. Applied Geodesy Part 1, Engineering Geodesy. Book 2. Design and application of development and master plans. S. USLMB. Vanguard. 2017. 330 (book 2) – <https://tinyurl.com/ums3dfv>;

Milev, G., I. Milev. Applied Geodesy Part 1, Engineering Geodesy. Books 3(3.1); 3(3.2); 3(3.3). Construction of linear objects, buildings, facilities, and installation of technological equipment. Plans of the built complex objects. S. USLMB. Vanguard. {Books 3(3.1), 2020. 524; 3(3.2), 2022, 530; 3(3.3), 2022, 466} – <https://tinyurl.com/ums3dfv>.

Due to the unconventionally huge volume of the complex monograph (2870 computer pages), the number of books – 5, type, content, exposition, language, etc. the reader may have difficulties with the overall view and perception of the use of what is presented in the complex monograph. This is avoided to a large extent by a generalized English/Bulgarian presentation of the monograph with what is offered in book 4(4.1) – in English and its analog 4(4.2) – in Bulgarian and their availability on the Internet (<https://joom.ag/Em6d> – EN; <https://joom.ag/Dm6d> – BG, Fig. 2). Thus, book 4(4.1) in English appears as an essential complementary and facilitating element – a bridge for the reader, when perceiving and using the complex monograph, in addition to the original and other languages. It also contributes to clarifying the concepts and views of the authors about the essence, ideas, understandings, and the type and manner of presentation of these interdisciplinary fields and areas of science, education, and practice.

We hope that the summary presentation of the complex monograph – books 4(4.1) and 4(4.2) will appear as an indispensable part and will contribute, to a certain extent, to its more successful evaluation and use.

As already noted, the books have posters, respectively in Bulgarian and English – a common poster for the five books (fig. 3), separate posters for books 1 (fig. 4) and 2 (fig. 5), and a common poster for books 3 (fig. 5)



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APPLIED AND ENGINEERING GEODESY

The project „APPLIED GEODESY“ of the authors G. Milev and I. Milev consists of three parts:

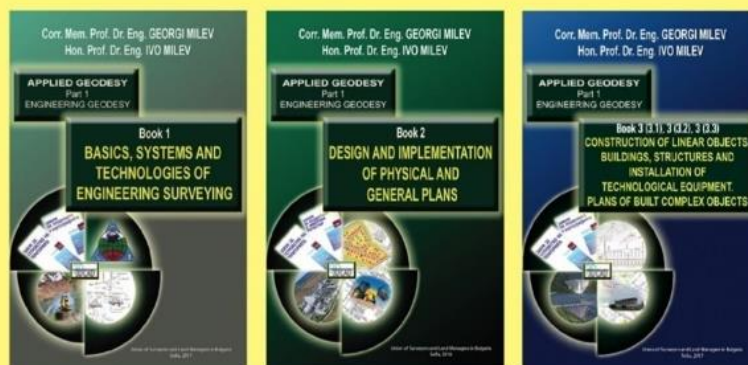
1. Engineering surveying,
2. Application of Geodesy in Earth Sciences,
3. Other (non-engineering and natural scientific) aspects of Geodesy.

The three parts together treat the versatile application of Geodesy.

Part 1. ENGINEERING SURVEYING consists of five books:

1. Basics, systems and technologies in Engineering Surveying – 496 p.,2017y.
2. Design and implementation of physical and general plans – 325 p.,2017y.
3. Construction of linear objects, buildings, facilities, installation of technological equipment. Plans of the built complex objects – due to the large volume, over 1500 pages, it is separated into three books – 3(3.1 – 524 p.,2020y.), 3(3.2 – 530 p.) and 3(3.3 – 468 p.),2022y.

Every one of the five books has a short presentation in English language (cover page, annotation, foreword, contents, biographies of the authors).



The books of Part 1 are formed as a complete whole. They contain uniform numbering of text, formulas, tables and black & white, and colour figures, and are in an A4 format. They are published in Avangard Publishing House and can be purchased in the bookstores of UACEG, UMC, SEK and Blestyasht Fakel.

The books were uploaded in digital form on the server of the electronic library Biblio.bg at <http://biblio.bg> in .pdf file format. General information and the beginning of the books to page 22 are immediately available by searching „Georgi Milev“ or at <https://tinyurl.com/wmbqz5c>; <https://tinyurl.com/ums3dfv>. They are uploaded on the servers of ISRT-BAS (http://space.bas.bg/publishing_activity/books_and_journals.html); DGK (<http://www.dgk.badw.de/meldungen.html>), Germany.

Summerized english presentations: EN - <https://joom.ag/Em6d> BG - <https://joom.ag/Dm6d>.

The books represent an original systematization, summary and exposition of this branch of science and practice in monographic form and are an edition of the Union. The authors have sponsored the books.

Fig. 3. General poster of the 5 books

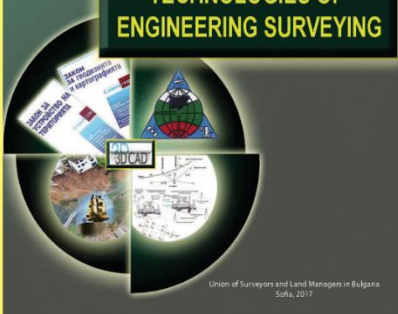
<p style="text-align: center;">Annotation</p> <p>Book 1 treats the fundamentals of Engineering Surveying – the modern: investment process, normative base, geodetic basis (digital data, plans, maps and control networks), instruments, apparatuses and systems; reference and coordinate systems and surfaces, theoretical bases of geodetic measurement processing, algorithms and software, modern numerical geospatial technologies and their application in Engineering Surveying and related information systems. The main issues of tracing are presented: essence, elements, methods, technologies, accuracy, norms and cases; theoretical bases and practice in the control and determination of displacements and investigation of deformations of engineering objects, including in landslides.</p> <p>In fact the exposition in this part of the book refers to the theoretical and principal essentials, including systems, methods and technologies. Their specific application is further considered in the design and application of a complex of objects in Book 2 and in the construction of the individual particular objects in Book 3.</p> <p>The presentation has an original structure. It corresponds to the current normative regulations and the possibilities afforded by the modern digital devices, instruments, systems and technologies. The book reflects to a large extent the views, long-term research, teaching experience and participation in the construction and investigation of engineering objects, including with original spatial constructive solutions of the authors.</p> <p>The book can be used by lecturers, students and practitioners in the field of Engineering Surveying and all those who work on the construction and exploitation of engineering objects and their complexes such as architects, civil engineers – constructors, and specialists in the transport and water sector, etc., designers, contractors performing organization and control of construction and installation of technological equipment. Undoubtedly, it is recommended to do this, if necessary, at the same time with the other two books of the authors.</p> <p>REVIEWERS:</p> <ol style="list-style-type: none"> 1. Corr. Mem. Prof. D.Sc. Arch. Atanas Kovachev, Assoc. Prof. Dr. Eng. V. Kotzeva 2. Prof. D.Sc. Eng. Georgi Valev 3. Assoc. Prof. Dr. Eng. Todor Kostadinov <p>ISBN 978-619-90732-2-3 Printed edition 978-619-90732-3-0 pdf</p>	<p style="text-align: center;">REVISED BOOK 2022</p> <div style="text-align: center;"> <p>Corr. Mem. Prof. Dr. Eng. GEORGI MILEV Hon. Prof. Dr. Eng. IVO MILEV</p> <p>APPLIED GEODESY Part 1 ENGINEERING GEODESY</p> <p>Book 1 BASICS, SYSTEMS AND TECHNOLOGIES OF ENGINEERING SURVEYING</p>  <p style="text-align: right; font-size: small;">Union of Surveyors and Land Managers in Bulgaria Sofia, 2017</p> </div>	<p style="text-align: center;">Editions of the book</p> <p>The book "Basics, systems and technologies of engineering surveys "Applied Geodesy" of authors, consisting of three parts</p> <ol style="list-style-type: none"> 1. Engineering Surveying 2. Application of Geodesy in Earth sciences 3. Non-engineering and natural science aspects of application of geodesy. <p>The three parts together treat the comprehensive application of Surveying. The book is actually Book 2 of part 1 "Engineering Surveying" which is ready for printing in form of three books:</p> <ol style="list-style-type: none"> 1. Basics, systems and technologies of Engineering Surveying; 2. Design and implementation of structural and master plans; 3. Construction of linear objects buildings, structures, installation of technological equipment. Plans of built complex objects. <p>Book 1 is in a volume of 498 pages – text, formulas, tables and black – white and colorful figures in a format A4.</p> <p>It is printed in Publishing house "Avangard" and can be bought in bookstores of the University of Architecture, Civil Engineering and Geodesy, SEC and Shining a torch. In digital form it is uploaded to the server: http://biblio.bg of the e-bookstore Biblio.bg in pdf format. The book is available up to page 22. The book is edition of the Union of Surveyors and Land Managers in Bulgaria.</p>
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Fig. 4. Book 1 poster

Annotation

Interdisciplinary problems related to the development of territories – development schemes, physical and general plans of a complex of objects – industrial enterprises, airports, etc., are presented along with the role of geodesy and the contribution of land surveyors to their realization. The major emphasis is laid on the technology of design and implementation of regulation plans, general plans and schemes and drafts for vertical planning. Moreover the problems are treated from an interdisciplinary point of view and in the context of the modern possibilities of: digital design, geospatial technologies, using of global navigation satellite systems, electronic systems for data measurement and processing, tracing and monitoring, geoinformation systems, use of modern digital cadastre and others. Along with this the exposition is based and reflects, insofar as possible, the huge current normative and subordinate basis – laws, rules, regulations, instructions, guidelines, etc., and it has become necessary in some cases to cite directly some major aspects of it. However this basis is dynamically developing and its actual state should be always accounted for. A number of real practical examples of physical planning of territories are also included. The long-year work and experience of the authors are also reflected.

Undoubtedly such a broad spectrum of issues cannot be exhaustively considered in all its aspects. A balance has been sought for in the structure of the book and exposition to present the main problems and the emphasis is put on the aspects related more directly to the activities of surveyors in the area of physical planning.

The book is intended primarily for surveyors. However, because of the interdisciplinary nature of the problems and the manner of exposition, it can be very useful for a broad circle of specialists – architects, engineers, lawyers and others working on the issues of physical planning. The benefits may be for the lecturers and all studying these problems, workers in the municipalities and courts, and in the design and construction in this area, owners of land estates and many others.

The authors

REVIEWERS:

1. Corr. Mem. Prof. D.Sc. Arch. Atanas Kovachev, Assoc. Prof. Dr. Eng. V. Kotseva
2. Prof. Dr. Eng. Ilinka Ivanova
3. Assoc. Prof. Dr. Eng. Todor Kostadinov

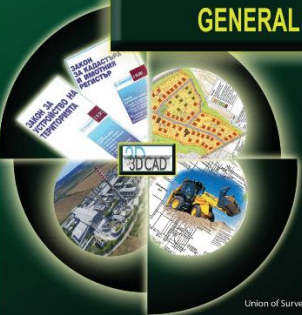
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REVISED BOOK 2022

Corr. Mem. Prof. Dr. Eng. GEORGI MILEV
Hon. Prof. Dr. Eng. IVO MILEV

APPLIED GEODESY
Part 1
ENGINEERING GEODESY

Book 2
**DESIGN AND IMPLEMENTATION
OF PHYSICAL AND
GENERAL PLANS**



Union of Surveyors and Land Managers in Bulgaria
Sofia, 2016

Editions of the book

The book "Design and implementation of structural and master plans" is part of the project "Applied Geodesy" of authors, consisting of three parts

1. Engineering Surveying
2. Application of Geodesy in Earth sciences
3. Non-engineering and natural science aspects of application of geodesy.

The three parts together treat the comprehensive application of Surveying. The book is actually Book 2 of part 1 "Engineering Surveying" which is ready for printing in form of three books:

1. Basics, systems and technologies of Engineering Surveying;
2. Design and implementation of structural and master plans;
3. Construction of linear objects buildings, structures, installation of technological equipment. Plans of built complex objects.

Book 2 is in a volume of 330 pages – text, formulas, tables and black – white and colorful figures in a format A4.

It is printed in Publishing house "Avangard" and can be bought in bookstores of the University of Architecture, Civil Engineering and Geodesy, SEC and Shining a torch. In digital form it is uploaded to the server:

<http://biblio.bg>

of the e-bookstore Biblio.bg in pdf format. The book is available up to page 22. The book is edition of the Union of Surveyors and Land Managers in Bulgaria. The other two books of part 1. Engineering Surveying will be printed and digitally accessible on the same server.

Fig. 5. Book 2 poster

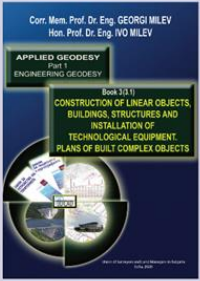
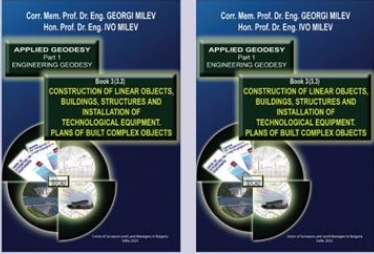
<p style="text-align: center;">ANNOTATION</p> <p>Books 3 of part 1. Engineering Geodesy of Applied Geodesy present the essence, tasks and role of Engineering Geodesy in the design, tracing, construction and operation of specific types of engineering objects - linear objects, buildings, facilities, and installation of technological equipment, plans, models and information systems of the built complex sites, etc.</p> <p>Due to the versatility of the treated problems and the large volume of exhibited material, exceeding 1500 computer pages, book 3 is divided into three books - 3 (3.1), 3 (3.2) and 3 (3.3).</p> <p>Book 3 (3.1) presents the design, construction, operation and reconstruction of linear objects and the peculiarities of geodetic works on railways, roads, energy supply sites, communications, water supply and sewerage, cableways, as well as tunnels and subways.</p> <p>Book 3 (3.2) includes problems related to the design, construction and installation of facilities on other linear sites, e.g. bridges, as well as geodetic methods and technologies for tracing and control measurements and the study of their deformations. These problems are also presented at hydrotechnical sites, built independently or in complexes of engineering ones - dams, cascades, etc., as well as hydro-ameliorative sites, river corrections, floods and droughts and ports.</p> <p>Book 3 (3.3) presents the study, design, tracing and control, and study of deformations in the construction, installation and operation of buildings, industrial facilities and technological equipment, installation of machinery for various purposes, as well as sites for civil purposes - airports, sport, high facilities, etc. The making of the plans and modeling of the constructed sites - BIM and the cadastre of communications of complexes of engineering sites and relevant information systems, respectively - Specialized data (model) of underground communications, and other engineering aspects of application are presented further.</p> <p>For the various sites, in the exposition 3 (3.1), 3 (3.2) and 3 (3.3), first of all, brief, specific information about their nature, construction, requirements, normative base and peculiarities is given. Thus, among other things, up-to-date engineering information and terminology are used and specialists speak the same language, especially since the issues under consideration are interdisciplinary.</p>	<p style="text-align: center;">REVISED BOOK 2022</p>  <p style="text-align: center;">NEW BOOKS 2022</p> 	<p>The structure of the books is original. The exposition is in accordance with the accepted way of exposition in books 1 and 2 of the authors, with the current regulatory framework and the opportunities offered by modern digital devices, tools, systems and technologies. It largely reflects the views, many years of research, teaching experience, participation in the construction and study of deformations of engineering objects, including those with original spatial design solutions, implemented with the participation of the authors.</p> <p>Books 3 (3.1), 3 (3.2), 3 (3.3) are intended for professionals working on the construction (research, design, construction, installation) and operation of various engineering sites and complexes of them. Also for lecturers, doctoral students, students in the field of "Architecture, Civil Engineering and Geodesy", etc., as well as for practitioners in the field of construction, architecture, spatial planning and engineering geodesy.</p> <p>Reviewers:</p> <ol style="list-style-type: none"> 1. Corresponding Member Prof. Dr. A. Dr. Arch. Atanas Kovachev, 2. Assoc. Prof. Dr. Eng. Veneta Kotseva 3. Assoc. Prof. Dr. Eng. Todor Kostadinov 4. Dr. Eng. Ivan Kalichev Ivanov <p>ISBN 978-619-90732-4-7 print ISBN 978-619-90732-5-4 pdf ISBN 978-619-90732-6-1 (hardcover) ISBN 978-619-90732-8-5 (pdf) ISBN 978-619-90732-7-8 (hardcover) ISBN 978-619-90732-9-2 (pdf)</p>
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Fig. 6. General poster of books 3

3.3. Problems treated in individual books

The problems in the five books of the Complex Monograph are summarized in one place here.

Book 1 presents the foundations of Engineering Geodesy – the modern ones: investment process, regulatory framework, the geodetic foundation (digital data, plans, maps, and reference networks), tools, apparatus, and systems; reference and coordinate systems and surfaces, theoretical foundations for processing geodetic measurements, algorithms, and software, modern numerical geospatial technologies and their application in Engineering Geodesy and related information systems. The main problems of tracing are presented: the essence, elements, methods, technologies, accuracies, norms, and cases; theoretical foundations and practice in the control and determination of displacements and the study of deformations of engineering objects, incl. and in landslides.

What is presented in this part of the book are the theoretical and principled essences, including the systems, methods, and technologies. Their specific application is considered further in the design and application of a complex of objects, in Book 2 and the construction of individual concrete objects, in books 3.

The structure of the book is original. The exhibition is following the current legal framework and the possibilities offered by modern digital devices, tools, systems, and technologies. The book largely reflects the views, long-term research, teaching experience, participation in the construction and research of engineering objects, including original spatial constructive solutions of the authors.

It can be used by teachers, students, and practicing specialists in the field of Architecture, Construction, and Geodesy, i.e. Engineering Geodesy and all those who work on the construction and operation of engineering objects and their complexes, such as architects, construction engineers – constructors, and those in transport, waterworks, etc., designers, contractors, carrying out organization and control of construction and installation of technological equipment. Undoubtedly, it is recommended that this, if necessary, be done at the same time as the other books of the authors under consideration.

Book 2 presents the interdisciplinary problems related to the organization of the territories – layout schemes, layout and general plans of a complex of objects – industrial enterprises, airports, etc., together with the role of geodesy and the contribution of surveyors in their implementation. A major emphasis is placed on the design and application technology of regulatory plans, master plans, and vertical

planning schemes and plans. In doing so, the problems are treated from an interdisciplinary position and the position of modern possibilities of: digital design, geospatial technologies, the use of global satellite navigation systems, electronic systems for measurement and data processing, tracking and control, geoinformation systems, the use of modern digital cadastre and etc. Along with this, the exposition is based on and reflects, as far as possible, the vast current normative and sub-normative base laws, rules, regulations, instructions, instructions, etc., and in some cases its main points had to be quoted directly. However, it is dynamically developing and its current state should always be taken into account. Also included are a number of examples from real practice on the organization of territories. It also reflects the long-term work and experience of the authors.

Undoubtedly, such a vast matter cannot be comprehensively presented in all its aspects. In the structuring of the book and the exhibition, a balance was sought in the presentation of the main problems and an emphasis on those aspects that are more directly related to the activity of surveyors in the field of spatial planning and geospatial technologies.

The book is primarily intended for surveyors. However, due to the interdisciplinary nature of the problems and the manner of presentation, it can be very useful for a wide range of specialist architects, engineers, lawyers, and others working on the problems of urban planning. It can be used by those who teach and study these problems, those working in municipalities, the courts, in the design and construction of this area, owners of landed properties, and many others.

Book 3 continues already with consideration of the construction of specific types of objects and here includes and presents the role, tasks, methods, and technologies of Engineering Geodesy in their realization. Due to the large volume of the exposition, book 3, as already mentioned, is structured as 3 books: 3(3.1), 3(3.2), 3(3.3). At the same time, with information and specific examples from practice for solving problems for individual sites, which we believe is of particular importance.

Book 3(3.1) sets out the design, construction, operation, and reconstruction of linear objects and the peculiarities of geodetic works at railway lines, roads, objects of energy supply, communications, water supply and sewerage, ropeways, as well as tunnels and subways.

Book 3(3.2) includes problems related to the design, construction, and installation of facilities on other linear sites, e.g. bridges, as well as geodetic methods and technologies, for tracing and control measurements, and the study of their deformations. These problems are also presented in hydro-technical objects, built independently or in complexes of engineering ones – dams, cascades, etc., as well as hydro melioration objects, corrections of rivers, floods and droughts, ports, and river transport.

Book 3(3.3) presents the study, design, tracing, and control and study of deformations during the construction, installation, and operation of buildings,

industrial facilities, and technological equipment, installation of machines for different purposes, also objects with civil purposes – airports, sports, high facilities, etc. Next, the drawing up of the plans and modeling of the built objects is presented – BIM and the cadastre of communications of complexes of engineering objects and the relevant information systems, respectively – specialized data (model) of underground communications, as well as other engineering aspects of the application.

3.4. Numbering system

As already said, the complex monograph is a digital whole of 5 books with the uniform numbering of content, text, formulas, figures, tables, and literature. In the preface and in the books themselves, their nature and use are precisely explained. Here, for illustration, in condensed form, what the original presentation of some of the contents of book 3(3.3) looks like, with graduations and indents. However, in the text, things look like the previous numbering and do not cause problems.

CONTENTS of book 3 (3.3) – part – sample

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3.10.1. General information about the construction of buildings, industrial facilities, and technological equipment	18
3.10.2. Types of buildings, design, construction, installation, and operation of buildings	18
3.10.2.1. General statements	18
1. General on buildings and exposition	18
2. Basic requirements for the structures	20
3. Structural systems and schemes of buildings	21
3.10.2.2. Classification of buildings	22
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3.10.2.4. Construction and control of buildings	37
1. Preparatory works at the construction site	37
2. Start of construction	37
3. Providing a construction line and level	39
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5. Technologies, construction, and installation of the above-ground part of buildings	46
5.1. General data	46
5.2. Auxiliary devices, equipment, and	

activities for construction and installation	46
5.2.1. Formwork	47
5.2.1.1. General data about formwork	47
5.2.1.2. Description, technologies, and activities for formwork	51
1. Large area 2D and 3D formwork	51
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1.1.1. Large area formwork for walls	52
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5.2.2. Cranes	59
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5.13. Very high buildings	77
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6. Control and commissioning of buildings	77
6.1. Regulation	77
6.2. Acceptance of construction sites and their commissioning	78
6.3. Geodetic activities	79
3.10.2.5. Regulatory base	80
1. Standards, laws, regulations, ordinances, bylaws in construction and assembly of buildings, industrial facilities and technological equipment and their condition in Bulgaria	80

4. ORIGINAL SOLUTIONS IN THE SYSTEM OF MONOGRAPHS. KEY CONTRIBUTIONS

1. New concepts are introduced in literature – a complex monograph consisting of books, each of which is a system of separate monographs.
2. Summary, systematization, classification, structuring, and presentation of Applied and Engineering geodesy on a certain principle with an emphasis on Geospatial technologies. Practically so far, it is missing;
3. Separation of matter into three groups: 1. Basics, systems, and technologies, 2. A complex of objects and 3. Individual objects (three books);
4. Presentation of the material in 5 books {due to a large amount of material included in book 3, it is printed in three books 3(3.1), 3(3.2) and 3(3.3)} under uniform numbering, contents, and as a single unified digital edition of Part 1, Engineering Surveying (over 2,870 computer pages);

5. There is a planned, immediate and inevitable connection of the matter under consideration and its concrete realization in the books of 1. Engineering geodesy – one, separate organic whole;
6. Uniform structuring of individual sections;
7. A comprehensive interdisciplinary joint presentation of the current state of the individual sites, the legal basis, and the type, volume, nature, and specificity of geodetic works;
8. Creation and application of original, consistent multiple (triple – up to 3 degrees) four-level numbering of content, figures, tables, and citations;
9. Introduction of the regulatory framework for all objects;
10. Bringing a large number of specific examples from practice for the objects under consideration;
11. Written with a multipurpose purpose – science, education, application (practice);
12. The principles implemented here – exposure and generalized joint presentation of construction, architecture, structural planning, and Engineering Geodesy - are a prerequisite and fully fit into BIM (Building Information Modeling), which is the desired perspective;
13. Perhaps, with the presented indicators, it was also of interest to the famous "Book of..."?!

5. CONCLUSION

A comprehensive, interdisciplinary, peer-reviewed work was published – complex monograph "Applied Geodesy, Part 1. Engineering Geodesy" of 5 books, each of which is a system of monographs, (the first books were printed in 2017, the last 2 in 2022; nearly 9 years in the making).

In essence, the work summarizes the main aspects of the modern problems of construction, architecture, territorial organization, and the role and place of geodesy – Engineering geodesy, in their implementation. For the first time, this complex activity is presented together from an interdisciplinary position, with Engineering Geodesy as an irrevocable element of it. Other specialists and especially Geospatial Technologies have an indisputable role in it.

It is formed as a single original digital whole (2870 computer pages) with a single table of contents, exposition, numbering, and other new elements, and a brief introduction in English (title page, abstract, preface, table of contents, biographies of authors). Additionally, two books in English and their analog in Bulgarian are available on the Internet, which summarize 5 books, together with additional information. The complex monograph has no analog in the literature. Own financing. The evaluations of the individual and the five books as a whole, by the reviewers of the publication and users, are extremely positive and superlative. Such are e.g. – a

systematization, summary and complex original presentation was made, missing until now in the world literature; unique work; "Book of Books"; the exhibition is from an interdisciplinary position and for a wide range of users with different professional and scientific interests; has original contributions to science and practice and many others. The work is also highly rated in reports on the activities of the BAS for 2022.

21.04.2023

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