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CONSTRUCTION COST ESTIMATE

Practical Work Guide



**Editura "Bioflux" Cluj – Napoca
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1. Introduction

The cost level is a very important factor in most construction decisions, and its estimates are prepared during the planning, design and construction phases of a construction project. Various types of cost estimates are made in a construction project, from preliminary estimates to detailed estimates. All these estimates are important because they invariably influence the expenditure of major expenses. Estimates made in the early stages of a project are of particular importance, as they influence the most basic decisions related to the construction project.

Cost estimation can be defined in various ways. For example, estimation is the assembly of all the costs of the elements of a project, which for an entrepreneur represents the cost that will most likely be incurred for the completion of the project. In another definition, it is a statement-making about the approximate amount of materials, time, and costs to take construction decisions. Cost estimation is also defined as the process of analyzing a specific work and predicting the cost of performing it. The main challenges facing the construction contractor are estimating the cost of building a project, scheduling specific construction activities, and then building the project within the estimated cost and schedule.

The purpose of cost estimation is to obtain an accurate and cost-effective prediction of the costs of a project, being analyzed different possibilities for its realization, in different stages. Cost estimation is a complex process that involves collecting available and relevant information about the project, the likely consumption of resources, and future changes in their costs.

Estimation is not an exact science. The estimation of material costs can be done with a relatively high degree of accuracy. Estimating the costs of the materials is a relatively simple and easy task. The amount of materials for a

particular work can be accurately calculated from the dimensions on the drawings for that particular work. After calculating the quantity of material and knowing the unit prices, the cost could be estimated by multiplying the quantity by the unit prices. Unlike the calculation of the cost of materials, the exact estimation of labor and equipment costs is much more difficult to achieve. The cost of labor and equipment depends on productivity rates, which can vary substantially from one job to another. Work ability, working conditions and many other factors affect labor productivity.

Throughout the investment process, from the feasibility study to the reception of construction works, the economic documentation is present, and among its components different connections may occur.

The technical-economic documentation is elaborated on design phases, as follows:

a) in the case of new investment objectives:

- pre-feasibility study, as appropriate;
- feasibility study;
- project for the authorization / cancellation of the execution of the works;
- technical execution project.

b) in the case of interventions on existing constructions:

- approving documentation of the intervention works;
- project for the authorization / cancellation of the execution of the works;
- technical execution project.

c) in the case of mixed investment objectives:

- pre-feasibility study, as appropriate;
- feasibility study, completed with the specific elements of
- the approving documentation of the intervention works;;
- project for the authorization / cancellation of the execution of the works;
- technical execution project.

The estimator, also called quantitative inspector or cost engineer is the person who makes cost estimates in the planning, design, and construction stages. An estimator has studies that require a thorough understanding of the principles and methods of engineering economics. He must work closely with the managers, accountants, financial analysts, and engineers involved

in the investment project analyzed, to accurately forecast the cash or loan requirements for the project.

As the preliminary estimate provides the information that may underlie a major decision regarding an investment project, this also places a responsibility on the estimator. He or she will risk a reputation when an insufficiently accurate estimate is prepared for a bid, but the owner or contractor will risk money.

A good estimator must have a vision of the whole building and be able to think and perceive the details of the project. At the same time, he or she must know the expected lifespan of construction materials, accounting, taxes, law, economics, and engineering design awareness. Qualifications for a good estimator include attention to detail; technical knowledge; good memory; knowledge of the construction process; ability to plan the works; to have an image of the relative costs and good analysis capacity. On the other hand, an estimator does not have to analyze unnecessary details in determining the costs of insignificant items, because the estimate will take time and will be expensive.

The objective of the estimate is to determine the forecast costs required to complete a project in accordance with the contractual plans and specifications. Regardless of the analyzed project, the estimator can determine with reasonable accuracy the direct costs for materials, labor, and equipment. The offer price is then obtained by adding to the direct costs the indirect ones, the contingencies (costs for any potential unforeseen work), and the profit. The bid price of a project should be of an adequate level, so as to allow the contractor to complete the project with a reasonable profit, but also to fit within the owner's budget.

The cost estimates are divided, mainly, into three major categories:

- 1- Conceptual cost estimates, that are elaborated using incomplete project documentation;
- 2- Semi-detailed cost estimates, that are developed when project have been partially designed;
- 3- Detailed cost estimates are based on fully developed construction drawings and specifications.

CONSTRUCTION COST ESTIMATE

The accuracy of the estimate depends on the completeness of the documents provided by the contract and by the experience of an estimator. The typical accuracy of the various types of cost estimates is shown in Table 1.

Table 1. *Accuracy of different types of cost estimates*

Estimate type	Development of the Construction Documents	Expected Percent Error*
Conceptual	Schematic Design 0-30% Construction Documents	± 10-20 %
Semi-Detailed	Development Design 30-90% Construction Documents	± 5-10 %
Detailed	90-100% Plans and Specifications	± 2-4 %

* Percent error - the expected variation between the estimate cost and actual cost

The purpose of this guide is to present how to carry out a detailed estimate for a construction project, namely the estimate by category of works, one of the most used type of estimate in this industry. A detailed estimate is also known as a bottom-up, fair-cost, or bid estimate. Detailed estimates are prepared once the design has been completed and all construction documents prepared.

The procedures described in this guide apply to the elaboration of estimates for construction works as defined in the classification of activities in the national economy (CANE), approved by GD 656/1997 and which are presented in Annex 1.

In the first part of the paper are presented general theoretical notions about the elaboration of the technical-economic documentation for the development of the estimate, with emphasis on the description of the types of estimates that can be made for a construction project.

The second part of the guide describes in detail the method of developing an estimate by categories of works related to a construction investment project, aiming to go through clear defining steps.

The last part of the paper presents a practical example of elaborating an estimate by category of works in the case of the infrastructure of a building construction project with residential use.

In order to complete the information in the content of the guide, a series of annexes are attached at the end, as follows:

-
- for the appropriate understanding of the notions, complementary to the direct explanation in the text of the guide, in Annex 2 definitions are presented, including necessary clarifications on the content of the terms used;
 - the categories of trades related to the categories of works, according to the list of trades, used in constructions in accordance with the Classification of Occupations in Romania (COR), presented in Annex 3;
 - Expenditures in labour on material handling are set out in Annex 4.
 - The item breakdown of the transports is provided for guidance in Annex 5;
 - In Annex 6 are presented the structure and content of indirect costs;
 - a List of Indicators of Estimate Norms is provided in Annex 7;
 - in Annex 7 is presented a list of Normative acts and regulations in force.

CONSTRUCTION COST ESTIMATE

2. Elaboration of the technical-economic documentation for the elaboration of the estimate

Depending on the moment of elaboration of the technical-economic documentation, it is structured in:

- a) The documentation prior to the preparation of the estimate which includes:
 - bill of quantities;
 - lists with the quantities of works related to each category of works;
 - lists of machinery and equipment.
- b) Effective elaboration of the estimate.
- c) The documentation subsequent to the elaboration of the estimate that includes the extracts of resources (materials, labor, construction equipment, transport).

2.1 Documentation prior to drawing up the estimate

2.1.1 Bill of quantities

In order to evaluate the cost of a construction, it is necessary to know the quantities of works that are included in its realization. This is done in the design phase and is called **the Bill of Quantities**. The Bill of Quantities is

the written piece that determines the quantities of works for each article necessary to be executed in a category of works within a construction object. This is the basis for drawing up the lists with the quantities of works for each category of works.

During and after the construction, the measurement is called attachment. It only includes the quantities of works done in a period of time. The Bill of Quantities serves us in different pre-calculations as well as in the bidding activity. The attachment is necessary for the settlement of the works between the investor and the entrepreneur based on the payment situation.

Before preparation of the Bill of Quantities one should proceed as follows:

- It examines the technical design, detailed design and tender documents accompanying the draft.
- The technological and organizational solutions are established in execution by identifying the construction processes and activities to be executed to achieve the construction site.
- For each construction process to identify a time estimate.

The Bill of Quantities:

- establishes the category of construction works in the construction process;
- identifies the appropriate Indicator of estimate norms accordingly to the category of construction works.
- identifies the table of contents of each chapter of norm estimate whose name is similar to the analyzed construction part.
- analyzes the structure of the Indicator of estimate norms identified in this way. This analysis supposes:
 - to analyze the estimate standard name to establish the correspondent technical, technological and organizational building process;
 - to analyze the operations presented in the content of Indicator of estimate norms. Execution of construction process on site has a particular character materialized in specific operations to be performed. By comparing the contents of the Indicator of estimate norms with the specific particularities of the process, it will be determined whether execution time estimate corresponds to the construction process analysis.

- to identify the specific measurement unit from the Indicator of estimate norms. This will be the appropriate unit of measure that will be used to calculate the article from the Bill of Quantities;
- to analyze the resource consumption tables. At this step, there are identified the types of resources and it is analyzed to exist the correspondence with the project and/or the specification of the construction process. The analyzed and identified estimate article is written than in the Bill of Quantities and it becomes item from the Bill of Quantities.
- for each item from the Bill of Quantities, quantities in the specific unit of measure specified by teh Indicator of estimate norms are calculated. Calculations are based on the size of building elements as they are specified in the project.

The main functions of Bill of Quantities are:

- To identify and quantify the elements of works to be completed within the contract.
- To facilitate comparison of tender price. Each constructor present his tender price in an identical document and basis his price on the same quantity of work.

The Bill of Quantities is grouped according to the most relevant classes of works of a building:

- structure
- infrastructure
- Finishing works
- Sanitary works, etc

2.1.2 Lists of quantities of works

The lists include the quantities of works filled by chapters according to the categories of works within a construction object.

The executors (bidders) have full freedom to provide in their bid their own consumption and execution technologies, in compliance with the quantitative and qualitative requirements provided in the technical project,

in the Specifications, and in other normative acts in force that regulate the execution of works.

2.1.3 Lists of machinery and equipment

Separate lists are drawn up for technological machinery and equipment and for functional machinery and equipment.

For technological machines and equipment that are mounted, separate lists are drawn up for each construction object. For each type of machinery or technological equipment to be installed, included in the list, a work article will be provided in which its installation is included, as well as the quantity and unit of measure of the respective work article. If the transport of machinery and equipment, including related handling, is carried out by the executor, the costs of these operations shall be included in the estimates by category of works in the articles for the installation of the machinery and equipment concerned.

For functional machines and equipment that require assembly, separate lists are drawn up for each object.

2.2 Effective elaboration of the estimate

The estimate is an integrated part of the technical-economic documentation, more precisely of the execution projects, with the help of which the total and structural cost of the investment works is evaluated. In our economic practice, the following estimates are used to evaluate investments:

- 1. Estimate by categories of works (analytical estimates by physical stages);***
- 2. Estimate by object;***
- 3. Estimate by categories of expenses (financial estimates);***
- 4. General estimate;***
- 5. Offer estimate***
- 6. Payment situation***

2.2.1 Estimate by categories of works (analytical estimate)

The estimate by categories of works (analytical estimate) is the written piece within the economic documentation which determines the value of each category of works based on the consumption of resources from articles of works and on the unit prices of these resources. It contains the description of the works to be executed at the physical stage or a category of works, within an object, the expenses necessary for the execution, and the partial and total values of these works.

The estimate by categories of works is based on the notion of "category of works" in constructions. The category of works represents the set of operations, homogeneous in terms of used materials, construction equipment, and labor, which are required by the execution of an object of investment (a construction delimited spatially and functionally).

The estimate by categories of works presents the greatest importance in organizing the accounting of the costs of construction works. It reproduces and evaluates the costs of the works to be executed for the categories of works within an object.

The estimate by categories of works is elaborated on the basis of the lists with the quantities of works afferent to each category, on chapters and subchapters of works. For all the categories of works regarding the physical execution of the objective, estimates are drawn up by categories of works on the basis of which the estimate price is determined.

The value of the estimate by categories of works can be presented on the basis of an estimate structured by expenditure chapters (as presented in this guide) or one in unit prices or in both ways, depending on the requirements of the investor or the regulations in force on the procurement procedure for public works.

The basis for the elaboration of estimates or lists of quantities of works is GD 907 from 2016, form F3. According to this form, the estimates are grouped into objects and the objects into investments or objectives. To each work item in the estimate is assigned a current number followed by the item symbol with its name and unit of measure. The quantities of works in

the list are established according to each article of work in the unit of measurement corresponding to it.

The estimated value of each category of works is determined as the sum of the following expenditure chapters:

1. direct expenses by categories of resources (materials, labor, equipment, transport);
2. other direct expenses, determined by taxes due by the economic agent (executor) according to the legal provisions in force (CAS, unemployment, health, risk fund, and other expenses of the same nature);
3. indirect expenses;
4. profit.

1. *Direct expenditures* by resource categories are as follows:

a) *expenses with materials*, from the value of the materials (products) that are put into operation, at producer level (which also includes the expenses with the supply) in the quantities resulting from the lists with the quantities of works; in the case of imported materials, taxes are included, as well as the customs commission;

b) *labor expenses* that include the total expenses expressed in monetary units (M.U.) made by the execution unit with the labor force necessary to carry out the construction works of assembling (including the legal obligations of the economic agents provided by law, such as - CAS, risk fund, unemployment fund, health fund, etc.).

Expenditures on handling that are set out in Annex 4 for guidance will be included in direct labor, where applicable.

c) *expenses with the equipment* that include the expenses that are made with the construction equipment that contributes to the accomplishment of the works during the immobilization of the equipment for the performance of the work;

d) *transport expenses* that include:

- expenses with the transport of materials, prefabricated products, garments, machinery, and equipment, from the manufacturer or supplier to the place

of installation (within the reach of the lifting means), including, if applicable, the intermediate warehouse;

- transport expenses (technological), if they are not included in separate items (transport of earth, concrete, mortar, rubble);
- expenses for the transport of construction equipment from the machine base to the work point or from the machine supplier to the work point.

The item breakdown of the transports is provided for guidance in Annex 5.

Expenditures are recorded by categories of resources (materials, labor, equipment, and transport), by articles of works, by subchapters, and by chapters of works, in final being obtained the total direct expenditures by categories of works.

Direct expenditures by resource categories are determined by multiplying the unit prices related to resources by the quantities related to works items from the lists of quantities (Bill of Quantities).

The unit prices related to the work articles represent the product between the specific consumption of resources and the prices, and the tariffs respectively related to each category of resources.

For the assessment of resource consumption, both resource consumption norms from the Indicators of estimate norms and own resource consumption can be used.

For the works that are not found in the Indicators, the executor is free to assess the consumption of resources corresponding to the execution technologies he uses, provided that the qualitative and quantitative requirements provided in the technical project and in the Specifications comply with the norms in force.

The unit prices, related to the resources from the articles of works, provided in the lists of quantities, have the following characteristics:

- *materials* - prices of the producers (suppliers) from which the executor is supplied, excluding VAT;
- *labor* - average hourly rates, practiced by the executor for the payment of labor, by categories of trades related to the categories of works, according

to the list of trades, used in constructions in accordance with the Classification of Occupations in Romania (COR), presented in Annex 3;

- *equipment* - average hourly rates for the construction equipment from the endowment of the execution units or of those practiced by the service providers units, necessary for the execution of the works;
- *transport* - tariffs, that as the case may be are approved, at the national level, by competent forums (SNCFR), depending on the categories of transports used, distances and quantities.

For the works where the contracting authority makes materials and supplies available to the contractor, that are included in the tender estimates, the value of these materials and supplies will be deducted from a strictly financial point of view from the related payment statements, as they are consumed, according to unit prices from the offer, related to the quantities actually executed.

2. Other direct expenses that are included in the estimate by categories of works, a partial subtotal of the direct expenses, are determined by the application of taxes according to the legal provisions in force, which are the obligation of the economic agents. The value of these expenses results from the application to direct labor resulted from the partial total of direct expenses, of the quotas provided in the regulations in force for CAS, unemployment, health, risk, and others.

3. Indirect expenses at the level of an estimate by categories of works are determined by applying a related quota to the value of Total – Direct Expenses. This quota is established by each execution unit on the basis of its own analyzes.

If the contracting authority awards a public procurement contract by negotiation with a single source, the authority shall, on the basis of the information and data in its possession, determine the share of indirect costs.

The content of indirect expenses is very diverse, therefore Annex 6 presents a breakdown of them on the following components:

- Expenses of general interest and execution of works;
- Administrative-household expenses;
- Unproductive expenses;

- Expenses regarding the insurance of construction works.

4. The profit, respectively the share related to it, is specific and is established by each execution unit, based on the analyzes regarding the efficiency and profitability of the unit in free-market conditions and/or the economic-financial situation of the period, and last but not least, the risk margin that it assumes.

The value of the profit is determined by applying this quota to the sum between the value of Total – Direct Expenses and that of Indirect Expenses.

The value of the estimate by categories of works results from the sum of the total values of the corresponding direct expenses for each category of resources (materials, labor, equipment, transports) to which is added the value corresponding to the indirect expenses and to the profit, respectively.

The form for the estimate by categories of works is presented in table 2 and is completed taking into account the specifications in the form and the indications below:

- a. The articles of work grouped by chapters and subchapters of works together with the units of measurement and their quantities are entered in columns 1, 2, and 3, respectively.
- b. The unit estimate prices of the articles of works on elements of material expenses, (lei / m; lei / piece; lei / kg etc.); labor (lei / hour;), construction equipment (lei / hour) and transport (lei / ton, km, etc.) are entered in column 4.
- c. The partial values that are entered on expenditure elements - in columns 5-8 of the estimate by categories of works, result from the multiplication of each of these elements included in the unit price estimate of the article (materials, labor, construction, and transport equipment) with the quantity provided for in column 3 for that article.
- d. The total value of the estimate of the respective article, that is entered in column 9 of the estimate by categories of works, results from the summation (horizontally) of the partial values by elements of expenses entered in col. 5 - 8 for that article.

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- e. The partial value of the direct expenses from the estimate by categories of works is totaled on columns 5-9 (material, labor, equipment, transport) on all chapters and subchapters of works.
- f. The values included in other direct expenses that refer to CAS, unemployment, health, risk fund and other expenses, result from the application of the related quotas established by legislation, to the value resulting from column 6 of direct expenses (labor) and are entered in column 9 .
- g. By totaling in columns the values entered for direct expenses and other direct expenses, we obtain TOTAL DIRECT EXPENSES of the estimate by categories of works on the elements of expenses (material, labor, equipment, transport and total).
- h. The value of indirect costs is determined by applying the share of indirect costs, specific to each execution unit to the value of TOTAL DIRECT EXPENDITURE in column 9 and is entered in column 9.
- i. The value of the profit is determined by applying the specific profit rate to each execution unit, to the amount resulting between the values in column 9 existing in TOTAL DIRECT EXPENSES and that of INDIRECT EXPENSES and is entered in column 9.
- j. By summing on column 9 the values of all expenses (direct expenses, indirect expenses and profit) we obtain the total value of the estimate by categories of works TOTAL GENERAL.

The form of presentation of the estimate by categories of works is that of Forms F3, F4 and F5, as provided in Decision no. 907/2016 (Table 2, 3, 4).

Table 2. Framework structure of the estimate by categories of works
FORM F3

OBJECTIVE (name)	Designer, (name of the legal person and identification data)
------------------------------	--

LIST
with quantities of works, by categories of works

Object

Category of works

Crt. No.	Chapter of works	U.M.	Quantity	Unit price a) materials b) labor c) equipment d) transport Total a) + b) + c) + d)	M Materials (3 x 4a)	L Labor (3 x 4b)	E Equipment (3 x 4c)	t Transport (3 x 4d)	T Total (3 x 4)
TECHNICAL SECTION				FINANCIAL SECTION					
0	1	2	3	4	5	6	7	8	9
1	Chapter of work 1.1. Subchapter 1.2. Subchapter ...								
2	Chapter of work 2.1. Subchapter 2.2. Subchapter ...								
...	...								
Direct costs					M	L	E	t	T
Other direct costs: - CAS - unemployment - risk fund - other expenses according to the legal provisions, nominated:									
Total of direct costs					M _O	L _O	E _O	t _O	T _O
Indirect costs = T _O x%									I _O
Profit = (T _O + I _O) x%									P _O
TOTAL GENERAL									V _O = T _O + I _O + P _O

Designer,
.....
(name and signature of authorized person)
L.S.

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Specifications:

1. The designer shall complete and be responsible for the data and information listed in columns 1-3. Columns 4-9 are completed by the bidders during a public procurement procedure.
2. The beneficiary has the obligation to include in the list of quantities of works, the materials and supplies to be made available to them. Its technological machinery and equipment will not be included in the value of the procurement lists of machinery and equipment.
3. Form F3 can also be used to determine the quantities of works for temporary constructions OS (site organization).

*Table 3. Framework structure of the list of equipment within the estimate
by categories of works*

FORM F4

OBJECTIVE	Designer,
.....	
(name)	(name of the legal person and identification data)

LIST

with the quantities of technological machinery and equipment, including
endowments and intangible assets

No. crt.	Name	U.M.	Unit Price [lei/U.M.]	Value (VAT excluded) (3 x 4) [lei]	Attached data sheet
0	1	2	3	4	5
	Machinery, technological and functional equipment that requires installation				
	a). . .				Technical sheet no.
	b). . .				Technical sheet no.
	. . .				Technical sheet no.
	Machinery, technological and functional equipment that does not require assembly and transport equipment				
	a). . .				Technical sheet no.
	b). . .				Technical sheet no.
	. . .				Technical sheet no.
	Endowments				Technical sheet no.
	Intangible assets				Technical sheet no.
TOTAL					

Designer,
.....
(the name and signature of
the authorized person)
L.S.

Specifications:

The designer shall complete and be responsible for the data and information entered in columns 1 and 2.

Columns 3-5 are filled in by the bidders during the development, in accordance with the law, of a public procurement procedure.

Table 4. Framework structure of the technical file within the estimate by categories of works

FORM F5

OBJECTIVE (name)	Designer, (name of the legal person and identification data)
------------------------------	--

TECHNICAL SHEET NO.

(To be completed for each machine, technological equipment, transport, endowments)

The machine, the technological equipment: (name)

No. crt.	Technical specifications required by the Specifications Notebook	Correspondence of the technical proposal with the technical specifications imposed by the Specifications Notebook	Supplier (name, address, phone, fax)
0	1	2	3
1	Technical and functional parameters		
2	Performance specifications and operational safety conditions.		
3	Conditions for compliance with relevant standards.		
4	Warranty and post-warranty conditions		
5	Technical conditions		

Designer,
.....
(the name and signature of the authorized person)
L.S.

Specifications:

The designer shall complete and be responsible for the data and information entered in column 1.

Columns 2 and 3 are completed by the bidders during the conduct, in accordance with the law, of a public procurement procedure.

2.2.2 Estimate by object

The estimate per object is a sum of the analytical estimates by categories of works (for foundations, actual constructions, installations, installation of equipment, finishes) that refer to the same investment object from the general estimate, as presented in table 4.

The estimate per object expresses the value of a construction object and represents a synthetic estimate. It is obtained by summing the values of the categories of works that make up the object, to which is added the Value Added Tax.

The Value Added tax is established by applying the legal quota to the cumulated value of the elements of the estimate.

The delimitation of objects within investment and their numbering is done by the designer.

In the estimates by objects, the value of the estimates by categories of works is established on the basis of an estimate of the quantities of works and their prices, not including VAT.

The expenses regarding the organization of the site are an integral part of the tender documentation of the contractor and will be presented by him, within the tender, as a distinct object, including also VAT. The organization of the site includes:

- the works for the realization of the production base, of the storage spaces, and of the enclosure of the lands destined for the organization of the construction site;
- preservation of materials, including the necessary utilities up to the enclosures;
- works and expenses necessary to ensure the satisfaction of the socio-cultural needs of the working staff, rents for accommodation spaces

established in accordance with the legal provisions, works for ensuring the working spaces of the technical, administrative management staff, etc. ;

- arrangements and organizational works necessary at the work point;
- transport of non-local workers in accordance with the legal provisions.

At the tender, the tenderer will present the value of the works of organization of construction site, depending on its own technological organization, as a lump sum, presenting a list of the main works, objects and expenses necessary for the construction site organization, based on its own project.

The contractor (the winning bidder) will present until the date established for receiving the order to start the works, the estimates by categories of works regarding the site organization works within the maximum limit of the lump sum included in the bid.

The settlement and updating of the value of the works situations related to the construction site organization according to the adjudicated offer, is done similarly to the settlement and updating of the basic works.

The estimate for construction shall be drawn up on the standard form set out in Tables 5 and 6, in accordance with the indications in the form and taking into account the following details:

- Chapter I - CONSTRUCTION WORKS - will include all categories of works, installation of machinery and technological equipment, including related networks, (column 1) their value (column 2) and their distribution by contractor (column 3) and subcontractor (column 4).
- In Chapter II - PURCHASE - will be recorded the expenses with the machinery and equipment with assembly; as well as with facilities, including independent machinery and equipment with long service life.
- In the estimate by object, the values of the categories of works, from chapter I and from chapter II are introduced not including VAT.
- The total value of the construction object is determined both by not including VAT and by including VAT.

The estimate per object establishes the estimated value of the object within the investment objective and is obtained by summing the values of the categories of works that make up the object.

CONSTRUCTION COST ESTIMATE

Table 5. The framework structure of the Expenditure summary by objective, within the estimate by object

FORM F1

OBJECTIVE (name)	Designer, (name of the legal person and identification data)
------------------------------	--

EXPENDITURE SUMMARY BY OBJECTIVE

No. of Chap./ subchap. of general estimate	Name of the expenditures chapters	The amount of expenses per item (VAT excluded)	From which: C+M
		lei	lei
1	2	3	4
1.2	Landscaping 1.2.1		
1.3	Arrangements for environmental protection and bringing the land to its original state 1.3.1		
1.4	Expenses for relocation / protection of utilities 1.4.1		
2	Realization of the utilities necessary for the objective		
3.5	Design (only if the objective is achieved in the "design & build" system)		
4	Basic investment 4.1 Constructions and related installations 4.2 Installation of technological machinery and equipment . . .		
5.1	Site organization 5.1.1. . . 5.1.2. . .		
6.2	Technological tests and trials		
Total value (excluding VAT):			
Value added tax			
Total value (including VAT):			

Designer,
.....
(the name and signature of the authorized
person)
L.S.

Specifications:

The designer shall complete and be responsible for the data and information entered in columns 1 and 2.

Columns 3 and 4 are completed by the bidders during the conduct, in accordance with the law, of a public procurement procedure.

Table 6. Framework structure of the Expenditure Centralizer by object and categories of works, within the estimate by object

FORM F2

OBJECTIVE	Designer,
.....	
(name)	(name of the legal person and identification data)

EXPENDITURE CENTRALIZER**by object and categories of works****Object**

No. chap./subchap. general estimate	Expenditure by category of works	Value (VAT excluded)
		lei
1	2	3
4.1	Constructions and related installations	
4.1.1	Excavation	
4.1.2	Strength structure	
4.1.3	Architecture	
4.1.4	Building Services	
Total I		
4.2	Installation of technological machinery and equipment	
Total II		
	Procurement	
4.3	Machinery, technological and functional equipment that requires installation	
4.4	Machinery, technological and functional equipment that does not require assembly and transport equipment	
4.5	Endowments	
4.6	Intangible assets	
Total III		
6.2	Technological tests and trials	
Total IV		
Total value (VAT excluded):		
Value added tax		
Total value		

Designer,
.....
(the name and signature of the authorized person)
L.S.

Specifications:

The designer shall complete and be responsible for the data and information entered in columns 1 and 2.

Column 3 is completed by the bidders during the development, in accordance with the law, of a public procurement procedure.

2.2.3 Estimate by categories of expenses (financial estimate)

Estimate by categories of expenses (financial estimate) refers to the expenses that do not materialize in works, but which contribute to the achievement of the objective regarding the investment object, to the expenses within the construction site organization, and to the expenses for the transport of the workers.

As these expenses are borne by the investment funds, for each expense an estimate is drawn up by categories of expenses (financial estimates).

By financial estimates, drawn up by the executor with the agreement of the beneficiary, the expenses necessary for the realization of the investments that are made by the contractor, but which are borne by the beneficiary in actions that do not constitute construction - assembly production, are determined. These can be:

- various services related to the storage and preservation of technological equipment or imported materials;
- land rents, etc.

Also through financial estimates, drawn up this time by the beneficiary, with the consent of the executor, are established the expenses related to the production of constructions - assembly for the services performed by the beneficiary, but which are borne by the executor.

Only direct expenditure shall be taken into account in the financial estimate.

2.2.4 General estimate

The **general estimate** establishes the total estimated value of the investment objectives in the design phase, and the totality of the expenses required to achieve an investment objective results from the sum of the expenses entered in the estimates by object and in the financial estimates (table 5).

The general estimate is the component part of the feasibility study or of the documentation for approving the intervention works, that establishes the total estimated value of the expenses necessary to achieve an investment objective.

The general estimate is structured by chapters and subchapters of expenditure. Each chapter/subchapter of expenses includes the estimated expenses related to the achievement of the investment object (s) within the investment objective.

The general estimate drawn up at the design phase of the feasibility study in the case of the new/mixed investment objective and, respectively, at the documentation phase for approving the intervention works in the case of the existing construction intervention is updated by the investment beneficiary/investor, whenever it is necessary but mandatory in the following situations:

- a. on the date of submission for approval of the feasibility study/documentation for approving the intervention works;
- b. at the date of requesting the building permit;
- c. after the completion of the public procurement procedures, resulting in the financing value of the investment objective;
- d. on the date of elaboration or modification by the the chief authorizing officer, according to the law, of the list of investment objectives, annexed to the state budget or to the local budget.

During the execution of the investment objective, the general estimate can be revised by the care of the investment beneficiary/investor, by compensating the expenses between the chapters/subchapters of expenses that are part of the construction-assembly works in the general estimate, within the total financing amount.

If the implementation of new tax legal provisions influences the value of the investment, it is restored through the care and responsibility of the investment beneficiary/investor, without the need to resume the procedure for approving the new resulting value.

The methodology for elaborating the general estimate and the estimate per object is provided in Annex no. 6 of Decision no. 907/2016. The general estimate and the estimate by object shall be elaborated in compliance with the framework contents provided in Annex no. 7, and in Annex no. 8 of Decision no. 907/2016, respectively.

CONSTRUCTION COST ESTIMATE

According to the legislation in force, the structure of the general estimate is as shown in tables 7 and 8.

Table 7. The framework structure of the objective estimate within the general estimate of an investment, according to Decision no. 907/2016

Designer,

..... (name of the legal person and identification data)

GENERAL ESTIMATE¹⁾ of the investment objective

..... (name of the investment objective) - framework-structure -

¹⁾ The general estimate is part of the feasibility study/documentation for approving the intervention works.

No. crt.	Name of chapters and subchapters of expenditure	Value ²⁾ (VAT excluded)	VAT	Value with VAT
		lei	lei	lei
1	2	3	4	5
CHAPTER 1 Expenditure on obtaining and arranging land				
1.1	Land obtaining			
1.2	Landscaping			
1.3	Arrangements for environmental protection and bringing the land to its original state			
1.4	Expenses for relocation / protection of utilities			
Total chapter 1				
CHAPTER 2 Expenditure on providing the necessary utilities for the investment objective				
Total chapter 2				
CHAPTER 3 Design and technical assistance expenditure				
3.1	Studies			
	3.1.1. Field studies			
	3.1.2. Environmental impact report			
	3.1.3. Other specific studies			
3.2	Supporting documentation and expenses for obtaining approvals, agreements and authorizations			
3.3	Technical expertise			
3.4	Energy performance certification and energy audit of buildings			
3.5	Designing			
	3.5.1. Designing theme			
	3.5.2. Prefeasibility study			

	3.5.3. Feasibility study/documentation for approving the intervention works and general estimate			
	3.5.4. Technical documentation required to obtain approvals/agreements/authorizations/documentation for approval of intervention works and general estimate			
	3.5.5. Technical verification of the quality of the technical design and execution details			
	3.5.6. Technical design and execution details			
3.6	Organizing procurement procedures			
3.7	Consulting services			
	3.7.1. Project management for the investment objective			
	3.7.2. Financial audit			
3.8	Technical assistance			
	3.8.1. Technical assistance from the designer			
	3.8.1.1. during the execution of the works			
	3.8.1.2. for the participation of the designer in the phases included in the control program of the execution works, approved by the State Inspectorate for Constructions			
	3.8.2. Site inspecting			
Total chapter 3				
CHAPTER 4 Basic investment expenditure				
4.1	Constructions and installations			
4.2	Installation of machinery, technological and functional equipment			
4.3	Machinery, technological and functional equipment that requires installation			
4.4	Machinery, technological and functional equipment that does not require assembly and transport equipment			
4.5	Endowments			
4.6	Intangible assets			
Total chapter 4				
CHAPTER 5 Other expenses				
5.1	Site organization			
	5.1.1. Construction works and installations related to the organization of the construction site			
	5.1.2. Expenses related to the organization of the site			
5.2	Commissions, fees, taxes, cost of credit			
	5.2.1. Fees and interest on the loan of the financing bank			
	5.2.2. ISC quota for quality control of construction works			
	5.2.3. ISC quota for state control in land use planning, urban planning and for the authorization of construction works			
	5.2.4. Share related to the Builders' Social House - BSH			
	5.2.5. Fees for agreements, compliant approvals and building/demolition permit			
5.3	Miscellaneous and unforeseen expenses			

CONSTRUCTION COST ESTIMATE

5.4	Expenditure on information and publicity			
Total chapter 5				
CHAPTER 6 Expenditure on technological tests and trials				
6.1	Training of operating personnel			
6.2	Technological tests and trials			
Total chapter 6				
TOTAL GENERAL				
From which: C + M (1.2 + 1.3 + 1.4 + 2 + 4.1 + 4.2 + 5.1.1)				

²⁾ In prices on; 1 euro = lei.

Date: Beneficiary/Investor,	Drawn up, (name, function and signature)
--	--

Table 8. The framework structure of the object estimate within the general estimate of an investment, according to Decision no. 907/2016

Designer,

.....(name of the legal person and identification data)

No. /

ESTIMATE of the object - framework-structure -

No. crt.	Name of chapters and subchapters of expenditure	Value (VAT excluded)	VAT	Value with VAT
		lei	lei	lei
1	2	3	4	5
Chapter 4 - Basic investment expenditures				
4.1	Constructions and installations			
4.1.1.	Earthworks, vertical systematization and exterior arrangements			
4.1.2	Strength structure			
4.1.3	Architecture			
4.1.4	Building services			
TOTAL I - subchap. 4.1				
4.2	Installation of machinery, technological and functional equipment			
TOTAL II - subchap. 4.2				
4.3	Machinery, technological and functional equipment that requires installation			
4.4	Machinery, technological and functional equipment that does not require assembly and transport equipment			
4.5	Endowments			
4.6	Intangible assets			
TOTAL III - subchap. 4.3+4.4+4.5+4.6				
Total estimate by object(Total I + Total II + Total III)				

The general estimate is structured on expenditure chapters, specifying the total value and the part that is subject to auction. Each chapter includes the objects or the nature of the expenses.

The content of the general estimate by chapters of expenditure is as follows:

Chapter. 1. Expenses for obtaining and arranging the land

1.1. Land obtaining

It includes the expenses made for the purchase of land, the payment of the concession (royalty) during the works, expropriations, compensations, the change of the legal regime of the land, the temporary or permanent removal from the agricultural circuit, as well as other expenses of the same nature.

1.2. Landscaping

Included are the expenses incurred at the beginning of the site preparation works and which consist of demolition, dismantling, deforestation, rest material discharges, deviations of utility networks from the site, vertical systematization, drainage, depletion (excluding those related to the execution of basic investment works), deviations of watercourses, relocations of localities or historical monuments, etc.

1.3. Arrangements for environmental protection

Expenses incurred for environmental protection works and actions are included, including for the restoration of the natural environment after the completion of the works, such as: planting trees, redevelopment of green spaces.

Chapter. 2 Expenditure to ensure the necessary utilities for the objective

It includes the expenses related to the provision with the utilities necessary for the functionality of the investment objective, such as water supply, sewerage, natural gas supply, thermal agent, electricity, telephony, radio-tv, access roads, industrial railways, which are executed on the location delimited from a legal point of view, as belonging to the investment objective, as well as the expenses related to the connection to the utility networks.

Chapter. 3 Expenditure on design and technical assistance

3.1. Field studies

It includes the expenses for geotechnical, geological, hydrological, hydro-geo-technical, photogrammetric, topographic, and stability studies of the land on which the investment objective is located.

3.2. Obtaining approvals, agreements, and authorizations

Expenses are included for:

- a) obtaining/extending the validity of the urbanism certificate, the fee for obtaining/extending the validity of the building permit, according to the law;
- b) obtaining approvals and agreements for connections to public water, sewerage, gas, district heating, electricity, telephony, etc .;
- c) obtaining the street nomenclature certificate and address;
- d) drawing up the documentation, obtaining the provisional cadastral number, and registering the land in the land book;
- e) obtaining the environmental agreement;
- f) obtaining the PSI approval;
- g) other approvals and agreements provided in normative acts.

3.5. Design and engineering

It includes the expenses for the elaboration of all design phases (pre-feasibility study, feasibility study, technical project, execution details), for the payment of the technical verification of the design, as well as for the elaboration of the necessary documentation to obtain the agreements, approvals, and authorizations related to the investment objective. documentation that is underlying the issuance of permits and agreements imposed by the urbanism certificate, urban planning documentation, impact studies, site studies/expertise.

For the modernization or consolidation works for existing constructions or for the continuation of the started and unfinished construction works, the expenses incurred for the technical expertise are included.

3.6.. Organizing public procurement procedures

The documentation includes expenses for preparation and submission of tenders and for multiplying, excluding those purchased by bidders; expenses with fees, transport, accommodation, and per diems of the members appointed in the evaluation commissions; notices of intent, participation,

and award of contracts, correspondence by post, fax, e-mail, etc., in connection with public procurement procedures.

3.7. Consulting services

Expenditure incurred, as appropriate, for:

- a) payment of consultancy services for the elaboration of the pre-feasibility study or of the market studies, of evaluation;
- b) payment for consulting services in the field of investment management or administration of the execution contract.

3.8. Technical support

Expenditure incurred, as appropriate, for:

- a) technical assistance from the designer, if it is not included in the design pricing;
- b) ensuring the supervision of the execution by site inspectors designated by the contracting authority;
- c) payment of specialists employed on a contract basis according to the provisions of Decision no. 150/2010 for the establishment, organization and functioning of the Interministerial Council for the Approval of Public Works of National Interest and Housing.

Chapter 4. Basic investment expenditure

4.1. Constructions and installations

It includes the expenses related to the execution of all objects within the investment objective: buildings, special constructions, installations related to constructions, such as: electrical installations, sanitary, indoor natural gas supply installations, heating installations, ventilation, air conditioning, telephony, PSI, radio-tv, intranet and other types of installations imposed by the destination of the objective.

The expenses are carried out on objects, and the delimitation of the objects is done by the designer. The expenses related to each object are determined by the estimate per object.

4.2. Installation of machinery, technological and functional equipment

It includes the expenses related to the installation of the technological equipment and of the equipment included in the functional installations, including the related networks necessary for their operation. Expenditures are based on investment objects.

4.3. Machinery, technological and functional equipment with assembly

It includes the expenses for the purchase of technological machinery and equipment, as well as those included in the functional installations. Expenditures are based on investment objects.

4.4. Unassembled machinery and transport equipment

Expenses for the purchase of machinery and equipment that serve the technological flow and have short depreciation periods compared to those of constructions are included. Expenditures are based on investment objects.

4.5. Endowments

Expenditures include the purchase of goods that, according to the law, fall into the category of fixed assets or inventory items, such as: furniture, PSI equipment, household equipment, labor protection equipment, and, where appropriate, durable machinery and equipment great service. Expenditures are based on investment objects.

Chapter. 5 Other expenses

5.1. Site organization

It includes the expenses estimated as necessary for the contractor in order to create the conditions for carrying out the construction-assembly activity.

These costs are estimated by the designer, based on an estimate that takes into account the technology and work schedule related to the basic works, the location of the objective, the possibilities of connection to utilities - water, sewer, electricity, district heating, telephone, etc. -, their routes, car, and railway access roads, the existence of constructions, spaces, lands or arrangements that can be used by the constructor.

5.1.1. Construction works and installations related to site organization

Expenses related to natural land leveling works, local decommissioning of roads or constructions, connection to utilities, construction of access roads, constructions or arrangements to existing constructions are included.

5.1.2. Expenses related to the organization of the site

It includes the expenses for: obtaining the authorization for the execution of site organization works, site taxes, renting traffic signs, temporary interruption of water transport or distribution networks, sewerage, heating, electricity, natural gas, road traffic, railways, naval or air, contracts for

assistance with the traffic police, temporary contracts with utility providers, with sanitation units.

5.2. Commissions, fees, taxes, cost of credit

Commissions, fees, legal fees include, as the case may be: the commission of the financing bank, the quota related to the inspection for quality control of construction works, the quota for state control in landscaping, urbanism and for the authorization of construction works, the quota related to the Social House of Builders, the amount of insurance premiums borne by the contracting authority, as well as other expenses of the same nature, established in accordance with the law.

The cost of credit includes the commissions and interests related to the loan during the execution of the objective.

5.3. Miscellaneous and unforeseen expenses

a) Their estimation is made as a percentage of the value of the expenses provided in chapter/subchapter. 1.2, 1.3, 2, 3, and 4 of the general estimate, depending on the nature and complexity of the works.

b) In the case of new investment objectives, as well as capital repairs, extensions, transformations, modifications, modernizations, rehabilitation of existing constructions and installations, a percentage of up to 5% is applied.

c) In the case of consolidation works, a percentage of up to 15% is applied, depending on the nature and complexity of the works resulting as necessary following the excavations.

d) The established percentage shall cover, as the case may be, the expenses resulting from the modifications of technical solutions, additional quantities of works, equipment, or endowments required during the investment, as well as the conservation expenses during the interruption of execution due to causes independent of the contracting authority.

Chapter. 6 Expenditure on technological test and trials

6.1. Training of operating personnel

It includes the expenses necessary for the training/schooling of the staff in order to use the equipment and technologies correctly and efficiently.

6.2. *Technological tests and trials*

It includes the expenses related to the execution of the tests/trials, provided in the project, the running-ins, the expertise at the reception.

In the situation where incomes are obtained as a result of technological tests, the general estimate shall include the value resulting from the difference between the expenses incurred for performing the tests and the incomes realized from them.

2.2.5. *Offer estimate*

The offer estimate represents the written part included in the tender documentation - tender, through which the tenderer specifies the cost of construction in this stage. In the stage of elaboration of the technical project, lists of quantities of works are drawn up, on the forms of the offer estimate, without entering unit prices and total values.

The most common way of taking over a project for execution is to participate in the tender, organized according to the relevant regulations (Law no. 98 of 19 May 2016 on public procurement, Official Gazette no. 390/23 May 2016), the offer price being one of the most important factors in the award of tenders by contractors.

The constructor can award the execution of some works by participating, with his own offers, in the auctions organized by the purchasing legal entities. Based on their own prices regarding the materials, labor, equipment, transports, and the degree of the endowment of the contractors, they complete the offer estimate and include it in the offer documentation.

The estimate quotation contains the symbol of the estimate items, the description of the works to be executed, the quantities of works, the unit price, and the total value of the estimated article.

According to the legislation in force, the offer estimate has the same structure as the analytical estimate. The prices at which the offer estimates will be drawn up are only those charged by the resource producers and the

service providers, respectively in a time interval of a maximum of 30 calendar days prior to the bid submission deadline.

The form of drafting the offer estimate is presented in table 9:

Table 9. Framework structure of the Offer Estimate

OBJECTIVE:

OBJECT:

OFFER ESTIMATE No:

No. crt.	Article symbol	Articol name	Quantity	U.M.	Unit price	Total price
1	2	3	4	5	6	7
1	CG03G1	Plastic floors with flexible 1.5 mm thick PVC tiles, with PVC sill, area >20sqm	25.50	m ²	134.40	3427.20
2	CG03H2	Plastic floors with flexible 1.5 mm thick PVC tiles, with wooden sill, area <20sqm	14.20	m ²	126.00	1789.20
OFFER ESTIMATE TOTAL GENERAL						5216.40

When preparing the offer estimate, the tenderer must clearly distinguish the following values to be executed, including VAT, which are basic documents in the organization of internal management accounting, as follows:

- the total value of the works;
- the value on each object of the work;
- the value of each estimate related to the category of works;
- the value of the total consumption of material resources;
- value of total labor consumption:
- the value of the total consumptions regarding the construction equipment:
- the value of total consumptions regarding transports;
- the value of technological equipment and machinery with assembly and independent, including the related endowments.

The offer must include, as the main element, the value of the offer (the price claimed for the execution of the requested works), which is conditioned by:

- the level of direct expenditure calculated on the basis of:
 - consumption of resources per unit of work;
 - unit prices of resources per unit of work;

- unit prices for resource procurement.
- the level of indirect expenses;
- the size of the expected profit.

The most difficult step for the contractor, when drawing up the offer estimate, is to establish the direct costs. The steps presented for establishing these expenses are summarized in Figure 1.

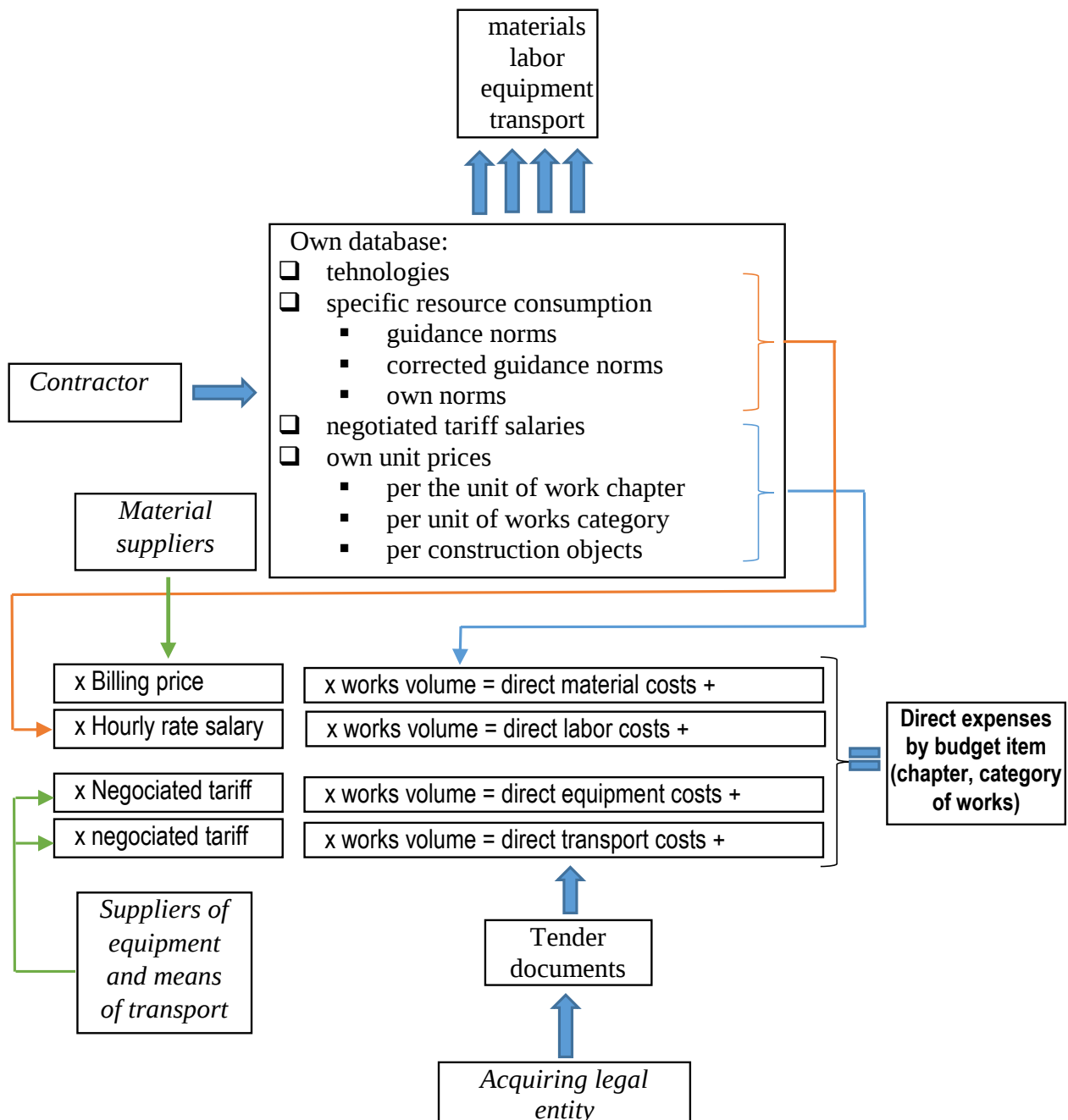


Fig 1. Steps to establish direct costs

It is found that the offer estimate no longer highlights the elements that make up the total price. However, its value is identical to that of the

analytical estimate. This is due to the fact that the unit price and the total value on the item of estimate within the offer estimate, also contain the share of expenses from the conclusion of the analytical estimate.

The determination of the unit price on the item of estimate within the offer estimate is done as follows:

- the ratio between the general total and the total direct expenses from the analytical estimate is calculated;
- the total value of each item in the analytical estimate is multiplied by the value of this report, thus determining the total value per item in the offer estimate;
- dividing the total value per item of the offer estimate by the quantity per item, the unit price per offer estimate item is determined.

The quality of the works, the characteristics of the location, the execution duration, the technical-organizational capacity of the bidder influence the volume of the works, but especially, the consumption of resources per work unit.

2.2.6. Payment situation

During the execution of construction works, between the investor and the contractor, the settlement of the works is made on the basis of an estimate called Payment Situation. At regular intervals, usually one month, measurements are made on the quantities of work performed during this interval.

The quantities of works are entered in the payment statement, and by attaching the unit prices, the cost of the works is finally obtained.

The structure of the payment situation is identical to that of the analytical estimate, in addition, the related VAT rate is calculated (Table 10). Considering that the works for which the analytical estimate presented above has been prepared have started, the corresponding payment situation at a given moment will look like below.

Depending on how the contract between the investor and the entrepreneur was concluded, the prices in the payment situation may be those declared in the offer estimate, or they may be the current prices.

The price revision is a procedure by which the price of construction, agreed at a given time, evolves over time, depending on the general conditions. This must be based on the evolution of prices for materials, labor, equipment, and services that are part of or related to the built object.

Two methods are used to review the price: updating and indexing. The update consists of bringing the price to the level of the economic conditions from the moment the works start, being practiced only once within a contract. Indexing consists of correcting the prices at different moments of the execution of the works. Usually, the indexing is operated on the occasion of the settlement of the works by the contractor, monthly respectively.

Table 10. Framework structure of Payment situation

BENEFICIARY:

INVESTMENT:

OBJECT:

PAYMENT SITUATION

Crt. No.	Article symbol	a) U.M. b) Article name c) Weight in tons of principal materials per U.M. of the article	Article quantity a) materials b) labor c) equipment d) transport	Values per estimate article					Total weight of principal materials in tons (3a x 3c)
				Materials (3a x 4a)	Labor (3a x 4b)	Equipment (3a x 4c)	Transport (3a x 4d)	TOTAL (5+6+7+8)	
1	2	3	4	5	6	7	8	9	10
CAP. A Direct costs									
01	CG03G1	m ² Plastic floors with flexible 1.5 mm thick PVC tiles, with PVC sill, area >20sqm	25.50 104.60 24.30 5.50 0.00	2667.30	619.65	140.25	0	3427.20	0.000
02	CG03H2	m ² Plastic floors with flexible 1.5 mm thick PVC tiles, with wooden sill, area <20sqm	0.00 96.20 24.30 5.50 0.00	0	0	0	0	0	0.000
		Total Cap. A:		2667.30	619.65	140.25	0	3427.20	0.000
Cap. B Other direct costs									
Autotransport (col.10 x value/tonne)							0	0	
Foremen's salary (4,5% of Total Cap.A Labor)					28			28	
CAS (30% of Total Cap. A + Foremen's salary)					214			214	
Unemployment benefits (5% of Total Cap.A Labor + Foremen's salary)					59			59	
Total direct costs:				2667.30	920.65	140.25	0	3728.20	
Cap. C Indirect costs (15% of Total direct costs)								559.23	
Cap. D. Profit (10% of Total direct costs + Cap. C)								932.05	
GRAND TOTAL ESTIMATE								5219.48	

2.3 Documentation subsequent to the elaboration of the estimate

At the level of economic documentation prepared by the executor (the bidder), resource extracts are prepared.

For each estimate by categories of works, the following types of extracts are prepared:

- a) extract of materials;
- b) labor force extract (labor);
- c) extract of construction equipment;
- d) transport extract.

The quantities in the above extracts shall be determined on the basis of the quantities in the work items provided for in the Bill of quantities and on the basis of the consumptions in the respective Indicator of estimate norms or own consumptions.

The elaboration of an extract supposes the completion of two stages:

- identification of resources and calculation of quantities,
- elaboration of the proper extract, by ordering the resources (most frequently in alphabetical order).

Sometimes the value of the respective resources is also calculated in the extracts.

2.3.1 Materials Extract

The extract material is the documentation that identifies economic construction materials on sorto-types and sizes and related quantities needed for the execution of construction works in the conditions specified by rules of estimate (table 11).

Table 11. Framework structure of the Materials Extract

MATERIAL EXTRACT
for Estimate no.

No. crt.	Material name	U.M.	Total consumption	Unit price [lei/U.M.]	Total value [lei]
1	2	3	4	5	6
1.	Water	m ³	0.237	1.35	0.32
2.	Cement M30	kg	378.914	3.10	1174.63
3.	Sand 0 ... 3 mm	m ³	0.631	56.00	35.34
4.	Scrubbing stone	kg	4.380	2.25	9.86
5.	Marble mosaic stone	kg	455.779	0.42	191.43
6.	Wood sawdust	kg	0.790	0.15	0.12
7.	Planed softwood slats of 5 ... 15 x 10 ... 30 mm	m	3.060	1.80	5.51
TOTAL					1659.37

2.3.2 Labor Extract

The labor extract is the economic documentation that identifies the specialties and qualifications of the workers as well as the duration measured in hours consumed by them, necessary for the execution of construction works under specific conditions mentioned in the Indicator os estimate norms (table 12).

Table 12. Framework structure of the Labor Extract

LABOR EXTRACT
for Estimate no.

No. crt.	Trade name	U.M.	Direct labor consumption [man-hour]	Hourly rate [lei/h]	Value (VAT excluded) [lei]
1	2	3	4	5	6 = 4 x 5
1.	Inlay 4.1	hours	6.12	7.00	42.84
2.	Inlay 3.1	hours	7.74	6.50	32.81
3.	Inlay 2.1	hours	23.52	6.00	141.12
4.	Inlay 1.1	hours	4.58	5.50	25.19
5.	Serevice worker 2.1	hours	11.83	5.00	59.15
6.	Mason 1.2	hours	2.80	7.00	19.60
TOTAL			53.59	-	318.71

2.3.3 Equipment Extract

The equipment extract is the economic documentation that identifies the machines, equipment, technological installations, and their operation duration, necessary for the execution of construction works (table 13).

Table 13. Framework structure of the Equipment Extract

EQUIPMENT EXTRACT					
for Estimate no.					
No. crt.	Equipment name	U.M.	Consumption [operating hours]	Hourly rate [lei/h]	Value (VAT excluded) [lei]
1	2	3	4	5	6 = 4 x 5
1.	Semi-automated concrete plant 8-20 m ³ /hour	hours	2.14	40.00	85.60
2.	Self-propelled roller with rollers up to 12 TF	hours	15.80	18.00	284.46
3.	Hydraulically controlled wheel excavator with thermal engine (Backhoe loader)	hours	11.34	54.00	612.41
4.	Electrically operated outdoor vibrator	hours	1.61	9.60	15.49
5.	Indoor vibrator for pneumatically operated concrete VP2C (without air consumption)	hours	20.17	9.60	193.65
6.	Resources unnamed (max. 20% of total)	hours			
TOTAL			61.07		1191.61

3. Making an estimate by categories of works for a construction object

In preparing an estimate, it is important to understand the basic principles and responsibilities. This includes an analysis of the scope of work, the procurement plan, the determination of quantities, costs and sources of pricing, the evolution of costs, and supporting documentation. The basic elements of an estimate consist of: descriptions of the elements of work (tasks) to be performed, the amount of work required for each task, and the unit cost for each amount of task.

A detailed estimate involves determining the costs of materials, labor, equipment, and subcontractor work. The detailed estimate requires a thorough analysis of a complete set of contract documents, sketches, and technical specifications before submitting a tender. In addition, an on-site visit should be made to observe factors that may influence the cost of construction, such as available storage space, security, traffic control, and existing underground utilities.

The estimator performs a Bill of quantities of the materials needed to carry out the project by studying the drawings first, then by dividing them into individual work elements, estimating the work quantities for each element, and then evaluating them to determine an estimated cost for each. The estimated costs are summed, thus resulting in the direct costs. The direct cost of a project includes material, labor, equipment, and subcontractor costs.

After calculating the estimated direct costs, the estimator must determine the indirect costs of taxes, bonds, insurance, and overheads

required to complete the project. He/she must also carry out a risk analysis to take into account unforeseen situations that may arise during construction. At the end of the estimated calculation, a profit is added to establish the offer price. The value of the profit can vary considerably, depending on many factors, such as the size and complexity of the project, the amount of work in progress by the contractor, the accuracy and completeness of the tender documents, the competition for the work.

The main steps in making an estimate are as follows:

- I. *Studying the technical design of the construction object*
- II. *Detailing of the construction object in parts of the construction object (infrastructure, superstructure, etc.)*
- III. *Identification of the elementary construction processes necessary for the realization of the parts of the construction object (excavation, supports, formwork, shaping and assembly of reinforcement, etc.)*
- IV. *Description of the operations within the elementary construction processes (execution conditions, construction technology, resources, the succession of technological operations, etc.)*
- V. *Defining the specific unit of measurement and determining the quantity for each operation*
- VI. *Framing of technologically identified operations in estimate items through the Collection of Estimate Norms*
- VII. *Taking over the standard consumption of material, labor, equipment, and transport from the recipes of the identified estimate items, and transposing them into a spreadsheet program (Excell)*
- VIII. *Identification of the unit price for each type of resource consumed in the estimate article and calculation of the price on Materials, Labor, Equipment, and Transport within the same article*
- IX. *Determination of the total price for the estimate item (for the entire quantity of that estimate item)*

- X. Realization of Extracts of Materials, Labor, Equipment, and Transport*
- XI. Establishing direct expenses*
- XII. Calculation of indirect costs. Establishing recapitulation coefficients (taxes due to the State) and profit. Recapitulation*
- XIII. Determination of total costs for the realization of the investment object (final price of the estimate)*
- XIV. Using specialized software to make estimates*

I. Studying the technical design of the construction object

The estimate engineer must have a good understanding of the field of activity of the project, the bidding process, its construction, and operation. The cost engineer must also review drawings, specifications, descriptions of the site, ground conditions, access to site etc., available facilities, the position of existing services, the description of any demolition works or temporary work, and construction sequences and durations to determine total construction costs. It is advisable to make an on-site visit to allow the estimate engineer to correlate the physical characteristics of the project with the available design parameters and details. This is essential for projects with unusual site conditions, major maintenance and repair projects, modification/addition projects, environmental projects, and dredging projects.

The estimate engineer has the mission of planning all the tasks of each estimate so that the data is logical and traceable. The documentation underlying the estimate includes a description of the project, construction schedule, construction plan, work plan (subcontracting), back-up data, and drawings and sketches.

The elements that must be analyzed are:



A. Size of the project

As a general rule: as a project gets bigger, the cost of the project increases. As projects get bigger they get more expensive, but at a less rapid rate.

B. Quality of the work

As the quality and complexity of a project increase (above the minimum quality level required by the law), so does the project's cost.

C. Location

The location of the project is a major factor in the preparation of an estimate. Depending on where the project will be constructed, a great variation exists in:

- soil conditions (influencing the technical solution of the infrastructure, and consequently its cost),
- the price of materials and their delivery,
- the rental or purchase of equipment,
- the cost of labor,
- the proximity of other properties, etc.

D. Construction start and duration

When a project is built, time can have a major impact on the cost of the project.



II. Detailing of the construction object in parts of the construction object

The cost estimate is based on the determined quantities and the related unit prices that depend on the degree of detail of the analyzed project. This is accomplished by separating construction into its incremental parts (Fig. 2). These parts are commonly referred to as construction tasks and are the line-by-line listings of every estimate (Fig. 3).

An investment in construction is called an **investment objective**. The investment objective may comprise one or more constructions as well as technological machinery or equipment. The construction of a plant, a complex of blocks of flats or a dam is in this case investment objectives.

Constructions within an investment objective are called **construction objects**. *The construction object is a distinct construction, delimited spatially, having a precise functionality and which together with the other construction objects and equipment ensures the functionality of the investment objective.* For example, a block of flats with related facilities in a neighborhood, a production hall with related facilities at an industrial unit, etc. The object of construction includes all the installations and devices that directly serve the operation of the construction; the machinery and equipment necessary for the technological process are not included.

The global assessment of the volume of resources embedded in the object of construction is not possible. It is necessary to make the global assessment of construction objects based on global indicators, by comparison with similar works. The global indicators are price elements that were determined after going through the process of decomposition - recomposition of the construction object and can be expressed in the consumption of resources or in monetary expression per construction unit. It is, therefore, necessary to go through the process of decomposition of construction objects until we reach a phase that allows us to make measurements and therefore operate with units of measurement. So, the construction object is broken down into smaller parts, called **construction object parts**. *The construction object part represents a component of a construction object, spatially delimited, having a precise and distinct function in the composition of the object and which, together with the other parts of the object, ensure its designed functionality.* For example, the superstructure of construction is spatially delimited, has a precise function (takes over the loads and transmits the efforts to the infrastructure), and, together

with the infrastructure, ensures the stability and functionality of the construction.

Different degrees of detail can be used for the object parts: **ensemble, subensemble, construction element**.

The ensemble represents the totality of the subensembles defining distinct parts of the object. For example, the infrastructure of a building includes the subensembles of embankments, the resistance structure of the infrastructure.

The subensemble represents a conventional spatial delimitation on functional, structural considerations or on execution phases of several similar elements executed simultaneously or continuously. For example, all foundations related to a construction object.

The construction element is the smallest part of the construction object that retains its attributes. For example a pillar, a beam, a floor, a mounted pipe, etc.

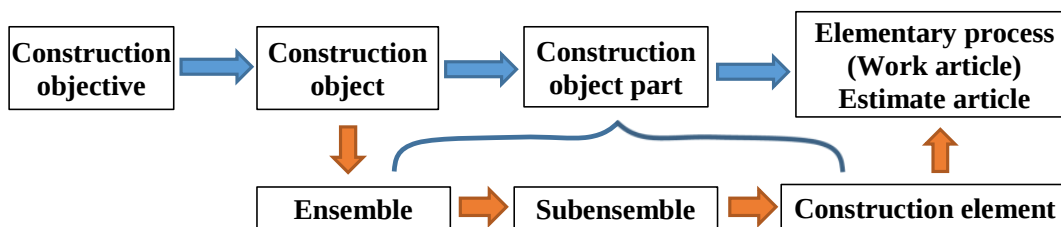


Fig. 2. Components of a construction objective

The Bill of Quantities is composed of the following work groups:

- Civil works: Earth works (leveling, excavation, backfilling, transportation of excavated soil); Foundation works (plain and reinforced concrete, piling foundations); Brick works (internal and external); Skelton reinforce concrete (columns, beans, slabs and stairs); Water proofing; Staircases; Plastering, Flooring; Painting; Metal works (windows, doors, accessories); etc.
- Sanitary works: Water feeding systems; Internal and external plumbing works; Finishes of plumbing works; etc.

- Electrical works: Electrical cables; Wiring; Accessories; Internal connections; etc.
- Mechanical works: Air conditioning systems; Elevators; etc.

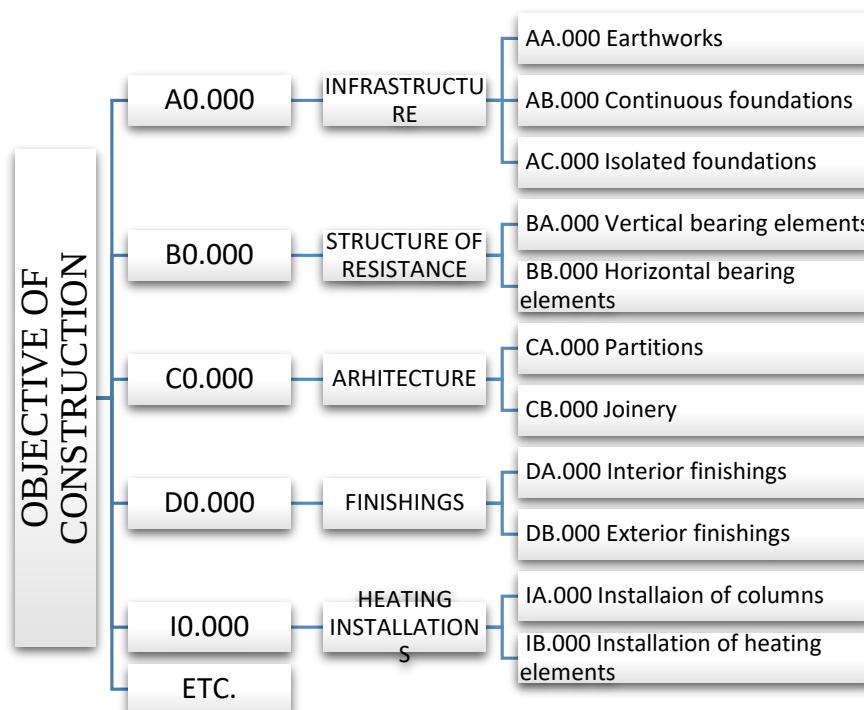


Fig. 3. The scheme of the process of decomposing an investment objective

III. Identification of the elementary construction processes necessary for the realization of the parts of the construction object

It is found that the construction element, the smallest division of an object, cannot be measured. For this reason, the construction elements decompose, in their turn, in the elementary construction processes that led to their realization.

The elementary process (simple process) is a part of the construction process consisting of a succession of operations, that is



generally performed by workers of the same trade, according to a certain technology, on a certain job and for which it can be defined a unit of measure. For example, the execution of excavations and supports, the making and assembly of formwork, the preparation and pouring of concrete, etc.

For example, Earth works usually include the following works:

- site preparation: such as remove topsoil, general leveling, etc.
- excavation: trench excavation / large excavation;
 - digging the soil and throwing it on the digging side;
 - depositing the dug soil on the top of the trench/pit, providing a safe distance equal to the trench depth;
 - leveling the trench sides and bottom
- earthwork support;
- disposal of water;
- filling;
- surface treatments.

IV

IV. Description of the operations within the elementary construction processes

Each task is then defined as accurately as possible. Construction tasks are necessary to develop the construction cost.

Description of an estimate norms is necessary in order to make a clear and detailed evaluation of the construction process. The description can involve data about:

- Condition of execution
- Technology of execution
- Resources
- Succession technological operations.

For each of the works identified at Step III, must be planned the method to be adopted according to the technical conditions of the construction site. The resources usage rates are established according to the particular job conditions specific to each work item.

For example, in case of the manual digging, the main aspect that makes the difference among the resources usage rates of the work items is given by the “difficulty to dig”. According to this, soil to be manually dug may be classified into four categories:

- Light: using a shovel or a spade;
- Medium: using a spade and partially a pick;
- Hard: using a pick and partially a spade;
- Very hard: a pick and eventually a sledge hammer.

According to the dimensions of the work place, the manual digging works are:

- digging works in large spaces: when the worker can move easily and can throw the earth into an soil deposit or into a transport device;
- digging works in narrow spaces: when the worker should firstly throw the soil vertically and then can throw the earth into an soil deposit or into a transport device;
- digging works inside closed caisson.

Also, the soil types influence the maximum digging depths with vertical slopes, in order to ensure the safety of labour, as follows :

- Granular soils (gravel, sand) = 0.75 m
- Medium cohesive soils (common earth) = 1.25 m
- High cohesive soils (some clays, shale) = 2.00 m

Any other depths for excavation should be performed with inclined slopes or strutting.

V. Defining the specific unit of measurement and determining the quantity for each operation

After dividing the object of construction into construction tasks, these must be quantified before setting the price. Quantities must be calculated in standard units of measurement and be consistent with design units. The accuracy of the quantities depends on the work of the estimate engineer. A distinction should be made between 'net' quantities without waste from quantities that include waste or losses to ensure that no duplication occurs in the estimate.

The level of detail at which the quantities for each task are calculated depends on the detail level of design. Explanatory draft notes will be added to explain the method for calculating the quantity, in order to clearly show the assumed quotas of the quantity or contingencies of the quantity. The following aspects are recommended in the evaluation of the quantity:

- Make sure the goal of the project is fully reflected in the estimate.
- Include a list of materials in the pre-measurement
- Use a method to easily identify the quantity assessment, ie the source and date of the document, the name of the estimator, the location within the project, proven calculations, separation of gross quantities, and additions such as waste or losses.
- Use a systematic approach similar to the required construction methodology.
- Check the scale and dimensions of each drawing;
- Mark the drawing areas for which you have determined the quantities to ensure that the whole drawing has been analyzed and duplications of the quantities have not been recorded.

- Consider estimate items that do not contain materials but still involve costs, for example, office overhead, task setup, people training.
- When evaluating quantities, use decimals where the situation requires it to be as accurate as possible.
- Also consider a certain amount of waste, losses, or supplementary lengths of materials. Make sure that this addition is separate from the initial quantity measured.
- Select a natural breakpoint during work interruptions.
- Carry out a check of estimate items with a high cost and volume.
- Collaborate with designers if errors occur in the project, if it is impossible to bid, or if a better approach is discovered.

The accuracy and consistency of the measurement method applied to buildings are essential. Some situations require a quantitative surveyor to measure and record the dimensions on the drawings as well as on the site, depending on the stage of the project. In order to standardize the measurement rules and conventions, a number of standard measurement methods are presented in the Indicators of Estimate Norms. in a brief presentation they are presented below:

- ☐ *Each (numbers)*: Piles, doors, Windows, Precast concrete, etc.
- ☐ *Length (meter)*: Windows sills, Pipes, Skirts, stair steps, etc.
- ☐ *Area (Square meter)*: Flooring, painting, plastering, Brick walls (12 cm or less), etc.
- ☐ *Volume (Cubic meter)*: Brick walls (>12 cm thick), Excavation, Backfilling, Reinforced Concrete, etc.
- ☐ *Weight (Ton)*: Metallic works, Reinforcement steel, etc.
- ☐ *Lump Sum*: Some electrical and plumbing works, Manholes, etc.
- ☐ *Effort (Man-day)*: Renting of equipment or labor, etc.

Conditions for measuring works

The quantities of works that are included in the economic documentation related to the projects of execution are established in

the unit of measurement of the estimate norm. The calculation of the quantities of works is sometimes done in a simplified way and is specified in the Generalities section at the beginning of each chapter of the collections of estimates.

Below are presented extracts from the measurement conditions of the works for several chapters.

It should be noted that whenever we have doubts about the method of calculating the quantities of works we must consult the conditions for carrying out measurements by the Generalities at the beginning of each chapter of the collections of estimates.

1. Earthworks (Ts)

Excavation

- ☐ Quantities are calculated based on the dimensions of the foundation in plans from the owner perspective.
- ☐ Contractors should consider the excess of material excavated to all for safe operations.
- ☐ Prices differ based on the soil type, deep of excavation, ground water level, site location, shoring system, Equipment used, etc.
- ☐ Unit of measurement is cubic meter (volume).

Consider the following example (Fig. 4).

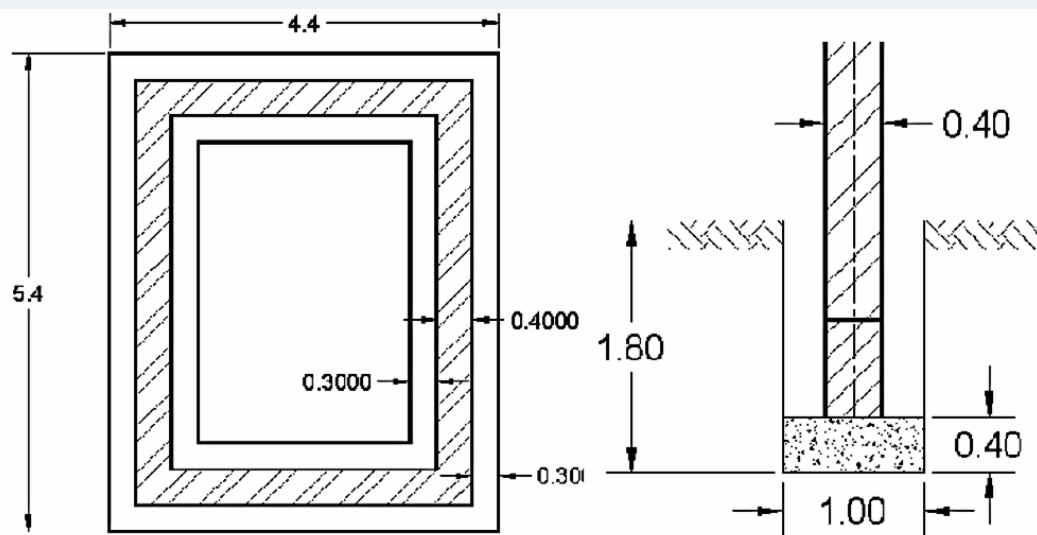


Fig. 4. Plan and cross section of building foundation

The length of excavation = $5.4 \times 2 + (4.4 - 2) \times 2 = 15.6$ m

Depth of excavation = 1.8 m

Width of excavation = width of plain concrete footing = 1.0 m

Volume = $15.6 \times 1.8 \times 1.0 = 18.8$ m³

Manual excavations (TsA)

- ☐ the volumes of manual excavation works are measured per cubic meter in the excavation, for each norm;
- ☐ the excavation volumes in large spaces will be calculated on the basis of the excavation surfaces from the transversal profiles raised in the characteristic points of the land from the longitudinal profile and from the distances between the respective transversal profiles;
- ☐ the volumes of excavations in limited spaces will be calculated on the basis of flat horizontal or parallel sections with the surface of the land (for drains and trenches), executed in sloping lands and on the basis of the respective depths of the excavations. The quantities of works will be established on steps of depth for framing the excavations in the norm. The depth of the excavation steps is considered in relation to the upper level of the excavation bank or to the level at which the support of the bank requires the lifting of the excavated earth, at a higher level than the level of the bank;
- ☐ the volume of excavations in the open caisson is determined according to the surface of the horizontal section of the caisson and the depth of the excavation.

Mechanized excavations (TsC)

- ☐ The volume of mechanized excavations is measured at 100 cubic meters in the excavation and for other units of measurement according to the indication from each norm.
- ☐ The volumes of mechanical excavations will be calculated based on the surface of the transversal profiles, raised in the characteristic points of the land in the longitudinal profile, and of the distances between the respective transversal profiles.

- ❑ The transport distances are considered for the excavated earth according to the used equipment, as follows:
 - for scraper and scraper with tractor, the transport distance is equal to half of the distance traveled by the machine to achieve a complete cycle: digging, transport with load, transport for unloading, transport for return to the digging place;
 - for bulldozer and grader, the distance between the center of gravity of the excavated massif and the center of gravity of the filling or deposit made.

Shores support (T_sF)

- The support of the shores with fir spiles, metal spiles, or wooden sheet piles is measured per square meter of surface supported exclusively by the unit of measurement for article T_sF07 .
- The quantities of works are established for each estimate norm, depending on the type of support and the execution conditions shown in each article.

Backfilling (T_sD)

- ❑ Unit of measurement is cubic meter (volume)

Backfilling = Excavation – volume of all works inside the excavated pit (footings, smells, column necks, brickwork, etc.) + amount above GL (or – mount below GL) as shown in Fig. 5.

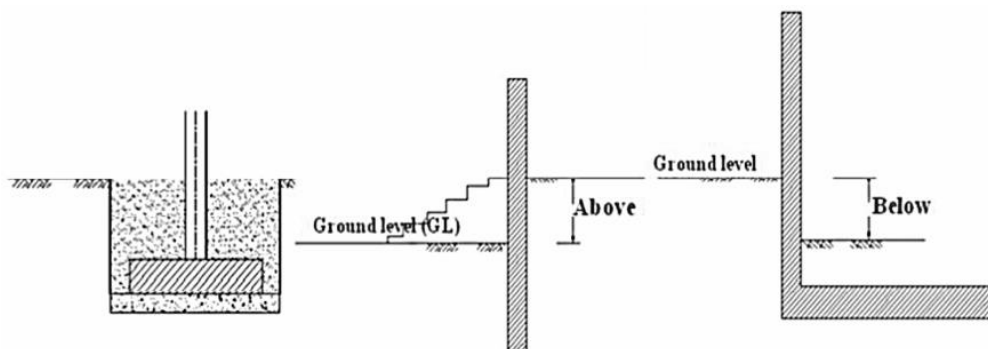


Fig. 5. Backfilling quantities calculations

- ☐ The volume of soil spread by hand is measured per cubic meter in the earth excavation;
- ☐ The volume of mechanically scattered soil is measured in 100 cubic meters of earth excavation;
- ☐ The volume of manually compacted fillings is measured per cubic meter and the mechanically compacted one per 100 cubic meters, after compaction;
- ☐ The calculation of the filling volumes will be made on the basis of the volumes resulting from the transversal profiles raised in the characteristic points of the land from the longitudinal profile and of the distances between the respective transversal profiles;
- ☐ When establishing mechanically spread and compacted volumes, the volumes executed manually along the slope to a thickness of 0.5 m measured perpendicular to the slope surface shall be taken into account.

Site leveling:

- ☐ Measured in m^2 (area) if thickness less than 30 cm.
- ☐ Measured in m^3 (volume) if thickness more than 30 cm.

Soil transportation:

- ☐ Transported soil = vol. of exc. – vol. of backfilling + additional soil at site
- ☐ Add swelling factor based on the soil type: 5% sandy soil. 15% clayey soil and 25% for demolition material (owner or contractor).

2. Construction works

Concrete works (CA)

- ☐ The measurement of the concrete preparation and pouring works is done per cubic meter of ready-poured and compacted concrete, based on the real volumes of the cast elements, according to the project, decreasing the gaps with a section greater than 400 cm³ each.

- ❑ The measurement of the concreting of the buttons on the machine foundations is done on the bolt piece.

Formwork and scaffolding (CB)

- ❑ Formwork from reusable panels:
 - with the square lath made of short softwood boards;
 - with P plywood;
 - metal flats, including space;
- ❑ Sliding and stepping formworks are measured per square meter of formwork and sliding concrete surface, respectively, without decreasing the formwork gaps, the measurement being carried out unfolding.
- ❑ Resin plank formwork is measured per square meter of concrete formwork surface, without reducing the gaps less than 0.25 m² inclusive.
- ❑ PFL formwork is measured per square meter of the actual formwork concrete surface.
- ❑ Frame-type formwork is measured per square meter of void included in the outer perimeter of the frame.
- ❑ The supports made of tubular metal scaffolding elements are measured per square meter, horizontal projection of the supported surface.
- ❑ Tubular metal scaffolding for ceiling finishing works, measured per square meter of horizontal surface covered by the scaffolding platform.
- ❑ The formwork of the cast beams using the support beams TS20 and TS21 is measured per square meter of the actual formwork concrete surface.
- ❑ Supports with pops are measured in one piece of pop.
- ❑ E75 support scaffolds are measured per linear meter of mounted tower.
- ❑ Tubular metal scaffolding for works on vertical surfaces and self-erecting metal scaffolding is measured per square meter of facade, covered by scaffolding.

- ☐ Metal scaffolding for monolithization - the area where the columns join the beams is measured in vertical projection unfolded on the outer surface of the scaffolding from around the column.
- ☐ The supports with extensible beams are measured per square meter of supported floor, in horizontal projection.
- ☐ The wooden scaffolding for interior finishing works is measured per square meter of horizontal surface occupied by the scaffolding.

Reinforcements for concrete (CC)

- ☐ The works for making and assembling the actual reinforcement bars are measured in kilograms by multiplying the length of the bars according to the reinforcement plan, with their mass per meter, according to STAS 438/1-8 and the accompanying reinforcement extracts reinforcement plans;
- ☐ The assembly works of the welded mesh reinforcements are measured in kilograms, by multiplying the number of pieces of whole nets - without decreasing the gaps or cuts that enter within the work according to the reinforcement plan, with their mass per piece
- ☐ Welding reinforcement is measured on the joint piece.

Brick works (CD)

The rules and precautions that should be followed when measuring brick works are (Fig. 6):

- ☐ Measured in m^2 (by area) if thickness < 25 cm.
- ☐ Measured in m^3 (by volume) if thickness ≥ 25 cm.
- ☐ Deduct all openings.
- ☐ Deduct half the area (volume) of arches.
- ☐ Deduct all Concrete elements.
- ☐ Facades are measured by area.
- ☐ Separate item for each brick type
- ☐ The stone masonry works are measured per real cubic meter executed, decreasing the gaps or the places of the construction

elements, which are to be incorporated in the masonry with a section larger than 0.04 m^2 ;

- ❑ Masonry works made of ceramic bricks or replacements are measured per real cubic meter executed with the deduction of all gaps or places of construction elements embedded in masonry with a section greater than 0.04 m^2 ;
- ❑ The walls of asbestos-cement and sheet metal panels, made of PAS tiles, are measured per square meter of wall executed, decreasing the gaps greater than 0.25 m^2 and adding material losses caused by the inscription of the panels in the installation dimensions.

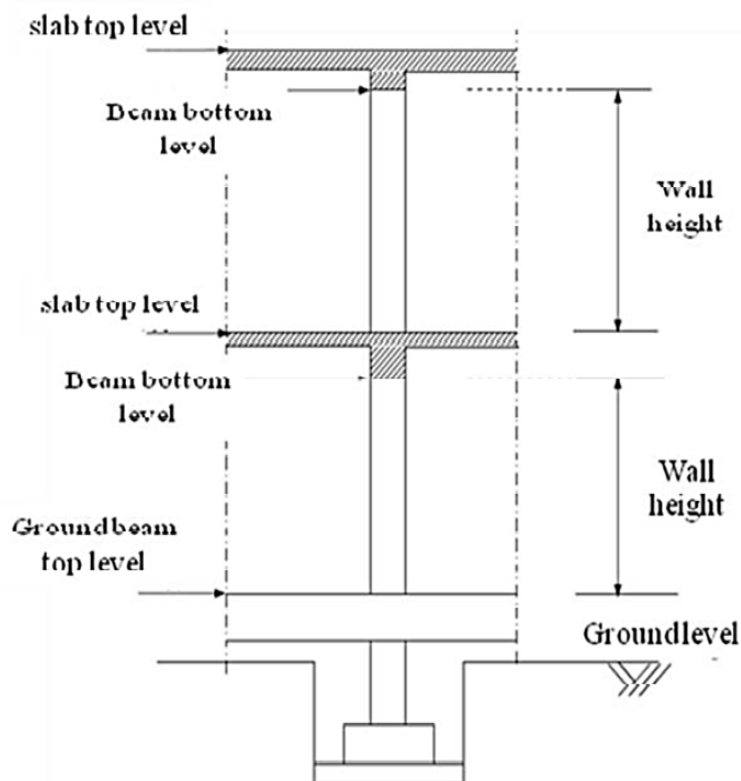


Fig. 6. Cross section of a brick walls

Wooden roofs and trusses (CE)

- ❑ Roof coverings made of metal sheet, clay tiles, asbestos-cement, or plastic - are measured per square meter of actual surface area, measured in the plane of the roof, with the decrease of gaps greater

than 0.5 m² inclusive, occupied by roof trap doors, eyelets, skylights, etc.

- ☐ Rain gutters, downpipes, window sills, sun-blinds of zinc-coated sheet are measured at one meter of actual executed length;
- ☐ Various accessories for covers, roof trap doors, rosettes-sleeves, are measured in pieces;
- ☐ Wooden frames are measured per square meter in horizontal projection, measured in drops;
- ☐ The roof boarding is measured per square meter of actually executed area, measured in the plane of the roofing, with the decrease of gaps greater than 0.5 m²;
- ☐ Wooden fascia boards and simple overhangs are measured in linear meters.

Plastering (CF)

Plaster works are measured according to its location of being internal or external works.

Internal Plaster:

- ☐ Engineering measurement by area (m²).
- ☐ All openings are deducted.
- ☐ All openings sides are added.
- ☐ Inclined slabs are calculated based on their horizontal projection.
- ☐ Interior plasters for walls and flat or curved ceilings, thin plasters as well as splash or tuff finishes, calcium-old finishes, exterior plasters, crushed plasters, special protective plasters, as well as differences in the thickness of plasters, provided by designers, are measured per square meter of the developed area.
- ☐ The surface of interior plasters on walls or columns is determined by multiplying their height, measured between the lower raw face of the upper floor and the finished face of the floor, to which is added 2 cm, with their width, measured between the raw faces of adjacent walls or unfolded width of the raw faces of the pillar.
- ☐ For walls provided with plinths, scaffolding, paneling, plywood - the height of the plaster is measured between the lower raw face of

the upper floor and the upper edge of the plinth, scaffolding, paneling or plywood to which is added 2 cm.

- ☐ For ceilings with exposed beams or ribs, the surface in horizontal projection is measured, to which the lateral surfaces of the beams or ribs are added;
- ☐ Gaps in plasters for doors, windows, hatches, etc. whose surface is less than 0.50 m², are not deducted from the surface of the plasters; those larger than 0.50 m² are reduced, but the surfaces of the plastered window sills and pallets are added;
- ☐ Surfaces that remain partially unplastered in order to cover them with plywood of different materials (tiles, tiles, mosaics, etc., or with ornaments, are subtracted from the total surface of the respective walls. When calculating the decreasing surfaces, their real dimensions will be taken into account, each reduced by 5 cm in both directions.

External plaster:

- ☐ Measured by area (m²).
- ☐ Openings with areas < 4 m² are kept with deduction.
- ☐ Deduct half the area of the openings ≥ 4 m².
- ☐ Openings with areas < 4 m² are kept with deduction.
- ☐ Cantilever slabs < 1 m projection not added.
- ☐ Add half the area of cantilever slabs ≥ 1 m.

Boarded floors (CG)

- ☐ Boarded floor works of any kind, as well as the substrates considered insulation and polishing of the floor, are measured per square meter of actually executed area, with the decrease of gaps greater than 0.25 m².
- ☐ For works performed without scaffolding or plinths, the measurement is performed considering the distances between the "red" faces of the walls of the rooms where the boarded floors are made.
- ☐ For all boarded floors that are executed inside the scaffolding or borders provided separately, the distances between the inner edges

of the boarded floor, of the scaffolding or borders, are taken into account.

- ❑ When working on plinths, scaffolding or borders, polishing of plinths and scaffolding - the distances between the "red" faces of the walls or of the rooms with the decrease of any interruptions are taken into account.
- ❑ Plinths, scaffolding, and horizontal borders are measured in linear meters.

Interior and exterior plywood (CJ)

- ❑ Plywood works on walls and pillars are measured per square meter of unfolded area, subtracting the areas occupied by the linear elements in plywood, which are measured separately, as well as the gaps greater than 200 cm².
- ❑ Linear elements in plywood: window sills, window ledges, baguettes - are measured per linear meter, taking into account the most prominent edge.
- ❑ Bush hammering and rubbing of stone-covered surfaces, waxing, and polishing of plywood is measured per square meter of unfolded area.

Wooden joinery and metal joinery (CK)

- ❑ Windows and doors made of wood or metal, single or double, interior or exterior, are measured only once, per square meter, the area included in the outer contour of the frame, respectively of the lining.
- ❑ For balcony doors with adjacent windows, measure the doors separately and the windows separately, each in the outer contour of the respective frame.
- ❑ Door sheets fixed on ready-assembled frames or linings, sliding or folding metal gates, metal gates with wire mesh, shall be measured per square meter of surface, contained in the outer contour of the respective sheets or gates.

- ❑ The metal showcases are measured per square meter of surface included in the outer contour of the showcase frame.
- ❑ Door linings, wider than 19 cm, are measured per square meter of surface, which exceeds the surface, corresponding to the width of 19 cm.
- ❑ The linings under 19 cm wide are not measured separately, being included in the respective joinery.
- ❑ Metal skylights and frames are measured per kilogram of skylight or metal frame, ready-made, which is mounted - the weight of the respective elements being established by weighing, before mounting or adopting the weight mentioned in the delivery act of the parts, or based on drawings and extracts of rolled steel.

Painting and dye works (CN)

The measurement of the painting and dye works is done according to the provisions below, specifying for each work article:

- the name of the estimate article and the element to be painted;
- how was determined the base surface;
- the multiplication coefficient of this surface as well as the possible observations regarding their determining.
- ❑ Interior and exterior paintings executed: simple with lime milk, clay, tempera, white zinc, are measured based on the surface determined for the plastering works. The multiplication coefficient is 1.00.
- ❑ For calcium-old paintings executed on the interior, on walls, and ceilings, the surface determined for the plastering works is considered. Multiplication coefficient: 1.00.
- ❑ In the case of calcium oil on walls and ceilings, the actually painted surface is considered, with the decrease of unpainted gaps greater than 0.04 m^2 , but the surface of window sills, shingles, beams, etc. encountered on that surface is added. Multiplication coefficient: 1.00.
- ❑ For interior and exterior dye works, the actual painted surface is considered, with the decrease of gaps greater than 0.04 m^2 , but the

surface of window sills, shingles, beams, etc. encountered on that surface is added. Multiplication coefficient: 1.00.

- ❑ For embossed decorative dye works, the actual painted surface is considered, with the decrease of unpainted gaps greater than 0.04 m², but the surface of window sills, shingles, beams, etc. encountered on that surface is added. Multiplication coefficient: 1.00.
- ❑ For perchlorvinyl dye works applied on the surfaces of prefabricated elements made of autoclaved aerated concrete, the actual painted surface is considered, with the decrease of unpainted gaps greater than 0.04 sqm, but the surface of window sills, spallets, beams, etc. encountered on that surface is added. Multiplication coefficient: 1.00.
- ❑ For dye works on wood joinery, including plasters and linings (up to 19 cm wide), the measurements are made as follows:
 - a. *simple windows (with a single row of frames) painted on both sides* - the surface contained in the outer contour of the frame or lining is considered separately; multiplication coefficient: 1.50;
 - b. *fixed windows and skylights* - it is considered the surface included in the outer contour of the frame or lining; multiplication coefficient: 0.75;
 - c. *double windows (with two rows of frames) or coupled, painted on all sides* - it is considered the surface included in the outer contour of the frame or lining; multiplication coefficient: 3.00;
 - d. *simple doors on a frame* - it is considered the surface included in the outer contour of the frame or lining; multiplication coefficient: 2.50;
 - e. *simple doors on linings* - it is considered the surface included in the outer contour of the frame or lining; multiplication coefficient: 2.90;
 - f. *painted double doors on all 4 sides* - consider the surface contained in the outer contour of the frame or lining; multiplication coefficient: 4.50;

- g. *window sills and frames for windows and doors* - it is considered the actual painted surface; multiplication coefficient: 1.00;
- h. *linings with a width of more than 19 cm* - it is considered the surface that exceeds the width of 19 cm, measured unfolded; multiplication coefficient: 1.00.
- ❑ For dye works on metal joinery, including frames, the measurements are made as follows:
 - a. *simple, fixed windows, painted on both sides* - the surface included in the outer contour of the frame is considered; multiplication coefficient: 0.50;
 - b. *simple windows with interior or exterior openings, painted on both sides* - the surface included in the outer contour of the frame is considered; multiplication coefficient: 1.00;
 - c. *movable meshes for simple, fixed windows* - the surface included in the outer contour of the frame is considered; multiplication coefficient: 0.50;
 - d. *double or coupled windows, painted on all sides* - the surface included in the outer contour of the frame is considered; multiplication coefficient: 2.00;
 - e. *solid painted doors on both sides* - the surface included in the outer contour of the frame is considered; multiplication coefficient: 2.50.
- ❑ Painting of zinc coated corrugated sheet. It is considered the surface actually painted, with the decrease of gaps greater than 0.25 sqm. Multiplication coefficient: 1.00.

Precasts of concrete and reinforced concrete (CP)

- ❑ All assembly works of the prefabricated elements provided in the norms are measured on the piece of ready-assembled part.
- ❑ The assembly works of the prefabricated reinforced concrete elements to the supporting walls and of the strips of cellular concrete walls, are measured per square meter of the realized element.

- ☐ The butt jointing of the reinforcements by electric welding and the joining by overlapping reinforcements are measured on the welding piece.
- ☐ Contour welding of overlapping steel plates is measured per meter of welding actually performed.
- ☐ Cutting steel bars with oxyacetylene flame is measured per 100 pieces of cuts made.
- ☐ Poured concrete in the joints of prefabricated elements is measured in m³ of ready-poured and compacted concrete, calculated based on dimensions and project data.
- ☐ The installation of the M100-T mortar, for connection and monolithization between the prefabricated elements, is measured in cubic meters.
- ☐ Mortar grouting of joints between wall panels and floor panels is measured per meter of matte joint.
- ☐ The pouring of concrete in prefabricated elements made of prestressed reinforced concrete or prefabricated in site workshops is measured per cubic meter of real concrete put into operation.
- ☐ P-type beech plywood patterns and reinforced concrete molds for caisson type parts are measured per square meter of mold surface in contact with the concrete of the prefabricated part.
- ☐ The manufacture and installation of reinforced steel reinforcement in prefabricated elements, of prestressed reinforced concrete or prefabricated on-site, is measured in kilograms of reinforcement installed.
- ☐ Water-repellent and thermal insulation of vertical joints between large facade panels, sealing of joints to large facade panels, sealing of joints to exterior walls of strips of autoclaved aerated concrete, are measured per meter of joint.
- ☐ The sealing of the intersections between the horizontal and vertical joints at the exterior wall panels is measured on the intersection piece.

V

3. Construction insulation (IzF)

- ❑ Insulating layers and auxiliary works, applied on large areas, are measured per square meter of the actually executed area, measured unfolded, including scaffolding and throats with a decrease of gaps greater than 0.25 m^2 , taking into account the number of layers that make up the chosen insulation structure.
- ❑ The additional layer of waterproofing reinforcement at surface intersections, additional layers in the throats, joint sealing layers, is measured at the actually executed meter.
- ❑ The thermal insulation layer of expanded or granulated slag as well as other types of thermal insulation layers, in many cases and as a slope layer, which is poured on the spot is measured in cubic meters, taking into account the average thickness.
- ❑ The waterproofing of the baffle drains, the connection of the waterproofing to the punctures, and the parts related to the waterproofing works are measured in pieces.
- ❑ For thermal and refrigeration insulation in several layers, the measurement will be made as follows:
 - when the layers have the same thickness, the surface to be insulated multiplies by the number of layers;
 - when the layers have different thicknesses, each separate layer will be measured.

VI

VI. Framing of technologically identified operations in estimate items through the Collection of Estimate Norms

Precisely defining the execution conditions, assigning a unit of measurement and a symbol, and framing it in a certain category of works, *transforms the elementary process into a work article (work item)*. The *work article* represents a simple process, executed

continuously, by a certain formation of workers, and which together with other simple processes results in the realization of a construction element. For example, for the column construction element, the following work items can be defined: reinforcement shaping and assembly, formwork, concrete pouring, formwork removal, plastering, painting, etc. At this level of detail, the work items can be measured, because the respective simple processes can be assigned units of measurement (shaping and reinforcement - kg, formwork - m², concreting - m³).

The work articles are the basis for the evaluation of the constructions. For this reason, they are **also called estimate articles (estimate items)**.

Each estimate item corresponds to an estimate norm.

Estimated consumption norms

*The **estimate norm** is a technical-economic specification related to an estimate item that includes the standardized consumption of resources (materials, labor, and equipment) necessary for the execution of a unit of measurement in the respective work item.*

An estimate norm defines a simple or complex construction process. The estimate norm contains information about the conditions of execution, technologies and resource consumption.

The importance of the estimate norms lies in the fact that they are the basis for determining the price of the constructions and the settlement of the executed works.

The Indicators of Estimate Norms and the afferent Unit Price Catalogs were elaborated, in brochures, on categories of works (41 categories of works) and include over 40,000 estimate articles. As a benchmark, the 1981 series of Indicators of Estimate Norms (see Annex 7) and the revised and completed series oh these after 1998 can be used as a guide by both the designer and the bidder in the description

of the works, the conditions for measuring the works, the evaluation of the necessary resources and the specific consumption of materials, labor and equipment.

The value of the information contained in the Indicators of Estimate Norms is special (it represents the result of decades of studies in the field of consumption of materials, labor, and equipment per unit of work volume, of some specialists from research institutes). The National Institute for Research in Construction and Construction Economics (INCERC) revised in 1995, under the name "Collection of indicative norms of resource consumption on estimate articles", the most of the Indicators of estimate norms. These collections serve builders, currently, to the rapid elaboration of offers when they do not have their own collections of consumption norms, or to the elaboration of their own collections.

The elaboration of the estimate norms took into account a series of general principles, among which:

- the frequent applicability of the norms in the practice of constructions starting from the idea that the elaboration of these norms must be done for the works that present a certain frequency;
- the inclusion in norms of all the elements and operations necessary for the complete accomplishment of the respective production process (work article);
- the generalization of the applicability of the norms is obtained by reducing as much as possible the variants that appear due to some elements or working conditions that are too little differentiated;
- compliance with the technical prescriptions in force;
- the scientific organization of the production, taking into account the rational organization of the workplaces and of the technological processes.

The symbol of the estimate norm allows its rapid identification because each segment of the symbol leads to an identification element.

The first element specifies the category of works:

- "C" for Industrial, agro-zootechnical, housing and socio-cultural construction works ";
- "T" for "Tunnels";
- "D" for "Roads";
- "P" for "Bridges";
- Ts "for" Earthworks "

Each category of works is composed of distinct chapters of works that are identified by the symbol of the category (eg: "C") and of the chapter ("CA" for "Concrete works"; "CB" for "Formwork and scaffolding"; "CD" for "Masonry and walls": "CF" for "Plaster").

An Indicator of Estimate Norms is structured as follows:

- ☐ Summary of Chapters
- ☐ Table of Contents of all estimate norms
- ☐ Instructions for using the Indicator of Estimate Norms, including:
 - content and the use of indicator
 - general execution of work
 - materials
 - labor
 - construction equipment
 - technical requirements envisaged.

At the beginning of each chapter there is a general section with the following structure:

- ☐ content of the chapter
- ☐ special technical conditions considered in the development of standards in the chapter
- ☐ content norms
- ☐ specific consumption of materials
- ☐ specific consumption of workforce
- ☐ specific consumption of equipment
- ☐ measurement conditions of work, that should be consulted whenever there is doubt about how the measurement took place.

A time estimate is characterized by:

- ☐ symbol

VI

- ☐ standard name
- ☐ unit of measure
- ☐ specific consumption (per unit) of resource categories: materials, labor, equipment of construction.

When elaborating the orientative norms of resource consumption, the hypothesis taken into account was that the works are executed:

- ☐ at the level of current technology, taking into account the increasing trend of the industrialization degree of works;
- ☐ in average organizational conditions (materials are supplied to the object, within the range of the lifting or assembly equipment);
- ☐ with new materials, with physical-mechanical characteristics according to the standards specified by the norms in force;
- ☐ at average heights according to those to those the norm refers;
- ☐ in daylight or in appropriate artificial light;
- ☐ at ambient temperatures above + 5 ° C;
- ☐ on the unhindered work front;
- ☐ with ordinary working means and equipment corresponding to average mechanization.

The transport of materials from the warehouse next to the object of construction up to the place of installation is taken into account in the estimate norms with different average distances, according to the nature of the material, the type of storage and preparation, considering that the organization of the site is done rationally.

The standardized consumptions of materials, included in the Indicators of Estimate Norms were determined taking into account:

- ☐ the quantities of materials that actually enter into the work;
- ☐ technological losses resulting from processing (due to practical technology);
- ☐ non-technological losses caused by the transport, handling, and storage of materials from the place of supply to the place of installation. The materials that are used several times (formwork,

supports, scaffolding floors) are included in the norms with the specific consumption related to a single-use.

For materials used in very small quantities (these do not allow the establishment of norms) the name "small material" is used, and is expressed as a percentage of the value of the explicit materials.

The norms of estimated consumption for labor include the labor consumed for:

- transports of any kind, from the point of taking over the materials to the work front;
- the execution of the actual works, according to the adopted technology;
- cleaning and maintenance of working tools of materials and tools and transporting them outside the work area.

The labor included in the norms is broken down by skilled workers and unskilled workers and refers to the use of equipment with average yields and average labor productivity.

Labor consumption in the Indicators of estimate norms is expressed in hours and centesimal fractions.

The norms of consumption of equipment-hours within the indicative norms contain the actual operating times of the machine for the execution of a quantity of work.

Auxiliary times (start, stop, supply, change of working position, technological interruptions) are taken into account for the calculation of the estimated price per hour of actual operation of the equipment by means of the coefficient K (ratio between rental hours and hours of actual operation of the equipment).

The constructor has the possibility:

- use these Indicators of estimate norms;
- to adapt these norms to the particularities of its own endowment and organization;

- to use its own norms (ignoring the orientative ones), if its endowment and organizational models are completely different from the average ones taken into account when elaborating the Indicators of estimate norms.

If the Indicators of estimates norms are used when drawing up the lists of quantities by articles of works, this is done taking into account the scope of the indicator, the general and specific conditions, the instructions for use of the indicator as well as the generalities related to the chapter in which the articles fall.

If, when drawing up the lists of quantities on work articles, no concrete articles from the Indicators of Estimate Norms are used, the designer must make a description as clear as possible of the articles in the list, so as to enable the executor to assess correctly all the technological operations necessary to be performed within this description and respectively to evaluate the related costs.

The articles thus determined must meet the following requirements:

- ☐ to correspond to distinct categories of works;
- ☐ to represent an activity for which the nature of significant resources is homogeneous;
- ☐ to represent an activity whose development in time should be done continuously, on technological segments, so as to avoid the interruptions determined by the need for another distinct activity.

The estimate article is a component element of the estimate and represents a distinct work process (concrete pouring, brick masonry, plaster with lime mortar, cement, etc.).

To each work item, regardless of how the lists of work quantities are compiled, is assigned a current number followed by the item symbol with its name and unit of measure.

If the Indicators of estimate norms are used when drawing up the lists with the quantities of works, the symbol of the article will be the one from the indicator.

The norm estimate symbol (code)

The norm estimate symbol is also called code. The role of the code is to uniquely identify an estimate norms solution.

It represents a code either alphanumeric or only numerical, represented on 12 spaces (Fig.7). The alphanumeric symbol of the norm comprises a group of letters and numbers with a precise meaning.

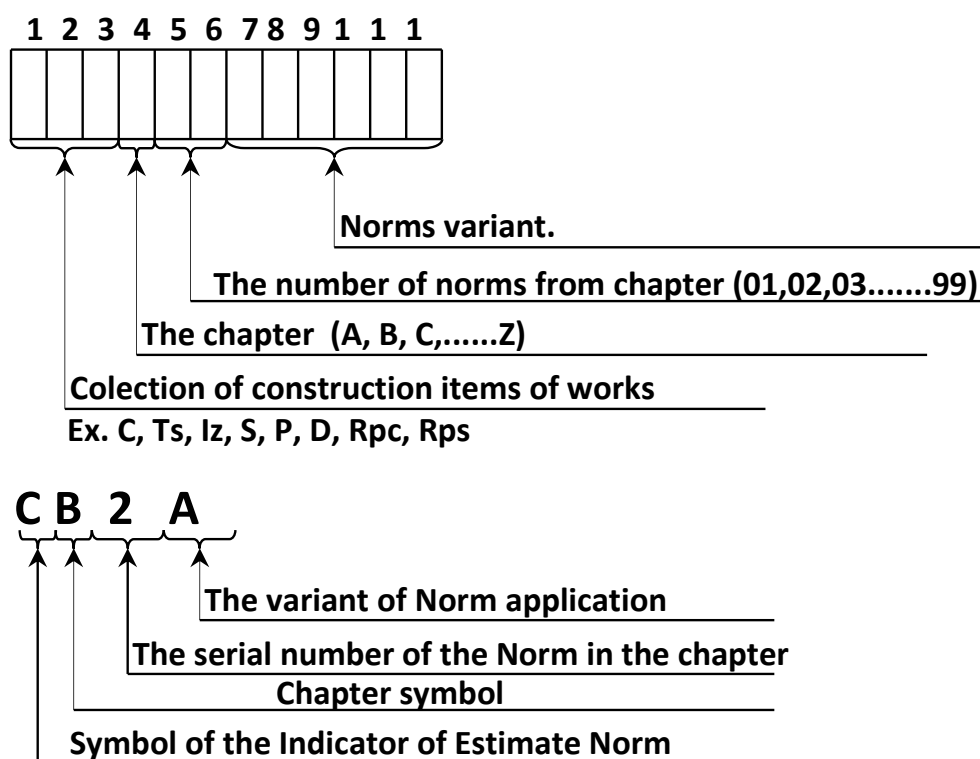


Fig. 7. Explanation of the norm estimate cod

For example:

The code **CA02XH** it can be identify as follows:

Work classification: **C** - building works (buildings, process plants, agricultural constructions)

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Chapter A - Concrete works

02 - the second item of the chapter: Concrete in foundations and retaining walls

X - denotes that the collection of construction items of work is published after 1990

H - The technological method of execution of the work

VII

VII. Taking over the standard consumption of material, labor, equipment, and transport from the recipes of the identified estimate items, and transposing them into a spreadsheet program

Recipe of estimate norms

Recipe of estimate norms is the amount of resources required for a specific measurement unit of work item to that the norm refers to.

In a recipe of an estimate norms there are these types of resources:

- Material
- Labour
- Equipment
- Transport
- Annex.

Beside the code, description and unit of measure, each norm in a Collection Indicators of Estimate Norms has attached three more indications, namely the usage rates of resources for the item (for materials, labour and equipment, respectively).

A resource usage rate is the quantity of resource consumed to construct a unit of measure of the specified item of work. **The resource usage rates** allows us to compute the list of resources required by the contract and the economic department of any construction company.

Specific consumption of the materials

Specific consumption of the materials represents the materials quantities that real enter into a work, plus technological loss, and transportation handling and storage loss of materials.

It is used the following formula:

$$N_{cm} = C_t + P_t + P_{tm}$$

where, N_{cm} – materials consumption norm,

C_t - technological consumption,

P_t - technological loss,

P_{tm} – material loss due to transportation, handling and storage.

Specific labour consumption

Specific labour consumption represent the necessary labour time to accomplish the operations that interfere during the technological processes starting with material preparation, set-up materials and finish with final material placing into the work. Specific labour consumption is expressed in hours.

Specific equipment/hours consumption

Specific equipment/hours consumption represent only the functioning hours of an equipment for execution of a unit measure for a specific work. It is expressed in hours.

Transport

In the Indicators of Estimate Norms are presented special rules for transport. They are used to describe the transport of materials to the execution of the work. A transport norm contains a resource recipe type of transport. A transport resource type is described by weight of materials transported and the distance transported.

Annex

Annex is a source abstract, it specifies what should be used instead of a resource that fits in the description specified in the list.

VII

Example: "simple concrete casting in foundations continue, isolated and sockets with volume up to 3 m included". We will not create a new norm for each type of concrete, but, for concrete, we will replace the standard recipe with a annex.

Example

From the Indicator of Estimate Norms for construction industry, agrobusiness, housing, social and cultural, C 1981 edition, we choose the norm CZ0104.

CZ0104- Preparation of the brand B100 concrete, that have the following variants:

- A- ballasted with grain up to 31 mm, prepared with cement F25, in centralized installations
- B- idem in uncentralized installations
- C- idem, manual
- D- ballast, grain up to 71 mm, prepared with cement F25, in centralized installations
- E- idem, in uncentralized installations
- F- idem, manual
- G- ballast grit up to 31 mm M30 cement preparation and addition of fly ash in centralized systems is measured in mc.

For the example was chosen the A variant, and a quantity of 100 m³ of concrete to be prepared.

So the code will became **CZ0104A**, and we have to calculate the direct costs for 100 m³ of concrete preparing (tables 14, 15, 16).

Table 14. The recipe of the estimate article regarding the materials involved

CZ0104 Concrete mixing

No.	Material description	U.M.	Total consumption						
1	2	3	A	B	C	D	E	F	G
1.	Cement F25(bulk)	kg	201	-	-	181	-	-	-
2.	Cement F25(bag)	kg	-	203	204	-	183	184	-
3.	Cement M30 (bulk)	kg	-	-	-	-	-	-	166
4.	The ashes of the thermo-power station	kg	-	-	-	-	-	-	166
5.	Ballast 0-31 mm	m ³	1.19	1.20	1.20	-	-	-	1.06
6.	Sand 3-7 mm	m ³	0.14	0.14	0.14	0.14	0.14	0.14	0.13
7.	Ballast 0-71 mm	m ³	-	-	-	1.20	1.21	1.21	-
8.	Water	m ³	0.16	0.16	0.17	0.14	0.14	0.15	0.17

Table 15. The recipe of the estimate article regarding the labour involved

No.	Labour force	U.M.	Total consumption						
1	2	3	A	B	C	D	E	F	G
1.	Concrete	hours	-	0.29	0.88	-	0.29	0.88	-
2.	Concrete	hours	0.08	0.88	2.62	0.08	0.88	2.62	0.11
TOTAL		hours	0.08	1.17	3.50	0.08	1.17	3.50	0.11

Table 16. The recipe of the estimate article regarding the equipments involved

No.	Equipment description	U.M.	Total consumption						
1	2	3	A	B	C	D	E	F	G
1.	Ready mix concrete	hours	0.04	-	-	0.04	-	-	-
2.	Concrete mixer	hours	-	0.29	-	-	0.29	-	-
3.	Buldoexcavator	hours	0.01	-	-	0.01	-	-	0.02

VIII. Identification of the unit price for each type of resource consumed in the estimate article and calculation of the price on Materials, Labor, Equipment, and Transport within the same article.

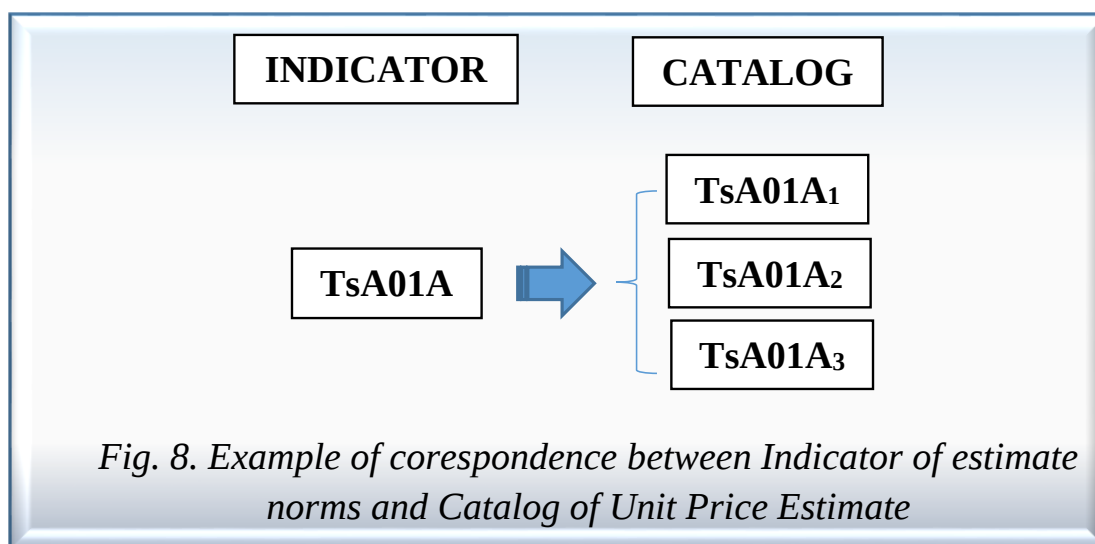
For the accuracy of the estimate, a unit cost is assigned to each item of the estimate, which should provide a reference comparison with historical experience.

Cost information for pricing different estimate items can be collected or formed from different sources.

It is advisable for the estimate engineer to use several sources of information in order to be able to set a fair price. The pricing engineer's experience and ability to correlate handy data with a specific circumstance is essential. The following paragraphs present some price sources commonly used in making estimates.

1. *Catalog of unit price estimate*

- For each Indicator of Estimate Norms were developed catalogs unit prices, these bearing the same symbol as the Indicators C, Ts, Iz, etc.
- The Catalog of Unit Price Estimate has structured chapters similarly as the Indicator of estimate norms estimate to which corresponds; the chapters are marked with letters, from A to Z.
- Within each chapter are found several price options, in the same order as in the Indicator of estimate norms (fig. 8).
- The price variations reflect different difficulties of execution for the same building complex as defined by the Indicator of estimate norms or the use of different materials or of various labor methods.



2. Unit trade cost books (annual technical price bulletins)

The unit trade cost books are common sources usually available by subscription or purchase. The cost bases presented are usually explained together with the adjustment methodology. Such publications are valuable for verification and appropriate for the prices of commercial work items. However, caution is advised, as the costs are average, which may not reflect special applications for certain areas of the project.

3. Historical Data

Historical costs from similar works in the past are an excellent way to set prices, provided that two criteria are met: the details of the historical cost base must be known, and the historical costs must be adjusted to take into account the specifics of the project. If these conditions are met, then parts of other estimates with similar work can be recovered and reevaluated according to the current project tariffs. This reevaluation involves adjustments to the project location, working methodology, workload, and other differences that affect prices. Historical costs must also be constantly adjusted to the current estimated effective price level. To make it easier to work with historical costs, there are automatic cost engineering systems that allow the collection and analysis of historical costs.

VIII**Development of unit costs for specific tasks**

A unit cost for each task is a direct cost that cumulates separate costs for labor, equipment, and materials, resulting in a direct cost per unit of estimate item.

Direct Cost Development

Direct costs are those costs that can be attributed to a single task of construction work. These costs are usually associated with a construction work crew that performs a task using specific equipment and materials or subcontracted work.

A. Materials and Supplies Unit Cost

Materials and consumables may be generically referred to as materials in the estimation process, except for those situations where they have to be considered separately due to different tax rates.

The defining feature of materials is that they are physically incorporated into the construction and become part of the permanent structure. Consumables are objects used in construction but do not become physically incorporated into the project, such as concrete forms, welding rods, etc.

The unit price of the material is obtained using supplier quotations, historical costs, sources of commercial prices, or component calculations. The price of the materials should include delivery to the project site.

The unit price estimate for materials k_m (equation 1) is the sum of:

- Delivery prices suppliers: producers or intermediaries k_f
- Packaging expenses k_{am} , if requiring packaging materials, where such costs are included in shipping prices of suppliers
- Expenses from a material supply k_{ap} , consisting in shares that pay added supply units and sales outside the assembly building organizations.

$$k_m = k_f + k_{am} + k_{ap} \quad (\text{eq. 1})$$

The unit price estimate for materials does not include the transport costs (included in delivery of legal prices of suppliers) and handling costs that is performed by construction organizations assembly.

Unit price estimate for materials k_m refers to quantities (sorto-type and size) required to achieve a unit of norm estimate (table 17).

Sources of Pricing Data

Sources for pricing materials and consumables can be represented by various pricing services, trade cost books, catalogs, quotations, and historical data records. However, the estimate engineer should examine the source of the prices contained in these publications and assess their reasonableness before taking them over.

Standard unit prices from the mentioned sources are considered satisfactory only after their applicability has been analyzed as there are various factors that can influence their level (eg inflation).

Waste Allowance

Waste and material losses may be included in their unit price calculations. This alternative practice of increasing the quantity measured by the addition of waste and losses is acceptable if the excess quantity is not used for other purposes. If the quantities of materials are determined by others, it must be determined whether these quantities include waste or losses in order to avoid double quantification. The use of this practice should not include labor taxation for the excess amount of materials. Regardless of the method of estimating the materials, with or without consideration of waste and/or losses, a note statement is required in the estimate explaining the methodology used.

Quotes from Manufacturers and Suppliers

Quotations from suppliers or manufacturers are required for all essential materials and equipment, as well as for specialized or non-

readily available items. Offers can be received either in writing or by phone. Obtaining quotations for each project ensures that the costs are up-to-date and that the item meets the specifications. If possible, it is recommended that more than one offer be obtained to ensure that prices are competitive. The estimate engineer must ensure that contractors' discounts are taken into account in the estimate and check that the offer includes delivery and sales fees.

Quotations should be confidential, as they may be influenced by certain particular features of the project for which they were offered, which cannot be found in all projects so that those quotes cannot be applied universally either.

Forward Pricing. In most cases, quotes are requested in advance of the expected date of purchase. Under these conditions, suppliers are reluctant to guarantee future prices and offer only current prices. Thus, the estimate engineer may be in a position to adjust current prices to obtain the expected cost at the date of actual acquisition. This cost adjustment, if necessary, must be clearly and separately defined in each estimate, and not presented as an unforeseen situation. The adjustment of current prices to future prices occurs when there is an extended period for construction and is done using escalation factors. The details of the adjustment calculation should be as clear as possible and should be maintained as a reserve for cost estimate.

Freight. Upon receipt of an offer, the estimate engineer must consider whether it also includes freight costs. Where the quotes do not include freight costs to the project site, they must be established and included. An approximation of them is usually offered by the suppliers.

Handling and Storage

In situations where materials and consumables are in large quantities in bulk requiring extensive unloading and transport equipment, consideration should be given to including the estimated workforce and material handling equipment. The contractor is responsible for unloading, handling, and storing materials from the

warehouse on site. Therefore, these costs should be included in the estimate. An element of electronic equipment that requires a special storage place, with low humidity, involves this special cost added to the direct cost of the equipment. For ordinary items, there are costs of fencing, temporary buildings, and handling of materials that should be considered as indirect costs and included in the overall costs of the site.

Taxes

There are cases when the sales tax must be added to the cost of materials. Sales tax is considered a direct cost of materials and consumables and should be included in the estimate.

Materials or Supplies Manufactured or Produced at Site

If there is an option for some materials or consumables to be produced at the project site, a separate estimate component should be made for this work. This estimate should be detailed and include all the equipment, labor, materials, and consumables needed to produce the product. The result of this estimate is a unit cost of the material or supplies delivered.

Table 17. The unit price estimation of materials

No.	Material description	U.M.	Total consumption							Unit price
			4							[Ron/UM]
1	2	3	A	B	C	D	E	F	G	5
1.	Cement F25(bulk)	kg	201	-	-	181	-	-	-	0.5
2.	Cement F25(bag)	kg	-	203	204	-	183	184	-	0,5
3.	Cement M30 (bulk)	kg	-	-	-	-	-	-	166	0,5
4.	The ashes of the thermo-power station	kg	-	-	-	-	-	-	166	0,5
5.	Ballast 0-31 mm	m ³	1.19	1.20	1.20	-	-	-	1.06	70
6.	Sand 3-7 mm	m ³	0.14	0.14	0.14	0.14	0.14	0.14	0.13	70
7.	Ballast 0-71 mm	m ³	-	-	-	1.20	1.21	1.21	-	70
8.	Water	m ³	0.16	0.16	0.17	0.14	0.14	0.15	0.17	1,9
TOTAL										

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B. Labor unit cost

Although we are in an era when industrialization is developing at a very fast pace and many products around us are mass-produced in factories by machines, the construction industry is an exception. The construction is one of the few things that are done piece by piece by craftsmen.

The construction industry involves one of the largest labor consumption in the world. The cost of labor in a construction project is between 30 and 50% and can reach 60% of the total cost of the project. It is concluded that the construction workforce is a vital component of a construction project. Being a very complex product, the construction consists of many different systems, as a structural system, outdoor enclosure system, and HVAC system, systems that can be divided into several subsystems and subsystems, resulting in numerous work packages. These work packages are the responsibility of an individual worker or of a crew. A crew is a team of workers of the same trade or different trades. Carrying out a construction project thus involves several types of craftsmen from several different trades.

Labor unit costs are expressed as “lei per unit of the quantity being priced” (ex. lei/mp of formwork), and are covered by normd of unified economy in construction work as well as an appropriate salary level from the construction industry.

To determine the cost of labor (table 18) the following basic elements that make up the cost of labor should be considered:

- Wages;
- Fringe benefits (health and welfare, pension etc);
- Payroll taxes (social security, unemployment insurance);
- Other elements that may be part of the cost like travel and overtime.

Table 18. The unit price estimation of labor

No.	Labour force	U.M.	Total consumption 4							Unit price	Quantity	Total value
										[Ron/UM]	[...]	[Ron]
1	2	3	A	B	C	D	E	F	G	5	6	7
1.	Concrete	hours	-	0.29	0.88	-	0.29	0.88	-	15		
2.	Concrete	hours	0.08	0.88	2.62	0.08	0.88	2.62	0.11	15	100	1500
TOTAL		hours	0.08	1.17	3.50	0.08	1.17	3.50	0.11	15	1500	

C. Construction Equipment and Plant Unit Cost

The construction equipment and installation represent the tools, instruments, equipment, and other mechanical tools necessary to carry out the construction works. The construction installation refers to those concrete installations, aggregate processing installations, transport systems, and any other processing installations, which are located at the workplace and stationary (fixed in place). Equipment refers to portable or mobile equipment, ranging from small hand tools to tractors, cranes, and trucks. In making the estimate, the facilities and equipment are grouped together as equipment costs.

The **equipment unit price** covers the cost of the equipment necessary to install the material (table 20). These costs are of two general types:

1. the equipment itself: the cost of ownership, lease or rental, that includes interest, storage, insurance, taxes, and license.
2. the cost of operating it: cost of operating the equipment for as long as it is needed. This includes the cost of gasoline, oil, periodic maintenance, transportation.

In establishing *the unit price estimate for the equipment itself*, there must be considered the occurrence of the following cases:

- i. *The equipment must be rented for the necessary period to be used.*

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Equipment costs can be figured on an item - by - item basis or covered on a project basis (ex. A crane would probably be rented on a monthly/hourly basis – being used by all trades, for various items of work).

ii. ***The equipment exists in the assets of the construction company.***

As an asset, the equipment is part of the constructor working capital. *An asset* is something that is of value to its possessor and provides monetary flow to its owner.

Capital is a factor of production usually represented by either machinery, plant, buildings, land (physical capital = fixed capital = capital asset) or money (financial capital). The concept can be applied to a variety of other assets (e.g. human capital). Capital is something that is generally used to enhance the pro-ductivity of other factors of production (plant, labor).

When the equipment is bought by the constructor and become a part of its capital, its value must be its value must be covered over time. This process is named amortization and there are more methods to do it. *Amortization (depreciation)* is the systematic allocation of the costs of capital investment over a number of years.

The calculation of the depreciation accounting value (book value) of equipment is justified for three reasons:

- ☐ provides the owner/project manager with an easily calculated “estimate” of the current market value of the equipment; thus, the depreciation method should approximate the market value;
- ☐ provides a systematic method for allocating the depreciation portion of equipment ownership costs over a period of time and at a specific productivity rate;
- ☐ distributes the depreciation part of the property costs in such a way as to obtain the highest tax benefits; thus, accounting depreciation must closely take into account the strict, frequently changing legal government guidelines.

There are usually at least three different methods of depreciation for a given asset. Regardless of the depreciation method adopted, the following elements must be known:

- ❑ The purchase cost of the piece of equipment (**C**);
- ❑ The economic/useful life of the of the equipment (the recovery period allowed for income tax purposes (**N**));
- ❑ The estimated resale value at the close of the economic life, known as the **salvage value** (**S**).

With these three items, the depreciation can be calculated using a number of methods, such as:

- a. **Straight – line method;**
- b. Declining method;
- c. Accelerated method.

a. Straight – line method of amortization

Straight – line method of amortization represents the most widely used method in construction industry. The annual amount of depreciation ***D_n***, for any year ***m*** is a constant value and thus the book value ***BV_m*** decreases at a uniform rate over the useful life of the equipment. The equations are 2, 3 and 4:

Amortization rate:

$$R_m = 1/N \quad (\text{eq. 2})$$

Annual amortization amount:

$$A_m = R_m (C-S) = (C-S)/N \quad (\text{eq. 3})$$

if any S is allowed

Book value at year ***m***:

$$BV_m = C - m A_m \quad (\text{eq. 4})$$

Example: A concrete vibrator that depreciates over ***N* = 5 years**, is purchased at a cost of ***C* = 5,000 lei**, and will have a salvage value of ***S* = 0 lei**, will depreciate at ***A_m* = 1,000** per year: **(5,000 - 0)/5 = 1,000 lei annual straight-line amortization ammount**. In other

words, it is the **depreciable cost** of the asset divided by the number of years of its useful life.

Book Value = Original Cost - Accumulated Amortization

Book value at the end of year becomes book value at the beginning of next year. The asset is depreciated until the book value equals to zero value.

Table 19 illustrates the straight-line method of amortization. Book value at the beginning of the first year of depreciation represent the original cost of the asset. At any time book value equals original cost minus accumulated depreciation.

Table 19. The straight-line method of amortization

Book value - beginning of year -	Annual amortization amount (Am)	Accumulated amortization	Book value - end of year -
5000	1000	1000	4000
4000	1000	2000	3000
3000	1000	3000	2000
2000	1000	4000	1000
1000	1000	5000	0

b. Declining method of amortization

Declining method of amortization involves amortization rates multiplied by some coefficients according to the useful life of the fixed asset (1,5 for N = 2-5 years; 2,0 for N = 5-10 years; and 2,5 for N = more than 10 years).

c. Accelerated method of amortization

Accelerated method of amortization involves including a total amortization amount of 50% of the original cost in the first year, and than applying the straight – line method for the rest of the years.

The unit price estimate for equipment k_u , has two components, namely:

- The value spending time running the machinery involved in the branch unit of estimate $k_{hi} = 1, 2, 3....$ number of equipment;

- The expenditure for mechanical handling of materials that are part of a unit of measure from the norm k_u^* .

Operating expenses for the time the equipment shall be set as in equation 5:

$$k_{h_i} = C_1 + C_2 + C_3 + \frac{C_4 + C_5 + C_6}{OLE} \cdot n \quad (\text{eq. 5})$$

where:

C_1 - the rent that returns the actual hours machine operation [lei/ hour];

C_2 - the cost of fuel-consumption, fuels, lubricants, electricity and maintenance materials included in the price per hour of actual operation of the machine [lei/hour];

C_3 - the drivers wages and their aid equipment, not included in the rental rate, respectively, relative to the rate of use of hours program k_{FU} [lei/ hour];

C_4 - cost of return transportation of the equipment from the equipment at site based [lei];

C_5 - value of installing and dismantling of equipment operations [lei];

C_6 - the rent equipment during a normal installation and dismantling of a machine [lei];

OLE - number of hours actually worked by a machine on a calendar year interval;

n - average number of sites at which the machine moves during a calendar year.

In establishing these types of expenses are taken into account: daily or hourly rental rates of each type of machine, charging salaries of drivers and their helpers, depending on category and stage of employment, transport distances etc.

Considering that the development of a complex process defined by a part-time estimate "m"; machines of different types, unit price estimate for equipment will be as set by equation 6:

$$k_u = (N_{TU_1} \cdot k_{h_1} + \dots + N_{TU_i} \cdot k_{h_i} + \dots + N_{TU_m} \cdot k_{h_m}) + k_u^* \quad (\text{eq.6})$$

VIII

Selection of Equipment

In an estimate development, selecting the right equipment to perform the tasks is very important. It is imperative that the estimate engineer carefully consider the number, size, and function of the equipment that will be involved in the project, in order to reach its optimal use. Some of the factors to be analyzed in the selection process are:

- Conformance to specification requirements,
- Magnitude of the job,
- Type of materials,
- Job progress schedule (production rate),
- Distances material must be moved,
- Suitability of equipment for other uses,
- Availability of space and site access,
- Loading and unloading of freight,
- Onsite batch or production plants,
- Number of shifts,
- Mobility and availability of equipment,
- Weather conditions,
- Steepness and direction of grades,
- Hauling restrictions,
- Equipment capabilities,
- Mobilization and demobilization costs,
- Standby time.

The design engineer must be well trained in the construction equipment and working conditions of the project. The equipment chosen must be in accordance with the contractual requirements and be suitable for the materials to be handled and the conditions of the project.

Equipment Productivity

If the construction project requires a more detailed cost estimate, the concept of "crew" must also be taken into account in the costs of the equipment because, if a major equipment serves more than

one crew, the total operating time of it should be proportionally divided between the user crews.

The estimate engineer must first choose the type of equipment to be used, and then its size. On the size (or power) of the equipment depends its the production rate, the size of the station, the availability of space for equipment operations, the project construction schedule for the various work tasks, the number of shifts to be worked, and the availability of equipment operators. Establishing an optimal production rate is essential to achieve economic efficiency.

Mobilization and Demobilization

Mobilization costs for equipment means the cost of loading in the contractor's yard, the cost of transport from the yard to the site, including permits, unloading on site, assembly and testing required, and waiting costs during mobilization. Everything that means labor, equipment, and supply costs required to mobilize equipment must be included in the cost of mobilization. Where the location of the equipment is not known at the time of the estimate, the mobilization and demobilization distance should be based on a circular area around the project site, which will take into account a reasonable number of qualified tenderers.

Demobilization costs involve those costs related to the return of equipment to the contractor's warehouse and can be expressed as a percentage of mobilization costs. Other costs that are assimilated to those of demobilization are those with labor, equipment, and supplies that are necessary for cleaning/preparing the equipment so that it returns to the same condition in the warehouse as when it arrived on site. The fees to be applied should be obtained from qualified firms that normally engage in this type of work.

Mobilization and demobilization costs are based on the delivered cost of the item, plus assembly costs, taxes, and dismantling costs minus the recovery amount at the end of the project. Equipment maintenance and repair are operating costs that must be distributed during the work.

VIII

Small Tools

The cost of small and hand tools and of various non-capitalized equipment and consumables can be estimated as a percentage of labor cost, depending on the work involved. Another variant of their estimation is the application of a real cost of small tools within the team that uses them. The estimate engineer must ensure that this cost is not doubled as a percentage of the overhead rate.

Table 20. The unit price estimation of equipment

No.	Equipment description	U.M.	Total consumption							Unit price
										[Ron/UM]
1	2	3	A	B	C	D	E	F	G	5
1.	Ready mix concrete	hours	0.04	-	-	0.04	-	-	-	200
2.	Concrete mixer	hours	-	0.29	-	-	0.29	-	-	
3.	Buldoexcavator	hours	0.01	-	-	0.01	-	-	0.02	150
TOTAL										

D. Subcontracted Work

In construction, it is preferable to subcontract works on plumbing, heating, electrical, roofing, and architectural finishes as they are performed more efficiently in this way. Taking into account the diversity of specialties, subcontracting works become a very significant part of the total construction costs, so that subcontracting costs become a necessary consideration in making the estimate of the cost of a construction project.

Parts of Work to be Subcontracted. The first step that the estimate engineer must take is to determine first those parts of the work that will be subcontracted, and then to identify those elements in the estimate. The overheads and profits of the subcontractor shall be applied to the direct cost elements of the subcontractor, in addition to the overheads and corresponding profits of the main contractor.

Cost of Subcontracted Work. The cost of subcontracted works is considered a direct cost to the main contractor. Subcontractor costs include labor, materials, and consumables, equipment, second-tier subcontracts, mobilization and demobilization, transportation, overhead, and profit.

Use of Quotations. Although is not a recommended option, the estimate engineer may use quotations to assess the cost of the expected subcontracted work when they are considered reasonable after verification has been carried out. This method is acceptable if the subcontracted work is not a major task in the estimate. The verification is performed by obtaining several quotations or by developing a gross estimate of the offers or comparing it with historical or parametric data.

Where the quotation method is not applied, each work task of the subcontract should be estimated as a direct cost of the subcontractor, with an appropriate rate of indirect costs and added profit.

IX. Determination of the total price for the estimate item (for the entire quantity of that estimate item)

Knowing the consumption of resources necessary to make a unit of measurement of work, as well as the prices related to them, one can determine the price of a unit of measure in that work. If we multiply the unit price of the work item by the quantity to be made, we obtain the price corresponding to the estimate item (table 21, 22, 23).

CONSTRUCTION COST ESTIMATE

IX

Table 21. The unit price estimation of materials for 100 m² of the estimate article CZ0104 Concrete mixing

No.	Material description	U.M.	Total consumption							Unit price	Quantity	Total value
			4							[Ron/UM]	[...]	[Ron]
1	2	3	A	B	C	D	E	F	G	5	6	7
1.	Cement F25(bulk)	kg	201	-	-	181	-	-	-	0.5	20100	10 050
2.	Cement F25(bag)	kg	-	203	204	-	183	184	-	0,5		
3.	Cement M30 (bulk)	kg	-	-	-	-	-	-	166	0,5		
4.	The ashes of the thermo-power station	kg	-	-	-	-	-	-	166	0,5		
5.	Ballast 0-31 mm	m ³	1.19	1.20	1.20	-	-	-	1.06	70	119	8330
6.	Sand 3-7 mm	m ³	0.14	0.14	0.14	0.14	0.14	0.14	0.13	70	14	980
7.	Ballast 0-71 mm	m ³	-	-	-	1.20	1.21	1.21	-	70		
8.	Water	m ³	0.16	0.16	0.17	0.14	0.14	0.15	0.17	1,9	16	30.4
TOTAL											19 390.4	

Table 22. The price estimation of labour for 100 m² of the estimate article CZ0104 Concrete mixing

No.	Labour force	U.M.	Total consumption							Unit price	Quantity	Total value
			4							[Ron/UM]	[...]	[Ron]
1	2	3	A	B	C	D	E	F	G	5	6	7
1.	Concrete	hours	-	0.29	0.88	-	0.29	0.88	-	15		
2.	Concrete	hours	0.08	0.88	2.62	0.08	0.88	2.62	0.11	15	100	1500
TOTAL		hours	0.08	1.17	3.50	0.08	1.17	3.50	0.11	15	1500	

Table 23. The price estimation of equipments for 100 m² of the estimate article CZ0104 Concrete mixing

No.	Equipment description	U.M.	Total consumption							Unit price	Quantity	Total value
										[Ron/UM]	[...]	[Ron]
1	2	3	A	B	C	D	E	F	G	5	6	7
1.	Ready mix concrete	hours	0.04	-	-	0.04	-	-	-	200	4	800
2.	Concrete mixer	hours	-	0.29	-	-	0.29	-	-			
3.	Buldoexcavator	hours	0.01	-	-	0.01	-	-	0.02	150	1,5	225
TOTAL											1025 RON	

X. Realization of Extracts of Materials, Labor, Equipment, and Transport

A. Extract of material

The spreadsheet calculation is made in the form of the table 24.

Table 24. Calculus of the material usage rate

No.	Article code and description	UM	Quantity	Materials		
				Material 1 [U.M.]	Material 2 [U.M.]	
1	2	3	4	5	6	...
				SCN	SCN	

col. (4) x SCN(5)

col. (4) x SCN(6)

*SCN- specific consumption norm



The method applied for the calculus in table 24 is as follows:

- ❑ In columns 1, 2, 3, 4 are introduced the items from the Bill of quantities together with their characteristic data.
- ❑ For each item of Bill of quantities introduced in the calculation table, it is identified in the Indicators of Estimate Norms that estimate norm chosen when the Bill of quantities was drawn up.
- ❑ From the table of resources in the structure of the estimate norm it is identified:
 - The names of the materials and the specific unit of measurement, that are introduced in the table in columns 5, 6,
 - The specific consumption norm (SCN) of each material is introduced in the column corresponding to each material above the diagonal line.
- ❑ It is calculated for each article and for each material, the total quantity of the respective material that will be consumed for the execution of the quantity of work article. This calculation is performed by multiplying the value of the item quantity (in column 4) by the value of the specific consumption norm of each material (written above the diagonal line in the column of the respective material). The result is written below the diagonal line, in the material column.
- ❑ It is specified that if a type of material is used for the execution of several work articles, the calculations described above are made in the same column but on the line corresponding to each article.
- ❑ Finally, the quantities inscribed below the diagonal line are summed on the column corresponding to each material. These values are recorded in a separate table called the material extract (table 25, 26).

Table 25. Materials extract

**MATERIALS EXTRACT**

No.	Material description	U.M.	Quantity	Observations

Table 26. "Materials extract" example

No.	Article code and description	U.M.	Quantity	Materials			
				Cement F25(bulk) [kg]	Ballast 0-31 mm [m³]	Sand 3-7 mm [m³]	Water [m³]
1	2	3	4	5	6	7	8
1.	CZ0104 Concrete mixing	mc	100	201 20100	1.19 119	0.14 14	0.16 16
Total				20 100	119	14	16

B. Labor Extract

The calculation of the labor is performed tabularly, in a table having the form specified in table 27.

Table 27. Calculus of the labour consumption

No.	Article code and description	UM	Quantity	Labour		
				Job qualification [hours]	Job qualification [hours]	
1	2	3	4	5	6	...
				SCN*	SCN*	

col. (4) x SCN(5)

col. (4) x SCN(6)

*SCN- specific consumption norm

For the calculation in the table 27, proceed as follows:

- ❑ In columns 1, 2, 3, 4 introduce in order the items from the Bill of quantities together with their characteristic data.
- ❑ For each item from Bill of quantities entered in the calculation table, that estimate rule chosen when the Bill of quantities was drawn up shall be identified in the Indicators of Estimate Norms.
- ❑ From the table of resources in the structure of the estimate norm there are identified:
 - The names of the trades and the qualifications related to them are introduced in the table in columns 5, 6,
 - Specific consumption norm (SCN) of each type of labor is introduced in the column corresponding to each type of labor above the diagonal line.
- ❑ It is calculated for each item and for each type of labor, the total quantity in hours that will be consumed for the execution of the quantity of work item. This calculation is performed by multiplying the value of the item quantity (in column 4) by the value of the specific consumption norm of each type of labor (written above the diagonal line in the column of the respective type of labor). The result is written below the diagonal line in the material column.
- ❑ It is specified that if a type of labor is used for the execution of several work items, the calculations described above are made in the same column but in the row corresponding to each item.
- ❑ The quantities inscribed below the diagonal line are added to the column corresponding to each type of labor. These values are introduced in a separate table called labor extract (table 28, 29).

Table 28. Labour extract

LABOUR EXTRACT

No.	Qualification description	U.M.	Quantity/hour	Observations

Table 29. "Labour extract" example

No.	Article code and description	UM	Quantity	Labour
				Concrete [hours]
1	2	3	4	5
1	CZ0104A Concrete mixing	mc	100	0.08
Total				8

C. Equipment Extract

The calculation for construction equipment is performed in a tabular (table 30).

Table 30. Calculus of the hours equipments consumption

No.	Article code and description	UM	Quantity	Equipments		
				Equip. 1 [hours]	Equip. 2 [hours]	
1	2	3	4	5	6	...
				SCN*	SCN*	

col. (4) x SCN(5)

col. (4) x SCN(6)

*SCN- specific consumption norm

For the calculations in Table 30, the method used is as follows:

- ☐ In columns 1, 2, 3, 4 are introduced in order the items from the Bill of quantities, together with their characteristic data.
- ☐ For each item from Bill of quantities introduced in the calculation table, the estimate norm chosen when the Bill of quantities was drawn up shall be identified in the Indicators of Estimate Norms.



- ❑ From the table of resources in the structure of the estimate norm, there are identified:
 - Names of machinery, equipment, technological installations, and their technical specifications, that are introduced in the table in columns 5, 6,
 - Specific consumption norm (SCN) of each equipment is entered in the column corresponding to each equipment, above the diagonal line.
- ❑ It is calculated for each item and for each equipment, the total operating time of the respective equipment that will be consumed for the execution of the quantity of work item. This calculation is made by multiplying the value of the item quantity (in column 4) by the value of the specific consumption norm of each equipment (written above the diagonal line in the column of the respective equipment). The result is below the diagonal line in the equipment column.
- ❑ It is specified that if a type of equipment is used for the execution of several work items, the calculations described above are made in the same column but in the row corresponding to each item.
- ❑ Finally, the quantities inscribed below the diagonal line are added to the column corresponding to each equipment. These values are recorded in a separate table called the equipment extract (table 31, 32).

Table 31. Equipment extract

EQUIPMENT EXTRACT

No.	The Plant's name	U.M.	Quantity	Observations

Table 32. "Equipment extract" example

No.	Article code and description	UM	Quantity	Plants	
				Ready mix concrete [hours]	Buldoexcavator [hours]
1	2	3	4	5	6
1	CZ0104 A Concrete mixing	mc	100	0.04	0.01
				4	1
Total				4	1

XI. Establishing direct expenses

The direct cost represents the amount of money actually consumed for the execution of construction processes. This money is spent on providing resources necessary for the execution of the construction process. These resources are divided into 4 categories:

1. *Materials*, defining the cost of materials respectively cash equivalent quantities of material, raw materials, semi-prefabricated prefabricated consume or use for constructive process execution,
2. *Workmanship*, defining the cost of labor that value in money time work of labor expended for the execution of the construction process;
3. *Equipment*, defining the cost of equipment or cash equivalent extension of the operation of equipment, installations, equipment, machinery used for the execution of the construction process.
4. *Transport*, defining transport costs or value in use of cash machines and equipment for transport. Here are included:

- material, precast, clothing, machinery and equipment from the supplier (producer) and for the place of formal operations;
- transport technology (ground transportation, transport concrete) if they were not considered processes independent construction;
- transport equipment, machinery, equipment, vehicles that are used to run processes construction equipment provider at the point of work and back.

Direct cost calculation (table 33) execution through analytical estimate categories of works, is based on the notion of unit price of the resource.

The unit price of resource to understand the unit prices of works related articles, representing the product of the specific consumption of resources and prices that tariffs for each category of resources (table 33).

Tabel 33. Determining the total costs for a construction object

No	Code	Quantity	UP _m UP _M UP _p	Material	Labour	Plant	TOTAL
1.	CZ0104 A	100	193,9004 15 10,25	9390,4	1500	1025	1915,4
2.				...	...	...	...
Total materials price					19390,4+.....		
Total labour price					1500+.....		
Total plants price					1025+.....		
TOTAL DIRECT COST					21915,4+.....		

XII. Calculation of indirect costs. Establishing recapitulation coefficients (taxes due to the State) and profit. Recapitulation

Indirect costs are those costs that cannot be attributed to a single task of construction work. These costs include the prime contractor markups such as overhead, profit, bond, and certain taxes. Indirect costs are also referred to as distributed costs.

A list of possible indirect costs that can occur in a construction project is provided in Annex no. 6 of "Guide on estimates developing at the level of work categories and construction objects for investments made from public funds", indicative P 91 / 1-02 (see Annex no. 6).

Summary estimate

The summary estimate is the final part of the estimate which calculates the overall costs of the contractor and the rates of recap final price estimates for construction companies.

Under the legislation in force from 2020, recap currency rates are as follows:

- ☐ Work insurance contribution (C.A.M.) = 2.25%
- ☐ According to GEO 114/2018, Article 71 - (2) Between January 1, 2020 and December 31, 2028, for the construction field, the minimum gross basic salary per country guaranteed in payment will be at least 3,000 lei per month, without including allowances, bonuses and other additions, for a normal work schedule of an average of 167,333 hours per month.
- ☐ VAT = 19%
- ☐ The estimates for constructions and installations cannot contain labor tariffs lower than 17.928 lei / hour, ie 3000 lei / month, for a program of 8 hours / day, from Monday to Friday.

XIII

XIII. Determination of total costs for the realization of the investment object (final price of the estimate)

Total construction cost is the sum of all direct costs plus applicable indirect costs to reflect the total construction cost (table 34).

Chapter A – Direct costs, includes the cost of materials, cost of labor, cost of equipment, cost of direct execution and total tonnage as was calculateacete estimate values using synthetic or analytic estimate by category of work.

Tabel 34. Determining the total costs for a construction object

	MATERIAL	LABOR	EQUIPMENT	TOTAL(T)
CAP. A DIRECT COSTS				
	145614.46	35171.13	1193.61	181979.20
CAP. B OTHER DIRECT COSTS				
Estimate rates			0	
C.A.S 20,8%		7315.60		7315.60
Unemployment 0.5%		175.86		175.86
Health 5.20%		1828.90		1828.90
Risk Found 1.379%		485.01		485.01
TOTAL DIRECT EXPENSES = CAP A+CAP B				
	145614.46	44976.5	1193.61	191784.57
CAP C INDIRECT COSTS				
Indirect costs 10% x T				19178.46
TOTAL COSTS = CAP A+CAP B+CAP C				210 963.03
Profit 5%				10 548.15
TOTAL PRICE (VAT not included)				221 511.18
TVA 24%				53 162.69
TOTAL PRICE (VAT include)				274 673.87

Chapter B – Other direct costs, include expenses resulting from charges in force, entering the trader obligation. Their value result from the application of labor costs allowance provided by the regulations in force for CAS, unemployment, health, risk, etc. Also in this chapter include spending on transport tonnage material.

Chapter C – Indirect costs, reflects the general expenses of the contractor. These costs are determined by applying a rate related to the total direct costs (total costs head. B and head. B). Indirect costs refer to the following activities of a firm with general execution.

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XIV. Using specialized software to make estimates

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The preparation of the estimate through the use of specialized software contributes significantly to the reduction of its implementation time, these software generally having complex and up-to-date databases in order to obtain a detailed estimate, regardless of the specific conditions of the analyzed construction project.

In order to be able to use specialized estimate software, however, it is necessary to follow the initial steps in the calculation of the estimated cost of the project, until the identification of the estimate items in the Indicator of Estimate Norms.

After entering the estimate items in the specialized software, in order to achieve a correct recapitulation, there are verified the recapitulation coefficients used by the program to be those regulated by the regulations in force at that time, as well as the profit coefficient adopted.

The final value of the estimate made through a calculation program may differ from the value calculated manually, depending on the unit price adopted for each item of the estimate.

Through the use of a specialized calculation program, there is the possibility of generating a construction schedule also, through which you can plan the calendar months when each work is performed (item, estimate, or object) within an investment objective. Also, various reports can be generated in the model of the forms regulated

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by the norms in force, in order to be easily attached to the investment file.

Depending on the complexity of the calculation program used to make the estimate, many other functions can be available that can facilitate the preparation of technical and economic documentation related to the construction project and then following its implementation from a financial point of view.

4. Example of calculation of an estimate by categories of works for the infrastructure of a construction

Bill of quantities

1 - CA01B - Class C 10/8 concrete preparation on site with concrete mixer – UM: m³ – Quantity: 5.996 (see R03)

$$V = (9.2 + 3.55 + 5.7 + 2.45 + 12.7 + 12.6 + 2.8 + 2.8 + 1.27 + 2.58 + 2.6 + 1.07$$

$$+ 2.58 + 2.8 + 1.57 + 1.98 + 4.38 + 2.8 + 1.57 + 2.8 + 1.57 + 4.28) * 0.7$$

$$* 0.1 = 5.996$$

2 - CA02A - Simple concrete pouring in leveling, slopes, screeds – UM: m³ – Quantity: 5.996 (see R03)

$$V = (9.2 + 3.55 + 5.7 + 2.45 + 12.7 + 12.6 + 2.8 + 2.8 + 1.27 + 2.58 + 2.6 + 1.07$$

$$+ 2.58 + 2.8 + 1.57 + 1.98 + 4.38 + 2.8 + 1.57 + 2.8 + 1.57 + 4.28) * 0.7$$

$$* 0.1 = 5.996$$

3 - CB02A - Reusable panel formwork with planking for bearings, glass foundations and machine foundations including supports – UM: m² – Quantity: 79.911 (see R03)

$$A = (15.15 * 2 + 12.6 * 2 + 2.8 * 2 + 5.07 * 2 + 1.98 * 2 + 2.8 * 2 + 2.6 * 2 + 2.8 * 2$$

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+ 1.07 * 2 + 2.8 * 2 + 2.58 * 2 + 2.8 * 2 + 2.58 * 2 + 1.57 * 2 + 1.27 * 2

+ 1.57 + 2.8 * 2 + 1.57 + 4.38 * 2 + 4.28 * 2 + 2.58 * 2 + 5.48 * 2 + 4.18

* 2 + 3.05 * 2) * 0.45 = 79.911

4 - CZ0301G1 - Manufacture of reinforced steel reinforcement for reinforced concrete in foundations, shaping of bars for insulated foundations, continuous and slab foundations, in workshops on site, OB 37, D=8 mm – UM: Kg – Quantity: 70.468

5 - CC01B2 - Shaping PC concrete steel bars, in centralized workshops, having: D=8 mm – UM: Kg – Quantity: 299.89

6 - CC01B3 - Shaping PC concrete steel bars, in centralized workshops, having: D=10 mm – UM: Kg – Quantity: 3264.239

7- CC01B4 - Shaping PC concrete steel bars, in centralized workshops, having: D=12, 14, 16 mm – UM: Kg – Quantity: 3368.037

(see R-1, R-2, R-3, R-4, R-5, R-5, R-6, R-7, R-8, R-9, R-10, R-11)

8- CC02C - Installation of reinforcements in continuous foundations and slab foundations, with D=8 mm– UM: Kg – Quantity: 370.357

(see R-1, R-2, R-3, R-4, R-5, R-5, R-6, R-7, R-8, R-9, R-10, R-11)

9- CC02D- Installation of reinforcements in continuous foundations and slab foundations, with D>8 mm – UM: Kg – Quantity: 3368.037

(see R-1, R-2, R-3, R-4, R-5, R-5, R-6, R-7, R-8, R-9, R-10, R-11)

Bar Mark	Structural Member		Diameter [mm]	No.of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	
1	Ax 3-3	1	14	5	5.13				25.65	
2			14	4	5.13				20.52	
3			14	4	6.57				26.28	
4			10	10	3.8		38			
5			14	2	3.05				6.1	
6										
7										
8			10	29	2.5		72.5			
9			12	39	1.5			58.5		
10			10	39	1.5		58.5			
11			8	39	1.2	46.8				
12			8	26	0.45					11.7
Total length per bar size [m]						46.8	169	58.5	78.55	11.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						18.486	104.273	51.948	94.8884	4.6215
TOTAL MASS [kg]						274.22				

Bar Mark	Structural Member		Diameter [mm]	No. of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	
1	Ax A-A	1	14	5	6.5				32.5	
2			14	5	8.1				40.5	
3'			14	4	8.45				33.8	
3			14	4	6.7				26.8	
4			10	20	7.75		155			
5			14	4	4.27				17.08	
6			14	4	9.17				36.68	
7			12	240	1.5			360		
8			10	240	1.5		360			
9			10	120	2.5		300			
10			10	120	1.9		228			
11			8	46	0.45					20.7
12	8	80	1.2		96					
Total length per bar size [m]						96	1043	360	187.36	20.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						37.92	643.531	319.68	226.3309	8.1765
TOTAL MASS [kg]						1235.64				

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Bar Mark	Structural Member		Diameter [mm]	No.of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	8
1	AxC-C	1	14	5	6.5				32.5	
2			14	5	8.1				40.5	
3'			14	4	8.45				33.8	
3			14	4	6.7				26.8	
4			10	20	7.75		155			
5			14	4	4.5				18	
6			14	4	9.17				36.68	
7			12	240	1.5			360		
8			10	240	1.5		360			
9			10	120	2.5		300			
10			10	120	1.9		228			
11			8	46	0.45					20.7
12	8	80	1.2	96						
Total length per bar size [m]						96	1043	360	188.28	20.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						37.92	643.531	319.68	227.4422	8.1765
TOTAL MASS [kg]						1236.75				

Bar Mark	Structural Member		Diameter [mm]	No. of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	8
1	AXE-E	1	14	5	5.15				25.75	
2			14	4	5.15				20.6	
3			14	4	4.05				16.2	
4			10	10	3.55		35.5			
5										
6			12	22	1.5			33		
7			10	22	1.5		33			
8			10	44	2.5		110			
9			8	16	0.45					7.2
10			8	22	1.2	26.4				
Total length per bar size [m]						26.4	178.5	33	62.55	7.2
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						10.428	110.1345	29.304	75.5604	2.844
TOTAL MASS [kg]						228.27				

Bar Mark	Structural Member		Diameter [mm]	No. of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	8
1	Ax 3-3	1	14	5	5.13				25.65	
2			14	4	5.13				20.52	
3			14	4	6.57				26.28	
4			10	10	3.8		38			
5			14	2	3.05				6.1	
6										
7										
8			10	29	2.5		72.5			
9			12	39	1.5			58.5		
10			10	39	1.5		58.5			
11			8	39	1.2	46.8				
12			8	26	0.45					11.7
Total length per bar size [m]						46.8	169	58.5	78.55	11.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						18.486	104.273	51.948	94.8884	4.6215
TOTAL MASS [kg]						274.22				

Bar Mark	Structural Member		Diameter [mm]	No. of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	8
1	Ax A-A	1	14	5	6.5				32.5	
2			14	5	8.1				40.5	
3'			14	4	8.45				33.8	
3			14	4	6.7				26.8	
4			10	20	7.75		155			
5			14	4	4.27				17.08	
6			14	4	9.17				36.68	
7			12	240	1.5			360		
8			10	240	1.5		360			
9			10	120	2.5		300			
10			10	120	1.9		228			
11			8	46	0.45					20.7
12	8	80	1.2	96						
Total length per bar size [m]						96	1043	360	187.36	20.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						37.92	643.531	319.68	226.3309	8.1765
TOTAL MASS [kg]						1235.64				

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Bar Mark	Structural Member		Diameter [mm]	No. of bars	Length of bar	Steel grade and length per bar size				
	Name	Pieces		Single Member		PC 52				OB37
						8	10	12	14	8
1	Ax C-C	1	14	5	6.5				32.5	
2			14	5	8.1				40.5	
3'			14	4	8.45				33.8	
3			14	4	6.7				26.8	
4			10	20	7.75		155			
5			14	4	4.5				18	
6			14	4	9.17				36.68	
7			12	240	1.5			360		
8			10	240	1.5		360			
9			10	120	2.5		300			
10			10	120	1.9		228			
11			8	46	0.45					20.7
12	8	80	1.2	96						
Total length per bar size [m]						96	1043	360	188.28	20.7
Steel mass per metre [kg]						0.395	0.617	0.888	1.208	0.395
Total mass per bar size [kg]						37.92	643.531	319.68	227.4422	8.1765
TOTAL MASS [kg]						1236.75				

Bar schedule AX2-2						
Structural member	Bar mark	Diameter	Total (pieces)	Length of bar [m]	Steel grade	
					PC 52	
					14 [mm]	10 [mm]
First Floor Slab	1	14	10	8.55	85.5	
	2	14	4	10.15	40.6	
	3	14	4	7.6	30.4	
	4	10	8	7.75	0	62
	5	14	4	4.45	17.8	
	6	14	4	3.05	12.2	
	7	14	4	9.6	38.4	
Total length per bar size [m]					286.9	
Steel mass per metre [kg]						1.208 0.617
Total mass per bar size [kg]						346.5752 177.0173
TOTAL MASS [kg]					523.5925	

Bar schedule AX2-2								
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade			
					PC 52			OB37
					8 [mm]	10 [mm]	12 [mm]	8 [mm]
First floor plan	8	12	224	1.5			336	
	9	10	224	1.5		336		
	10	10	23	1.9		43.7		
	11	10	44.4	2.5		111		
	12	8	64.4444	0.45				29
	13	8	96.6667	1.2	116			
Total length per bar size [m]					116	490.7	336	29
Steel mass per metre [kg]					0.395	0.617	0.888	0.395
Total mass per bar size [kg]					45.82	302.7619	298.368	11.455
TOTAL MASS [kg]					658.4049			

Bar schedule - AX4-4 L						
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size	
					PC 52	
					10[mm]	14[mm]
FIRST FLOOR SLAB	1	14	10	8.55		85.5
	2	14	4	7.40		29.6
	3	14	4	10.30		41.2
	4	10	20	7.75	155	
	5	14	2	6.50		13
	6	14	2	7.50		15
	7	14	4	8.00		32
Total length per bar size [m]					155	216.3
Steel mass per metre [kg]					0.617	1.208
Total mass per bar size [kg]					95.64	261.29
TOTAL MASS [kg]					356.93	

CONSTRUCTION COST ESTIMATE

Bar schedule - AX5-5 L						
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size	
					PC 52	
					10 [mm]	14[mm]
FIRST FLOOR SLAB	1	14	5	9.65		48.25
	2	14	5	4.85		24.25
	3	14	8	7.55		60.4
	4	10	20	6.50	130	
	5	14	2	6.60		13.2
	6	14	2	7.00		14
	7	14	4	6.75		27
Total length per bar size [m]					130	187.1
Steel mass per metre [kg]					0.617	1.208
Total mass per bar size [kg]					80.21	226.02
TOTAL MASS [kg]					306.23	

Bar schedule - AX4-4 T							
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size		
					PC 52		
					8 [mm]	10 [mm]	12 [mm]
FIRST FLOOR SLAB	8	10	146	2.50		365	
	9	12	97	1.50			145.5
	10	10	97	1.50		145.5	
	11	8	97	1.20	116.4		
	12	8	66	0.45	29.7		
Total length per bar size [m]					146.1	510.5	145.5
Steel mass per metre [kg]					0.395	0.617	0.888
Total mass per bar size [kg]					57.71	314.98	129.204
TOTAL MASS [kg]					501.89		

Bar schedule - AX5-5 T							
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size		
					PC 52		
					8 [mm]	10 [mm]	12 [mm]
FIRST FLOOR SLAB	8	10	120	2.50		300	
	9	12	80	1.50			120
	10	10	80	1.50		120	
	11	8	80	1.20	96		
	12	8	54	0.45	24.3		
Total length per bar size [m]					120.3	420	120
Steel mass per metre [kg]					0.395	0.617	0.888
Total mass per bar size [kg]					47.52	259.14	106.56
TOTAL MASS [kg]					413.22		

Bar schedule - AXB-B L						
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size	
					PC 52	
					10 [mm]	14 [mm]
FIRST FLOOR SLAB	1	14	5	10.03		50.15
	2	14	4	10.03		40.12
	3	14	4	9.18		60.4
	4	10	10	8.65	86.5	
Total length per bar size [m]					86.5	150.67
Steel mass per metre [kg]					0.617	1.208
Total mass per bar size [kg]					53.37	182.01
TOTAL MASS [kg]					235.38	

CONSTRUCTION COST ESTIMATE

Bar schedule - AXB-B T							
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size		
					PC 52		
					8 [mm]	10 [mm]	12 [mm]
FIRST FLOOR SLAB	5	10	84	2.50		210	
	6	12	56	1.50			84
	7	10	56	1.50		84	
	8	8	56	1.20	67.2		
	9	8	38	0.45	17.1		
Total length per bar size [m]					84.3	294	84
Steel mass per metre [kg]					0.395	0.617	0.888
Total mass per bar size [kg]					33.30	181.40	74.592
TOTAL MASS [kg]					289.29		

Bar schedule - AX C'-C' L						
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size	
					PC 52	
					10 [mm]	14 [mm]
FIRST FLOOR SLAB	1	14	5	5.15		25.75
	2	14	4	5.15		20.6
	3	14	4	4.05		60.4
	4	10	4	3.55	14.2	
Total length per bar size [m]					14.2	106.75
Steel mass per metre [kg]					0.617	1.208
Total mass per bar size [kg]					8.76	128.95
TOTAL MASS [kg]					137.72	

Bar schedule - AX C'-C' T							
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size		
					PC 52		
					8 [mm]	10 [mm]	12 [mm]
FIRST FLOOR SLAB	5	10	36	1.90		68.4	
	6	12	24	1.50			36
	7	10	24	1.50		36	
	8	8	24	1.20	28.8		
	9	8	8	0.45	3.6		
Total length per bar size [m]					32.4	104.4	36
Steel mass per metre [kg]					0.395	0.617	0.888
Total mass per bar size [kg]					12.80	64.41	31.968
TOTAL MASS [kg]					109.18		

Bar schedule - AXD-D L						
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size	
					PC 52	
					10 [mm]	14 [mm]
FIRST FLOOR SLAB	1	14	5	10.23		51.15
	2	14	4	10.23		40.92
	3	14	4	4.50		18
	4	10	10	8.70	87	
	5	14	4	5.68		22.72
Total length per bar size [m]					87	132.79
Steel mass per metre [kg]					0.617	1.208
Total mass per bar size [kg]					53.68	160.41
TOTAL MASS [kg]					214.09	

Bar schedule - AX D-D T							
Structural member	Bar mark	Diameter [mm]	Total (pieces)	Length of bar [m]	Steel grade and length per bar size		
					PC 52		
					8 [mm]	10 [mm]	12 [mm]
FIRST FLOOR SLAB	6	10	52	2.50		130	
	7	12	58	1.50			87
	8	10	58	1.50		87	
	9	8	58	1.20	69.6		
	10	8	32	0.45	14.4		
	11	10	32	1.90		60.8	
Total length per bar size [m]					84	277.8	87
Steel mass per metre [kg]					0.395	0.617	0.888
Total mass per bar size [kg]					33.18	171.40	77.256
TOTAL MASS [kg]					281.84		

- 10- CB02B - Reusable panel formwork with planks for: elevations, straight walls and diaphragms including supports at heights up to 20 m inclusive – UM: m²– Quantity: 216.92 (see R-03)

$$A = ((9.2-0.3+2.8+0.5+5.95+5.7-0.3+2.45+12.7-0.3+12.6-0.3+((2.8+0.4) \times 2+1.27+0.22+2.58+0.42) \times 2)+(2.6+0.4+1.07+0.42+2.58+0.42) \times 2+2 \times (4.8)+(5.07+0.44+1.98+0.44) \times 2+(2.8+0.4+1.57+0.44) \times 4) \times 1.45 = 216.92 \text{ m}^2$$

- 11- CA03B - Concrete pouring in foundations, plinths, retaining walls, walls below 0 level, pump casting – UM: m³– Quantity: 73.399 (see R-03)

$$V=0.3 \times (12.2+12.3+8.5+11.6+3+1.5+3+5.5 \times 3+3.2+4.7 \times 2+4.8 \times 2+3+3.4 \times 2) \times 1.45+0.45 \times (0.7 \times (12.6+14.45 \times 3+8.5+2.8 \times 3+2.6+1.27+1.07+2.58 \times 2+4.18+4.38+2.58))=73.399[\text{m}^3]$$

- 12- TSD06A1 - Compaction with the vibrating plate of the fillings in layers of 20-30 cm thickness, excluding the watering of each layer, the fillings being made of non-cohesive soil, compacted with the vibrating plate of 0.7 t – UM: 100m³– Quantity: 0.213 (see R-03)

$$V=((5.07+0.42) \times (2.8+0.4)+(2.6+0.4) \times (2.8 \times 0.4)+(1.07+0.44) \times (2.8 \times 0.4)+(2.58+0.42) \times (2.8+0.4)+(2.8+0.2) \times (1.57+0.42)+(1.27+0.22) \times (1.57+0.42)+(2.58+0.42) \times (1.57+0.42)+(2.8+0.4) \times (1.98+0.42)+(4.38+0.42) \times (4.28+0.42)+(2.58+0.42) \times (5.58)+(4.18+0.36) \times (3.05+0.38)) \times 0.2=0.213 [100\text{m}^3]$$

- 13 - RCSE40B% - Insulating layers of KRAFT paper – UM: m² - Quantity: 165.97 (see R03)

$$A = (15.5 * 12.6) - (3.55 * 5.95) - (3.35 * 2.45) = 165.97 \text{ m}^2$$

- 14 - IFB09A1 - Drainage layer of: sand, ballast, gravel, crushed stone, having a thickness after compaction of 2 cm– UM: m² – Quantity:167.09. (see R03, A8 Characteristic section S1)

$$A = ((3.5 + 3.3 + 1.8 + 3.3 + 0.3) * (3.5 + 2.3 + 2.7 + 2.3 + 1.2 + 2.5 + 0.3)) - ((5.95 + 0.15) * (3.55 + 0.15)) - ((3.35 + 0.15) * (3.35 + 0.15))$$

$$(2.45 + 0.15)) = 167.09$$

- 15 - IFZ42A01 - Thermal insulation with Austrotherm boards for floors and floors, in the console from B.A. – UM: m² – Quantity – 167.09 (see R03, A8 Characteristic section S1).

$$A = ((3.5 + 3.3 + 1.8 + 3.3 + 0.3) * (3.5 + 2.3 + 2.7 + 2.3 + 1.2 + 2.5 + 0.3)) - ((5.95 + 0.15) * (3.55 + 0.15)) - ((3.35 + 0.15) * (2.45 + 0.15)) = 167.09$$

- 16 - CB03E - Reusable panel formwork with planks for boards and beams excluding supports at heights up to 20 m inclusive – UM: m² – Quantity: 8.108 (see R03)

$$A = ((9.2 - 0.3) + 3.3 + 5.95 + (5.7 - 0.3) + 2.45 + 3.35 + (12.7 - 0.3) + (12.6 - 0.3)) * 0.15 = 8.108$$

- 17 - CC04C - Installation of welded nets at heights less than or equal to 35 m, on slabs – UM: Kg – Quantity: 877.61. (see R33).

- 18 - CA04B - Pouring concrete into slabs, beams, columns. Pump casting – UM: m³ – Quantity: 20.051 (see R33).

$$V = ((3.5 + 3.3 + 1.8 + 3.3 + 0.3) * (3.5 + 2.3 + 2.7 + 2.3 + 1.2 + 2.5 + 0.3)) - ((5.95 + 0.15) * (3.55 + 0.15)) - ((3.35 + 0.15) * (2.45 + 0.15)) * 0.12 = 20.051$$

- 19 - IZF47A01 - Thermal insulation with Austrotherm tiles for heated basements, foundation, general screed: brick masonry base – UM: m² – Quantity: 38.85 (see R03 and A8 Characteristic section S1).

$$A = (9.20 + 3.55 + 5.95 + 5.70 + 3.35 + 2.45 + 12.70 + 12.6) \cdot 0.7 = 38.85 [m^2]$$

- 20 - IZF47B01 - Thermal insulation with Austrotherm tiles for heated basements, foundation, general screed: wall in contact with the ground – UM: m² – Quantity: 41.625 (see R03 and A8 Characteristic section S1).

$$A = (15.15 - 0.40 + 12.60 - 0.40 + 15.15 - 0.40 + 12.60 - 0.40) \cdot$$

$$0.75 = 41.625[m^2]$$

21 - TSD06A1 - Compactarea cu placa vibratoare a umpluturilor in straturi de 20-30 cm grosime, exclusiv udarea fiecarui strat in parte, umpluturile executandu-se din pamant necoeziv, compactat cu placa vibratoare de 0.7 t – UM: $100m^3$ – Quantity: 0.416 (see R03 and A8 Characteristic section S1).

$$A = (15.15 - 0.40 + 12.60 - 0.40 + 15.15 - 0.40 + 12.60 - 0.40) \cdot 0.75 = 0.416[m^2]$$

22 - CA01B - Class C 10/8 concrete preparation on-site with concrete mixer – UM: m^3 – Cantitate: 0.494 (see A1 – Ground floor plan).

$$V = (9.20 + 3.55 + 5.95 + 5.70 + 3.35 + 2.45 + 12.70 + 12.6) \cdot 0.06 \cdot 0.15 = 0.494[m^3]$$

23 - CO03A - Kerbs laying down, brand M 100 -T 5 cm thick, on a concrete foundation class C 5/4 (B0 5 / B 75) of approx. 15 cm thick, with joints filled with mortar – UM: m^2 – Quantity: 3.33 (see A1 – Ground floor plan).

$$A = (9.20 + 3.55 + 5.95 + 5.70 + 3.35 + 2.45 + 12.70 + 12.6) \cdot 0.06 = 3.33[m^2]$$

24 - CO01B - Sidewalk made of simple concrete bays class C10 / 8 (Bc 10 / B 150) cast in site without crushing on a layer of pounded sand 10 cm thick with joints filled with sand, having the dimensions: 100x100x10 cm – UM: m – Quantity: 55.5 (see A1 – Groundfloor plan).

$$P = (9.20 + 3.55 + 5.95 + 5.70 + 3.35 + 2.45 + 12.70 + 12.6) = 55.5 [m]$$

25 - CH02A - Exterior steps made of plain concrete poured on-site with granite slabs - UM: m of step – Quantity: 17.9 (see A1 – Groundfloor plan).

$$L = 6 \cdot 1.1 + 3 + 3 + 2 \cdot 0.3 + 3 + 0.3 = 17.9 [m]$$

Mark	Welded fabric	Width [m]	Length [m]	Area [mp]	Mass/m ² [kg]	Mass/piece [kg]	No of pieces	Mass [kg]
1	7.1X100X100	0.90	4.80	4.32	6.22	26.87	1	26.87
2	7.1X100X100	0.9	3	2.70	6.22	16.79	1	16.79
3	7.1X100X100	2	4.7	9.40	6.22	58.47	3	175.40
4	7.1X100X100	1.6	4.7	7.52	6.22	46.77	1	46.77
5	7.1X100X100	1.4	4.7	6.58	6.22	40.93	1	40.93
6	7.1X100X100	1.5	2	3.00	6.22	18.66	1	18.66
7	7.1X100X100	2	3	6.00	6.22	37.32	4	149.28
8	7.1X100X100	1.5	3.2	4.80	6.22	29.86	1	29.86
9	7.1X100X100	1.8	3	5.40	6.22	33.59	2	67.18
10	7.1X100X100	0.95	1.5	1.43	6.22	8.86	0	0.00
11	7.1X100X100	0.95	3	2.85	6.22	17.73	0	0.00
12	7.1X100X100	1.45	3.9	5.66	6.22	35.17	1	35.17
13	7.1X100X100	1.4	4.8	6.72	6.22	41.80	2	83.60
14	7.1X100X100	1.8	3.2	5.76	6.22	35.83	3	107.48
15	7.1X100X100	2	3.2	6.40	6.22	39.81	2	79.62
								877.61

Materials, labour and plant for each article

CA01B			
RESOURCE NAME	U.M	QUANTITY	
		5,667	
Materials			
Cement	m ³	280	1586,76
Sieved sand unwashed 0-7 mm	m ³	0,78	4,42026
Sieved gravel 7-15 mm	m ³	-	
Sieved gravel 15-30 mm	m ³	-	
Sieved gravel 7-30 mm	m ³	0,71	4,02357
Water	m ³	0,19	1,07673
Labour			
Concrete worker	hour	1,2	6,8004
Equipment			
Concrete mixer 250	hour	0,4	2,2668

CONSTRUCTION COST ESTIMATE

CB02A			
RESOURCE NAME	U.M	QUANTITY	
		77,43	
Materials			
Formwork panel	m ²	0,1	7,743
Softwood planks	m ³	0,0035	0,271005
Softwood round wood	m ³	0,0005	0,038715
Release agent	kg	0,12	9,2916
Construction nails	kg	0,08	6,1944
Ordinary soft wire	kg	0,05	3,8715
Steel clamps for construction	kg	0,03	2,3229
Screws M 10X140 mm	piece	0,3	23,229
Nuts M 10	piece	0,3	23,229
Washers M 10	kg	0,005	0,38715
Labour			
Construction carpenter	hour	1,05	81,3015
Construction assembly worker	hour	0,15	11,6145
Total	hour	1,2	92,916

CA02A			
RESOURCE NAME	U.M	QUANTITY	
		5,667	
Materials			
Concrete class...	m ³	1,025	5,808675
Labour			
Concrete worker	hour	4,6	26,0682
Equipment			
Jigger	hour	0,4	2,2668

CZ0301G1			
RESOURCE NAME	U.M	QUANTITY	
		70,468	
Materials			
Reinforcement steel with smooth profile	m ³	1,01	71,17268
Labour			
Smith concrete worker	ore	0,04	2,81872

CC01B2			
RESOURCE NAME	U.M	QUANTITY	
		299,89	
Materials			
PC reinforcement steel	kg	1,015	304,3884
Soft steel wire 1 mm	kg	0,01	2,9989
Labour			
Smith concrete worker	hour	0,028	8,39692
Total	hour	0,028	8,39692
Equipment			
Electric winch	hour	0,006	1,79934
Concrete steel straightening machine	hour	0,0013	0,389857
Electric punch	hour	0,0017	0,509813
Automatic shaping machine	hour	0,0052	1,559428

CC01B3			
RESOURCE NAME	U.M	QUANTITY	
		3264,239	
Materials			
PC reinforcement steel	kg	1,015	3313,203
Soft steel wire 1 mm	kg	0,01	32,64239
Labour			
Smith concrete worker	hour	0,025	81,60598
Total	hour	0,025	81,60598
Equipment			
Electric winch	hour	0,006	19,58543
Concrete steel straightening machine	hour	0,0013	4,243511
Electric punch	hour	0,0017	5,549206
Automatic shaping machine	hour	0,0052	16,97404

CONSTRUCTION COST ESTIMATE

CC01B4			
RESOURCE NAME	U.M.	QUANTITY	
		B4	3368.037
Materials			
PC52 reinforcement steel	kg	1.015	3418.558
Soft steel wire 1 mm	kg	0.01	33.68037
Labour			
Smith concrete worker	hour	0.02	67.36074
TOTAL	hour	0.02	67.36074
Equipment			
Electric winch	hour	0.006	20.20822
Concrete steel straightening machine	hour	0.0013	4.378448
Electric punch	hour	0.0017	5.725663
Automatic shaping machine	hour	0.0052	17.51379
CC02C			
RESOURCE NAME	U.M.	QUANTITY	
		C	370.3575
Materials			
Spacers	kg	0.	55.553
Soft steel wire, black D=1.00mm	kg	0.	3.7035
Labour			
Smith concrete worker	hour	0.0	9.2589
Assembly construction worker	hour	0.0	1.8517
TOTAL	hour	0.	11.110
CC02D			
RESOURCE NAME	U.M.	QUANTITY	
		D	3368.037
Materials			
Spacers	buc	0.1	505.205
Soft steel wire, black D=1.00mm	kg	0.0	33.6803
Labour			
Smith concrete worker	hour	0.0	67.3607
Assembly construction worker	hour	0.00	13.4721
TOTAL	hour	0.02	80.8328

CB02B			
RESOURCE NAME	U.M.	QUANTITY	
		B	216.92
Materials			
Formwork panel with short plank decking	m²	0.1	21.692
Softwood planks..*)	m³	0.001	0.21692
Softwood lumbers..*)	m³	0.001	0.21692
Softwood round wood..*)	m³	0.0015	0.32538
Release agent	kg	0.12	26.0304
Metal straps for formwork for concrete pillars	kg	-	-
Construction nails..***)	kg	0.025	5.423
Ordinary soft wire D=2.5	kg	0.05	10.846
Steel clamps for wooden constructions	kg	0.03	6.5076
Usual square screws M10X140 mm	pieces	0.3	65.076
Usual square nuts M 10	pieces	0.3	65.076
Usual washers M 10	kg	0.005	1.0846
Labour			
Construction carpenter	hour	0.75	162.69
Assembly construction worker	hour	0.2	43.384
TOTAL	hour	0.95	206.074
Equipment			
Tower crane..****)	hour	0.02	4.3384
CA03B			
RESOURCE NAME	U.M.	QUANTITY	
		B	73.399
Materials			
Concrete class ...*)	m³	1.025	75.23398
Small materials (water, cement, lamber, nails, clamps)	%	2	146.798
Labour			
Concrete worker	hour	0.6	44.0394
Assembly construction worker	hour	0.05	3.66995
TOTAL	hour	0.65	47.70935
Equipment			
Jigger..**)	hour	0.2	14.6798
Concrete pump	hour	0.1	7.3399

CONSTRUCTION COST ESTIMATE

TSD06A1			
RESOURCE NAME	U.M.	QUANTITY	
		A1	0.213
Labour			
Unqualified worker	hour	4.4	0.9372
TOTAL	hour	4.4	0.9372
Equipment			
Vibrating plate weight = 1.6 tf, combustion engine int <10 HP	hour	-	-
Vibrating plate weight = 0.7 tf, combustion engine int <10 HP	hour	4.9	1.0437

RCSE40B%			
RESOURCE NAME	U.M.	QUANTITY	
		Per unit	Total
Materials			
Construction nails	kg	0.01	1.6597
Karft paper	m ²	1.17	194.1849
Small materials	%	2	331.94
Labour			
Water-repellent insulator	hour	0.25	41.4925
Service worker for construction assembly	hour	0.1	16.597
		Quantity	165.97

IFB809A1			
RESOURCE NAME	U.M.	QUANTITY	
		Per unit	Total
Materials			
Sived sand unwashed, 0.0-7.00 mm	m ³	0.05	8.3545
Labour			
Stonemason	hour	0.11	18.3799
		Quantity	167.09

IFZ42A01			
RESOURCE NAME	U.M.	QUANTITY	
		A01	Total
Materials			
Small materials	%	2	334.18
Expanded polystyrene for terraces, interior floors, and sloping roofs Austrotherm EPS A100 thickness = 50 mm, size = 100x500 mm	m²	1.01	168.7609
Sand layer, adhesive	Kg	8.5	1420.265
Labour			
Insulator for special works	hour	0.5	83.545
Service worker	hour	0.15	25.0635
		Quantity	167.09
CB03E			
RESOURCE NAME	U.M.	QUANTITY	
		Per unit	Total
Materials			
Formwork panel with 15 mm plywood	m²	0.13	1.05404
Softwood planks	m³	0.001	0.008108
Softwood round wood	m³	0	0
Softwood lumbers	m³	0.001	0.008108
Construction nails	kg	0.03	0.24324
Ordinary soft wire	kg	0	0
Release agent	kg	0.12	0.97296
Steel clamps for wooden constructions	kg	0.03	0.24324
Usual square screws M 10x140	pieces	0.3	2.4324
Usual square nuts M 10	pieces	0.3	2.4324
Usual washer M 10	kg	0.005	0.04054
Labour			
Construction carpenter	hour	0.85	6.8918
Assembly construction service worker	hour	0.15	1.2162
Equipment			
Tower crane	hour	0.02	0.16216
		Quantity	8.108

CONSTRUCTION COST ESTIMATE

CC04C			
RESOURCE NAME	U.M.	QUANTITY	
		Per unit	Total
Materials			
Welded nets	kg	1.01	886.3861
Reinforcement steel OB 37	kg	0.005	4.38805
Soft steel wire, black D=1.00mm	kg	0.1	87.761
Spacers	pieces	0.3	263.283
Labour			
Smith concrete worker	hour	0.04	35.1044
Assembly construction service worker	hour	0.005	4.38805
Equipment			
Tower	hour	0.0006	0.526566
		Quantity	877.61

Per unit			
RESOURCE NAME	U.M.	QUANTITY	
		Per unit	Total
Materials			
Concrete class C20/25	m³	1.025	20.55228
Small materials (water, cement, lumber, nails)	%	4	80.204
Labour			
Concrete worker	hour	0.9	18.0459
Assembly construction service worker	hour	0.1	2.0051
Equipment			
Jigger	hour	0.2	4.0102
Concrete pump	hour	0.15	3.00765
		Quantity	20.051

IZF47A01 - IZF47B01						
RESOURCE NAME	UM	QUANTITY				
		A01	B01	A01 (m²)	B01 (m²)	
Materials						
Bituminous insulation 111 B		0,5000	0,5000	38,8500	41,6250	
1K bituminous insulation (polystyrene bonding)		0,8000	0,8000			
Small materials	%	1,0000	1,0000			
Adhesive mortar			2,0000			
Extruded polystyrene board for insulating Austrotherm XPS TOP P GK / SF basements and plinths thickness = 50 mm size = 1250x600mm		1,0100	1,0100			
Fiberglass mesh			1,1000			
Exterior decorative plaster (shock resistant)			5,5000			
Labour						
Insulator for special works		0,7000	1,0000			
Service worker		0,2000	0,3000			
Total labour		0,9000	1,3000			
Total price		43,5300	101,0200			

CONSTRUCTION COST ESTIMATE

TSD06A1				
CODE	RESOURCE NAME	U.M.	QUANTITY	
			A1	A1 (100m³)
Labour				0,416
9310060019900	Unqualified worker	hour	4,4	
TOTAL		hour	4,4000	
Equipment				
2952270004020	Vibrating plate weight = 1.6 tf, combustion engine int <10 HP	hour	-	
2952270004019	Vibrating plate weight = 0.7 tf, combustion engine int <10 HP	hour	4,9000	

CA01B			
RESOURCE NAME	UM	QUANTITY	
		B	B (m³)
Materials			
Cement ...*)		280	0,4940
Sieved sand unwashed 0-7 mm		0,78	
Sieved gravel 7-15 mm		-	
Sieved gravel 15-30 mm		-	
Sieved gravel 7-30 mm		0,71	
Water		0,19	
Labour			
Concrete worker		1,2	
TOTAL		1,2	
Equipment			
Concrete mixer 250		0,4	

CO03A				
RESOURCE NAME	UM	QUANTITY		
		A	A (m²)	
Materials				
Sidewalks ...*)	m	1,005		3,330
Cement II B 32.5 (M 30) saci		13,375		
Sieved gravel 7-30 mm		0,031		
Sieved gravel 0-7 mm		0,052		
Water		0,013		
Labour				
Paver		0,62		
Assembly construction service worker		0,08		
TOTAL		0,70		
Equipment				
Concrete mixer with free fall 250 l		0,04		
Mortar mixer ...**)		0,02		
CO01B				
RESOURCE NAME	UM	QUANTITY		
		B	B (m)	
Materials				
Cement II B 32.5 (M 30) saci		30,25		55,500
Sieved sand unwashed 0-3 mm		0,107		
Sived sand unwashed 0-7 mm		0,072		
Sieved gravel, washed 7-30 mm		0,066		
Softwood boards ...*)		0,0045		
Reinforcement steel OB 37 D = 6mm		3,2		
Soft, black steel wire D=1.00 mm		0,035		
Water		0,002		
Labour				
Concrete worker		0,93		
Assembly construction service worker		0,25		
TOTAL		1,18		
Equipment				
Concrete mixer with free fall 250 l		0,06		

CONSTRUCTION COST ESTIMATE

CH02A						
RESOURCE NAME	UM	QUANTITY				
		B	B (m)			
Materials						
Granite steps thickness = 4 cm ...**)	m	1,03	17,9			
Granite counter steps thickness =4 cm ...**)	m	1,03				
Cement II B 32.5 (M 30) saci	kg	11,45				
Sieved gravel washed 7-15 mm	mc	0,016				
Sieved sand unwashed 0-3 mm	mc	0,019				
Sieved river sand unwashed 0-7 mm	mc	0,02				
Water	mc	0,015				
Softwood boards ...*)	mc	0,001				
Polishing stone	kg	0,215				
Dry polishing paper 23x30 gr6	buc	0,24				
Citom	kg	0,24				
Construction plaster	kg	0,48				
Glue D 50	kg	0,11				
White cement PA 35	kg	0,025				
Parchetin	kg	0,025				
Technical oxalic acid 1 st quality	kg	0,01				
Labour						
Concrete worker	ore	5,1				
Inlay	ore	0,2				
Assembly construction service worker						
TOTAL	ore	5,8				

				Materials																						
NO	Article and code description	Work item	UM	Quantity	Cement	Sorted sand unwashed 0-7 mm	Sieved gravel 7-30 mm	Water	Concrete	Formwork panel	Softwood planks	Softwood round wood	Screws M10 X 140 mm	Nuts M10	Release agent	Construction nails	Ordinary soft wire	Steel clamps for construction	Washers M10	Smooth concrete profile steel	Soft steel wire 1mm	Reinforcing steel PC	Work price			
1	CA01B	Preparation of concrete class C 10/8	mc/kg	5,996	280	0,78	0,71	0,19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1596,8332		
					1586,76	4,6768	4,2571	1,1392	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2	CA02A	Simple concrete pouring in equalizations	mc	5,996	-	-	-	-	1,025	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,1459		
					-	-	-	-	6,1459	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
3	CB02A	Reusable panel formwork	mp	79,911	-	-	-	-	-	0,1	-	-	-	-	-	-	-	-	-	-	-	-	-	7,9911		
					-	-	-	-	-	-	7,9911	-	-	-	-	-	-	-	-	-	-	-	-	-		
			mc		-	-	-	-	-	-	-	0,0035	0,0005	-	-	-	-	-	-	-	-	-	-	-	-	0,31964
					-	-	-	-	-	-	-	-	0,2796	0,0399	-	-	-	-	-	-	-	-	-	-	-	-
			bc		-	-	-	-	-	-	-	-	-	-	-	0,3	0,3	0,12	0,08	0,05	0,03	0,005	-	-	-	66,7256
			-		-	-	-	-	-	-	-	-	-	-	-	23,9733	23,9733	9,5893	6,3928	3,9955	2,3973	0,3995	-	-	-	
			kg		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3,99555
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,01	-	-	71,1726			
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	71,1726	-	-				
5	CC01B2	Shaping the reinforcing steel bars:D=8	kg	299,89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	1,015	307,3872		
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2,9989	304,3883				
6	CC01B3	Shaping the reinforcing steel bars:D=10	kg	3264,239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0,01	1,015	3345,8449		
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32,6423	3313,2025			
Total					1586,76	4,67688	4,2571	1,1392	6,1459	7,9911	0,2796	0,03995	23,9733	23,9733	9,5893	6,3928	3,99555	2,39733	0,3995	71,1726	35,6413	3617,5909	5406,4160			
Materials price					0,539	46	21,69	2,16	250	45	665	230	0,1	0,02	20,55	5,09	5	4,71	0,45	3,06	5,37	3,13	1307,869			
Total price on materials					855,2636	215,1364	92,3378	2,4607	1536,475	359,5995	185,9928	9,1897	2,39733	0,4794	197,0605	32,5397	19,9777	11,2914	0,1797	217,7884	191,3937	11323,0596	15252,6236			

CONSTRUCTION COST ESTIMATE

NO	Article and code description	Work item	U M	Quantity	Type of worker				Total price
					Concrete worker	Construction carpenter	Construction assembly worker	Smith concrete worker	
1	CA01B	Preparation of concrete class C 10/8	ore	5,996	1,2 7,1952	- -	- -	- -	7,1952
2	CA02A	Simple concrete pouring in equalizations	ore	5,996	4,6 27,5816	- -	- -	- -	27,5816
3	CB02A	Reusable panel formwork	ore	79,911	- -	1,05 83,9065	0,15 11,9866	- -	95,8932
4	CZ0301G1	Manufacture of steel reinforcements	ore	70,468	- -	- -	- -	0,04 2,81872	2,8187
5	CC01B2	Shaping the reinforcing steel bars :D=8	ore	299,89	- -	- -	- -	0,028 8,3969	8,3969
6	CC01B3	Shaping the reinforcing steel bars :D=10	ore	3264,239	- -	- -	- -	0,025 81,6059	81,6059
Total					34,7768	83,9065	11,9866	92,8216	223,4916
Price					14,88	16,25	18,06	18,45	67,64
Total price per worker					517,4787	1363,4814	216,4788	1712,5587	3809,9979

NO	Article and code description	Work item	UM	Quantity	Tip utilaj						Work price
					concrete mixer 250	Jigger	Electric winch	Steel straightening machine	Electric punch	Automatic shaping machine	
1	CA01B	Preparation of concrete class C 10/8	ore	5,996	0,4 2,3984	- -	- -	- -	- -	- -	2,3984
2	CA02A	Simple concrete pouring in equalizations	ore	5,996	- -	0,4 2,3984	- -	- -	- -	- -	2,3984
3	CB02A	Reusable panel formwork	ore	79,911	- -	- -	- -	- -	- -	- -	-
4	CZ0301G1	Manufacture of steel reinforcements	ore	70,468	- -	- -	- -	- -	- -	- -	-
5	CC01B2	Shaping the reinforcing steel bars :D=8	ore	299,89	- -	- -	0,006 1,7993	0,0013 0,3898	0,0017 0,5098	0,0052 1,5594	1,5594
6	CC01B3	Shaping the reinforcing steel bars :D=10	ore	3264,239	- -	- -	0,006 19,5854	0,0013 4,2435107	0,0017 5,5492	0,0052 16,9740	16,9740
Total					2,3984	2,3984	21,3847	4,6333	6,0590	18,5334	50,6106
Price					12,5	3,62	34	7,4	7,4	7,4	72,32
Total price					29,98	8,6822	727,0823	34,2869	44,8367	137,1476	982,0158

No.	Article and code description	Work item	U.M.	Quantity	Materials															Total	
					Reinforcing steel PC52	Soft steel wire 1mm	Spacers	Formwork panel	Softwood planks	Softwood lumber (Dulap rasinoase)	Softwood round wood	Release agent	Construction nails	Ordinary soft wire D=2.5	Steel clamps for construction	Usual screws	Usual nuts	Usual washer	Concrete		Small materials
7	CC01B4	PC concrete steel bar shaping	Kg	3368.037	1.015 3418.5575	0.01 33.6804															10880.95
8	CC02C	Installation of reinforcements in continuous and slab foundations	Kg	216.92		0.01 2.1692	0.15 32.538														16.2039
9	CC02D	Installation of reinforcements in continuous and slab foundations	Kg	3368.037		0.01 33.6804	0.15 505.2055														251.5924
10	CB02B	Reusable panel formwork with planking	m²	216.92			0.1 21.692	0.001 0.2169	0.001 0.2169	0.0015 0.3254	0.12 26.0304	0.025 5.423	0.05 10.846	0.03 6.5076	0.3 65.076	0.3 65.076	0.005 1.0846				3594.937
11	CA03B	Concrete pouring in foundations	m³	73.399														1.025 75.2339	2 146.798		18811.43
12	TSD06A1	Compaction with the vibrating plate	100 m³	0.213																	33555.11
Total materials					3418.5575	69.5299	537.7435	21.692	0.2169	0.2169	0.3254	26.0304	5.423	10.846	6.5076	65.076	65.076	1.0846	75.2339	146.798	4450.358
Material					Reinforcing steel PC52	Soft steel wire 1mm	Spacers	Formwork panel	Softwood planks	Softwood lumber (Dulap rasinoase)	Softwood round wood	Release agent	Construction nails	Ordinary soft wire D=2.5	Steel clamps for construction	Usual screws	Usual nuts	Usual washer	Concrete	Small materials	
Price					3.13	5.37	0.14	95	1929.45	1772.89	230	20.55	5.09	5.05	4.71	0.1	0.02	0.45	250	0.02	Total
Total price per materials					10700.0851	373.3757	75.2841	2060.74	418.5363	384.5753	74.8374	534.9247	27.6031	54.7723	30.6508	6.5076	1.3015	0.4881	18808.49	2.9359	33555.11

No.	Article and code description	Work item	U.M.	Quantity	Labour						
					Smith concrete worker	Smith worker	Construction assembly worker	Construction carpenter	Concrete worker	Unqualified worker	
7	CC01B4	PC concrete steel bar shaping	Kg	3368.037	0.02						
					67.3607						
8	CC02C	Installation of reinforcements in continuous and slab foundations	Kg	216.92		0.025	0.005				
						5.423	1.0846				
9	CC02D	Installation of reinforcements in continuous and slab foundations	Kg	3368.037		0.02	0.004				
						67.3607	13.472				
10	CB02B	Reusable panel formwork with planking	m²	216.92			0.2	0.75			
							43.384	162.69			
11	CA03B	Concrete pouring in foundations	m³	73.399			0.05		0.6		
							3.6699		44.0394		
12	TSD06A1	Compaction with the vibrating plate	100m³	0.213						4.4	
										0.9372	
Total labour					67.3607	72.7837	61.6107	162.69	44.0394	0.9372	
Labour					Smith concrete worker	Smith worker	Construction assembly worker	Construction carpenter	Concrete worker	Unqualified worker	
Price					18.45	18.45	18.06	16.25	14.88	8.87	Total
Total price oer labour					1242.8056	1342.8600	1112.6892	2643.7125	655.3062	8.3129	7005.6865

No	Article and code description	Work item	U.M.	Quantity	Equipment								
					Electric winch	Electric punch	Steel straightening machine	Automatic shaping machine	Tower crane	Jugger	Concrete pump	Vibrating plate weight = 0.7tf, combustion engine int <10 HP	
7	CC01B4	PC concrete steel bar shaping	Kg	3368.037	0.006	0.0013	0.0017	0.0052					
					20.2082	4.3784	5.7256	17.5137					
8	CC02C	Installation of reinforcements in continuous and slab foundations	Kg	216.92									
9	CC02D	Installation of reinforcements in continuous and slab foundations	Kg	3368.037									
10	CB02B	Reusable panel formwork with planking	m²	216.92					0.02				
									4.3384				
11	CA03B	Concrete pouring in foundations	m³	73.399						0.2	0.1		
										14.6798	7.3399		
12	TSD06A1	Compaction with the vibrating plate	100m³	0.213								4.9	
												1.0437	
Total equipments					20.2082	4.3784	5.7256	17.5138	4.3384	14.6798	7.3399	1.0437	
Equipments					Electric winch	Electric punch	Steel straightening machine	Automatic shaping machine	Tower crane	Jugger	Concrete pump	Vibrating plate weight = 0.7tf, combustion engine int <10 HP	
Price					34	7.4	7.4	7.4	73.87	5	328.69	39.02	Total
Total price per equipment					687.0795	32.4005	42.3699	129.6020	320.4776	73.399	2412.5517	40.7251	3738.6055

No	Article code	Work	UM	Quantity	Materials																		Work price	
					Construction nails	Kraft paper	Small material	River sand	Expanded polystyrene for terraces	Sand blanket, adhesive	Formwork panel with 15 mm plywood	Softwood planks	Softwood lumber	Release agent	Steel clamps for wooden constructions	Usual square screws M10x 140	Usual square nuts M10	Usual saiba M10	Welded nets	OB 37 Reinforc ement steel	Soft steel wire, black D=1.00mm	Spacers		Concrete class C20/25
13	RCSE40B%	Slab insulation over the foundation	m²	165.97	0.01	1.17	2																527.7846	
					1.6597	194.1849	331.94																	
14	IFB809A1	Strat drenant din nisip	m²	167.09				0.05															8.3545	
								8.3545																
15	IFZ42A01	Termoizolatii la placi si plansee	m²	167.09			2		1.01	8.5													1923.2059	
							334.18		168.7609	1420.265														
16	CB03E	Cofraje pentru placi	m²	8.108	0.03						0.13	0.01	0.01	0.12	0.03	0.3	0.3	0.005					7.58098	
					0.24324						1.0540	0.0811	0.0811	0.9729	0.2432	2.4324	2.4324	0.0405						
17	CC04C	Montare plase sudate la placi	Kg	877.61															1.01	0.005	0.1	0.3	1241.8182	
																		886.3861	4.3880	87.761	263.283			
18	CA04B	Turnare beton cu pompa in placi	m³	38.85			4															1.025	195.2212	
							155.4															39.8212		
Total					1.90294	194.1849	821.52	8.3545	168.7609	1420.265	1.0540	0.0811	0.0810	0.9729	0.2432	2.4324	2.4324	0.0405	886.3861	4.38805	87.761	263.283	39.82125	
Price per unit of material					5.09	1.38	0.02	8.4	11.14	1.11	46.4	1929.45	1772.89	20.55	4.71	0.1	0.02	0.45	16.5	3.25	5.37	0.2	345	
Total price per material					9.6859	267.9752	16.4304	70.1778	1879.9964	1576.4942	48.9074	156.4398	143.7459	19.9943	1.14566	0.2432	0.0486	0.0182	14625.37	14.2612	471.2765	52.6566	13738.33	
Total price					33093.19944																			

No	Article code	Work	UM	Quantity	Equipment			
					Tower crane	Crane	Jigger	Concrete pump
1	RCSE40B %	Insulation of slab over the foundation	hour	165.97				
2	IFB809A1	Drainage layer of sand	hour	167.09				
3	IFZ42A01	Thermoinsulations in slabs and floors	hour	167.09				
4	CB03E	Slabs formwork	hour	8.108	0.2 1.6216			
5	CC04C	Welded nets assembling in slabs	hour	877.61		0.0006 0.526566		
6	CA04B	Concrete pouring in slabs with pump	hour	38.85			0.2 7.77	0.15 5.8275
Total hours					1.6216	0.526566	7.77	5.8275
Price per unit of hour					73.87	5.03	7.97	328.69
Total price per hour					119.7876	2.648627	61.9269	1915.4410
Total price					2099.8041			

No	Article code	Work	UM	Quantity	Labour							
					Water-repellent insulator	Service worker for construction assembly	Stonemason	Insulator for special works	Carpenter Construction	Smith concrete worker	Concrete worker	
13	RCSE40B %	Insulation of slab over the foundation	hour	165.97	0.25 41.4925	0.1 16.597						
14	IFB809A1	Drainage layer of sand	hour	167.09			0.11 18.3799					
15	IFZ42A01	Thermoinsulations in slabs and floors	hour	167.09		0.11 18.3799		0.5 83.545				
16	CB03E	Slabs formwork	hour	8.108		0.15 1.2162			0.85 6.8918			
17	CC04C	Welded nets assembling in slabs	hour	877.61		0.005 4.38805				0.04 35.1044		
18	CA04B	Concrete pouring in slabs with pump	hour	38.85		0.1 3.885					0.9 34.965	
Total hours					41.4925	44.46615	18.3799	83.545	6.8918	35.1044	34.965	
Price per unit of hour					21.5	18.06	21.45	21.34	16.25	18.45	14.88	
Total price per hour					892.08875	803.058669	394.2489	1782.8503	111.99175	647.6762	520.2792	
Total price					5152.193704							

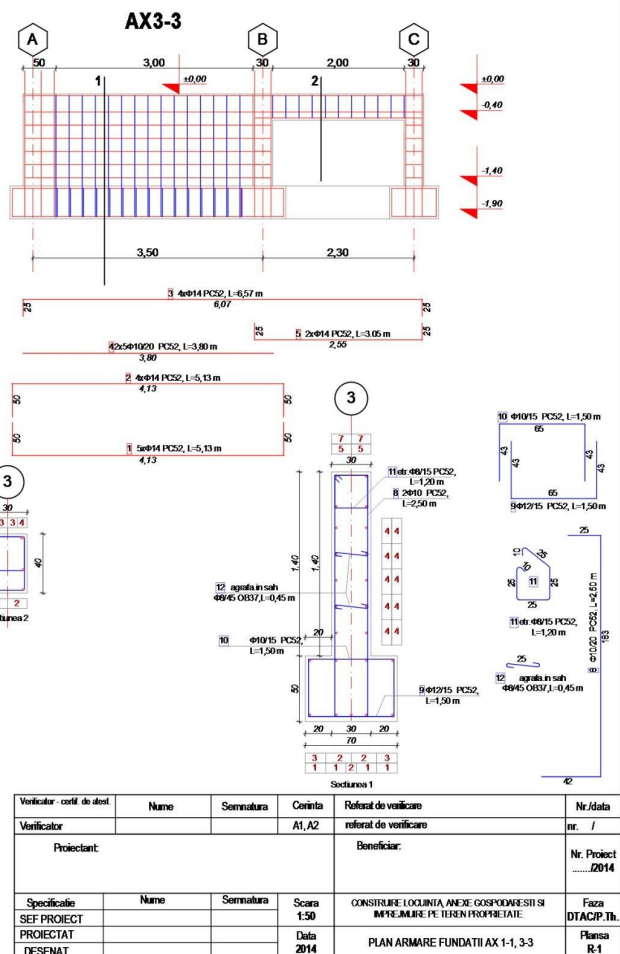
No	Article work	Work	UM	Quantity	Materials																														Price per work		
					Bituminous insulation 111 B	1K bituminous (polyethylene bonding)	Small material	Adhesive mortar	Extruded polystyrene plate 7-30	Fiberglass mesh	Plaster (shock resistant)	Cement	Sieved sand unwashed 0-7 mm	Sieved gravel 7-15 mm	Sieved gravel 15-30 mm	Sieved gravel 7-30 mm	Water	Sidewalks	Cement II 532.5 (M 30) bags	Sieved gravel 7-7 mm	Sieved sand 0-3 mm	Softwood planks	Reinforced steel Ø87 D=6mm	Soft, black steel wire Ø1.00 mm	Granite steps thickness 4 cm	Granit countersteps gros 4-cm	Polish stone	Dry paper for polishing 23x30 gr6	Citom	Construction plaster	Glue D 50	White cement PA 35	Parchetin	Technical oxalic acid			
19	IZF47A00	Thermoinsulations	m ²	38.85	0.5000	0.8000	1.0000	0	1.0100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1323.047		
					19.425	31.08	38.85	0	39.2385	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
20	IZF47B01	Thermoinsulations	m ²	41.625	0.5000	0.8000	1.0000	2.0000	1.0100	1.1000	5.5000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3715.694	
					20.8125	33.3	41.625	83.25	42.04125	45.7875	228.9375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
22	CA01B	Concrete preparation	m ³	0.416	0	0	0	0	0	0	0	280	0.78	0	0	0	0.19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98.2188	
					0	0	0	0	0	0	0	116.48	0.32448	0	0	0	0.0790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
23	CO03A	Sidewalks	m ²	3.33	0	0	0	0	0	0	0	0	0	0	0	0.031	0.013	1.005	13.375	0.052	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50.2102	
					0	0	0	0	0	0	0	0	0	0	0	0.10323	0.0433	3.3466	44.53875	0.1732	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
24	CO01B	Simple concrete pavement class C10/8	m	55.5	0	0	0	0	0	0	0	0	0.072	0.066	0	0.002	0	30.25	0.107	0.0045	3.2	0.035	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2750.892
					0	0	0	0	0	0	0	3.996	3.663	0	0.111	0	1678.875	0.59385	0.24975	177.6	1.9425	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
25	CH02A	Simple concrete exterior steps	m of step	17.9	0	0	0	0	0	0	0	0.02	0.016	0	0	0.015	0	11.45	0.019	0.001	0	0	1.03	1.03	0.215	0.24	0.24	0.48	0.11	0.025	0.025	0.01	0.01	0.01	0	710.4807	
					0	0	0	0	0	0	0	0.358	0.2864	0	0	0.2685	0	204.995	0.3401	0.0179	0	0	0	18.437	18.437	3.8485	4.296	4.296	8.592	1.969	0.4475	0.4475	0.179	0.179	0		
Total quantity					40.2375	64.38	80.475	83.25	61.27975	45.7875	228.9375	116.48	4.67848	0.2864	3.663	0.10323	0.5018	3.3466	1928.3687	0.1732	6.2786	0.2676	177.6	1.9425	18.437	18.437	3.8485	4.296	4.296	8.592	1.969	0.4475	0.4475	0.179	0.179		
Price per unit					8.56	9.5	0.02	0.9	20.3	3.32	8.56	0.539	59.35	48.33	44.18	23.5	2.16	6.32	0.45	38.66	66.21	1929.45	3.25	5.37	12.97	5.83	6.57	2.51	15	0.69	10.33	1.21	15.69	39			
Price per materials					344.433	611.611	1.6096	74.925	1649.9789	152.0145	1999.705	62.7827	277.6677	13.8417	161.8313	2.4259	1.0839	21.1508	867.7699	6.6943	415.7061	516.4173	577.2	10.4312	239.1278	107.4877	25.2846	10.7829	64.44	5.92848	20.3397	0.5415	7.0213	6.981			
Total price					8217.210302																																

CONSTRUCTION COST ESTIMATE

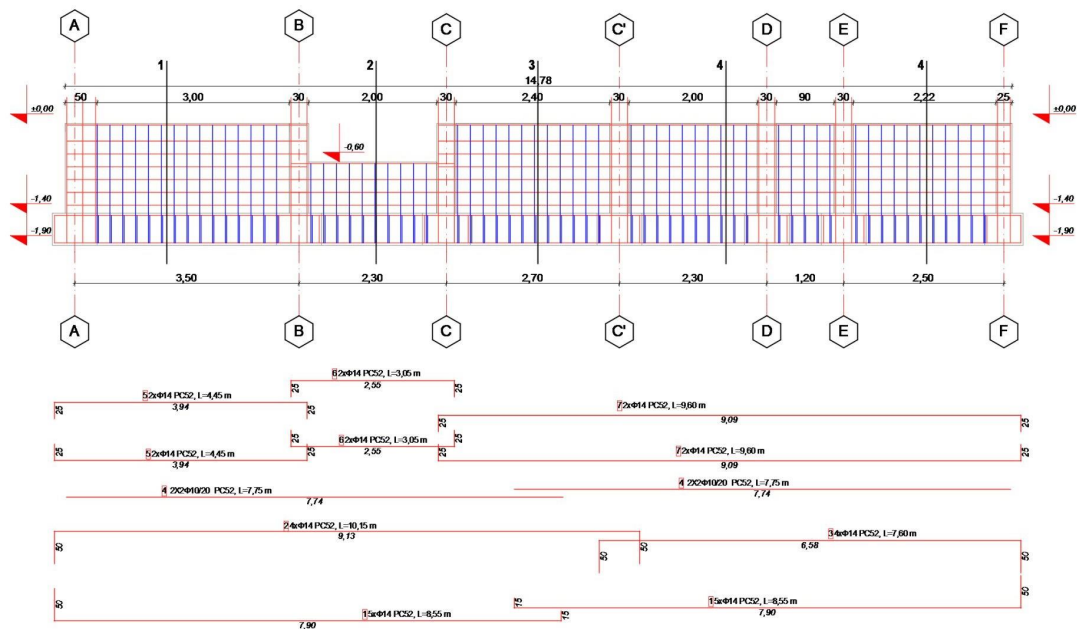
No	Article code	Work	UM	Quantity	Labour							Price per work
					Insulator for special works	Service worker	Unqualified worker	Concrete worker	Paver	Assembly construction service worker	Inlay	
19	IZF47A00	Thermoinsulations	m ²	38,85	0,7000	0,2000	0	0	0	0	0	
					27,1950	7,7700	0,0000	0,0000	0,0000	0,0000	0,0000	
20	IZF47B01	Thermoinsulations	m ²	41,625	1,0000	0,3000	0	0	0	0	0	1113,8017
					41,625	12,4875	0	0	0	0	0	
21	TSD06A1	Compaction with the vibrating plate of the fillings	100m ³	0,416	0	0	4,4	0	0	0	0	16,2356
					0	0	1,8304	0	0	0	0	
22	CA01B	Preparation of concrete class C10/8	m ³	0,416	0	0	0	1,2	0	0	0	7,4281
					0	0	0	0,4992	0	0	0	
23	CO03A	Sidewalks	m ²	3,33	0	0	0	0	0,62	0,08	0	46,1032
					0	0	0	0	2,0646	0,2664	0	
24	CO01B	Simple concrete pavement class C10 / 8	m	55,5	0	0	0	0,93	0,00	0,25	0	1018,6137
					0	0	0	51,615	0	13,875	0	
25	CH02A	Simple concrete exterior steps	m of step	17,9	0	0	0	5,1	0	0	0,2	1450,9382
					0	0	0	91,29	0	0	3,58	
Total quantity					68,8200	20,2575	1,8304	143,4042	2,0646	14,1414	3,5800	
Price per unit					21,3400	18,0600	8,8700	14,8800	20,0000	18,0600	25,8500	
Labour price					1468,6188	365,8504	16,2356	2133,8544	41,292	255,3936	92,543	
Total price												

No	Article code	Work	UM	Quantity	Equipment					Price per work
					Vibrating plate weight = 1,6 tf, combustion engine <10 HP	Vibrating plate weight = 0.7 tf, combustion engine int <10 HP	Concrete mixer 250	Concrete mixer with free fall 250 l	Mortar mixer	
21	TSD06A1	Compaction with the vibrating plate	100m ³	0,416	0	4,9000	0	0	0	79,90528
					0	2,0384	0	0	0	
22	CA01B	Preparation of concrete class C10/8C 10/8	m ³	0,416	0	0	0,4	0	0	1,7056
					0	0	0,1664	0	0	
23	CO03A	SidewalksSidewalks	m ²	3,33	0	0	0	0,04	0,02	3,278718
					0	0	0	0,1332	0,0666	
24	CO01B	Simple concrete pavementclass C10/8	m	55,5	0	0	0	0,06	0	34,1325
					0	0	0	3,33	0	
25	CH02A	Simple concrete exterior steps	m of step	17,9	0	0	0	0	0	0
					0	0	0	0	0	
Total quantity					0	2,0384	0,1664	3,4632	0,0666	
Price per unit					39,02	39,2	10,25	10,25	28,73	
Equipment price					0	79,90528	1,7056	35,4978	1,913418	
Total price					119,022098					

		MATERIAL	LABOR	EQUIPMENT	TOTAL
CAP. A DIRECT EXPENSES		90118.143	20341.667	6939.448	117399.258
CAP. B OTHER DIRECT EXPENSES	Estimated Rates		0		
	C.A.S. 15.8%		3230.9		17082.45
	Unemployment 0.5%		102.24		540.58
	Health 5.20%		1063.33		5622.07
	Risk Found 0.27%		55.21		291.92
TOTAL DIRECT EXPENSES CAP. A + CAP. B		76719.7024	24793.347	20364.6254	140936.278
CAP. C	INDIRECT EXPENSES 10%xT				13165.38
TOTAL DIRECT EXPENSES CAP. A + CAP. B + CAP. C		154101.658			
Profit 5%		7240.96			
TOTAL PRICE VAT not included		161342.618			
VAT 19%		28891.43			
TOTAL PRICE VAT included		190234.048			

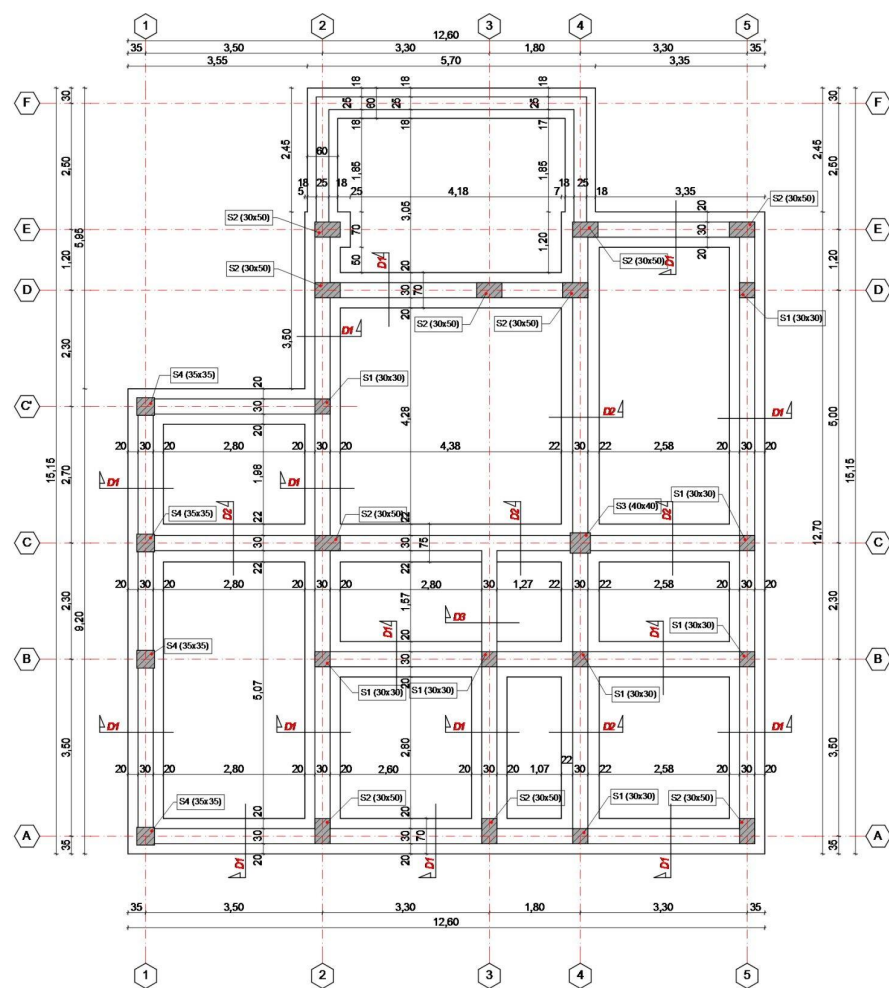


AX2-2

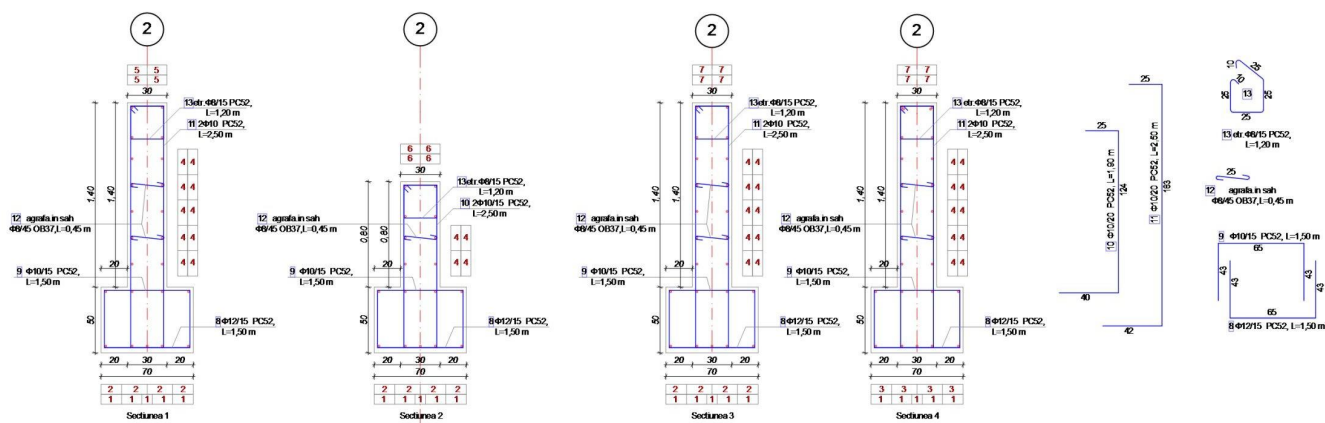


MATERIALE:
 - Otel: OB37 - elemente beton armat
 PC 52 - elemente beton armat
 - Beton:
 C8/10 - beton egalizare
 C16/20 - elemente infrastructura
 CLASA DE IMPORTANTA III
 Categoria de importanta D-reduca

Verificator - cont. de alcat	Nume	Semnatura	Conținut	Referat de verificare	Nr. data
Verificator			A1, A2	referat de verificare	nr. /
Proiectant:			Beneficiar:		Nr. Proiect/2014
Specificatie	Nume	Semnatura	Scara	CONSTRUIRE LOCUINTA ANEXE GOSPODARESTI SI	
SEF PROIECT			1:50	IMPREJURARE PE TEREN PROPRIETATE	
PROIECTAT			Data	PLAN ARMARE FUNDATII AX 2.2	
DESENAT			2014	Faza DTACIP.1h.	
				Planşa R.2	

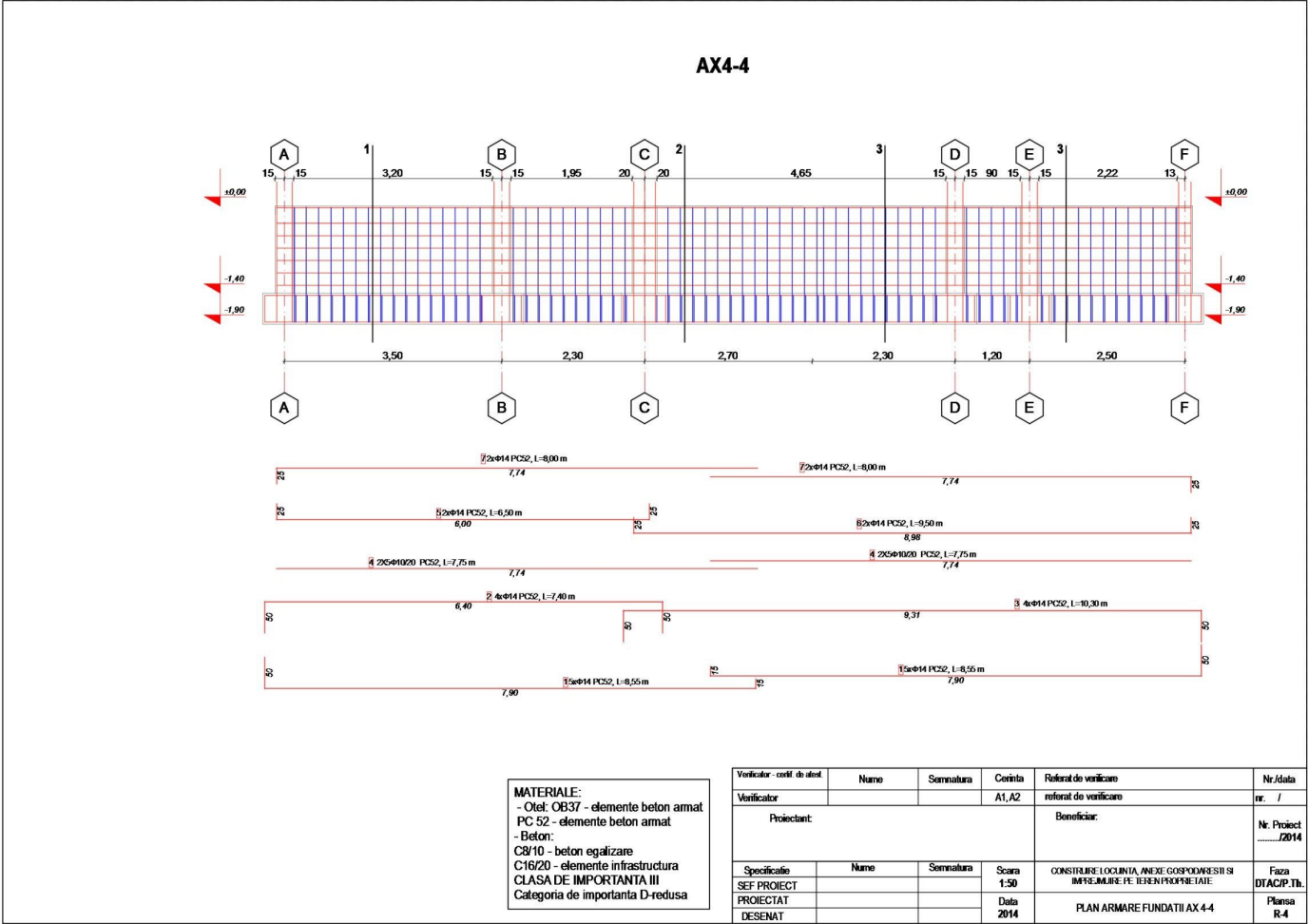


Secțiuni FUNDATII AX2-2

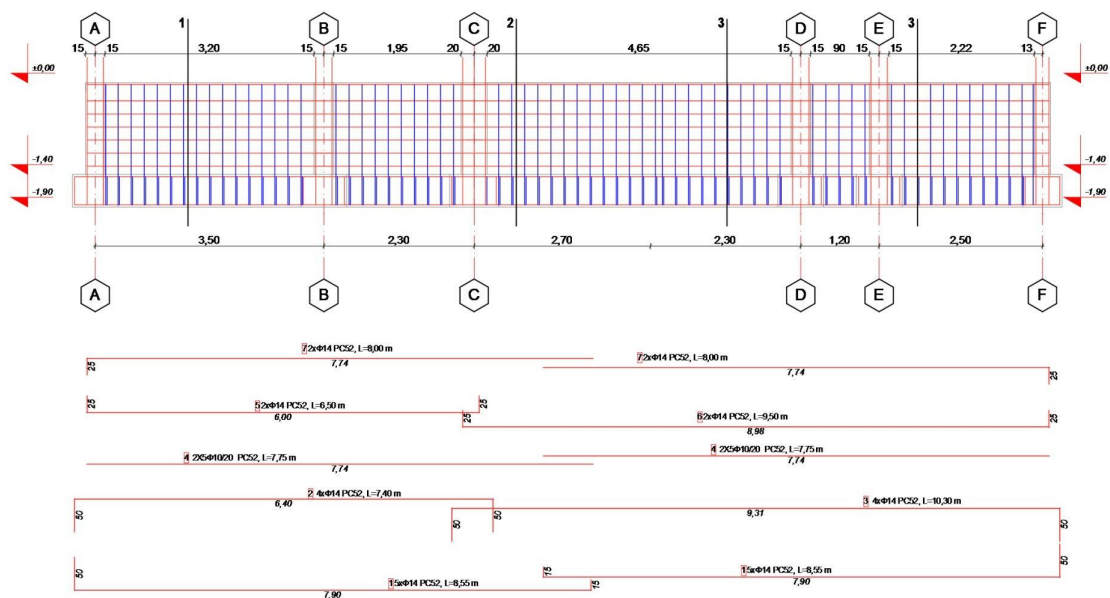


MATERIALE:
 - Otel: OB37 - elemente beton armat
 PC 52 - elemente beton armat
 - Beton:
 C8/10 - beton egalizare
 C16/20 - elemente infrastructura
 CLASA DE IMPORTANTA III
 Categoria de importanta D-reduca

Verificator: costul de alcat	Nume	Semnatura	Corinta	Referat de verificare	Nr./data
Verificator			A1, A2	referat de verificare	nr. /
Proiectant:			Beneficiar:		
			Nr. Proiect		
			/2014		
Specificatie	Nume	Semnatura	Scara	CONSTRUIRE LOCUINTA ANEXE GOSPODARESI SI	Faza
SEF PROIECT			1:50	INFRASTRUCTURA PE TEREN PROPRIETATE	DTACIP.11.
PROIECTAT			Data	SECTIUNI FUNDATII AX 2-2	Planşa
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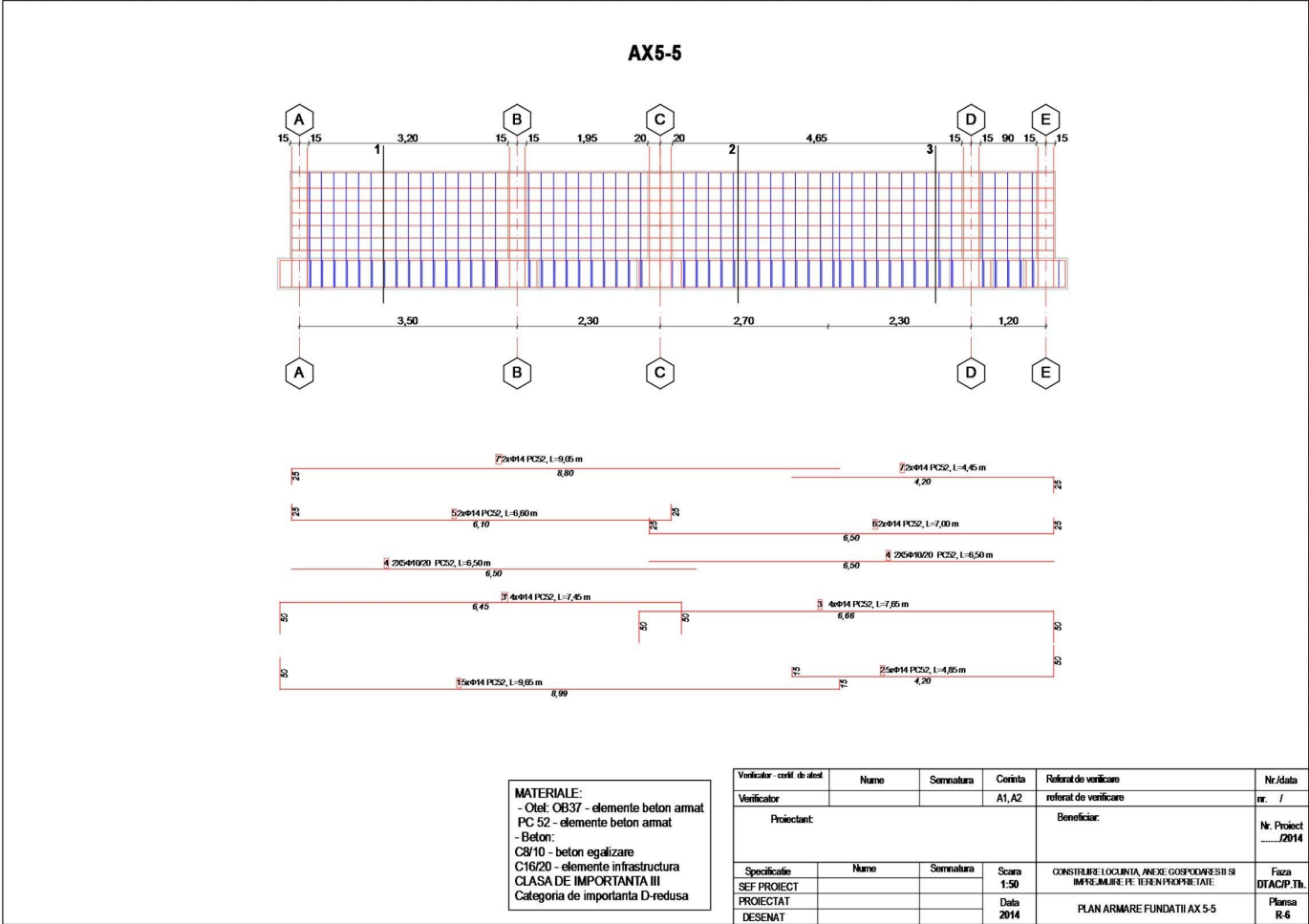


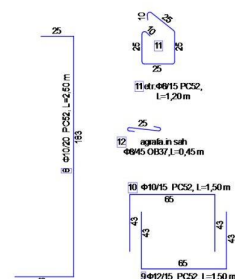
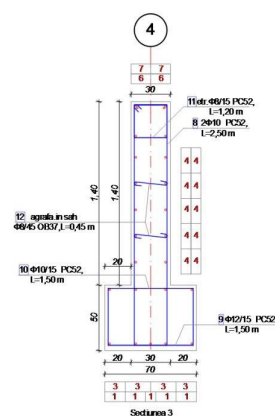
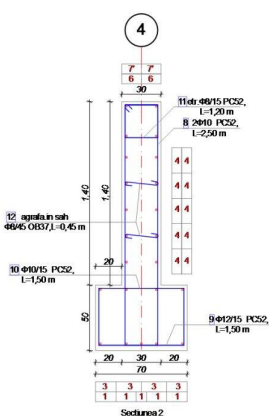
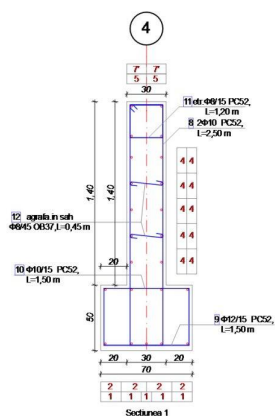
AX4-4



MATERIALE:
 - Otel: OB37 - elemente beton armat
 PC 52 - elemente beton armat
 - Beton:
 C8/10 - beton egalizare
 C16/20 - elemente infrastructura
 CLASA DE IMPORTANTA III
 Categoria de importanta D-reduca

Verificator - contul de alcat	Nume	Semnatura	Cerinta	Referat de verificare	Nr./data
Verificator			A1, A2	referat de verificare	nr. /
Proiectant:				Beneficiar:	Nr. Proiect /2014
Specificatie	Nume	Semnatura	Scara 1:50	CONSTRUIRE LOCUINTA, ANEXE GOSPODIARE SI IMPREJURARE PE TEREN PROPRIETATE	Faza DTACIP.Th.
SEF PROIECT					
PROIECTAT			Data 2014		
DESENAT					Planşa R-4

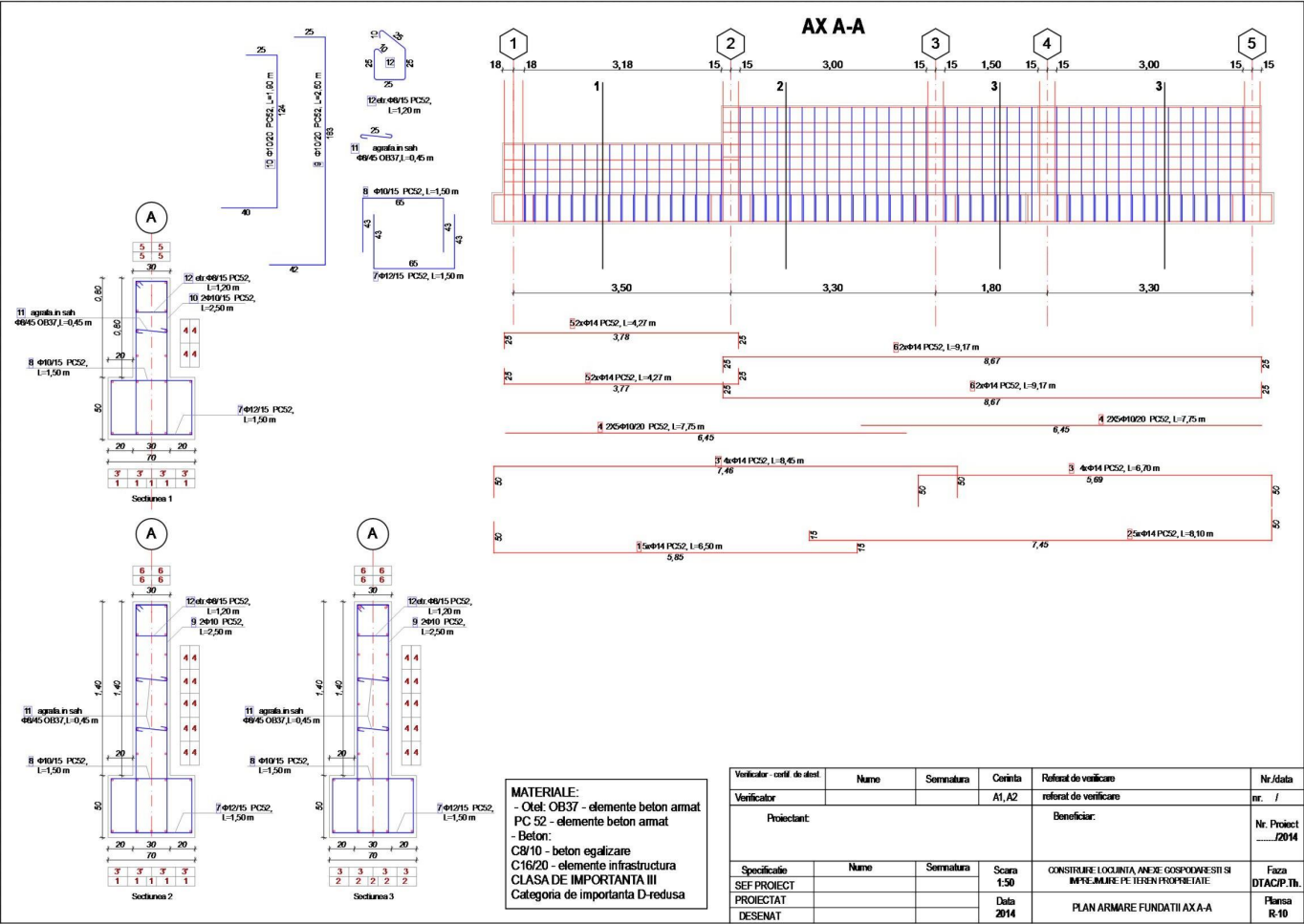


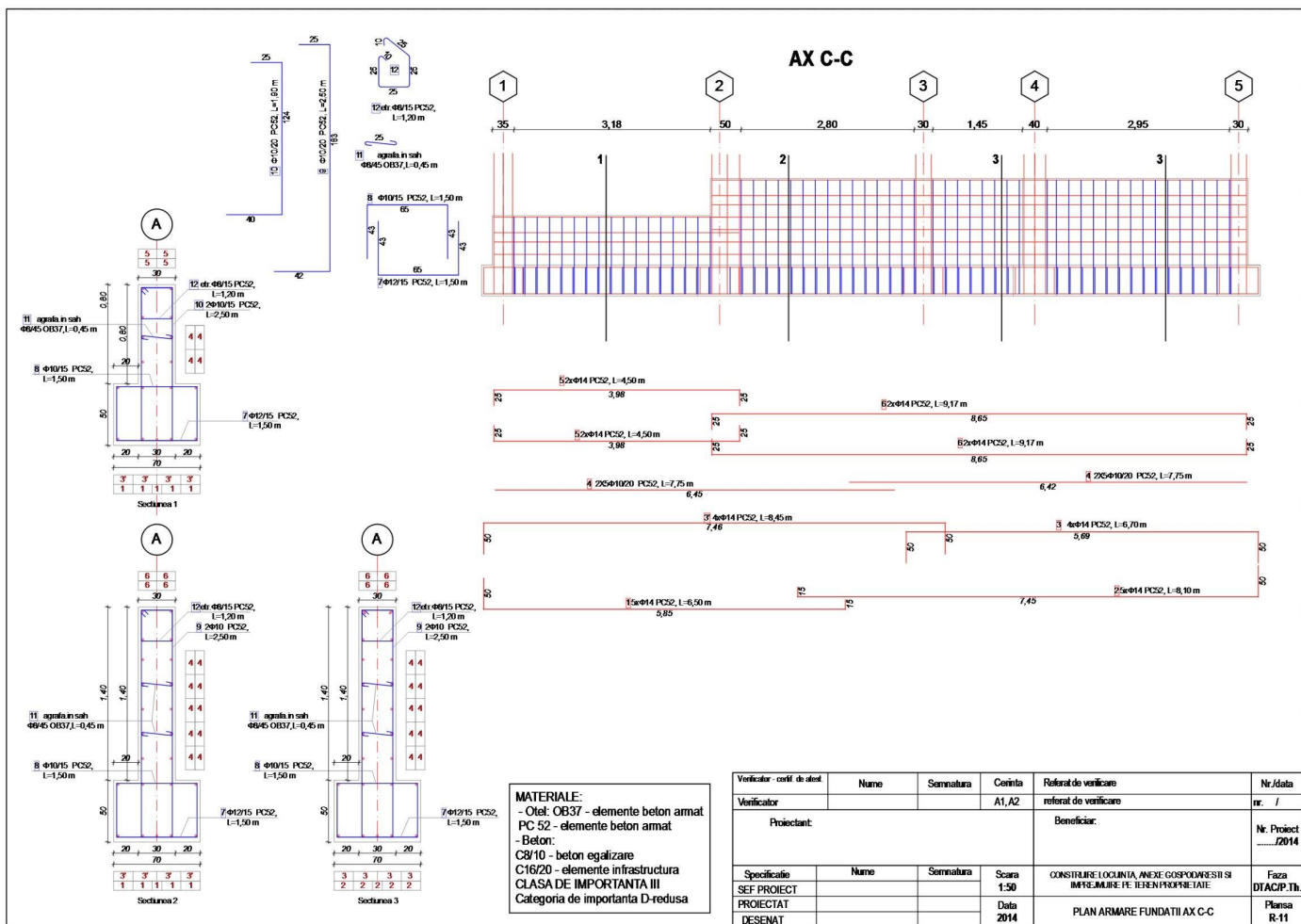


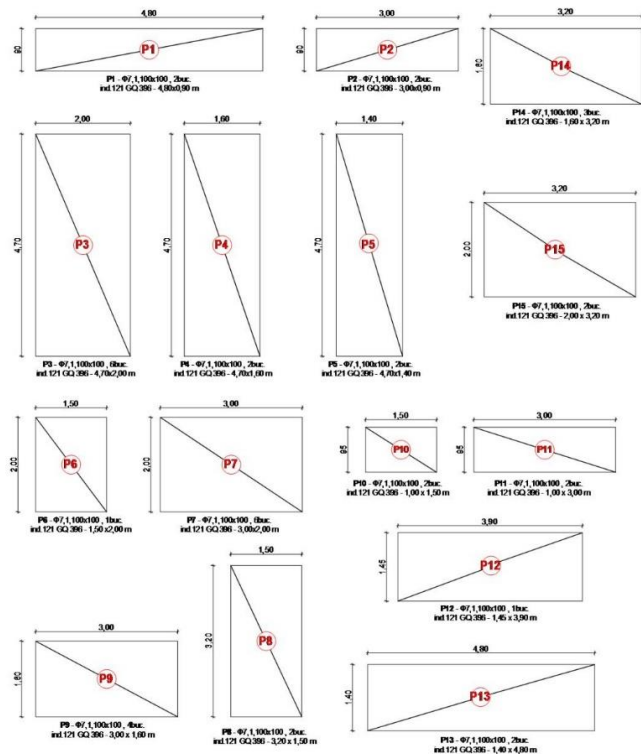
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C8/10 - beton egalizare
C16/20 - elemente infrastructura
CLASA DE IMPORTANTA III
Categoria de importanta D-rezusa

Verificator - contul de debit	Nume	Semnatura	Continuta	Referat de verificare	Nr./data
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Proiectant:				Beneficiar:	Nr. Proiect _____/2014
	Nume	Semnatura	Scara 1:50	CONSTRUIE LOCUINTA, ANEXE GOSPODARESTI SI IMPELUMARE PE TEREN PROPRIETATE	Faza DIACAP/14
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PROIECTAT					
DESENAT					



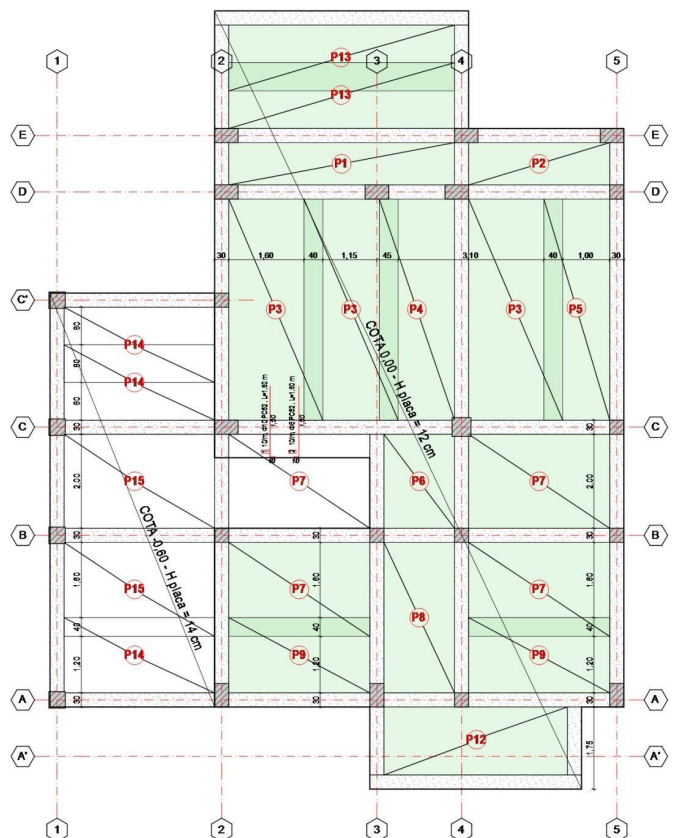






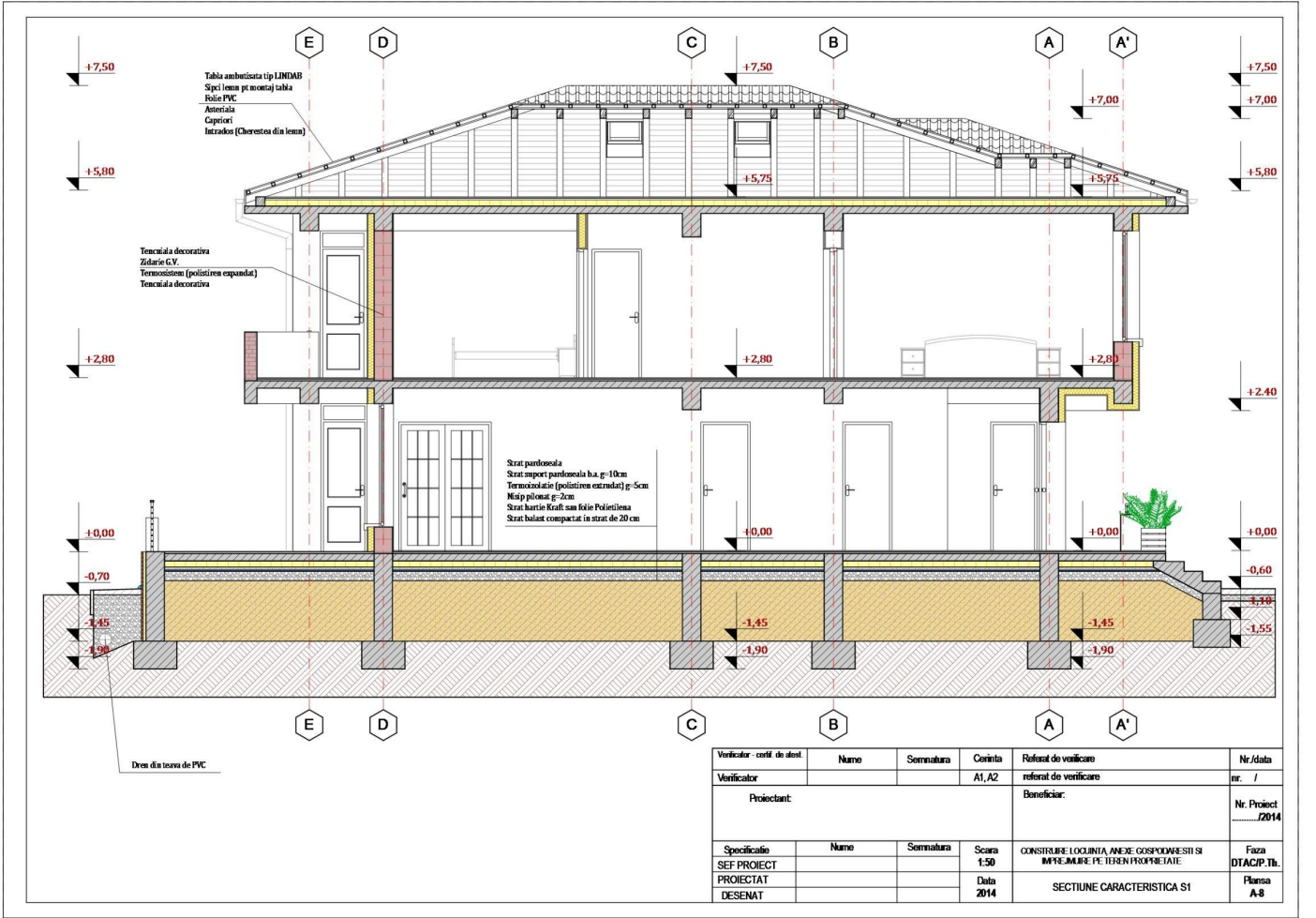
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PC 52 - elemente beton armat
- Beton:
CB10 - beton egalizare
C16/20 - elemente infrastructura
CLASA DE IMPORTANTA III
Categoria de importanta D-rezusa

Verificare: cursul de curs.	Nume:	Semestrul:	Cursul:	Indicatul de evaluare: notă de evaluare:	Nr. Alina
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SEF PROIECT			1:50		DETAȘAT
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			Data	PAVILION DE PLASA DURATA	Planșă
			2014		10-10



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Verificator:			A1, A2	Modulul de evaluare:	
Prezentant:				Beneficiar:	nr. / data
Specialitate:	Nume:	Semnatura:	Scara:	CONCERINTE LUCRARE ANEXE GOS/COARDE/SE/18	Faza
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PROIECTANT			Data:	PLAN ASINIE REPER/SE/18	Reș:
			2014	PLACA/18, COȚA/0,00 ȘI COȚA/0,00	Reș:

Voluntar: cursul de curs	Nume:	Semestrul:	Credite:	Releved de verificare:	Notă Medie
Voluntar:			A1, A2	releved de verificare:	nr. 1
Proiectant:				Releved:	Nr. Proiect/2014
Specialitate:	Nume:	Semestrul:	Scara	CONSTRUCȚIE LOCOMOTIVĂ, AEROMOBILITATE ȘI TRANSPORTURI INTEGRAȚIE DE SISTEME DE TRANSPORTURI PLANIFICARE	Faza DTAC-TP Faza A-4
REF. PROIECT PROIECTAT PROIECTAT			1:50 Data: 2014		



ANNEXES

Annex 1. Classification of activities in the national economy (CANE)

CONSTRUCTION CATEGORY

45 - Construction of new buildings and works of restoration and repair

451 - Organization of construction sites and land preparation

4511 - Demolition of buildings, earthworks, and organization of construction sites.

Demolition works of constructions and buildings: earthworks; site organization; cleaning works; excavations and earthworks; preparation of the sector for earth excavations (plugging, leveling, etc.)

4512 - Construction drilling and boring works

Works of foundation ground analysis through drilling and boreholes; digging tunnels and galleries as well as any other landscaping and preparation works, deposits for mineral aggregates.

452 - Construction of buildings and civil engineering

4521 - Construction works, including works of art

General construction works for the erection of residential, industrial, commercial, public buildings with cultural-administrative destination, educational institutions, medical-sanitary, religious, etc.

CONSTRUCTION COST ESTIMATE

Civil engineering construction works such as: bridges and viaducts, tunnels and underpasses; industrial constructions and other engineering works not included in other categories. This class also includes the installation and execution of buildings from prefabricated elements.

4522 - Roofing, framing, and terrace construction works

Roofing works, frame and terrace works, water collection and drainage works.

4523 - Construction of land communication routes and construction for sports

Construction of motorways (excluding suspended), roads, streets, railways, runways for airports. Construction of stadiums, golf courses, etc. (excluding buildings).

4524 - Hydrotechnical constructions

Construction works for waterways, harbors, dams; water management constructions; construction works for hydropower plants; irrigation works, discharges, correction of torrents, regularization, and bank protection.

4525 - Other engineering construction works

Construction works for pipelines, communication lines, and main power lines (cables); for transmission pipelines, communication lines, and power lines (cables) for the local network; auxiliary works for urban development.

4526 - Other construction-specific works

Specific construction works such as: foundation improvement, foundations, piling, drilling of water wells, concreting works, shaping and installation of reinforcement (including welding works), masonry, scaffolding, scaffolding, and other such works.

453 - Installation and insulation works

4531 - Electrical installation works

Electrical installation works including installation of electrical fittings; electrical installation works at water and gas pipelines; electrical installation works for the installation of elevators and escalators; works of setting up for fire signaling installations and fire-fighting equipment; installation of alarm installations; antenna mounting; works for electric heating and air conditioning systems, etc.

4532 - Insulation and corrosion protection works

Insulation works: thermal, acoustic, hydro, and anti-vibration; corrosion protection works.

4533 - Works of sanitary and central heating installations and setting up of technological equipment and machinery for engineering buildings and constructions.

Installation of heating and ventilation systems and air conditioning systems. Water supply works through pipes and drainage works; gas pipeline installation works; assembly works of technological equipment and machinery, etc.

4534 - Other installation and auxiliary construction work

Installation of fences, the arrangement of enclosures and related metal constructions, other construction works assembly.

454 - Finishing work

4541 - Plastering works

Plastering works and execution of plaster profiles

4542 - Joinery and carpentry

Joinery and carpentry (of wood, metal, plastics, and glass).

Exceptions: Joinery and carpentry of wood, of a kind used in the building, as a result of the material used, for example, woodwork is classified in class 2030 (Building carpentry and joinery) and so on

4543 - Flooring and wall cladding

Ceramic coating of walls and floors; flooring; lining the walls and gluing the wallpaper; paneling etc.

CONSTRUCTION COST ESTIMATE

4544 - Dye works, paintings, and glazing works

Setting up works of window and window frames, dye works, and paintings.

4545 - Other finishing works.

Decorative works, other building finishing works

455 - Rental of construction and demolition equipment, with related service personnel.

Rental services for the construction or demolition of buildings or other civil constructions, with operators.

Exceptions: Rental of construction machinery and equipment, without an operator, is included in class 7132. (Rental of construction machinery and equipment, without related service personnel).

Annex 2. Explanation of terms used

CONSTRUCTION WORKS

They are complex ensembles resulting from the activity of a multitude of categories of enterprises whose main purpose is the production of real estate.

The assembling or setting up of equipment designed for the operation of a building as such (sanitary objects, electrical installations, etc.), as well as the assembling of prefabricated concrete elements, metal structures, and carpentry, is included in Section G - Constructions.

The assembly or installation of industrial equipment executed by the enterprises that produce them is included in the manufacturing industry, and those assembled and installed by the construction enterprises are included in Section G - Constructions.

In the case of construction units that carry out prefabricated elements on construction sites or in workshops, their activities are also included in Section G - Constructions, provided that more than half of the physical quantities are mounted in the constructions executed by the construction units to which they belong.

INVESTOR

Organization (natural or legal person), authorizing officer or financier, who contracts the execution of a construction product or work with a construction supplier or contractor.

BENEFICIARY (CUSTOMER)

Recipient of a product (service, work, etc.) provided by the supplier (SR ISO 8402).

Note:

- 1) In a contractual situation the customer can be called a "buyer".
- 2) The customer can be the final consumer, user, beneficiary or buyer.
- 3) The client can be internal or external to the organization.

UNIT

Organization (economic agent, legal entity, with activity in the field of constructions (research/design institute, execution/exploitation enterprise, etc.).

ENTREPRENEUR

The qualified natural or legal person who undertakes to carry out a construction work.

EXECUTOR OF THE WORK

Contracting party that actually performs the work.

PROVIDER

An organization that provides a product to the customer (SR ISO 8402).

Note:

- 1) In a contractual situation, the supplier may be referred to as a "contractor".
- 2) The supplier may be, for example, the manufacturer, distributor, installer, or service provider.
- 3) The provider can be external or internal to the organization.

PUBLIC FUNDS

Amounts allocated from the state budget, state social insurance budget, social health insurance budget, special funds budgets, state treasury budget, local budgets, budgets of public institutions financed from extra-budgetary revenues, external financial aid granted to Romania or public institutions, and external credits contracted or guaranteed by the

state or by local public administration authorities, as well as internal loans contracted by local public administration authorities.

PUBLIC PROCUREMENT

Acquisition, permanent or temporary, by a legal person, defined as a contracting authority, of some products, works, or services by awarding a public procurement contract.

PUBLIC PROCUREMENT CONTRACT

A contract concluded in writing between the contracting authority and the contractor

- a) investment objective/project - the expected result of the capital investment for a limited time, as a result of the realization of one or more investment objects, located on a distinct delimited location, which ensures the satisfaction of the requirements formulated by the investment beneficiary and the investor; the term "investment objective" includes, where appropriate, the new investment objective, the mixed investment objective or the intervention to existing construction;
- b) investment object - part of the investment objective, with distinct functionality within its ensemble, which consists of construction works for the realization of new investment objects or of intervention works for existing constructions;
- c) objective/project of mixed investment - investment objective that includes construction works for the realization of one/more new investment objects, as well as intervention works on one/more existing constructions;
- d) objective/project of major investment - investment objective whose total estimated value exceeds the equivalent of EUR 75 million in the case of investments to promote sustainable transport systems and the elimination of bottlenecks in the infrastructure of major networks or the equivalent of EUR 50 million in the case of promoted investments in other areas;

CONSTRUCTION COST ESTIMATE

e) intervention at the existing construction - the expected result obtained as a consequence of carrying out intervention works on one/more existing constructions, including the related installations, as provided in Law no. 10/1995 on quality in constructions, republished, carried out in order to ensure, maintain and/or improve the fundamental requirements applicable to constructions, according to their destination;

f) public investment - all expenditures from public funds, initial or subsequent, intended for the realization of fixed assets of the public and/or private domain of the state/administrative-territorial unit, including the replacement of used fixed assets, as well as the expenses occasioned by their replacement, that is financed totally or partially from the public funds; public investment is also considered to be the total investment expenditure, initial or subsequent, intended for the realization of fixed assets of the nature of the private property of natural and/or legal persons, including the replacement of used fixed assets, as well as the expenses occasioned by their replacement financed totally or partially from the public funds;

g) investor - public entity, legal or natural person, which carries out investment expenses that are financed totally or partially from the public funds, resulting in the achievement of investment objectives/projects;

h) beneficiary of the investment - public entity, legal or natural person, which has a right to execute the construction works according to the provisions of Law no. 50/1991 regarding the authorization of the execution of construction works, republished, with the subsequent modifications and completions;

i) construction - building, civil engineering work or special construction work, respectively any civil engineering work, the realization of which consists in any structure fixed in or on the ground, designed and executed for the fulfillment or maintenance of technical, economic, social functions or environmentally friendly, regardless of the specificity, importance, category and class of importance, including

the related technological and functional machinery, equipment and installations;

j) existing construction - construction for which the reception at the end of the works was admitted or construction that was registered in the land book;

k) unfinished construction - construction in different stages of execution for which the execution of the works were stopped and the reception was not carried out at the end of the works and whose completion implies a rest to be executed, physically and in value;

l) technical solution - part of the scenario/technical-economic option of the feasibility study, respectively of the documentation for approving the intervention works, including the description, from a technical, constructive, technological and functional-architectural point of view, of the main works for the basic investment, correlated with the technical, qualitative and performance level resulting from the proposed technical-economic indicators;

m) duration of execution of the investment objective - the period, expressed in months, between the date set by the investor for the start of execution works and communicated to the executor and the date of conclusion of the report on the admission of reception at the completion of works;

n) the duration of achieving the investment objective - the period between the date of approval of the technical-economic indicators of the investment and the date of the report on the admission of the final reception;

o) duration of implementation of the investment objective - the period expressed in months between the date of approval of the concept note and the date of the acceptance report regarding the admission of the final reception.

CONSTRUCTION COST ESTIMATE

Annex 3. List of specific and non-specific trades used in construction¹

¹ Prepared according to the user manual through the “Classification of occupations in Romania”, elaborated by the Ministry of Labor and Social Protection together with the National Statistics Commission.

7113 STONE CUTTERS AND CARVERS

711301 - carver in stone and marble

711300 - carver fitter stone, marble

711303 - sawmill cut blocks of stone, marble

711304 - polishing cutter, polishing stone, marble

7121 CONSTRUCTION WORKERS USING TRADITIONAL TECHNIQUES AND MATERIALS

712101 - construction worker beams, adobe, stone

712102 - manufacturer of plates of various materials

712103 - manufacturer of nets and rabbit plastering web from reed

7122 MASONS

712201 - oven brickwork mason

712202 - masonry factory baskets

712203 - stonemason

712204 - mason

712205 - red mason - plasterer

7123 REINFORCED CONCRETE BUILDERS AND THE LIKE

712301 - concrete worker

712302 - smith for reinforced concrete

712303 - assembler of prefabricated reinforced concrete elements

CONSTRUCTION COST ESTIMATE

7124 CARPENTER

712401 - carpenter

7129 CONSTRUCTION WORKERS NOT CLASSIFIED IN PREVIOUS BASIC GROUPS

712901 - hydrometer worker

712902 - pavement worker

712903 - digging wells

712904 - asphalt worker

712905 - block station worker

712906 - caisson worker

712907 - railway builder

712908 - tram line builder

712909 - drainer channels worker

712910 - faggot worker

712911 - earth finish worker

712912 - hydrogeological worker

712913 - navigable construction worker, hydro-technical and
port works

712914 - head of maintenance team for metal bridges, viaducts,
and tunnels

712915 - hydro-technical agent

712916 - road or dangerous points inspector

712917 - track maintenance craftsman

712918 - track maintenance team leader

712919 - craftsman maintenance of metal bridges, viaducts, and
tunnels

7131 ROOF STRUCTURE WORKERS

713101 - roofing worker- tile, asbestos-cement, sheet metal
roofing worker

7132 PARQUET, LINOLEUM, MOZAIC AND TILES WORKERS

713201 - tile worker

713202 - interior and exterior plywood assemblers

713203 - mosaic worker

713204 - parquet - linoleum worker

7133 PLASTER WORKER

713301 - plaster worker

713302 - ornamental caster

7134 THERMAL AND ACOUSTIC INSULATION ASSEMBLERS

713401 - sound insulation worker

713402 - refrigeration insulation worker

713403 - water-repellent insulation worker

713404 - insulating special works worker (antacids and protection)

713405 - thermal insulator

7135 WINDOW WORKER

713501 - window worker

7136 FITTERS AND PIPE ASSEMBLERS

713601 - water and gas leak detector

713602 - plumber

713603 - refrigeration fitter

713604 - central heating and gas fitter

713605 - fitter of external water networks

713606 - ventilation and air conditioning fitter

713607 - underground channel verifier

7137 ELECTRICIANS IN CONSTRUCTION

713701 - construction electrician

7141 PAINTERS, UPHOLSTERERS, VARNISHERS, AND DYE PAINTERS

714101 - wallpaper worker

714102 - painter, dye painter

714103 - wood varnish

714104 - industrial painter

714105 - finisher - wood varnish

714106 – stuccoist

7143 FACADE AND PANEL CLEANERS

714301 - chimney sweep

CONSTRUCTION COST ESTIMATE

714302 - facade cleaner

7212 AUTOGENOUS WELDERS AND DEBITORS

721201 - worker of plate gluing to cutting tools

721202 - autogenous sweat

721203 - electric welder

721204 - automatic welder

721206 - flame cutter (autogenous)

721207 - gas welder

721208 - welder in a protective environment

7213 PLATER- VAT WORKERS

721301 - vat containers worker

721302 - tester of hydraulic vats, pipes, containers

721303 - bodywork plater

721304 - industrial plater

721305 - construction site plater

721306 - aviation structure plater

721307 - pipe vat worker

721308 - vat formator worker

7214 CONSTRUCTORS AND ASSEMBLERS OF METAL STRUCTURES

721405 - wire mesh manufacturer

721406 - worker of forming a pipe by welding

721407 - locksmith for metal and naval constructions

721408 - mine locksmith

721409 - locksmith overhaul wagons

721410 - mechanical locksmith

721411 - locksmith fitter

721419 - machinist for making metal packaging

721420 - machinist for making aluminum tubes

721421 - builder and assembler of metal structures

721422 - machinist in the manufacture of needles and accessories

721423 - riveting

721424 - mechanical locksmith for universal maintenance and repairs

7221 BLACKSMITHS, PUNCHERS, AND PRESSORS

722104 - puncher

722106 - mechanical forge

7222 HASPELS

722201 - SDV locksmith

722202 - die cutter tool worker

722203 - AMC locksmith

722204 - fine mechanical locksmith

7241 ELECTROMECHANICS ASSEMBLERS AND WORKERS IN REPAIR OF ELECTRICAL AND ENERGY APPLIANCES AND EQUIPMENT

724101 - electrician in electrical and energy equipment

724112 - regulator fitter and elevator repairman

7244 ELECTROMECHANICS ASSEMBLERS AND WORKERS IN REPAIR OF TELEGRAPHIC AND TELEPHONE INSTALLATIONS

724401 - automatics worker

724402 - electromechanical SCB (signaling, centralization, blocking)

724404 - electromechanical cable networks

724405 - networking lines electromechanical

724406 - electromechanical telegraphy, telephony

724407 - telecommunications electronic worker

724408 - junction worker

724409 - section liner

724410 - assembler, regulator, tester of telecommunications equipment and signaling, centralization, and blocking installations

724411 - electromechanical power supply

7245 ELECTRICIANS. AERIAL AND UNDERGROUND ELECTRICAL LINE ASSEMBLERS AND REPAIRERS

724501 - electricians in operating power plants and power stations

CONSTRUCTION COST ESTIMATE

- 724502 - electrician in operating electrical networks
- 724503 - electrician assembling and repairs of underground electrical cables
- 724504 - electrician assembling and repairs of overhead power lines
- 724505 - electrician assembling and repairs of electrical equipment in power plants, substations, and substations
- 724506 - electrician protection relays, automations and electrical measurements
- 724507 - electrician assembling and repair
- 724508 - electrician assembler of automated installations
- 724509 - electrician assembler of electrical installations for means of transport
- 724510 - electrician for cathodic protection
- 724511 - rural electrician
- 724512 - mine electrician
- 724513 - electrician for the use of electricity

8281 ASSEMBLERS IN MECHANICAL CONSTRUCTIONS

- 828101 - locksmith assembling for industrial, construction, and agricultural machinery
- 828102 - trainer and assembler of technological equipment

8332 DRIVERS OF EARTHMOVING MACHINES AND EQUIPMENT

- 833201 - machinist for earthmoving machines
- 833202 - machinist for installations of concrete preparation and pouring and installations of asphalt mixtures
- 833202 - light and heavy machining machine driver

8333 OPERATORS OF CRANES, MOBILE BRIDGES, UNDERGROUND LIFTS AND THE LIKE

- 833301 - crane operator
- 833302 - overhead crane operator
- 833303 - cable railway operator
- 833304 - operator of floating cranes
- 833305 - truck driver

-
- 833306 - navigable station supervisor
 - 833307 - funicular operator, passenger funicular operator
 - 833308 - docker, mechanizer (port worker)

8334 OPERATORS AT PALLETIZED GOODS TRANSPORT INSTALLATIONS

- 833401 - driver for mobile cars for internal transport
- 833402 - driver for other fixed horizontal and vertical transport
machines

9312 UNQUALIFIED WORKERS IN THE MAINTENANCE OF ROADS, ROADS, BRIDGES, DAMS ETC.

- 931203 - unquasified worker in the maintenance of roads,
highways, bridges, dams
- 931204 - manual digger

9313 UNQUALIFIED WORKERS IN HOUSE CONSTRUCTION

- 931301 - unqualified worker for the demolition of buildings,
masonry linings, mosaic tiles, ceramic tiles, ceramic
wall, and floor tiles
- 931302 - unqualified worker in breaking and cutting of
construction materials

9330 UNQUALIFIED WORKERS IN TRANSPORTATION AND HANDLING OF GOODS

- 933001 - truck driver
- 933002 - carrier
- 933003 - loader-unloader
- 933004 - load binder
- 933005 - goods handler
- 933006 - press distributor

CONSTRUCTION COST ESTIMATE

Annex 4. Content of material handling costs

1. Expenditure on handling materials from estimates by category of works shall include expenditures on:

1.1. Loading and unloading in and out of the means of transport of materials, prefabricated, semi-finished products, garments, generically called materials.

1.2. Small maneuvers with the arms of the wagons and removal of materials from the railways to ensure the gauge.

1.3. Approximation of materials within the loading range of means of transport and their removal from the place of unloading of vehicles to ensure the gauge of access to the point of unloading.

1.4. Local manual handling and transport (by direct loading, wheelbarrow, etc.) in warehouses, depots and construction sites from unloading sites to storage places and from storage places to construction objects within range of lifting equipment, respectively to the installation sites (in case of linear works).

1.5. Placing materials in stacks, figures, or on the shelves of warehouses and depots, as well as any handling operations - similar to the above - that occur during the transport of materials from the manufacturer to the object of construction within the range of the means of lifting, respectively until at the installation site, regardless of whether the materials pass through one or more warehouses.

1.6. Remuneration of transport attendants - is determined by the duration of the transport and the remuneration negotiated within the executing unit.

2. Expenditures determining

CONSTRUCTION COST ESTIMATE

2.1. Expenditures within points 1.1 .; 1.2. and 1.3. are determined using the work norms for loading-unloading elaborated by MTTc in 1987 to which the tariff value of the hour negotiated in the bidding unit is applied. You can also use upload-download rules specific to each experienced bidder.

2.2. Determination of the expenses from points 1.5. and 1.6. it is done using the work norms from the manual and mechanical transport chapters.

2.3. The handling costs are not considered in the case of those resulting from the handling of:

- filling or excess soil (see earth transport);
- waste, rubble, brick rubble - results from the execution works (these enter into indirect expenses);
- the equipment, machinery (functional and technological) that are taken over from the beneficiary - they are received at the assembly place, the rest of the operations are included in the assembly norm;
- ballast and quarry products, cistern water, the price of which is determined loco - object.

Annex 5. Content of transport costs

1. Auto transport

1.1. Through the expenses with the transport of materials, prefabricated products, garments, etc. it is understood the expenses incurred to bring the construction materials from the manufacturer to the intermediate warehouse (if applicable) from the intermediate warehouse to the construction object, to the range of the lifting means, respectively to the place of setting up in case of linear works.

Also in the transport expenses are included the taxes provided by the legislation, as well as the expenses determined by auxiliary and adjacent operations.

1.2. The car transport can be performed with means from the endowment of the executing unit or on the basis of a contract for the provision of transport services.

1.3. The beneficiary together with the designer will establish through the technical design the point to which the materials can be brought, a point considered as the center of gravity of the works if the objective has several construction objects or at the object when it is unique. In relation to its position are established by the organization project, partial and total distances from the destination station to the intermediate warehouse as well as the distance from the intermediate warehouse to the warehouse next to the object.

1.4. Usually, the materials, equipment, and machinery (functional and technological) that require assembly, owned, produced, or supplied by the beneficiary, are handed over to the executor at the place of installation.

If they are stored at an intermediate warehouse and the beneficiary cannot take care of their transport, the list of quantities of works will include a separate item for transport to the place of installation, which falls within the value of the estimate by categories of works.

1.5. The following categories of transport are not considered as expenses for the transport of materials and therefore constitute separate items as appropriate:

- ☐ transport in tanks of water necessary for technological processes for works with high water consumption located in isolated places and where a nearby water source or network cannot be used (road works, railways, agro-zootechnical constructions, land and art improvements, embankment consolidations, etc.);
- ☐ transport of earth for fillings or resulting from excavations, as well as rubble resulting from demolition;
- ☐ the transport of ballast products, metal works and constructions, concretes, mortars and other semi-finished products when in the estimate prices per work item was not provided their transport also, respectively their price is not calculated in the conditions of loco object, place of installation.

2. Rail transport

Railway transport costs include all transport costs from the loading station (manufacturer) to the destination station or to the safety mark or derailment shoe at the junction of the main industrial line, to the CFR line.

These expenses also include:

- ☐ taxes and tariffs for auxiliary and adjacent operations, related to transports (for the use of pallets, for handling according to time and junctions for weighing, re-weighing, for washing, disinfecting or cleaning wagons, for consignment notes, etc.);
- ☐ taxes and tariffs for maneuvers and transports within the industrial lines (tariffs for maneuvers in relation to the distance and number

of wagons) carried out with the means of traction of CFR, to the executor, or to the beneficiary.

The unit prices expressed in lei/tonne are calculated in the form of tables by groups of materials, and by types of wagons, and by transport distances. The values in these tables are multiplied by the index of increase of the expenses for the transport of goods on the railway that is established by SNCFR, approved by the Competition Office.

If the wagonable materials are transported inside the industrial lines of the beneficiary or of the constructor with CFR's means of traction, the transport costs on the industrial line according to the CFR tariff for maneuver in relation to the distance to the unloading place will be taken into account. Transport from the place of unloading to the object is provided by car.

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Annex 6. Structure and content of indirect costs

A. Expenditure of general interest and execution of works

1. Remuneration of the management, technical, economic, other specialized, administrative, service and guard personnel; tax, contribution to social insurance and to unemployment fund, related

- ☐ Remuneration of the management staff, technical, economic, and of other administrative services of the unit, including management allowances, seniority bonus, and other legal rights from the remuneration fund (excluding the remuneration of the staff from industrial production and services)
- ☐ Remuneration of foremen participating with the executive staff in the production process, including tax, social security contribution, and unemployment fund
- ☐ Remuneration of the household staff of all kinds (handlers, receivers, loaders, and unloaders from central depots, laborers, telephone operators, drivers, special vehicles, minibusses, caretakers, the staff of maintenance and small repairs to plumbing, water, heating, lighting, etc.) including seniority bonus and other legal rights from the remuneration fund (excluding the remuneration of the staff of the industrial production and services units)
- ☐ The amounts for setting up the management staff award fund within the remuneration fund
- ☐ Contribution to social security and unemployment fund on tariff remuneration, allowances, awards, and other legal rights included in this position

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- ☐ Preliminaries established for the payment of rest leave allowances and additions to the tariff remuneration for exceeding the indicators or plan tasks per quarter. IV of the reporting year, due to the technical, economic, other specialized, administrative, service and security management staff, including the tax, the social insurance contribution and the unemployment fund on these benefits and allowances
- ☐ Remuneration regarding the payment of auditors and external members of the boards of directors

2. Indirect expenditure quotas for component units

- ☐ Share - part of the indirect expenses of the company (enterprise) distributed to the component units without legal personality but with own accounting

3. Depreciation of fixed assets of general interest

- ☐ Depreciation of fences, buildings, installations that serve them; offices, iron houses, files, typewriters, and calculators; security and firefighting inventory; cars (excluding depreciation of fixed assets of industrial production and services units)
- ☐ Rents paid or due for administrative fixed assets of general and household interest rented

4. Expenditures on design, approval, study, research, experimental testing, creation, invention and innovation

- ☐ Expenses related to the design work for one's own needs, executed by the services, sections, offices, or design workshops within the company (excluding the works for investments that are supported from the investment funds)
- ☐ Expenses for approvals
- ☐ Expenditures for studies, research, and development work for own benefit, other than those made from special funds set up at the national level
- ☐ Materials consumed in the laboratories of the unit for tests, experiments, trials, creations, etc., wear and tear of tools and utensils used for tests, experiments, creations, etc.

- ☐ Payment of expertise and consultations related to the verification and testing of construction elements, as well as in problems with the operation of the technological equipment (if they were not provided in the estimate)
- ☐ The cost of the works regarding the implementation of the Management System and the quality assurance of the works
- ☐ Expenditures on inventions and innovations that do not materialize or do not relate to certain objectives (eg patent fees, expertise, research, films, exchanges of experience, etc.). Those expenses intended to be borne by the research and development fund are not included

5. Expenditure on labor protection

- ☐ Materials, remuneration, tax, contribution to social insurance and unemployment fund, monetary expenses, as well as the services of the sections or of third parties regarding:
 - security technique;
 - labor protection ventilation;
 - technical-sanitary measures and materials;
 - protective equipment;
 - work equipment;
 - special diet for the body's resistance;
 - research and design on labor protection;
 - labor protection training.

6. Bank interest

- ☐ Interest paid or due that according to the law is included in production costs
- ☐ Interest collected or certainly due for cash from the accounts of construction-assembly units, from the financing banks
- ☐ Bank charges (commissions, fees, etc.)
- ☐ The credit balance is transferred at the end of the month to the financial results

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7. Expenses for processing by means of automatic/mechanized calculation

- ☐ Expenses for design and implementation of automatic or mechanized data processing works, if not financed from other funds
- ☐ The cost of the works executed by specialized calculation units
- ☐ Specific costs required for the operation of the means of calculation for automatic or mechanized data processing (supplies and prints, printing paper, energy, etc.)
- ☐ Depreciation, maintenance, and repairs of any kind to own means of automatic or mechanized data processing
- ☐ Remuneration due to the staff serving their own means for automatic processing, the tax, the contribution to the social insurances and the related unemployment fund

8. Perishability within the approved norms

- ☐ Perishability established by norms approved by the competent bodies at material values during storage and handling that cannot be located on works, products, services, or destination. Only the actual perishables approved within the norms will be registered, if they are not due to someone's guilt

9. Additional remuneration of directly productive workers, tax, social security contribution, and unemployment fund on the total remuneration of these workers

- ☐ Awards from the remuneration fund, seniority bonus, allowances paid during decommissioning according to legal provisions, holiday allowances, and other rights paid from the remuneration fund, including tax and contribution to social insurance and unemployment fund, related
- ☐ Preliminary amounts for setting up the fund for rewarding directly productive workers, tax, contribution to related social insurance
- ☐ Expenses with double payment of overtime worked on public holidays when the production process or the deadlines for commissioning require it.

- ☐ Expenses related to the payment of paid medical leave, borne by the unit when they are less than 10 days and are not covered according to the legislation in force in CAS
- ☐ Expenses regarding the granting of remuneration to employees for non-working days, legally granted on different occasions:
 - family events (marriages, births, deaths, etc.)
 - for blood donors (two paid working days)
 - paid study leave
 - holiday allowances (when the unit decides to make such expenses for people with special problems)

10. Expenditure on construction equipment, tools, and other inventory items in use of a production nature (small equipment: dump trucks, wheelbarrows, water storage tanks, electric welding machines, shaping devices, etc.)

- ☐ Depreciation of small machine not included in estimate in the “Machines” chapter, as well as the rent of this equipment rented from third parties
- ☐ Current repairs of small machines, maintenance materials, grease, wiping, machine transport costs to and from work
- ☐ Use of production inventory items (stretchers, crates, buckets, pickaxes, screeds, shovels, rulers, and any kind of production tools)
- ☐ The cost of transporting tools and utensils from the central warehouse to the construction site and from one construction site to another
- ☐ Tariff remuneration of small equipment maintenance mechanics, tax, contribution to social insurance and unemployment fund, related

11. Expenses for the arrangement and maintenance of the site

- ☐ Expenses related to constructions, installations, and temporary arrangements that are made at the expense of indirect expenditures: booths (except for guarding), scaffolding, interior shelves, goat scaffolding, light suspended scaffolding, bridges over ditches inside the site, etc.

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- ☐ Maintenance and repair of works, installations, and temporary site arrangements
- ☐ Maintenance and repair of temporary interior roads, bridges, and footbridges inside construction sites

12. Expenses related to the delivery of works

- ☐ Expenses with transport and handling performed for the disposal of waste, rubble, chipping, etc., resulting from the execution of works
- ☐ Expenditure on remuneration including tax, social security contributions, and unemployment benefits for staff who washed stairs, floors, doors, windows, glazing, interior, and installations cleaning
- ☐ Expenses for the execution of measurements and verification of construction works that will not be subsequently verified
- ☐ Expenses with the manipulations for the evacuation from the site, at the end of the works, of the materials for which only losses quotas are provided in the estimate norms: formwork, scaffolding, scaffolds, etc. (remuneration of workers, handlers, cost of transport and lifting equipment)
- ☐ Other expenses for handing over the construction-assembly works to the beneficiary

13. Expenses for transporting workers

- ☐ The cost of regular transport of non-local staff visiting their family
- ☐ Expenses with the transport of the working personnel sent from the unit, from one construction site to another or from one job to another; the expenses with the daily transport of the workers, on the distances between the accommodation spaces and the workplaces are supported from the fund for the organization of the construction site

14. Expenses not imputable for carrying out the remediation and restoration of works

- ☐ Expenses not imputable for carrying out the works for remedying the deficiencies recorded in the minutes of the reception, as well as

for those works that appeared during the period of verification in the operation of the behavior of the construction-assembly works

- ☐ Expenses not imputable for carrying out repairs and restorations during the execution of works

15. Protocol expenses

- ☐ Representation and transport expenses

16. Expenses for advertisements, leaflets

- ☐ Publicity expenses - advertising

17. Expenses for schooling

- ☐ Expenses for training and qualification of workers, for exchanges of experience and for practice in production
- ☐ Expenses for the organization and operation of courses to raise the qualification of workers by taking them out of production (payment of lessons to course managers, other administrative expenses related to the operation of these courses)

18. Other expenditure of general interest and execution of works

- ☐ Expenditure on the transport of inventory items and barracks in use from the central warehouse, to construction sites or from one construction site to another
- ☐ The cost of water required for workers' accommodation barracks
- ☐ Actual costs of housing staff in youth hostels, billed by other units (if these expenses are not recovered from staff)
- ☐ Building tax and insurance premiums
- ☐ Fees for checking and marking measuring and weighing devices
- ☐ Traffic taxes, parking, etc. paid in accordance with legal provisions
- ☐ Rent of land and ramps from stations
- ☐ Expenses with military or militarized security made by specialized bodies
- ☐ Expenses related to traffic signs (warning lights at night for sewerage works, water supply, etc.)
- ☐ Garage rental for cars
- ☐ Expenses for handing-over the units and inventorying the goods

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- ☐ Expenditures for disaster prevention
- ☐ Insurance premiums for light means of transport
- ☐ The cost of rodent control and disinsection works
- ☐ Expenses for topometry, tracing, etc.
- ☐ Cost of propaganda materials for educational instruction for fire prevention (posters, billboards, brochures, etc.)
- ☐ Expenses with the management and administrative staff of other formations than of the construction-assembly units
- ☐ Expenses for disassembly, transport, and assembling of fixed assets moved from one unit to another during the transfer
- ☐ Expenses regarding the installation of mini telephone exchanges rented from PTTR units (project cost, the value of cables, etc.)
- ☐ Transport, accommodation, and subsistence expenses of the staff in charge of recruiting the labor force, as well as the transport expenses of the workers recruited from other localities of residence at the construction sites, according to the legal provisions
- ☐ Expenditure on the supervision of special labor used on construction sites

B. Administrative and household expenses

1. Office supplies

- ☐ Office stationery
- ☐ Printers
- ☐ Office supplies, including photo paper, tracing paper, and xerox
- ☐ Materials for tying the archive with own forces

2. Books, magazines, and subscriptions

- ☐ Books procured from the funds of the basic activity
- ☐ Magazines and various specialized publications
- ☐ Special bulletins for internal use
- ☐ Supplier catalogs (products/prices)
- ☐ Technical specifications - estimate norms
- ☐ Collections of normative acts STAS, internal norms, etc.

3. *PTTR expenses*

- ☐ Expenses for sending correspondence (postage stamps, taxes, postal prints, etc.)
- ☐ Telex and fax expenses
- ☐ Subscriptions for exchanges and telephone exchanges
- ☐ Intercom expenses
- ☐ Expenses with additional, long-distance and international telephone calls
- ☐ Subscriptions for radio and television, radio, amplification station

4. *Other office expenses*

- ☐ Cost of works for the binding of documents performed by third parties
- ☐ The cost of typing, multiplication, etc. performed by third parties
- ☐ The cost of accounting and technical expertise provided by law enforcement agencies

5. *Detachments, transfers*

- ☐ Expenses for the transport of personnel transferred in the interest of the service, as well as of family members and their belongings, according to the legal provisions
- ☐ Detachment and transfer allowance

6. *Travel in the country*

- ☐ Transport costs within the place of residence by public transport, including season tickets used for this purpose, as well as transport by taxi
- ☐ Transport costs by rail, by car, air and naval means of transport in the interest of service (travel and secondment) between localities, including the cost of road sheets, being purchased by bank transfer
- ☐ Accommodation expenses and information for accommodation
- ☐ Detachment and transfer allowance

7. *Travel abroad*

- ☐ Expenditure on rail transport, car, air, and naval transport for delegations in the interest of service abroad
- ☐ Expenses for accommodation abroad
- ☐ Expenses for per diems and legal allowances for delegations abroad

- ☐ Fees for passport visas in the interest of work, etc.

8. Materials for the maintenance and cleaning of buildings and other fixed assets

- ☐ The cost of materials for maintenance and cleaning performed with own forces at:
 - buildings
 - warehouses and barracks
 - accommodation spaces, bedrooms
 - administrative and basic spaces
 - means of calculation
 - means of multiplication
 - furniture and household inventory
 - bulbs and lighting fixtures for buildings and outdoor spaces (poles, cables, and lamps are supported from site organization funds)

9. Current repairs to buildings and other fixed assets

- ☐ The cost of materials and spare parts for current repairs performed with own forces at:
 - buildings
 - warehouses and barracks
 - accommodation spaces, bedrooms
 - administrative and basic spaces
 - means of calculation
 - means of multiplication
 - furniture and household inventory
- ☐ The cost of current repair works performed by third parties or their own specialized sections, on buildings of any kind, means of calculation (from the use of the compartments of the construction-assembly unit), furniture and household inventory
- ☐ Current repairs performed by third parties or through our own specialized sections on buildings and barracks intended for staff accommodation

10. Major repairs to buildings

- ☐ The cost of capital repair works on buildings of any kind, executed by third parties, own specialized sections or own forces

11. Materials and spare parts for the operation of light means of transport

- ☐ Expenses for the operation, maintenance, and repairs of any kind performed by third parties or own sections specialized in the means of car transport, used for the movement of management staff and other persons
- ☐ Fuels
- ☐ Lubricants
- ☐ Materials and spare parts (including tires and chambers) for maintenance, overhauls, and routine repairs performed by own or third party forces

12. Wear, maintenance and repair of small or short-term inventory items of an administrative-household nature

- ☐ Wear of low-value or short-term inventory items of an administrative-household nature
- ☐ Wear, maintenance and repair of barracks and inventory items in dormitories for staff accommodation
- ☐ Wear, maintenance, and repair of equipment
- ☐ Materials for the maintenance and repair of small or short-term inventory items of an administrative-household nature
- ☐ The cost of the uniforms of the personnel guarding the unit, granted according to the legal provisions
- ☐ Transport-supply expenses related to inventory items and barracks to the central warehouse

13. Heating expenses

- ☐ Fuel of any kind
- ☐ The cost of thermal energy provided by the plant itself or by third parties
- ☐ Expenses for heating dormitories and barracks for staff accommodation

14. Electricity for lighting and motive power for administrative and household purposes

- ☐ The cost of electricity supplied by third parties or produced by the plant itself, used for lighting
- ☐ The cost of electricity supplied by third parties or produced by the plant itself, used as a driving force for household administrative purposes (elevators, pumps for hydrophores, machines and electrical installations for computing means, computers, fax machines, multiplication equipment, etc.)
- ☐ The cost of energy for lighting homes and barracks for housing staff
- ☐ The energy cost for the lighting of the accesses to the workplaces (the cost of the electricity for the lighting of the workplace for the works that are executed in artificial light is supported by provisions in the offer estimate)

15. Water, sewer, sanitation for administrative-household needs

- ☐ The cost of water supplied by third parties or extracted by own forces, used for administrative-household needs (water for personal consumption, cleaning of workplaces, maintenance of outdoor spaces, including green spaces)
- ☐ Sewerage, sanitation, and garbage charges (including those for staff accommodation)
- ☐ Drainage costs for dormitories and barracks for staff accommodation

16. Other expenses for maintenance and household

- ☐ The cost of maintenance of computing tools, computers, multipliers, etc., performed by third parties
- ☐ Sewing fees
- ☐ Expenses for the cleaning of built spaces performed by third parties
- ☐ Expenses for fireproofing homes and barracks for workers' accommodation

C. Unproductive expenses*1. Interruption losses due to internal and external causes*

- ☐ Expenses during the production interruption caused to the construction-assembly unit such as:
 - Workers' remuneration legally due during the interruption, the tax, the contribution to the related social insurances and to the unemployment benefit
 - Energy and fuel consumed during interruptions
 - Rents paid or due for equipment rented during the interruption
 - Depreciation due for construction equipment in the unit during the interruption
 - Expenditure under this item is reduced by the amounts recovered

2. Lack of inventory for the circulating means from the warehouses of the unit over the legal norms of perishability

- ☐ Lack of basic materials, prefabricated and garments, fuel, packaging, inventory items above the legal norms of perishability that are not due to anyone's guilt based on the approval of the competent bodies
- ☐ The surpluses of the same elements of current assets found in the warehouses of the construction unit - an assembly that cannot be identified on the objects or works from which they originated (the surpluses from such current assets that are identified on objects or works are deducted from the direct production costs from the calculation article of "Materials")
- ☐ The value of the inventory surpluses that exceed the value of the non-imputable shortfalls is transferred to the financial results account

3. Other non-productive expenses

- ☐ Production costs (materials, remuneration, rents, equipment, etc.) regarding the previous years found in the current year for the completed works or liquidated construction sites
- ☐ Unproductive expenses such as:

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- ☐ the value of basic materials, prefabricated and garments of various materials, inventory items, spare parts, barracks, equipment, and production materials from the warehouse that were not in use, scrapped in accordance with legal provisions
- ☐ the value of materials recovered from scrapping operations (decreases)
- ☐ the difference between the supply price and the one established following the downgrading of materials; this item does not record the value of inventory items, barracks, equipment and materials in use, obsolete

D. Expenses regarding the insurance of construction works

1. Expenses regarding the insurance of construction works

- ☐ Expenses regarding the compulsory insurance provided by contracts under the special conditions for contracting construction works during the execution period

Annex 7. List of Indicators of estimate norms

1981 Edition

Ac	Water supply and sewerage	Alimentări cu apă și canalizări
At	Automations	Automatizări
C	Industrial, housing, social-cultural and agro-zootechnical constructions	Construcții industriale, locuințe, social - culturale și agrozootehnice
D	Roads	Drumuri
E	Electrical installations for construction	Instalații electrice la construcții
F	Refrigeration systems	Instalații frigorifice
Fj	Forage	Foraje
G	Transport and distribution pipelines of petroleum gas and liquids	Conducte de transport și distribuție a gazelor și lichidelor petroliere
H 1	Hydrotechnical constructions on the surface and underground	Construcții hidrotehnice la suprafața și în subteran
H 2	Port constructions	Construcții portuare
I	Central heating and gas installations in buildings	Instalații de încălzire centrală și gaze la construcții
If	Land improvements	Îmbunătățiri funciare
Iz	Insulations for constructions and installations	Izolații la construcții și instalații
L 1	Railways and narrow lines	Linii ferate și înguste

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L 2	Tram and trolleybus lines	Linii tramvaie și troleibuze
M 1	Installation of common-use technological equipment and pipes for technological installations	Montaje utilaje tehnologice de folosință comună și conducte pentru instalații tehnologice
M 2	Installation of technological equipment in the mining industry, at the surface and funicular construction	Montaje utilaje tehnologice din industria minieră la suprafață și construcții funiculare
M 3	Installation of technological equipment in the chemical, petroleum, cellulose, and paper industries	Montaje utilaje tehnologice din industria chimică, petrolieră, celulozei și hârtiei
M 4	Installation of technological equipment in the wood industry	Montaje utilaje tehnologice din industria lemnului
M 5	Installation of technological equipment in light industry	Montaje utilaje tehnologice din industria ușoară
M 6	Installation of technological equipment in the food industry, agriculture, and animal husbandry	Montaje utilaje tehnologice din industria alimentară, agricultură și zootehnie
M 7	Installation of technological equipment in thermal and hydroelectric power plants	Montaje utilaje tehnologice din centrale termo- și hidroelectrice
M 8	Installation of technological equipment in the metallurgical industry	Montaje utilaje tehnologice din industria metalurgică
M 9	Installation of technological equipment in the building materials industry	Montaje utilaje tehnologice din industria materialelor de construcții
P	Bridges	Poduri
RpA	Repairs of electrical elevator installations	Reparații ale instalațiilor de ascensoare electrice

RpAc	Repairs to water supply and sewerage	Reparații la alimentări cu apă și canalizări
RpC	Repairs to industrial, housing, social-cultural, and agro-zootechnical constructions	Reparații la construcții industriale, locuințe, social - culturale și agrozootehnice
RpE	Repairs to electrical installations in constructions	Reparații la instalații electrice la construcții
RpG	Repairs to construction gas installations	Reparații la instalații de gaze la construcții
RpI	Repairs to central heating installations in buildings	Reparații la instalații de încălzire centrală la construcții
RpS	Repairs to sanitary constructions	Reparații la instalații sanitare construcții
S	Sanitary installations for construction	Instalații sanitare al construcții
T	Tunnels	Tunele
Tc	Telecommunications	Telecomunicații
Tf	District heating	Termoficare
Ts	Earthworks	Terasamente
V	Ventilation systems in construction	Instalații de ventilații în construcții
W1	High voltage power stations, substations, and power lines	Stații, posturi de transformare și linii electrice de înaltă tensiune
W2	Electricity distribution networks, street lighting, and connections	Rețele de distribuție a energiei electrice, iluminat public și branșamente
W3	Railway contact lines, signaling, and switchboards	Linii electrice de contact, semnalizări și centralizări feroviare

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Annex 8. Normative acts and regulations in force

1. Classification of occupations in Romania - level of occupation (six characters), approved by the Order of the Minister of Labor, Family and Social Protection and of the President of the National Institute of Statistics no. 1,832 / 856/2011, (*in Romanian: Clasificarea ocupațiilor din România – nivel de ocupație (șase caractere)*), Official Gazette no. 561 of August 8, 2011;
2. Decision no. 656 of October 6, 1997, on the approval of the Classification of activities in the national economy – CANE (*in Romanian: Hotărâre Nr. 656 din 6 octombrie 1997 privind aprobarea Clasificării activităților din economia națională – CAEN*), Official Gazette, Part I no. 301 of November 5, 1997;
3. Decision no. 150 of February 23, 2010, for the establishment, organization, and functioning of the Interministerial Council for Approval of Public Works of National Interest and Housing (*in Romanian: Hotărâre nr. 150 din 23 februarie 2010 pentru înființarea, organizarea și funcționarea Consiliului Interministerial de Avizare Lucrări Publice de Interes Național și Locuințe*), Official Gazette, Part I no. 157 of March 11, 2010;
4. *** Decision no. 395 of June 2, 2016, for the approval of the Methodological Norms for the application of the provisions regarding the award of the public procurement contract/framework agreement from Law no. 98/2016 on public procurement, (*in Romanian: Hotărâre nr. 395 din 2 iunie 2016 pentru aprobarea Normelor metodologice de aplicare a prevederilor referitoare la atribuirea contractului de achiziție publică/acordului-cadru din*

- Legea nr. 98/2016 privind achizițiile publice*), Official Gazette no. 423 of June 6, 2016;
5. Decision no. 907 of November 29, 2016, on the stages of elaboration and the framework content of the technical-economic documentation related to the objectives/investment projects financed from public funds (*in Romanian: Hotărâre nr. 907 din 29 noiembrie 2016 privind etapele de elaborare și conținutul-cadru al documentațiilor tehnico-economice aferente obiectivelor/proiectelor de investiții finanțate din fonduri publice*, Official Gazette, Part I no. 1061 of December 29, 2016;
 6. Emergency Ordinance no. 98/1999 on the social protection of persons whose individual employment contracts will be terminated as a result of collective redundancies, (*in Romanian: Ordonanța de urgență nr. 98/1999 privind protecția socială a persoanelor ale căror contracte individuale de muncă vor fi desfăcute ca urmare a concedierilor colective*), Official Gazette, Part I no. 303 of June 29, 1999;
 7. Fiscal Code of 2015 (*in Romanian: Codul fiscal din 2015*), Official Gazette, Part I no. 688 of September 10, 2015;
 1. Govern Decision no. 656/1997 - Classification of activities in the national economy (CANE) (*in Romanian: Decizia Guvernului nr. 656/1997 – Clasificarea activităților din economia națională (CAEN)*), Official Gazette, Part I no. 301 of November 5, 1997;
 8. Guide on the elaboration of estimates at the level of categories of works and construction objects for investments made from public funds - indicative P 91 / 1-02, approved by MLPTL with order 1568 / 15.10.02 (*in Romanian: Ghid privind elaborarea devizelor la nivel de categorii de lucrări și obiecte de construcții pentru investiții realizate din fonduri publice– indicativ P 91/1-02*);
 9. Law no. 10 of January 18, 1995, on quality in constructions, (*in Romanian: Legea nr. 10 din 18 ianuarie 1995 privind calitatea în construcții*), published in the Official Gazette no. 12 of January 24,

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- 1995, republished in the Official Gazette, Part I no. 765 of September 30, 2016;
10. Law no. 97/2019 for the amendment and completion of Law no. 10/1995 on quality in constructions, (*in Romanian: Legea nr. 97/2019 pentru modificarea și completarea Legii nr. 10/1995 privind calitatea în construcții*), Official Gazette, Part I no. 359 of May 9, 2019;
11. Law no. 204/2020 for the amendment and completion of Law no. 10/1995 on quality in constructions, *in Romanian: Legea nr. 204/2020 pentru modificarea și completarea Legii nr. 10/1995 privind calitatea în construcții*), Official Gazette no. 858 of September 18, 2020;
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