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## **METHODOLOGY REGARDING THE MANAGEMENT OF CONSTRUCTIONS’ DECOMMISSION AND DEMOLITION AND THE CAPITALIZATION OF THE RESULTING MATERIALS**

BY

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**Abstract.** In this paper, the authors present a methodology for the demolition of buildings, based on research carried out previously. Thus the authors propose a methodology regarding the management of constructions’ decommission and demolition and the capitalization of the resulting material, called DEMCON. The methodology describes in a detailed way the main stages that make up a demolition project, its execution starting from the idea of demolition up to the freeing of the support-terrain and the capitalization of the resulting materials.

**Key words:** DEMCON; demolition; site; methodology; management.

### **1. Introduction**

In Romania, and not only here, the lack of a legislation referring to the rules applied within demolition projects leads to the apparition of different problems during the development of the works. This thing happens because there are not taken into account certain factors that appear at the same time with

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the development of the works and because of the lack of qualified personnel in the field of constructions' demolition.

The research performed by the authors, previously presented, discloses the need to elaborate and propose a methodology regarding the management of constructions' decommission and demolition and the capitalization of the resulting material.

Thus the authors propose a methodology regarding the management of constructions' decommission and demolition and the capitalization of the resulting material, called DEMCON.

In this work the authors present the three blocks that are part of the methodology, insisting more on the human resources block, intending to return to the other two blocks in a future works.

## 2. The Aims of the Methodology

DEMCON is keen on the developing of some methods and procedures, of some lists with steps that must be followed for a good unrolling of a demolition project. The methodology describes in a detailed way the main stages that make up a demolition project, its execution starting from the idea of demolition up to the liberation of the support-terrain and the capitalization of the resulting materials.

## 3. The Description of the Methodology

The methodology is presented under the form of a scheme that has in its structure three distinctive blocks:

- a) human resources block;
- b) economic block;
- c) organizational, technical and technological block.

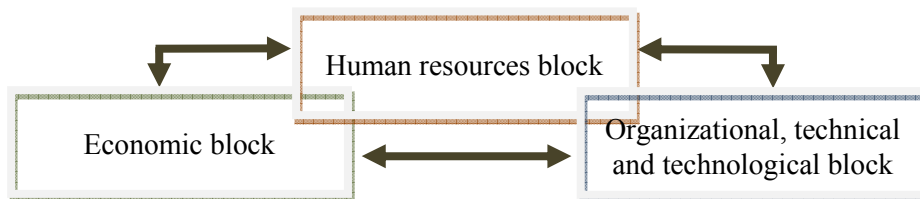


Fig. 1 – Scheme regarding the management of the demolition works and the capitalization of the resulting materials.

### 3.1. Human Resources Block

*The human resources block* in Fig. 2 gathers a series of activities through which there are assured *the planning, procuration, maintaining and*

*developing* of the most important resources, the human ones, respectively. These activities are done by the managers with the substantial support, mostly in the big organizations, of some specialists with skills and advanced knowledge in the field.

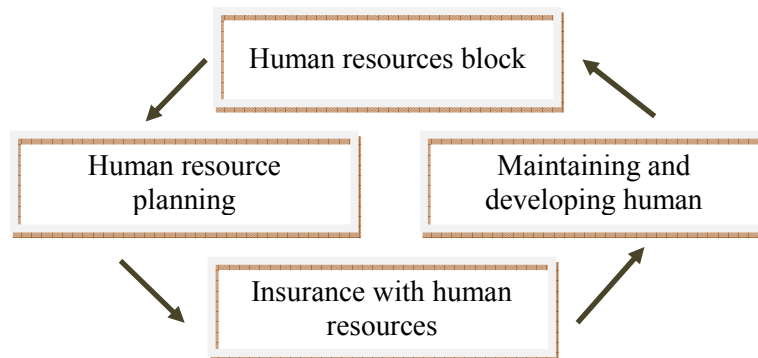


Fig. 2 – Human resources block.

Within a demolition project, the planning of the human resources must be done in concordance with the necessity that results from the contracting of the demolition project.

Human resources planning (Fig. 3) is done at one time with the planning and the programming of the demolition project.

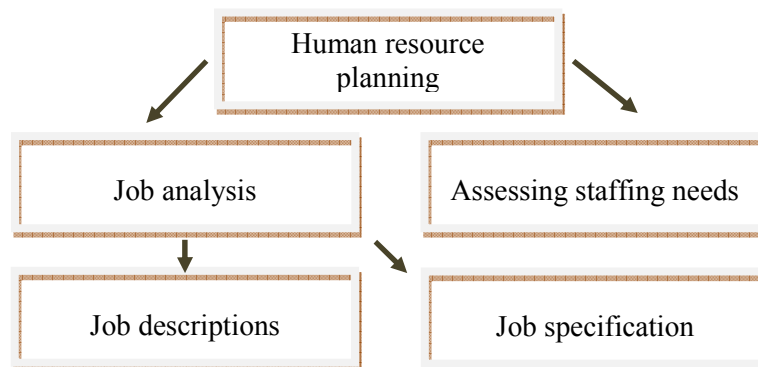


Fig. 3 – The planning of the human resources.

If the personnel that is indispensable for the execution of the project is smaller than the personnel available in the company, then there can be hired on a determined period a number of people to complete the necessary labour force. If the projects are placed at great distances and the building of some spaces for

workers' rest is imposed, then there will be studied the level of the labour market in that area and there will be investigated the availability of the local qualified personnel.

Assuring the human resource can be done by recruitment or by selection as in Fig. 4.

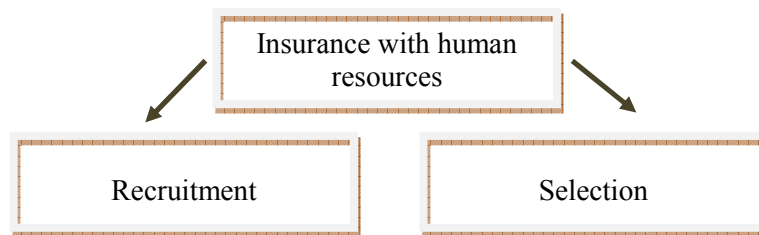


Fig. 4 – Assuring the human resources.

The selected workforce determines predictable costs and an optimal exploitation. Assuring the human resources has the following advantages:

- a) Long term predictability (the reduction of insecurity and risk elements) the own employees can concentrate upon productive activities;
- b) The professional competence of the personnel improves (knowledge transfer).

Knowing that assuring qualified personnel is a crucial condition for a good development of a demolition project, there is proposed the plan represented in Table 1.

**Table 1**  
*Plan Assuring the Human Resources*

Company ...			Made by...		
Project title ...			Document number ...		
Human resources insurance plan			Date ...		
No.	Responsibilities	Labor			Level of insurance, [%]
		Required	Available	Deficiency	
1.					
2.					
3.					
...					

To finish in time the demolition works there is imposed the right choosing of the workforce, with the necessary skills and experience (Table 2).

**Table 2**  
*The Plan of Distribution of the Human Resource*

Company ...				Made by...	
Project title ...				Document number ...	
The plan of distribution of the human resource				Date ...	
Position	Required persons	Responsibilities	Skills experience	Start dDate	Finish date
Site manager					
Team manager					
Qualified workers					
Unskilled workers					

There can be made a plan of the human resources distribution by which can be established a calendar of employment of the human resource during the development of the works, as in Table 3.

**Table 3**  
*The Employment of the Human Resource*

Company ...				Made by...																								
Project title ...				Document number ...																								
The human resource schedule...				Date ...																								
Position	Days planning																											
Site manager																												
Team manager																												
Qualified workers																												
Unskilled workers																												

The safety at the work place is very important, because during the execution of a demolition, no matter the applied method, the risks of injuring are very high. The risks for workers' health and safety are identified with the help of a proper evaluation before the beginning of the works (Fig. 5).

Working site's security standards must be maintained in any moment because demolition works have a spectacular character and can catch very quickly the eyes of the passersby or of the children, who can consider it a playground.

Continuing the determination of the known risks for the safety of workers, there will be used protection equipments imposed by the activity that each of them perform (footwear, gloves, clothes from frazzle-proof materials, protection helmet that does not reduce the visibility and the attention of the worker).

Depending on the working environment (areas with installations and flammable materials, flooding, closed unventilated spaces) there will be established means, methods and ways of evacuation, if it is imposed.

There will be made a health and safety plan for a working site as in Table 4.

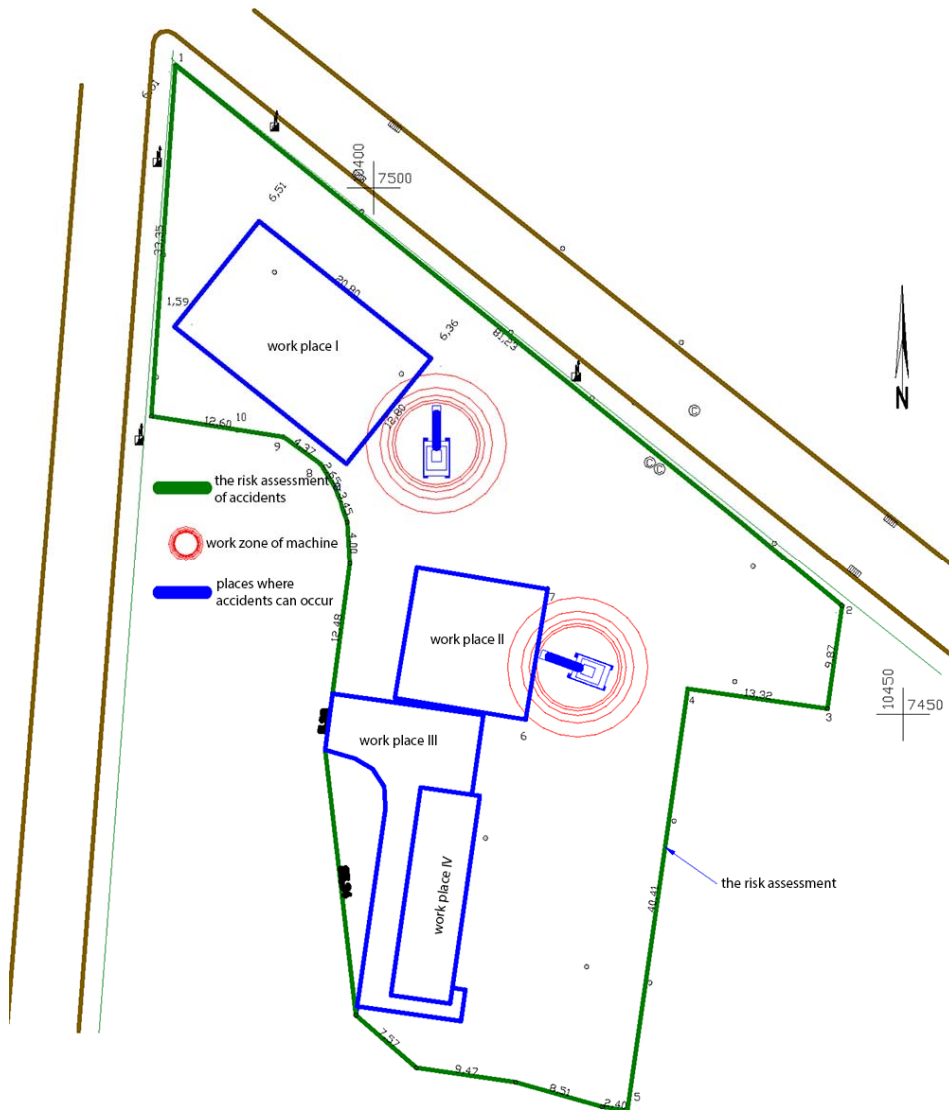



Fig. 5 – Evaluating and establishing the areas with a risk of injuring.

**Table 4**  
*Health and Safety Plan for a Working Site*

Company...		Made by...			
The title of the project ...		Document number...			
Health and safety plan for a working site		Date...			
Danger	Risk	Measures/Actions for the implement of the measure	Responsible	Deadline	Verified
Labour hygiene	3	<ul style="list-style-type: none"> <li>- Assuring toilets.</li> <li>- Assuring a source of drinkable water.</li> <li>- Assuring cloakrooms.</li> </ul>	Project manager	Before the activity	Ongoing
Labour accidents	5	<ul style="list-style-type: none"> <li>- Equiping with first aid kits.</li> <li>- Periodic instruction of a sufficient number of workers on first aid matters.</li> <li>- The instruction of all the workers concerning the obligativity of using the protection equipment on the working site.</li> </ul>	Project manager	Before the activity	Ongoing
Electricity	5	<ul style="list-style-type: none"> <li>- The installation of a organization electrical pannel with verified earthing.</li> <li>- The purveyance of electrical vehicles and tools in conformity with legal stipulations.</li> </ul>	Electrician	Before the activity	Ongoing
Internal transportation	3	<ul style="list-style-type: none"> <li>- The definition of the access ways, of the places of storage of waste on the working site's situation plan.</li> <li>- The observance of the demands for the installation places of the machinery (cranes – if it's imposed, crushers for grinding rubble.</li> </ul>	Project manager	Before the activity	Ongoing
Environment	3	<ul style="list-style-type: none"> <li>- The analysis of the to-be-demolished building in order to discover the main sources of pollution and the evaluation of the measures that can be taken in order not to pollute the environment factors.</li> <li>- The enclosing of the working site.</li> </ul>	Project manager	Before the activity	Ongoing
Other information	4	<ul style="list-style-type: none"> <li>- The informing regarding the eventual underground installations from the public infrastructure that weren't deviated or turned off.</li> <li>- The elaboration of the instructions regarding the dangerous works.</li> </ul>	Project manager	Before the activity	Ongoing
Dangers resulted from manipulating and driving vehicles and machinery		<ul style="list-style-type: none"> <li>- Using the equipment adequate to the manipulation of machinery.</li> <li>- The inspection before the beginning of work, of the functioning at normal capacities.</li> <li>- The respecting of the minimum distances to the cracking, cutting, lifting machines, etc.</li> </ul>	Workers	Before and during the activity	Ongoing
Dangers that can derive from the structure's instability or the fall of pieces of materials from height		<ul style="list-style-type: none"> <li>- Assuring the working equipments according to the stipulations.</li> <li>- The use of protection pannels for preventing the fall of concrete pieces.</li> <li>- Assuring the structural elements against decaying or overturning by mounting the scaffolds and the platforms of catch.</li> <li>- The periodic inspection of the elements that support and sustain.</li> </ul>	Building engineer	Before and during the activity	Ongoing

Therefore, after the model in Table 4 there will be filled the plan of prevention and protection in Table 5 with the information from the territory of the working site.

**Table 5**  
*Prevention and Protection Plan*

Company...			Made by...		
The title of the project ...			Document number...		
Health and safety plan for a working site			Date...		
Description of assessment area:		Situation plan			
Workers:					
Work equipment:					
Materials and chemicals:					
Labour organization:					
Danger	Risk	Measures / actions in order to achieve the measure	Manager	Dead line	Tested

### 3.2. Human Economic Block

Has in its composition aspects linked with auctions, contracts and the costs of the demolition.

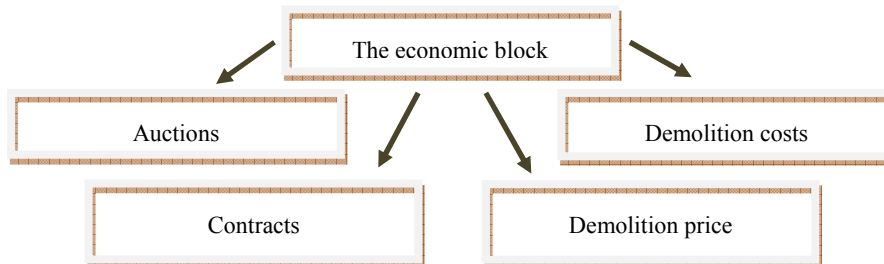


Fig. 6 – The structure of the economic block.

Aspects and documents that must be taken into consideration when preparing the auction contracts and documentation are the followings:



- a) a plan of situation in the area the structure that is to be demolished;
- b) plans through which to be established the localization of the object that is to be demolished and of its surroundings; this way there will be known exactly the distances to the surrounding constructions and their type;
- c) plans got from public services providers by which to be presented the alignment, the position and the depth of the distribution networks that they own;
- d) plans with the roads by which the access to the working site can be established, and if they have certain restrictions, there will be attached a document with the periods available for traffic;
- e) stipulations regarding the establishing of the terms and conditions of works' finalization and the establishing of some contractual stipulations;
- f) the taskbook of the works, where the demands need to be clear and devoid of ambiguity; all these notices and plans described ahead should be a part of an annex of the taskbook;
- g) the preparing of the assignment documentation and a documentation regarding the estimated costs and the final price;
- h) by the procedure of auctioning there must be hired at the demolition of the proposed objective a company that has the necessary competence and resources depending on the project's demands and complexity.

The dimensioning of the total cost of realization of a demolition project is

$$C_T = C_{AS} + C_{LP} + C_{PE} + C_E + C_D + C_{EA*} - P_{VM*}, \quad (1)$$

where:  $C_T$  represents the total cost of realizing a demolition project;  $C_{AS}$  – parameter that accents the group of costs concerning the enclosing and enhancing the site;  $C_{LP}$  – parameter that belongs to evaluating the costs of the works preceding demolition;  $C_{PE}$  – parameter that accents the group of costs concerning the activities of projecting and guidance;  $C_E$  – parameter that accents the group of costs concerning the demolition's execution;  $C_D$  – parameter that accents the group of diverse and unforeseen costs concerning the project's realization;  $C_{EA}$  – parameter that belongs to the costs of settlement's liberation;  $P_{VM}$  – parameter that represents the profit obtained as a result of delivering the materials resulted from demolition; \* parameters ( $C_{EA}$  and  $P_{VM}$ ) are taken into account only when the activities of settlement's liberation and the salvaging the resulting materials fall to the company that takes care of the demolition project's execution.

The dimensioning of the total price of a demolition price is obtained with relation

$$P_T = P_1 + P_2 + P_3 + P_4 - V_T, \quad (2)$$

where:  $P_T$  is the total price of the project;  $P_1$  – the price for the feasibility study;  $P_2$  – the projecting price;  $P_3$  – the price for execution;  $P_4$  – the price of the

materials' capitalization;  $V_T$  – the total income obtained after materials' capitalization.

### 3.3. The Organizational – Technical – Technological Block

This block presents itself under the form of a logical schema, as in Fig. 7.

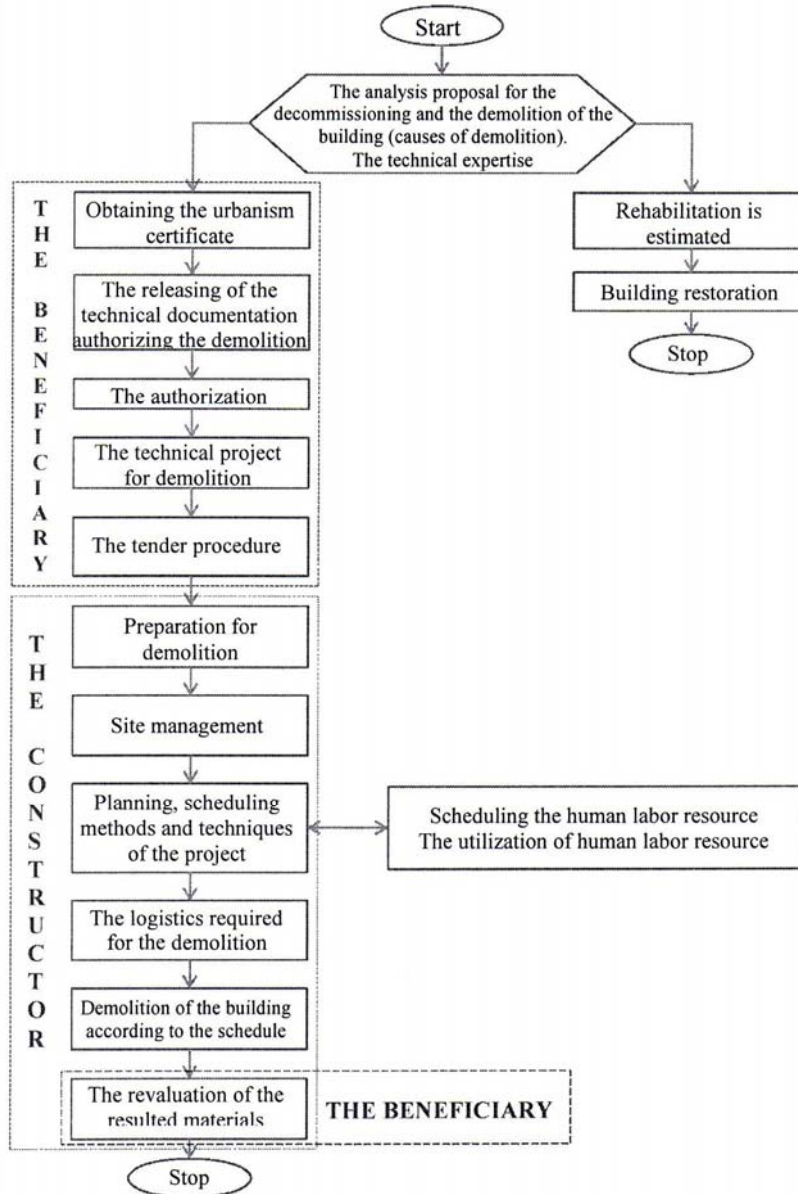


Fig. 7 – The structure of the organizational – technical – technological.

In this block there can be observed that there are activities which the beneficiary must take care of and activities specific to the constructor.

The capitalization of the resulting materials is a part of the last stage of the project and it can be done by the beneficiary or by the constructor, depending on the initially established contractual stipulations.

The demolition project should be conceived in such a manner that should exist the possibility of materials' optimal retrieval, this thing meaning minimization of the contaminated waste and the maximization of the possibility of recycling and reusing the obtained resources.

The study of the to-be-demolished objective and of the working site should offer us an estimation of the waste that will result from the demolition, a quantitative, as well as a qualitative one. By this estimation there can be planned ways of stocking up and retrieving the materials.

In Fig. 8 we emphasized the main factors that interfere in the management of environment protection and of materials' capitalization.

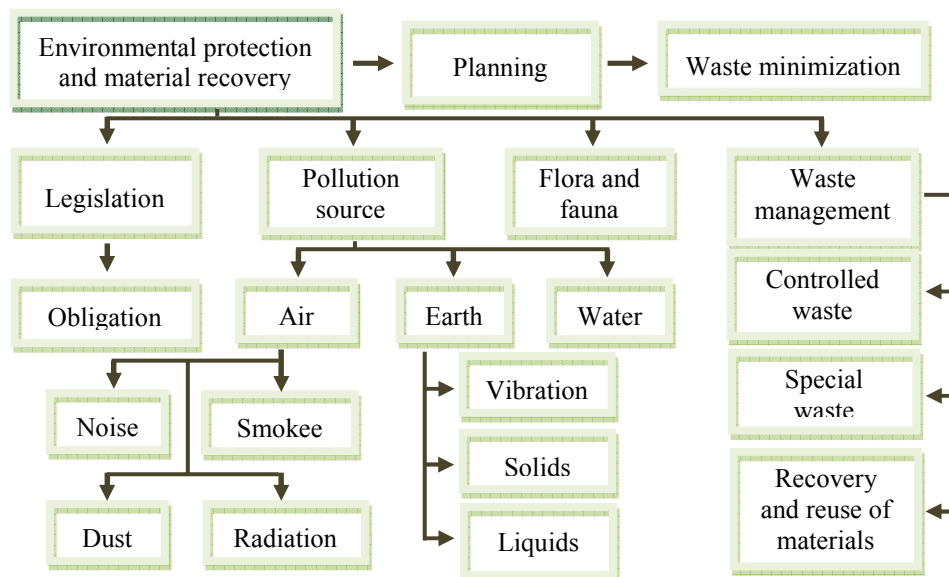


Fig. 8 – Environment protection and capitalization of the resulting materials.

#### 4. Conclusions

By elaborating and proposing this methodology and its division in blocks (human resources block, economic block, organizational, technical and technological block), the authors want the realization of a further step for the project managers who perform such demolition activities, who are involved in programming, leading and coordinating the constructions' demolition works.

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**METODOLOGIE PRIVIND MANAGEMENTUL DEZAFECTĂRII ȘI DEMOLĂRII  
CONSTRUCȚIILOR ȘI VALORIFICAREA MATERIALELOR REZULTATE**

(Rezumat)

Se prezintă o metodologie pentru demolarea construcțiilor, bazată pe cercetarea făcută anterior de către unul din autori.

Metodologia DEMCON este alcătuită din trei blocuri de comandă și urmărește dezvoltarea unor metode și proceduri, a unor liste de pași care trebuie urmați pentru buna derulare a unui proiect de demolare.

Metodologia descrie detaliat principalele etape care alcătuiesc un proiect de demolare, execuția acestuia, plecând de la ideea de proiect pentru o demolare, până la eliberarea terenului suport și valorificarea materialelor rezultate.