

Designing construction workmanship of the revitalization of the Park of John Paul II - Pope Pilgrim in Łomża

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Abstract

Construction objects are subject to wear, damage or destruction during operation. In order to restore their glory, they require revitalization. The article presents a comprehensive process of designing the construction workmanship of the revitalization of the John Paul II - Pope Pilgrim Park in Łomża, thanks to which the park will continue to serve as a place of relaxation and rest for the local community.

Due to the criterion of time in relation to the period of construction of the building, the article discusses superstitions and customs specific to the following stages of the investment: preparatory works and design, direct implementation and operation and operation.

Keywords: revitalization, building structures, execution of construction works.

1 Introduction

Revitalization is a process of removing degraded areas from the state of crisis, carried out in a comprehensive manner, through integrated activities for the benefit of the local community, space and economy, territorially concentrated, carried out by revitalization stakeholders on the basis of the municipal revitalization program [3]. In the definition of this explanation requires the concept of the so-called degraded area. According to the law on degraded areas is an area where at least one of the following negative phenomena occurs:

- economic – in particular the low degree of entrepreneurship, the poor condition of local enterprises,
- environmental – in particular exceeding environmental quality standards, the presence of waste posing a threat to life, human health or the state of the environment,
- spatial-functional – in particular insufficient equipment with technical and social infrastructure or its poor technical condition, lack of access to basic services or their low quality, failure to adapt urban solutions to the changing functions of the area, failure to adapt the infrastructure to the needs of people with special needs,
- technical – in particular degradation of the technical condition of construction works, including those for residential purposes, and non-functioning of technical solutions enabling effective use of construction works, in particular in the field of energy efficiency, environmental protection and ensuring accessibility for people with special needs [3].

The revitalization process is related to socio-economic policy and spatial policy in the socio-economic sphere – the Revitalization Act, and in the spatial sphere – the Act on Spatial Planning and Development [7].

Revitalization stakeholders are entities (individuals, communities, institutions, organizations, offices) that can influence the running organization and are influenced by its activities. In Poland, European Union funds are also of great importance in the revitalization process, which in many cases are the basic source of financing revitalization programs and projects.

The implementation of the revitalization process includes the following stages and activities:

- preparation stage:

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- conducting analysis and diagnosis,
- the establishment of a coordinating body,
- development of vision and strategy,
- analysis of revitalization options,
- the economic justification of the option chosen,
- revitalization program,
- determining the methods of financing,
- implementation stage:
 - development of design and executive documentation,
 - execution of construction works related to the implementation of revitalization [16].

2 Design of construction contracting

A building object *m* is a building, structure or object of small architecture which is created as a result of the implementation of a construction process [5, 9]. The construction process in terms of engineering and technology is the execution of an object on the construction site, i.e. the practical implementation of construction works. Works carried out directly on the construction site, with simple hand tools, can be carried out intuitively, based on the experience and skills of the workers. Works carried out in the execution of complex objects should be carried out according to the executive design.

The detailed design is secondary to the construction project, since the detailed design is always created in relation to a specific construction project [11, 12]. The envisaged solutions from the construction project in the executive design are clarified by describing the technical parameters of their construction. The information contained in the detailed design is to specify, on the one hand, the solutions provided for in the construction project, and on the other hand, to be as useful as possible for those performing the activities of the construction process. The executive draft should include, inter alia:

- information about materials, format, arrangement, construction of solutions provided for in the construction project,
- information about the connections of the structure,
- information on the reinforcement of individual elements,
- additional information to minimise the risk that construction contractors will make critical errors [8].

According to practitioners, the development of an executive design makes the construction process faster, there are fewer errors and waste of materials.

Information on the executive design can be found in the legal regulation [12], which introduces the concept of project documentation. The design documentation in accordance with that Regulation is used to describe the subject of the contract for the execution of construction works. It shall consist in particular of:

- construction design to the extent taking into account the specificity of the works;
- executive designs, which should complement and detail the construction project to the extent and degree of accuracy necessary to prepare the bill of quantities, investor's cost estimate, preparation of the offer by the contractor and implementation of construction works;
- the bill of quantities of works, which should contain a list of the basic works to be carried out in the technological order of their execution together with their detailed description and an indication of the appropriate technical specifications for the execution and acceptance of construction works, with a calculation and summary of the number of units of basic works;
- safety and health information where there is a need to develop it.

Detailed designs should include drawings on a scale taking into account the specificity of the ordered construction works and the use of scales and drawings in the construction project, together with descriptive explanations, in relation to:

- the object or part thereof,
- construction, construction and material solutions,
- architectural details and construction equipment,
- installations and technical equipment, so that they contain information necessary to create the price of the offer and the execution of construction works.

Detailed projects should be developed into groups of works resulting from the Common Procurement Vocabulary, i.e.:

- construction works for the erection of complete objects including finishing works,
- works in the field of construction installations,
- works related to land development.

The requirements for the form of executive designs are the same as for a construction project. The solutions contained in the implementing projects, as part of the detailing of the projects, should not introduce derogations of a material nature, and the design solutions contained in the individual implementing projects should be mutually consistent and coordinated between designers and checked in a manner analogous to the construction project being checked.

Detailed designs within the framework of the design documentation are made available to tenderers participating in public proceedings for the execution of construction works. They shall form the basis for tenderers to prepare and submit a tender. As part of the bidders' questions on the tender documents, questions are raised regarding the provision of explanations if the project documentation is ambiguous or defective.

Detailed designs are fully handed over to the selected contractor and are the basis for the execution of works, their control and acceptance of the works carried out and the final acceptance of the completed construction works. They also constitute, after any changes introduced during the execution of works, the basic component of as-built documentation, which is the basis for the use of completed objects and should constitute the main annex to the book of operation of the construction object.

Technological and organizational documentation may be helpful in the implementation of construction works [15]. The purpose of developing technological and organizational documentation is to obtain an optimal solution of construction technology, proper planning and proper organization of implementation in specific construction conditions. This documentation enables the efficiency of production activities and the economics of construction.

A typical design of construction works technology should include:

- a technical characteristics of the task and conditions for its implementation,
- a list of elements of the facility or processes (works, activities) that make up a specific investment task indicating the order of their execution and size,
- a description of the technology of the main processes specifying the methods of their implementation, the selection of machines and auxiliary equipment and transport units, diagrams of the operation of machines, drawings of forming devices, scaffolding and other special structures necessary for the adopted technology and the technology of performing specific construction processes in winter conditions [15].

An example of a procedure for designing process technology is shown in Figure 1.

The project of organization of works presents the course of construction work in time. Based on the design of the technology, it is necessary to determine the number of working brigades and the duration of individual works. Next, develop a network of dependencies between individual works and present the construction process in a graphic form in the form of a schedule, which consists of a summary of the work related to the entire construction, regardless of its size and level of complexity regarding the employment and (employment schedule), machines (machine work schedule), material (material supply schedule). And these formations will allow to develop the development of the construction site, which serves to improve and secure future construction works. The construction site development project is

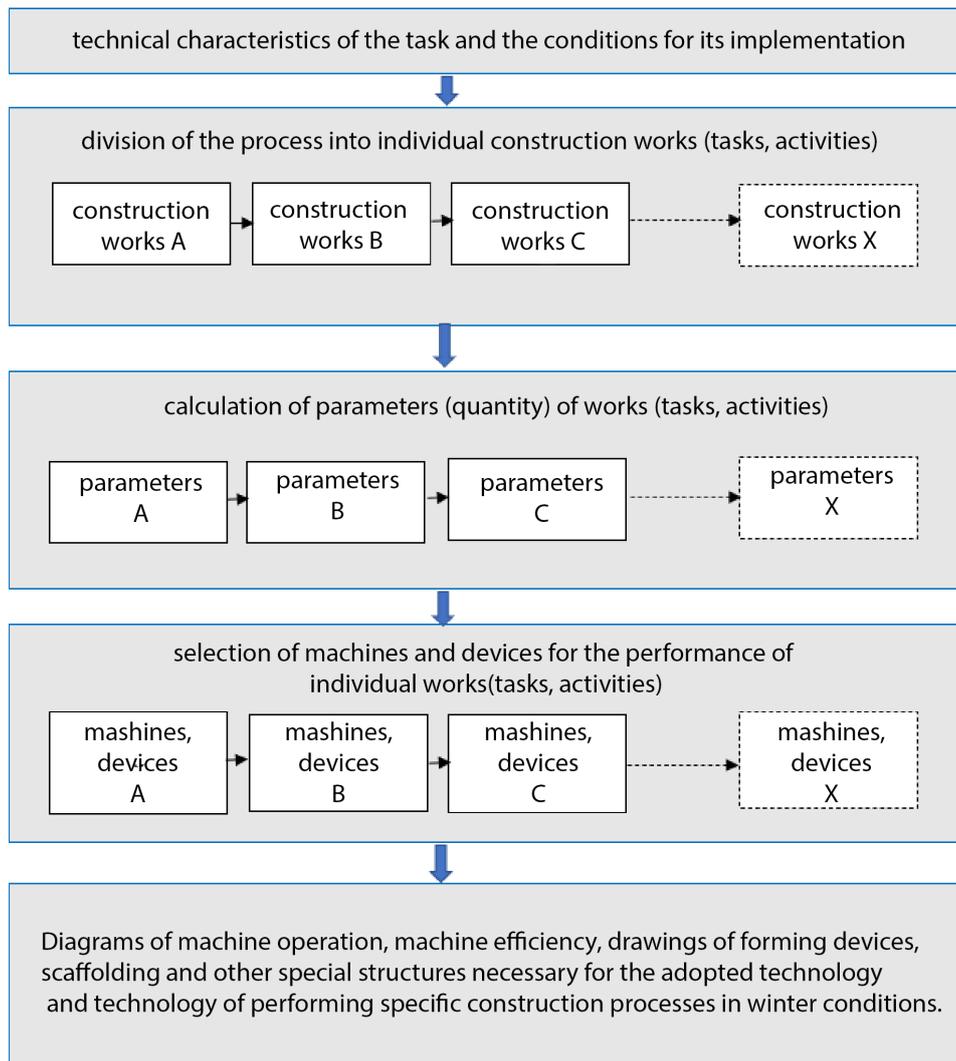


Figure 1. Diagram of the design procedure for building process technology

suedby rationally using resources (people, materials, equipment) and deploying them properly on the construction site during the construction process.

The safe course of the construction process is also important [10]. Safety at work on the construction site is provided by a safety and health protection plan, the so-called bioz plan, in which the risks that may occur during the works and methods of protection against these hazards should be characterized. This document consists of a descriptive and graphic part. In the graphic part (on the copy of the development of the construction site) the location of these hazards during the works should be presented [1, 4, 13].

3 Characteristics of the construction project

The construction project "Revitalization of the John Paul II – Pilgrim Pope Park in Łomża" is implemented as part of a project co-financed by the European Union from the Cohesion Fund under the Operational Programme Infrastructure and Environment 2014 – 2020. Priority Axis II: Environmental Protection, including adaptation to climate change, Measure 2.5. Improving the quality of the urban environment.

The project in question is implemented on an area of 6.07 ha in the form of additional infrastructure elements, i.e. playgrounds, paths, monitoring, connection and network, toilet, fountain, brine graduation tower, lighting and park equipment in the form of pedestrian routes. The location of the construction project is shown in Figure 2.

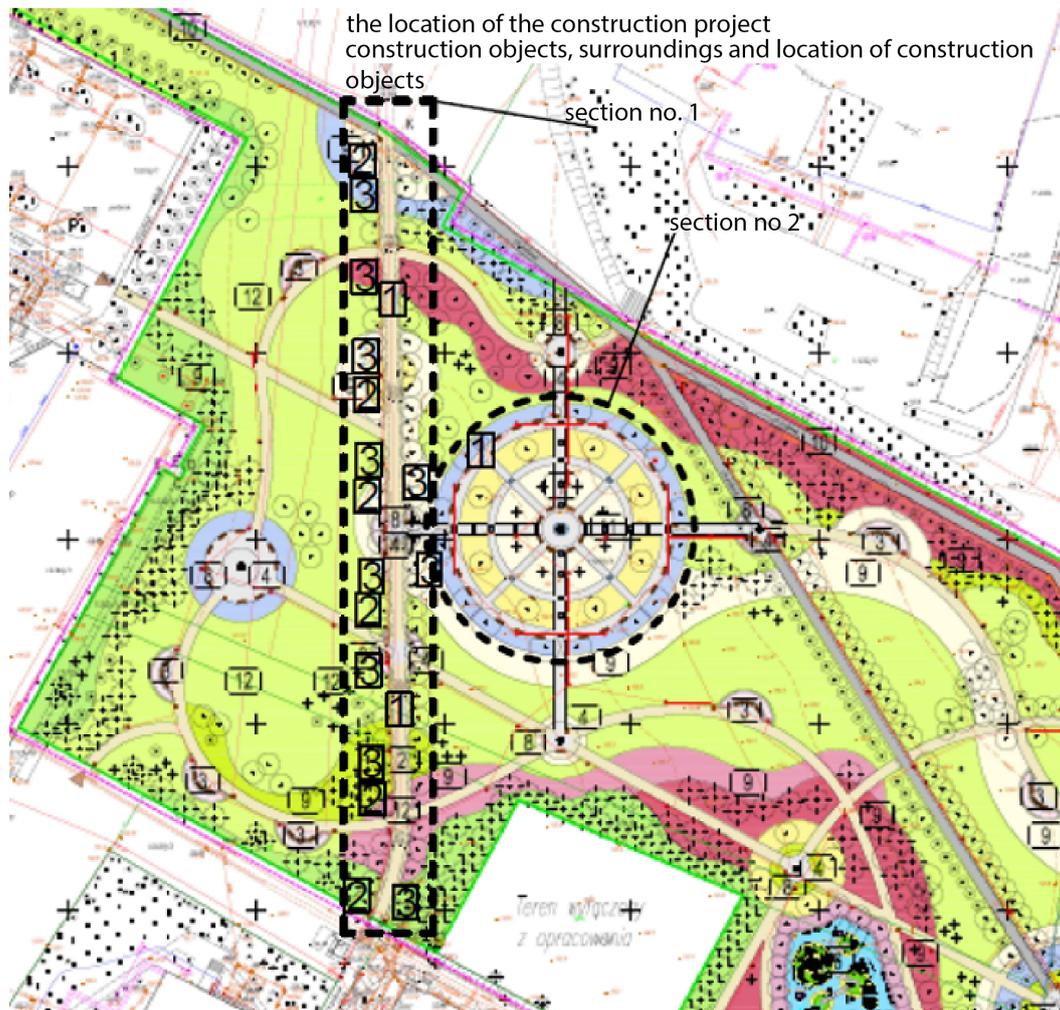


Figure 2. Location of the project [11]

The main goal of the project was to stop the decline in the area of green areas and to increase the investment and natural attractiveness of the area of the city of Łomża as a green city. The value of the project was – PLN 4,996,966.00 and the co-financing amounted to PLN 1,987,143.35.

The technical characteristics of the project concerned: soil and water conditions; communication routes (roads); lanterns; benches and trash cans.

Analyzing the soil and water conditions, it was not found that there was a need to determine the geotechnical conditions of the foundation of buildings in accordance with the adopted legal classification adopted [14]. The category of land was adopted taking into account the assessment of designers. 3 geotechnical wells were drilled, which showed a large variation in the thickness of the layer of the main bed and the type of stromal rock and the parent rock. This layer was qualified for the soil of the cult from medium to high. Studies have indicated that soil moisture is beneficial for plants, which they will assess as fresh. Among the parent rocks in the zone of root range, there are new sandy loamy formations, beneficial for the growth of the root system of trees and shrubs. Soil conditions were assessed as favorable and universal, which allow the proper development of a wide group of plants. Based on the results of soil and water research, the type and amount of equipment needed were selected, as well as the type of construction of the communication path.

In the construction project, two communication routes / sections with a width of 5 m and lengths of 200m and 180m were adopted. For both strings / sections, a construction typical of light traffic load, i.e. for kr1 category roads, was adopted due to the fact that this section intended for bicycle and pedestrian traffic, therefore the loads that the

road structure will have to carry will be small. A typical construction was adopted based on the Catalogue of typical susceptible and semi-rigid surfaces published by the General Directorate for National Roads and Motorways [6]. The structural layout of the strings is presented in table 1.

Table 1. Ustructural structure of the communication routes [10]

Layout of communication routes	
Section 1	Section 2
Bottom layer of broken aggregate foundation, layer thickness after compaction 25 cm	Bottom layer of broken aggregate foundation, layer thickness after compaction 20 cm
Base made of mineral-bituminous mixture with asphalt binder AC 16P 50/70 as for KR-1-2 - layer thickness after compaction 8 cm	Basic foundation made of mineral-bituminous mixture with asphalt binder AC 16P 50/70 as for KR-1-2 - layer thickness after thickening 10 cm
Asphalt binding layer - surface made of mineral-bituminous grit-gravel mixtures - CA/16W 50/70 according to PN as for KR-1-2 - thickness after compaction 8 cm	Asphalt binding layer - surface made of mineral-bituminous grit-gravel mixtures - CA/16W 50/70 according to PN as for KR-1-2 - thickness after compaction 8 cm
Asphalt abrasion layer - surface made of mineral-bituminous grit-gravel mixtures - with AC11S50/70 as for KR-1-2 - thickness after compaction 5 cm	Asphalt abrasion layer - surface made of mineral-bituminous grit-gravel mixtures - with AC11S50/70 as for KR-1-2 - thickness after compaction 3 cm

The project uses typical lanterns built of a prefabricated foundation (Fig. 3), a pole with or without a boom and a hole for mounting lantern attachments (Fig. 4) and a light fixture (Fig. 5).

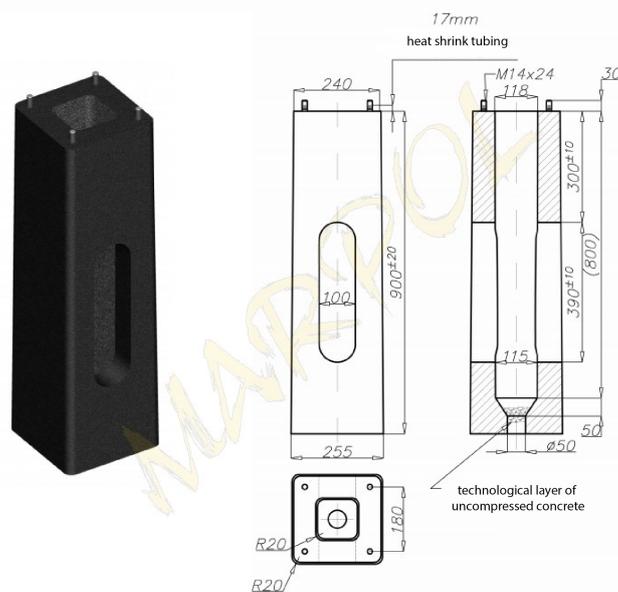


Figure 3. Prefabricated foundation [1]

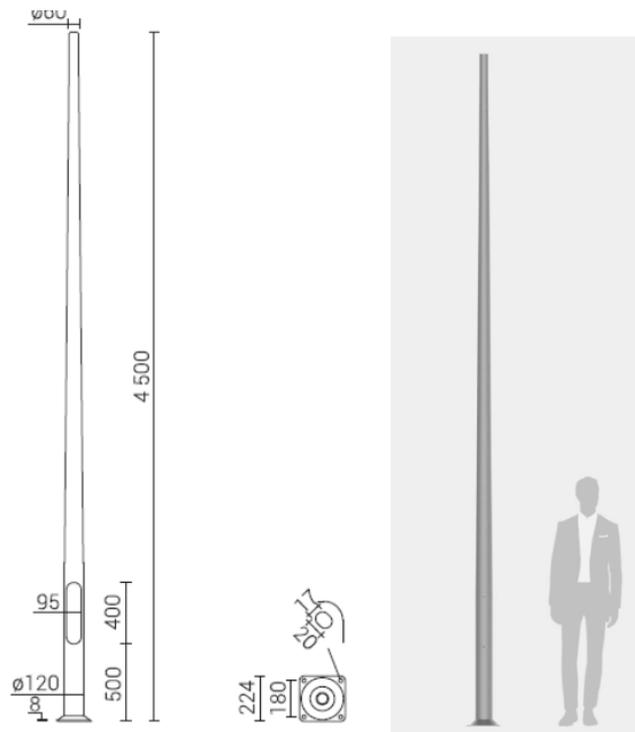


Figure 4. Steel booty [2]



Figure 5. Typical luminaires [2]



Figure 6. Bench and basket with a classic and elegant appearance and a design that increases its resistance to vandalism [13]

In addition to the designed communication route, benches and a basket were designed in a bench-basket arrangement. Due to the purpose, i.e. weather conditions and universal access of benches and baskets for the city, it was decided to choose an object built of metal and wood. This choice was dictated by the functional properties and resistance to damage caused by weather conditions and mechanical damage and aesthetic considerations. The proposed work had a classic and elegant appearance with a design that increased its resistance to vandalism, because thicker and wider boards were used, each of the boards was fixed through with four screws (Fig. 6). The boards were made of seasoned spruce wood, chamfered on all edges, protected with a layer of primer paint and 3 spray-painted with varnish, the bench was mounted on the base. The base was made of cast iron, which was equipped with holes allowing for permanent attachment of the bench to the ground. The bottoms were protected with primer paint and painted with chlorinated rubber paint which gave a slight shine. The adopted solutions meant that the profile of the bench provides high comfort of rest.

4 Construction contracting project

On the basis of the construction project, a construction project was developed, in which types, commonly available construction and material solutions were used, as well as selected machines that were efficient for this type of work (bituminous mass spreader, crawler dozer, static self-propelled roller, self-propelled vibrating roller, self-unloading car, backhoe loader, self-propelled grader).

The scope of the project included:

- identification of the construction process (Fig. 7),
- calculation of the number of works: bill of quantities for section 1 (Table 2), bill of quantities for section 2 (Table 3),
- selection of machines for construction work, including earthworks and paving works (Figure 7),
- calculated efficiency of machine work,
- preparation of the development plan of the construction site (Fig. 7a, 7b),
- on the work of safety and health: descriptive part, graphic part (Fig. 10),
- economic analysis (Tab.4, Tab.5).

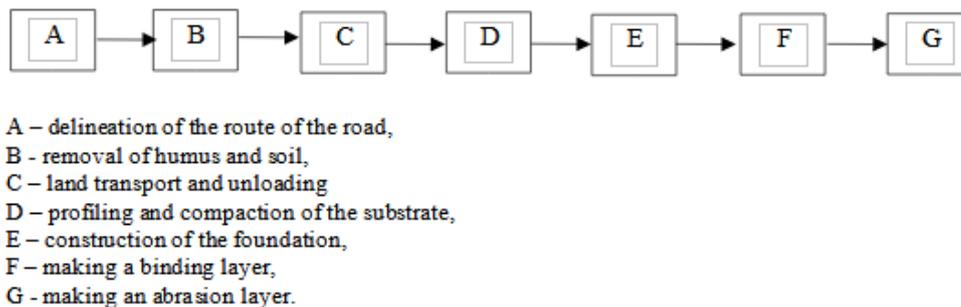


Figure 7. Diagram of the process specifying the construction works [13]

Table 2. Bill of quantities for section 1 [13]

No	Valuation basis	Description	Unit	Quantity
PREPARATORY WORKS CPV 45111200-0				
1	KNR 2-01 0119-03	Measurement works for linear earthworks - route of the road in plain terrain, including as-built inventory 180 m	km	0.180

Table 2. Bill of quantities for section 1 [13]

No	Valuation basis	Description	Unit	Quantity
EARTHWORKS CPV 45110000-1				
2	KNR 2-01.0126/02	Removal of the layer of fertile soil (humus) with dozers. Layer thickness up to 12 cm $180*2=360$	m2	360
3	KNR 01-203/020603/0214	Earthworks carried out with backhoe excavators with a capacity of buckets 0.60 m3 in the ground category I-II with transport of spoil by car $180*2*0.12=43.2$	m3	43.2
4	KNR 2-010235-02	Forming and compaction of embankments $180*2*0.12=43.2$	m3	43.2
5	KNNR 60103-03	Profiling and compaction of the substrate performed mechanically for structural layers of the road surface $180*2=360$	m2	360
CPV SUBSTRUCTURE 45233320-8				
6	KNNR 050-030-60113	Bottom layer of broken aggregate foundation, layer thickness after compaction 20 cm $180*2=360$	m2	360
7	KNR 2-311004-07	Sprinkling of the aggregate foundation stabil. moss. asphalt emulsion in the amount of 0.7-1.0 kg/m2 $180*2=360$	m2	360
8	KNR 2-310108-02	Basic foundation made of mineral-bituminous mixture with asphalt binder AC 16P 50/70 as for KR-1-2 - layer thickness after thickening 10 cm $180*2=360$	m2	360
BITUMINOUS SURFACE CPV 45233220-7				
9	KNR 2-311004-07	Sprinkling of the aggregate foundation stabil. moss. asphalt emulsion in the amount of 0.7-1.0 kg/m2 $180*2=360$	m2	360
10	KNNR 60308-0101	Surface made of mineral-bituminous grit-gravel mixtures - CA/16W 50/70 according to PN as for KR-1-2, asphalt binding layer - thickness to compaction. 8 cm $180*2=360$	m2	360
11	KNR 2-311004-07	Mechanical cleaning and sprinkling of the following subb. Bitumen. asphalt emulsion with a moisture content of 0.1-0.3 kg/m2	m2	360
12	KNR 2-310311-050311-06	Surface made of mineral-bituminous grit-gravel mixtures - asphalt abrasion layer with AC11S50/70 as for KR-1-2 - thickness after compaction 3 cm $180*2=360$	m2	360

Table 3. Bill of quantities for section 2 [13]

No	Valuation basis	Description	Unit	Quantity
CPV 45233162-2 Bicycle Path Construction Works				
PREPARATORY WORKS CPV 45111200-0				
1	KNR 2-01 0119-03	Measurement works for linear earthworks - route of the road in plain terrain, including as-built inventory 180 m	km	0.180
EARTHWORKS CPV 45110000-1				
2	KNR 2-01. 0126/02	Removal of the layer of fertile soil (humus) with dozers. Layer thickness up to 12 cm $180*2=360$	m2	360
3	KNR 01-2 03/0206 03/0214	Earthworks carried out with backhoe excavators with a capacity of buckets 0.60 m3 in the ground category I-II with transport of spoil by car $180*2*0.12=43.2$	m3	43.2
4	KNR 2-01 0235-02	Forming and compaction of embankments $180*2*0.12=43.2$	m3	43.2
5	KNNR 6 0103-03	Profiling and compaction of the substrate performed mechanically for structural layers of the road surface $180*2=360$	m2	360
CPV SUBSTRUCTURE 45233320-8				
6	KNNR 050-030- 60113	Bottom layer of broken aggregate foundation, layer thickness after compaction 20 cm $180*2=360$	m2	360
7	KNR 2-31 1004-07	Sprinkling of the aggregate foundation stabil. moss. asphalt emulsion in the amount of 0.7-1.0 kg/m2 $180*2=360$	m2	360
8	KNR 2-31 0108-02	Basic foundation made of mineral-bituminous mixture with asphalt binder AC 16P 50/70 as for KR-1-2 - layer thickness after thickening 10 cm $180*2=360$	m2	360
BITUMINOUS SURFACE CPV 45233220-7				
9	KNR 2-31 1004-07	Sprinkling of the aggregate foundation stabil. moss. asphalt emulsion in the amount of 0.7-1.0 kg/m2 $180*2=360$	m2	360

Table 3. Bill of quantities for section 2 [13]

No	Valuation basis	Description	Unit	Quantity
10	KNNR 6 0308-0101	Surface made of mineral-bituminous grit-gravel mixtures - CA/16W 50/70 according to PN as for KR-1-2, asphalt binding layer - thickness to compaction 8cm 180*2=360	m2	360
11	KNR 2-31 1004-07	Mechanical cleaning and sprinkling of the following subb. Bitumen. asphalt emulsion with a moisture content of 0, 1 -0.3 kg/m2	m2	360
12	KNR 2-31 0311-05 0311-06	Surface made of mineral-bituminous grit-gravel mixtures - asphalt abrasion layer with AC11S50/70 as for KR-1-2 - thickness after compaction 3 cm 180*2=360	m2	360

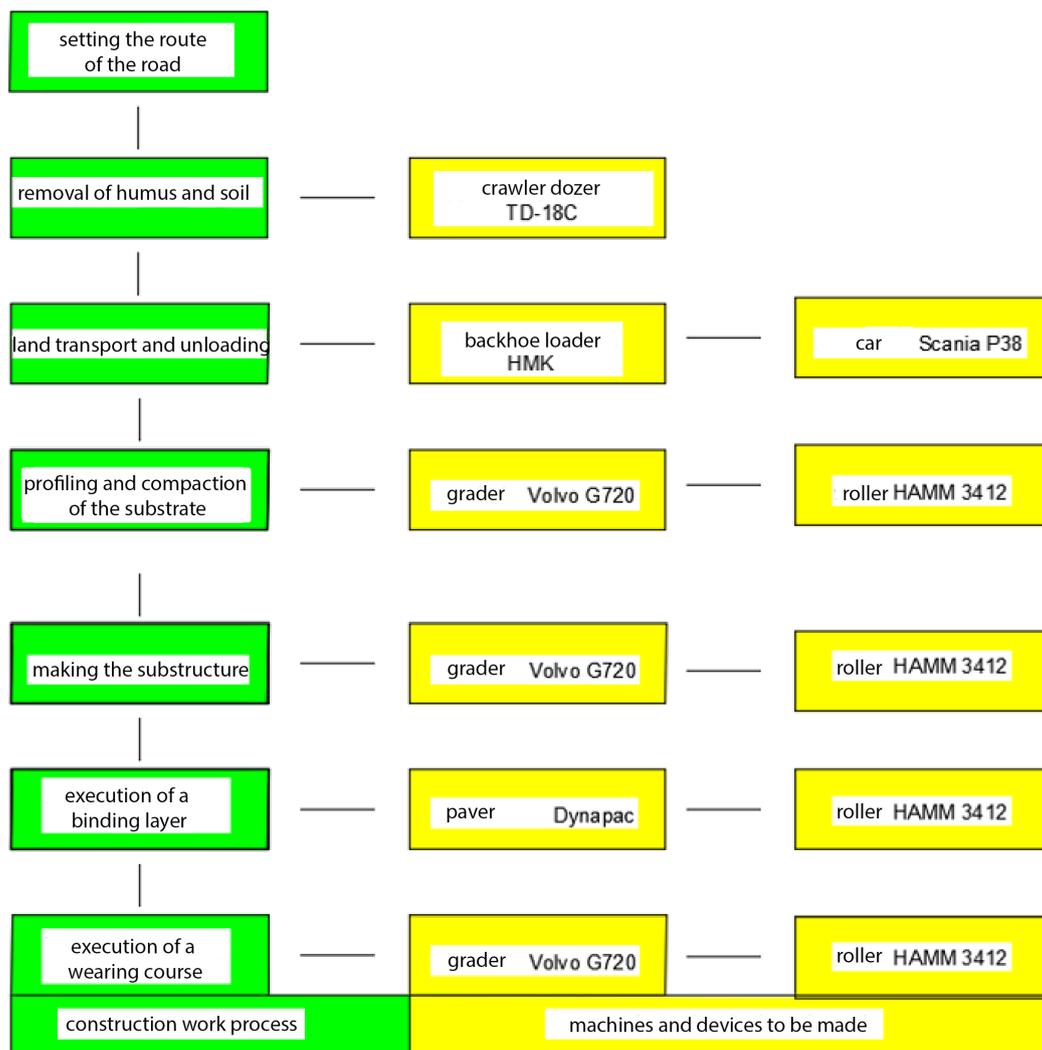
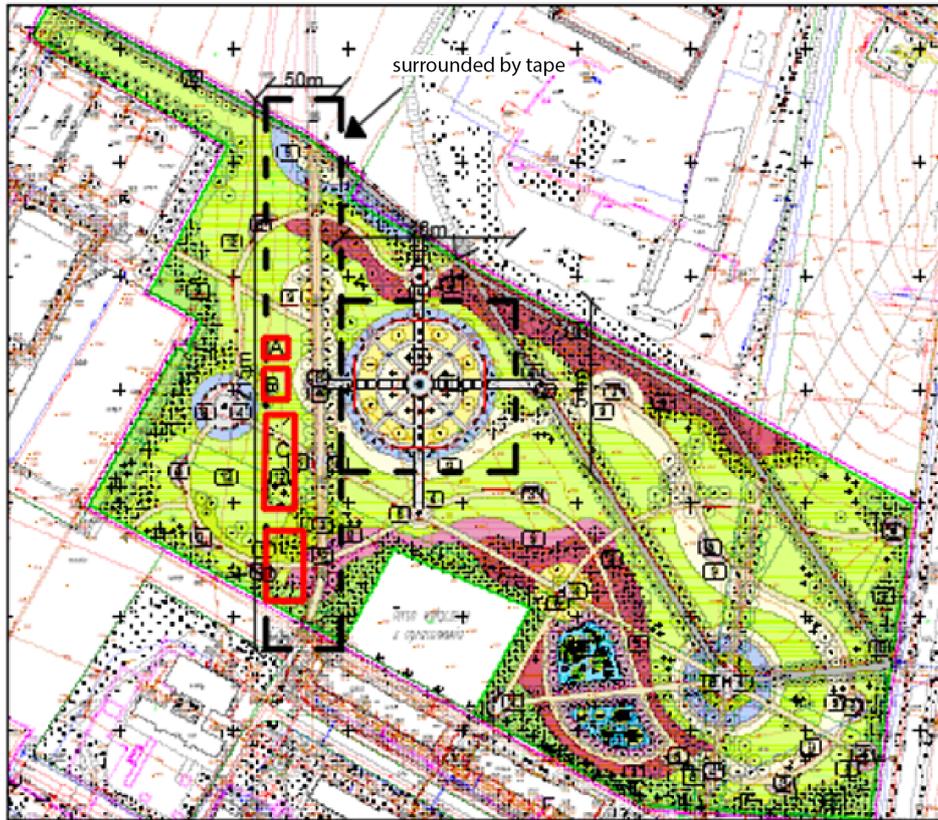


Figure 8. Diagram of the construction process with a specification of works and selected equipment [13]



Map symbol

- | | |
|-----------------------|-------------------------------------|
| A Office space | C Material storage |
| B Social room | D Parking space for machines |

Figure 9. Diagram of the development of the construction site on the map [13]

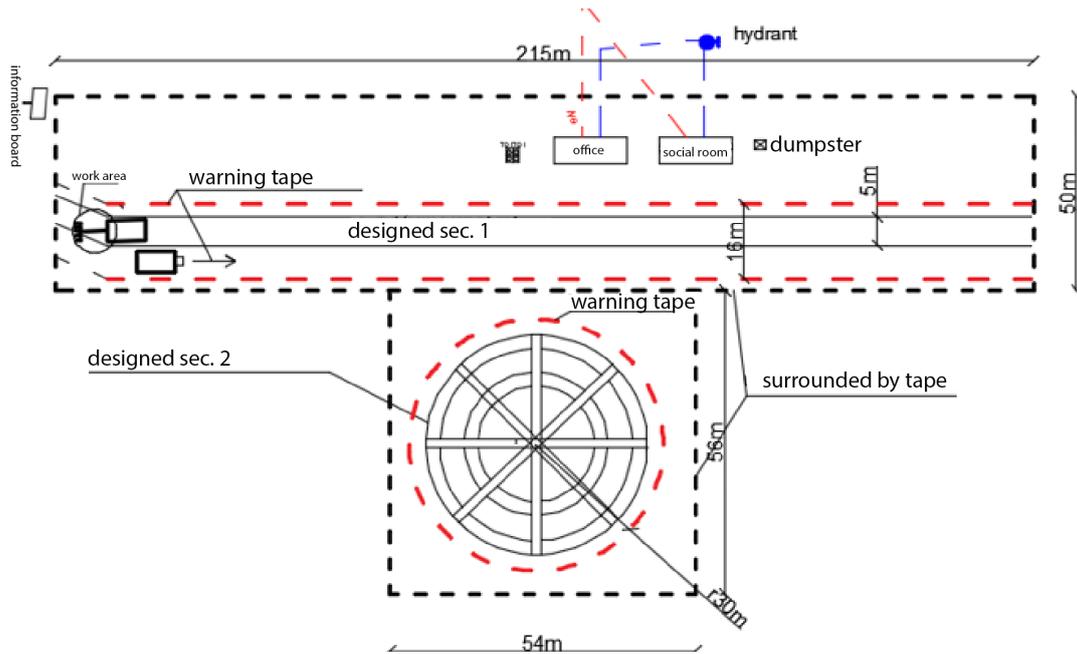


Figure 10. Graphic part of the safety and health plan [13]

Table 4. Cost estimate for the execution of construction works for section 1 [13]

No	Valuation basis	Description	Unit	Quantity	PLN per unit	net price PLN
I	PREPARATORY WORK					
1	KNR 2-01 0119-03	Measurement works for linear earthworks - the route of the road in the flat terrain, together with the as-built inventory	km	0.200	2 500.00	500.00
Total preparatory work						500.00
II	EARTH WORKS					
2	KNR 2-01 0126/02	Removal of the fertile soil layer (humus) - with the help of dozers layer thickness up to 15 cm	m2	1000	3.00	3 000.00
3	KNR 2-01 0207-02 0214-04	Earthworks performed with backhoe excavators with a capacity of 1.20 m3 buckets in the soil of category III with the transport of the excavated material by self-unloading vehicles at a distance of up to 10 km - to be deposited	m3	200	15.00	3 000.00
4	KNR 2-01 0206-03 0214-03	Earthworks performed with backhoe excavators with a capacity of 0.6 m3 buckets in soil category I-II with transport of the excavated material by self-dumping vehicles at a distance of up to 10 km (G1 soil - purchase) to embankments	m3	200	30.00	6 000.00
5	KNR 2-01 0235-02	Formation and compaction of embankments Embankments according to tables of works earthworks for the H-DW3 section	m3	200	10.00	2 000.00
6	KNNR 6 01-03-03	Profiling and compaction of the substrate performed mechanically under structural layers of the road surface	m2	1000	1.50	1 500.00
Total earthworks						15 500.00
III	FOUNDATION					
7	KNNR 60113-030-050	The lower layer of the crushed aggregate foundation, the thickness of the layer after compaction is 25 cm	m2	1000	45.00	45 000.00
8	KNR 2-31 1004-07	Sprinkling of construction made of stabilized aggregate. down. asphalt emulsion in the amount of 0.7-1.0 kg/m2	m2	1000	2.00	2 000.00
9	KNR 2-31 0108-02	The main foundation is made of a wedge-gravel stone-bituminous mixture with AC 16P 50/70 asphalt binder as for KR-1-2 - layer thickness after compaction is 8 cm	m2	1000	70.00	70 000.00
Total foundation						117 000.00
IV	BITUMEN LAYER					

Table 4. Cost estimate for the execution of construction works for section 1 [13]

No	Valuation basis	Description	Unit	Quantity	PLN per unit	net price PLN
10	KNR 2-31 1004-07	Sprinkling of the foundation made of mechanical stabilized aggregate asphalt emulsion in the amount of 0.7-1.0 kg/m ²	m ²	1000	1.80	1 800.00
11	KNNR 6 0308-0101	The surface is made of stone-bituminous grit and gravel mixtures - CA / 16W 50/70 according to PN as for KR- 1-2, asphalt binding layer - thickness after compaction 8 cm	m ²	1000	38.00	38 000.00
12	KNR 2-31 1004-07	Mechanical cleaning and sprinkling of the above-mentioned pads. bitumen. asphalt emulsion in the amount of 0.1-0.3 kg/m ²	m ²	1000	1.80	1 800.00
13	KNR 2-31 0311-05 0311-06	Surface made of mineral-bituminous mixtures asphalt wearing course with AC11S50 / 70 like KR-1-2 thickness after compacting 5 cm	m ²	1000	25.00	25 000.00
Total bituminous layer						66 600.00
V	SMALL ARCHITECTURE OBJECTS CPV 39113600-3, LAMPS AND LIGHTING LUMINAIRES					
14	individual calculation	Installation of benches and litter bins. Cast iron frame, wooden finish	pcs	10	1100	11 000.00
15	individual calculation	Installation of 4.5 lighting poles, steel (foundation, pole and light fitting)	pcs	6	2400	14 400.00
Together, the objects of small architecture						92 000.00
Estimated value excluding VAT						291 600.00
VAT 23%						67 068.00
Estimated value with VAT						358 668.00

Table 5. Cost estimate for the execution of construction works for section 2 [13]

No	Valuation basis	Description	Unit	Quantity	PLN per unit	net price PLN
I	PREPARATORY WORK					
1	KNR 2-01 0119-03	Measurement works for linear earthworks - the route of the road in the flat terrain, together with the as-built inventory	km	0.180	2 500.00	450.00
Total preparatory work						450.00
II	EARTH WORKS					
2	KNR 2-01 0126/02	Removal of the fertile soil layer (humus) - with the use of bulldozers Layer thickness up to 12 cm	m ²	360	3.00	1 080.00

Table 5. Cost estimate for the execution of construction works for section 2 [13]

No	Valuation basis	Description	Unit	Quantity	PLN per unit	net price PLN
3	KNR 2-01 0206-03 0214-03	Earthworks performed with backhoe excavators with a bucket capacity of 0.60 m ³ in the soil of category I-II with transport of the output by self-unloading vehicles at a distance of up to 10 km - (G1 land- purchase) for embankments	m ³	43.2	30.00	1 296.00
4	KNR 2-01 0235-02	Formation and compaction of embankments EMBANKMENTS according to the earth works tables for the H-DW3 section	m ³	43.2	10.00	432.00
5	KNNR 6 01-03-03	Profiling and compaction of the substrate performed mechanically under the construction layers of the road surface	m ²	360	1.50	540.00
Total earthworks						3 348.00
III	FOUNDATION					
6	KNNR 60113-030-050	The lower layer of the crushed aggregate foundation, the thickness of the layer after compaction is 20 cm	m ²	360	32.00	11 520.00
7	KNR 2-31 1004-07	Sprinkling of construction made of stabilized aggregate down. asphalt emulsion in the amount of 0.7-1.0 kg/m ²	m ²	360	2.00	720.00
8	KNR 2-31 0108-02	The main foundation is made of a wedge-gravel stone-bituminous mixture with asphalt binder AC 16P 50/70 as for KR-1-2- layer thickness after compacting 10 cm	m ²	360	85.00	30 600.00
Total foundation						42 840.00
IV	BITUMEN LAYER					
9	KNR 2-31 1004-07	Sprinkling of the stabilized aggregate foundation down. asphalt emulsion in the amount of 0.7-1.0 kg/m ²	m ²	360	1.80	648.00
10	KNNR 6 0308-0101	Surface made of stone-bituminous grit and gravel mixtures - CA/ 6W 50/70 according to PN as for KR- 1-2, asphalt binding layer - thickness to compaction. 8cm	m ²	360	38.00	13 680.00
11	KNR 2-31 1004-07	Mechanical cleaning and sprinkling of the above-mentioned pads. bitumen. asphalt emulsion in the amount of 0.1-0.3 kg/m ²	m ²	360	18.00	6 480.00
Total bitumen layer						21 456.00
Estimated value excluding VAT						68 094.00
VAT 23%						15 661.62
Estimated value with VAT						83 755.62

5 Conclusion

Construction law requires participants in the construction process: to design and build in the manner specified in the regulations, including technical and construction and in accordance with the principles of technical knowledge. This means, m.in., that the contractor of construction works is obliged to check and verify design solutions.

An executive design is a detailed elaboration of a construction project and must be drawn up whenever the investment is carried out from public funds. This document should complement and detail the construction project to the extent and degree of accuracy necessary to prepare a bill of quantities, a cost estimate, the preparation of an offer by the contractor and the implementation of construction works. The Regulation of the Minister of Infrastructure on the detailed scope and form of design documentation, technical specifications for the execution and acceptance of construction works and the functional and utility program, specifies the requirements regarding the form of executive designs are adopted as for a construction project. It should be remembered that the executive design is carried out mainly for the needs of performing construction works and specifies the solutions of the construction project. It is a list of technical instructions granted to contractors of the investment.

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