Organizational and technological stages of the forensic construction and technical expert examination when determining the compliance of a building facility with regulatory and technical documentation

I Y Zilberova¹*, V D Mailyan², A L Mailyan¹

¹ Don State Technical University, 344000, Gagarin Square 1, Rostov-on-Don, Russia
² Rostov-on-Don College of Civil Engineering, 344082, Maxim Gorky Street 30, Rostov-on-Don, Russia

E-mail: zilberova2011@yandex.ru

Abstract. According to the results of studying the modern theory of forensic examination, as well as the practice of appointing and conducting the forensic construction and technical expert examination during the proceedings in the most scaled and significant economic disputes of economic entities, issues related to the absence of development of organizational and technological stages of the forensic construction and technical expert examination in determining the compliance of a construction facility with regulatory and technical documentation were identified.

The paper describes the organizational and technological stages of the forensic construction and technical expert examination, which will provide a rational solution to the most common forensic issues in practice. The description of the stages is brought up to the methodological level of construction and technical research. The generalization of the results of the application of this proposal by the forensic expert-builder forms the basis for the development of methodological recommendations for the forensic construction and technical expert examination on the issues of determining the compliance of a construction facility with the regulatory and technical documentation.

Introduction

Based on the results of studying the modern theory of forensic examination, as well as the practice of appointing and conducting forensic construction and technical expert examination (hereinafter referred to as FCTEE) during the proceedings for the most significant, large-scale economic disputes of economic entities, issues associated with the absence of development of organizational and technological stages of FCTEE when determining the compliance of a building facility with regulatory and technical documentation (hereinafter – RTD) were identified.

Theoretical, procedural and methodological issues of using special construction and technical knowledge in proceedings of economic entities were the subject of numerous discussions at conferences, scientific and practical seminars and round tables devoted to the current state of the forensic science in general [1,2,3]. Along with this, a detailed theoretical study of the direction in the theory of forensics related to the organizational and technological stages of FCTEE, when determining the compliance of the construction facility with RTD, was not carried out.
Thus, the degree of theoretical development of the organizational and technological stages of FCTEE, in determining the compliance of the construction facility with RTD, can be defined today as insufficient, and the stage of its development – as the initial one.

All these facts set out the relevance of determining the organizational and technological stages of the forensic construction and technical expert examination when stating the compliance of a building facility with regulatory and technical documentation.

**Research materials and methods**

This paper describes the main organizational and technological stages of FCTEE in determining the compliance of the construction facility with RTD.

The analysis of a specific type and a certain amount of work is determined in accordance with the forensic expert situation and depends on the stage of the investment and construction project. FCTEE can be carried out at all stages of the implementation of the investment project of construction, reconstruction, modernization, technical re-equipment, overhaul and current repairs [4]. The main organizational and technological stages of FCTEE, when determining the compliance of the construction facility to RTD is presented in Figure 1.

In general terms, the FCTEE scheme, in determining the compliance of the construction facility with RTD, consists of five organizational and technological stages:

1. Study of the contractual terms and initial permits (hereinafter – IP);
2. Study of technical documentation (hereinafter – TD) and construction and installation works (hereinafter – CIW);
3. Technical (field) research;
4. Cameral treatment of results;
5. Formation of conclusion.

Next, we consider each stage separately.

At the first stage, the expert-builder studies the contractual conditions and IP.

The main points which require attention when studying a contract are:

1. Subject of the contract (the subject should be properly defined, otherwise the contract may be declared invalid);
2. Place of the contract fulfillment;
3. Requirements for the work performance;
4. Period of work performance;
5. Price condition (the payment for work performed is carried out in the amount stipulated by the estimate, within the time and in the manner established by law or construction contract);
6. Responsibilities for the provision of construction materials;
7. Conditions for monitoring the progress of work and the procedure for the work acceptance;
8. Warranty period for the work performed.

When researching IP, it is necessary to pay attention to the minimum required and mandatory list of documents (Article 48, Section 6 of the Town Planning Code of the Russian Federation [5]), which should include:

- The urban development plan of the land plot or, in the case of preparation of design documentation for a linear facility, a project for the territory planning and the land surveying;
- Results of engineering surveys (in case of absence, the contract for the preparation of design documentation should include a task for engineering surveys);
- Technical conditions (in case if the functioning of the designed capital construction project cannot be ensured without connecting (technological connecting) of such a facility to the engineering and technical support networks).

At the second stage, a study of technical documentation, a collection and analysis of documents required for conducting research is carried out. The composition and content of the documentation accepted for the research should comply with RTD [6,7].

At this stage, the following analysis is performed:
1. for the estimated documentation (hereinafter – ED);
2. for the design documentation (hereinafter – DD);
3. for the working documentation (hereinafter – WD);

![Diagram of organizational and technological stages of FCTEE](image)

**Figure 1.** Main organizational and technological stages of FCTEE

The study of ED is carried out in order to establish a reasonable cost of construction of buildings and structures. The study of ED should begin with verification of the source data and other provisions used in its development.

In this regard, documents should be submitted (simultaneously with ED) on the basis of which certain estimates were compiled, in particular:
- Statement of volumes of work, working drawings, specifications, equipment consumption statements;
- Section 1 “Explanatory Note”: parameters of buildings (structures), their parts and structural elements;
- Section 6 “Construction Organization Project” (COP), in which the applicable coefficients should be justified;
- Code and zone of the construction region;
- A list of machines and mechanisms used to perform works, as well as their technical features;
- The name of the materials used in the performance of work, as well as their features;
- Conditions for the performance of work (constraint, performance of work in the coverage area of engineering networks, high altitude, harmfulness, etc.);
Customer requirements for the preparation of estimate documentation and the use of certain correction factors, if they do not contradict the federal budget standards.

The ED verification includes the following steps:
1. Evaluation of the correct application of existing regulatory documents in the field of pricing and budgeting;
2. Assessment of the correctness of the applied coefficients;
3. Analysis of estimates and DD for compliance with the scope of work and materials used: checking the conformity of the volumes of work in the working drawings and in local estimates, assessment of the correctness of the applied unit rates and indices for converting the estimated cost of construction and installation works in local estimates, assessing the cost of design work.

It should be borne in mind that in order to determine the cost of construction and installation works, repair work, only the rates used in the design documentation that have received a positive conclusion from the state examination and a positive conclusion on the reliability of determining the estimated cost of the capital construction object should be applied.

Also, at the second stage, the DD study is carried out. At this stage, a construction and technical study is carried out as approved by the state customer, according to the results of a positive conclusion of the State examination bodies.

The DD study involves analysis in conjunction with estimates for compliance with the volume of work and the materials used. The DD study includes the research of the following issues:
- Replacement of materials provided by the project;
- Duplication of work;
- Change in the scope of work foreseen by the project.

The decision to replace the material is reflected in the project; during the study, it is necessary to establish the compliance of the materials provided for by DD and the materials considered in ED.

When checking, attention should be paid to the duplication of estimated prices, that is, the additional inclusion of a separate type of work in the estimate of prices, which is already provided for by a different price.

The estimated work should be consistent with the bill of quantities for the project. The scope of work, the number of installed equipment, structures and special products should be taken in the budget in accordance with the developed DD. At this stage, it is necessary to establish the compliance of the estimates.

FCTEE WD provides for the receipt of a complete set of performance and technical documentation (hereinafter referred to as PTD) with the stamp “For the production of work” relating to specific types and volumes of work.

A PTD drawn up in an appropriate manner is a document of a building or structure constructed that facilitates the operation process, reflects the technical condition, gives a clear idea of the persons responsible for any type of work performed.

In relation to PTD, FCTEE provides for the study of the executive documentation, taking into account the control of the on-site event, which includes a physical examination and control measurements.

The PTD research includes:
- Reception and analysis of PTD of specific types and volumes of work;
- Reception and review of the primary reporting documentation for specific types and volumes of work.

The list of forms of primary accounting documentation (WD study) for the accounting of works in capital construction and repair and construction work includes forms No. KS in accordance with the legislation acts according to the independently developed form containing the required details of the primary document.

When checking the acts of acceptance of the work performed, if required, actual control should be organized by reconciling the volume of work actually performed with the volume of work accepted for payment by the customer according to acts KS-2 (selective control measurement).
The essence of this check is comparing the actually completed volumes of work in kind (at the construction or repair facility) with the similar volumes indicated in the acceptance certificates for the performed works.

Thus, as a result of FCTEE when checking PTD, WD and ED, an unlawful change in the physical volumes and cost of work performed at the facility (overstatement or reduction) is revealed.

If during verification of acts on acceptance of work performed, DD, ED, and primary accounting PTD, violations were found (overstatement of work, incorrectly applied prices, overstatement of cost appreciation), then it is necessary to draw up a register of overstatement of work cost and determine the total amount of the work cost overstatement.

At the third stage, a study of construction and installation work is carried out. At this stage, the control outdoor events consisting of a physical examination and control measurements are carried out.

The main aims of the control measurements at the on-site inspection carried out at the facilities of capital construction and repair are:
1. Verification of the volumes and cost paid or presented for payment for work at fully completed facilities, as well as unfinished construction and installation works;
2. Establishment of the facility compliance with its features and purpose provided for by the approved DD;
3. Determining the quality and completeness of the work performance adopted according to the acts on acceptance of the work performed and the facility operational readiness;
4. Verification of volumes, quality and costs for unfinished work for construction, installation and repair;
5. Checking the equipment availability.

The main forms of conducting control measurements and field inspection are:
- Cameral verification of documents (without going to the researched facility);
- Verification of documents on-site directly with the use of measuring instruments and devices;
- Verification of documents with a visual inspection of the facility without the use of measuring instruments and devices with a direct visit to the facility.

The main methods for conducting control measurements and full-scale inspection can be continuous and selective as well as depending on the tasks for research in the FCTEE framework and the specifics of capital construction and repair facilities.

Thus, according to the results of the collection and analysis at the preparatory stage of the control exit measures (field inspection and control measurements), the following is determined:
1. Capital construction (reconstruction) and repair facilities or certain types of construction, installation and repair work to be checked with access (appearance) directly to the facility;
2. Overestimation of the volume of certain types of work and costs provided for by DD;
3. Inconsistency of DD acts on acceptance of work performed;
4. Incorrect application of norms and prices, as well as limited and unlimited costs in acts of acceptance of work performed;
5. Inconsistency of purchased equipment, including the DD equipment being subject to installation;
6. Non-compliance of the quality of DD construction and installation work with construction and technical documentation.

At the fourth stage, the cameral treatment of the obtained results is carried out.

At this stage, the obtained data of the field inspection are systematized, the inconsistency of the work performed is established according to building codes and rules, as well as design and working documentation, including the non-compliance of construction and installation work with quality indicators.

The result of FCTEE is the conclusion. At the final fifth stage, a conclusion is drawn up.

The following requirements are imposed on the conclusion:
- The conclusion should contain objective data on the volume of works actually performed at the facility;
- The contractor should guarantee the accuracy of the data reflected in the report.
At the fifth stage, a conclusion is drawn up. The report should contain the following information:

- The date and place of its compilation;
- The information about the expert (title, initials, last name, education, specialty, stage of expert activity);
- Copies of documents confirming the education of experts, qualifications and experience required for conducting expert activities and examining the correct application of norms, prices and ratios in determining the estimated cost of work (if required);
- Grounds for the study (authority);
- The study methods and techniques should be set out openly for persons without special knowledge;
- Reference and normative materials, used manuals and literature;
- Links to applications (illustrations, graphs, tables, etc.) and the necessary explanations thereto;
- Results of the examination of the correct application of the norms, prices and ratios in determining the estimated cost of construction and installation works and acts on acceptance of work performed;
- The expert assessment of the results of the study substantiating the conclusion on the stated question, with the calculation of the revealed deviations in physical and value terms, with reference to the regulatory document provisions (part, paragraph, subparagraph, article) being violated;
- The expert conclusions should not contradict each other, the answers should be clear and not allowing different interpretations;
- If it there were not possibilities to answer some of the questions, the expert should indicate the reasons;
- Photos of facilities or areas with identified deficiencies and defects with reference to the DD sheets;
- Results of laboratory tests conducted during the examination (if any);
- Other information, the indication of which is required, in the contractor’s opinion, for the quality service provision.

The report content may be different.

Summary

The organizational and technological stages of FCTEE described in this paper will make it possible to provide a practical rational solution to the most common forensic issues. The description of the stages is brought up to the methodological level of construction and technical research. The generalization of the results of the application of this proposal by the forensic expert-builder forms the basis for the development of methodological recommendations for FCTEE on the determination of the compliance of the building facility to RTD.

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