



Budapest University of Technology and Economics

Department of Mechanics, Materials and Structures
English courses
General course /2016
Fundamentals of Structures

Lecture no. 6:

The process of erection and operation of buildings (Parties contributing to design and realization of buildings)

Content:

Introduction

1. The phases of design and authorization
2. Execution
3. Use and maintenance
4. Demolishment
5. Closing conclusions

Introduction

Environment:

Natural environment - built environment

Examples of **environment pollution**:

Natural environment:

-consequences of industrial wood-felling in the Amazonas valley: increase of the ozone hole and of the harmful effect of ultraviolet radiation

Built environment:

-increase of environment pollution sources: CO₂ emission, water pollution, noise pollution, light pollution
-aesthetical „pollution,,

Means of **environment protection**:

Natural environment:

- international environment protection actions and agreements
- environment protection legislation
- activity of national environment protection authorities
- rubbish collection actions on communal areas

Built environment:

- legislation: country development law, **building law**
- creation of regional and local **general (or urban) development projects (GDP-s)**
- activity of local and regional **building authorities**
(handing out of building permits)
- activity of specialized authorities intervening in building authorization: fire protection authority, public roads authority, water conservancy authority etc.

Erection and operation of buildings

The process of *creation* (design),
realization (construction),
functioning (operation) and the final
demolishment (pulling down) of an object of architecture
– of a building – will be discussed by looking always for the main
participants and their role in each phase. Some of the important
requirements are formulated through elaboration of **the urban
development project** (GDP) of the area, where the building under
consideration is to be placed at a later time. The process of
architectural design can in itself be subdivided into different phases
which will be mentioned. The number of participants during the
realization process is in general greater than that of design. Depending
of the function of the building, the number of users and operators can
be the most numerous group of people who have direct connection to
the building during its existence. Finally, when the decision concerning
the demolition of the building is made, the last participants fulfil it.

1. The phases of design and authorization

1.1. Urban design: making the general development project (GDP)

Scale: 1:1000, 1:2000 fitting to content and the magnitude of the area concerned, with annexed projects (natural environment, road network and development plan, public utilities network and development plan etc.) up to scale 1:10000

Parties (participants)

Function, contribution, project, job

Members of the local (town, community) assembly
(*politicians*)

Formulating and acceptance of proposals for the content and general features of the urban development project
Entrust urban designers to make the general development project (GDP) of the administrative area of the town (community) or of the related part of it.

Urban designer

Acceptance of GDP

Elaboration and defence of proposal for GDP, documentation of the GDP which contains detailed rules concerning the erection of buildings, such as:
-where and what can be built, limits to respect concerning the minimum real estate area (necessary to erection of buildings), maximum % of occupied area, maximum building (facade) height, allowable roof and facade coverings, min. green area etc.

Remark: The *urban development* of the area includes naturally the supply of the area with *public utilities* (water supply, waste water canalization, energy (electricity and gas) supply, communication systems etc.), all of which are to be designed, authorized and executed, but the concerning details are out of the scope of this presentation.

Authorization process of the GDP

1.2 Building design

Client (investor, owner)

- Generally the owner of the real estate (of the later construction site), where the building is to be erected.
- Contracts the general manager company and/or all the parties intervening in the design and realization of the building (the project)
- Makes decisions concerning the different architectural projects (preliminary project, building permission project, working drawings)
- Finances the project

General manager company

- Representation of the client in the project
- Preparation of contracts of the architect

(and of eventual other design parties like designer of external infrastructure (roads, water, electricity and gas supplies, telecommunication, waste water canalisation etc.)) and (if needed) of specialists of environment protection.

-Call for *tenders*¹

-Participation in decisions by handing out of the project to the general contractor (the constructor)

-Supervision of the development of the project and continuous information supply to the client

¹ Tender: a kind of competition of general contractors (constructor firms) to be encharged with the project realization

Phases of building design

1.21 Preliminary project

Scale: 1:500, 1:200 fitting to the magnitude of the project

Architect

Price offer of the architect is generally based on a *preliminary project*

1.22. Building permission project

Scale: 1:100

Elaboration of the *building permission documentation* by the architect, contracting engineers or specialized engineering bureaus

Geodesic engineer

-site survey (geodesic measurements)

Soil mechanics engineer

-soil mechanics (to clarify subsoil conditions based on laboratory tests of soil samples)

Structural engineer -structural engineering (design of load-bearing structures)

Building mechanical engineer * -installation engineering: (internal) electricity, water and gas supply, heating, waste-water canalization,

Electric engineer, informatics engineer *
Illumination, ventilation, telecommunication, energetics

Architect of the interior * -interior design

Garden architect * -garden architecture

* These professionals sometimes enter at a later design phase

*Building authority*²
(local or regional)

Authorization of the building permission project, considering the fulfilment of the conditions stipulated in the general development project (GDP) of the administrative area. In case of more significant – and environment polluting – projects, taking also into consideration the project evaluation of *environment protection effect studies*.

Fire protection authority

Should be consulted by the architect, and the relevant expert opinion of the authority is to be jointed to the building permit documentation.

Environment protection authority

When necessary, should be consulted by the architect, and the relevant

² Authorities are partially financed by the state, partially by their clients (architects in this case)

expert opinion of the authority is to be jointed to the building permission documentation.

Chimney cleaning authority

Should be consulted by the architect, and the relevant expert opinion of the authority is to be jointed to the building permit documentation

Environment protector engineers Preparation of *environment protection effect study in* case of projects having considerable environment polluting effects.

Encharged and financed - by legal obligation – by the client.

*Local chief architect*³

Consultations with the architect of the project, representing the local interest in

³ Architectural critics formulated by the local chief architect or the local architect jury are to be handled as proposals only, and are not decisive by the authorization of the project

*Local architect jury*²

protection of the *architectural heritage* and respecting prescriptions of the GDP
Architectural evaluation of the building permission documentation before submitting to authorization.

1.23. Tender project

Scale: 1:100, 1:50

Detailing of the building permission documentation by supplementary informations necessary to elaborate *price offers* for the realization of the project (detailing of the structural solutions, listing of installation units, quantitative reports)

General contractor

(the constructor of the building) Winner of the tender, encharged with the realization of the building.

1.24. Working drawings (or realization project)

Scales: 1:50, 1:20, 1:10, 1:5, 1:2, 1:1 according to needs

Elaboration and documentation of all details necessary for the realization of the project (architecture and all the engineering directions enumerated above under the *building permission documentation*, contracting the intervening parties for the job)

building's manager
(or project manager)

The site realization is directed by the *building's manager* (or project manager), encharged by the general contractor. The general contractor may contract one or more *subcontractors* such as:

Subcontractors:

Subcontractor for foundation works

Subcontractor for reinforced concrete superstructures

Subcontractor for steel constructions

Subcontractor for timber constructions

Subcontractor for bricklaying and allocation works
Subcontractor for scaffolding and carpentry works
Subcontractor for sanitary installations
Subcontractor for electric installations
Subcontractor for illumination works
Subcontractor for elevator installation
Subcontractor for telecommunication installations
Subcontractor for tin-smith's works
Subcontractor for safety systems installation
Subcontractor for floor, wall and facade coverings
Subcontractor for heating systems
Subcontractor for ventillation systems
Subcontractor for doors and windows alloocation works
Subcontractor for gypsum works (partition walls, false ceilings etc.)
Subcontractor for water insulation works
Subcontractor for thermal insulation works
Subcontractor for glazing

Subcontractor for painting works
Subcontractor for external public utilities
Subcontractor for garden architecture

1.25 Project realization documentation or „as built,, project

Scale: same as by working drawings

By order of the client to the architect, after the realization of the building all modifications made during execution should be introduced into the working drawings by the relevant designers to have a documentation of the building 100% exact.

1.26 Demolishment project

Scale: the same as for building authorization project

The client (owner) contracts the architect to prepare the demolition project.

The demolition project is based on the building permission documentation or – if not available – on *measurement projects* of simi-

lar content. The technical description of the documentation should contain

- safety aspects* of the demolition works and
- environment protection aspects* of the transportation and allocation (placement) of constructions and materials (quantities, depots of environment polluting materials).

2. The phase of execution

The local building authority should be informed about the *beginning of the execution works*.

Technical supervisor

Contracted by the general manager as independent construction expert, who controls the quality of the execution regularly introducing the observations in the *construction diary* of the project

When finishing the execution an official *technical handing over ceremony* is taking place, where all the interested parties – designers, authorities and executors – are represented, and a report is made with indication of all the necessary alterations to be made or errors to be corrected before *putting the building into use*.

The official putting into use should be authorized by the local building authority.

3. The phase of use and maintenance

Operating manager company The client (the owner) can operate the building by himself or entrust a manager company or person with the operation

Users The relation of users to the building can range from members of a family in a family house to prisoners sitting in jail, so it could be the object of an other study.

For users the fundamental *design requirements of functionality and safety* play the main role. The *aesthetical requirement* – mainly the external outlook of the house - can be regarded as public interest. It is the client (the owner) who is the mostly interested in aspects of *economic operation*. (In reality, an economic optimum of the expenses on construction, use and demolishment should be aimed at.)

Regular *technical maintenance* of the building may be, out of public interest, legal obligation of the operating manager: for example safety

check of the load-bearing structural system by authorized structural expert in every 5 or 10 years.

4. The phase of demolition

In consequence of
natural catastrophe (earthquake, inundation, cunamy or fire),
or due to *complete deterioration of the constructions* of the building
out of public interest,
or due to *functional ageing* ,
or simply by free *decision of the owner* – if not being a protected
monument –
the demolition of the building may become necessary.

Closing conclusions

1. Well organized **cooperation** of a great number of contributors is needed to erect a building (to realize a project).
2. The fundamental **design requirements** represent the interest of different participants of the project:

<i>requirement</i>	<i>the mostly interested participants</i>
functional requirements	users
safety requirements	users, the public
aesthetics	the public, users
economic requirements of the erection and demolition	the client
economic requirement of operation	users

It is the architect who during the design process should properly weigh these - partially contradictory – requirements.

3. From among the great number of contributors the role of a few can be distinguished:
- the **client** who is financing practically all the other participants,
 - the **general manager**, who does not do practically anything, only organizes and distributes jobs, but earns the most money as a confidential partner of the client and
 - the **architect**, who, although has to work the most on the project, and may not get enough money for that, but is stimulated by the hope to become creator of a recognized work of art of architecture.