



Budapest University of Technology and Economics

Department of Mechanics, Materials and Structures
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Fundamentals of Structures

Lecture no. 7:

Phases of creation in architecture
(Design, construction, functioning and demolition of buildings)
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Content:

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1. The phases of building design and authorization
2. Execution
3. Use and maintenance
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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. Littering of waters and forests

Built environment:

-increase of environment pollution sources: CO₂ emission, public areas' 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
- garbage collection actions on communal areas

Built environment:

- legislation: country development law, **building law**
- preparation 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 (design and construction) and operation of buildings

The process of *-creation* (urban and architectural 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.

Introductory remarks

- 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-
- 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 during 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 **demolishment** of the building has been 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 of the project 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**)

Their function, contribution, project, job

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

-**Formulate** 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

Design, elaboration, defence and 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), allowable functions 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., network and capacities of each). All of these public

utilities are to be designed, authorized and executed before the erection of buildings, but the concerning details are out of the scope of this presentation.

Authorization process of the GDP: long and complicated process, including participation – in decisions – of the inhabitants

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 design and realization of the building (the project)

-Makes proposals and decisions concerning the different architectural projects (preliminary project, building permission

General manager company

project, working drawings)

-Finances the project

-Representation of the client in the project

-Preparation of contracts of the architect (and that 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 tenders¹

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

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

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

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, who may contract 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 jury²

protection of the *architectural heritage* and respecting prescriptions of the GDP Architectural evaluation of the building permission documentation before submitting to authorization. Set up by invitation of the chief architect.

1.23. Tender project

Scale: 1:100, 1:50

Detailing of the building permission documentation by **supplementary information 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, **enchaged 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

architect and all the engineering directions enumerated above under the *building permission documentation*

Elaboration and documentation of all details necessary for the realization of the project

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 are to 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 similar 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*.

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 ventilation systems
subcontractor for doors and windows allocation 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

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.

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 **demolishment**

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 demolishment 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 **fulfilment of the fundamental design requirements** represent the interest of different participants or parties having connection to the project:

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

It is the architect who, during the design process should properly

weigh these – sometimes partially contradictory – requirements.

3. From among the great number of contributors **the role of a few participants can be distinguished:**
 - the **client** who is financing practically all the other participants, and enjoys the income of the operation
 - 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.

People, having contact to a building from elaboration of the GDP till
demolishment:

local politicians
members of the local assembly,
urbanist designer,
client,
general manager,
architect,
civil engineer,
installation engineer,
electric engineer,
geodesic engineer,
soil mechanics engineer,
architect of the interior,
garden architect,
building authority,
environment protection authority,

fire protection authority,
chimney cleaning authority,
environment protector engineers,
local chief architect,
members of the local architect jury,
general contractor,
building's manager,
different subcontractors and their workers,
technical supervisor,
operating manager company,
users,
the public