Technical preparation and controlling of the construction. Contracting process.

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Department of construction technology and management

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Basics of construction

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INTRODUCTION

Preconstruction period

Construction process

Technical preparation of the construction

Controlling / quality management

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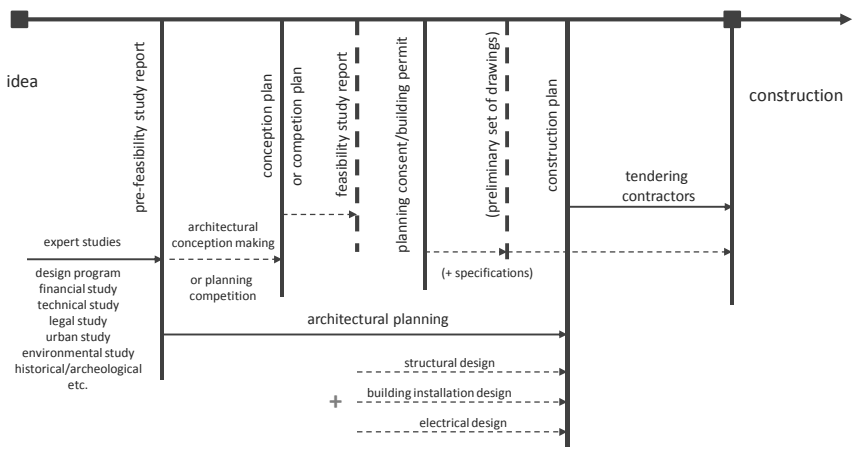
Preconstruction period

PRECONSTRUCTION PERIOD



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Preconstruction period

FEASIBILITY STUDY

DEF.:

Feasibility study is analysis and evaluation of a proposed project to determine if it

is **technically feasible**,

is feasible **within the estimated cost**,

will be **profitable***.

*=income or appreciation

1

Preconstruction period

CONTENT OF A FEASIBILITY STUDY

General contents
(5 common factors)

- technology and system analysis
  - -analysis of technical solutions
  - -capacity study
- economic study
  - -cost analysis
  - -benefit analysis
- legal study
- operational analysis
  - functional studies
- schedule (time) analysis

Project specific contents

Cultural feasibility
- urban study
- historical study
- archeological study
- etc.

Environmental study

Resource feasibility

Market feasibility

feasibility study report = the output of the process

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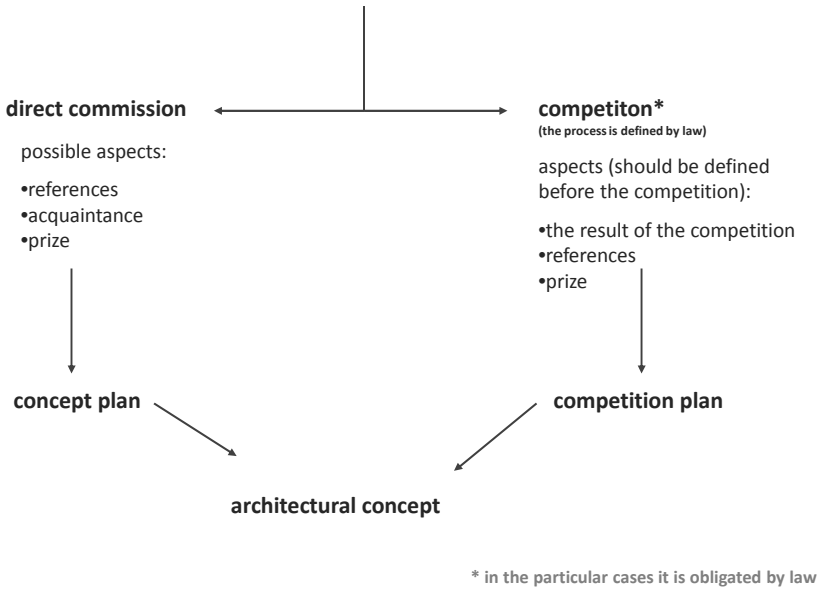
Preconstruction period

ARCHITECT SELECTION PHASE – DESIGN CONCEPT



* in the particular cases it is obligated by law

1

ARCHITECTURAL PLANNING PROCESS

Preconstruction period

Phase 0: developing architectural conception

Phase 1: planning consent – drawings for building permission

- legally prescribed
- permission is provided by the local authorities*
- the content is described by the law:
  - technical content:
    - technical drawings – scale = 1:100
    - architectural - technical description
    - technical descriptions of the load bearing structure, the building installation and the electrical systems
  - legal content:
    - disclaimers of the designers and the owner
    - official documentation on evidence of ownership
    - statements of the involved authorities and public services
    - official map of the site

* in case of monuments the National Office of Cultural Heritage

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ARCHITECTURAL PLANNING PROCESS

Preconstruction period

Phase 2: construction drawings

- legally prescribed
- the content is described by standards – should provided all the necessary information graphic and written
  - technical content:
    - technical drawings (architectural, structural, electrical, installation, etc.)
      - general drawings – scale = 1:50; 1:25; 1:20
      - detail drawings – scale = 1:10; 1:5; 1:2; 1:1
    - finalized description and detailed specification (architectural, structural, electrical, installation, etc.)
  - legal content:
    - disclaimers of the designers

+

After the construction will be requested (for the permission of use):

- permissions of the involved authorities
- consent of the public services

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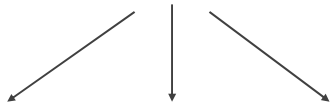
Preconstruction period

THE SELECTION OF THE CONTRACTOR



direct contracting

optional aspects:

- references
- acquaintance
- prize

simple competition

optional aspects :

- references
- prize

official tender*
(the process is defined by law)

aspects (should be defined in the tender documentation):

- references
- prize
- other aspects (e.g. specialization)

* in the particular cases it is obligated by law

1

Preconstruction period

SIMPLE COMPETITION

Phase 1: providing the invited contractors with the documentation
- simple list of the planned work activites
- drawings + list of the work activites
- drawings + specification

Phase 2: collecting the bids from the candidate contractors

Phase 3: the selection process of the contractor

Phase 4: contracting

1

Preconstruction period

TENDERING PROCESS (legally prescribed)

open / restricted / negotiated

Phase 0: prepation of the announcment and the documentation of the tendering
(the content is defined by the law)

Phase 1: publish the tender in the adequate forums (legally defined)

Phase 2: present the documentation to the applying firms

Phase 3: collecting the tender bids from the candidates

Phase 4: selection of the contractor

Phase 5: contracting process

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Preconstruction period

DOCUMENTATION FOR TENDERING

Contents (described by law):

- the conditions of the participation on the tender
- architectural plans
  - construction drawings (if possible)
    or tender plan (=the documentation of the planning consent + final specification) in case of necessity
- the aspects of the selection
- the deadline of the tender
- legal documentation

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Technical preparation

SITE PLANNING

drawings + written documentation

general site plan

for the whole construction process

construction phase plans

for the distinct phases of the construction

(at least)

earthwork

substructures

superstructures

for different phases of the finishing works

2

Technical preparation

SITE PLANNING

written documentation

Who does what?

Who is responsible for what?

Identified hazards and risks.

How the works are controlled?

2

Technical preparation

SITE PLANNING

written documentation

Project description

Technical data

Management of the work

Arrangements for controlling significant site risks

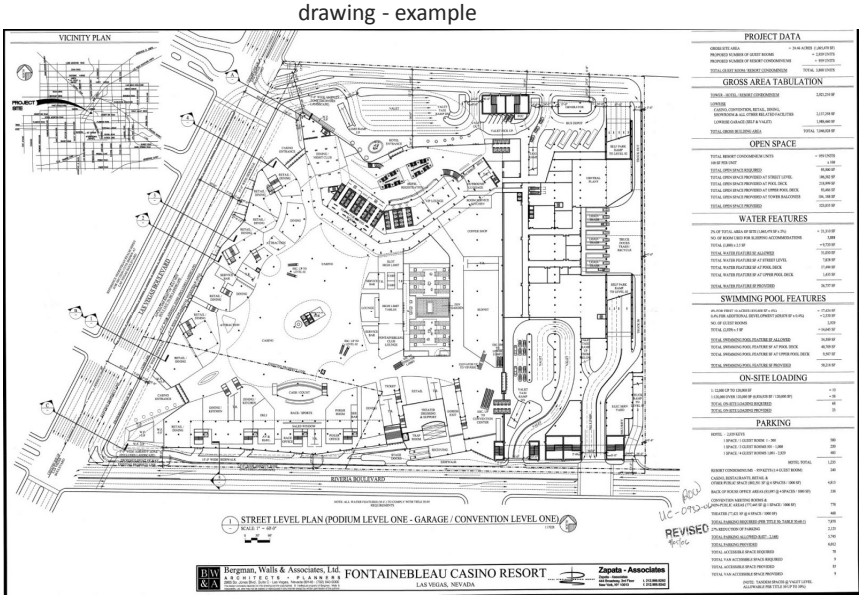
Health and Safety file

2

Technical preparation

SITE PLANNING

drawing - example



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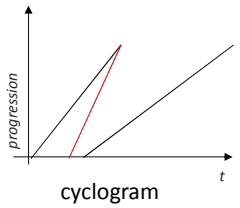
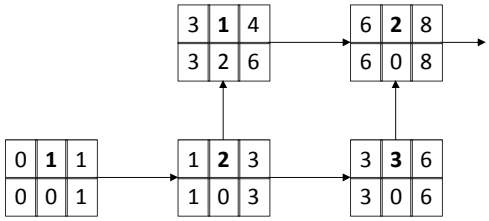
TIME MANAGEMENT

Technical preparation

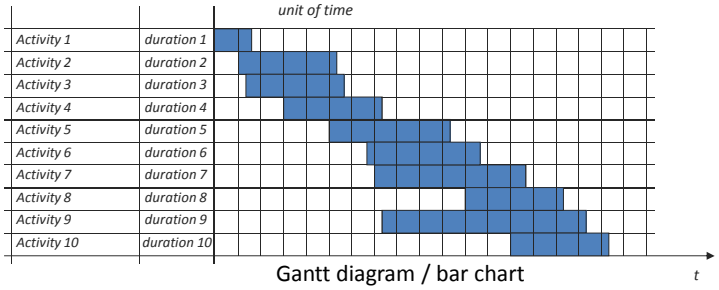
Forms of programming



cyclogram



network planning



Gantt diagram / bar chart

2

TIME MANAGEMENT

Technical preparation

Level	Schedule form
project manager	project timetable – network plan
site manager	schedule of the entire construction – network plan / Gantt diagram
general foremen	schedule of the present construction phase – Gantt diagram
foreman	list of the following activities

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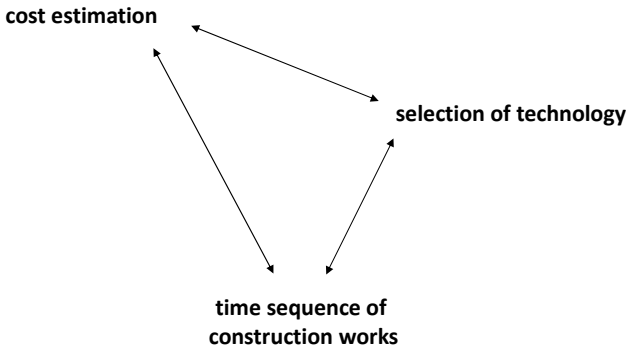
Technical preparation

COST ESTIMATION / CALCULATION

during the technical preparation



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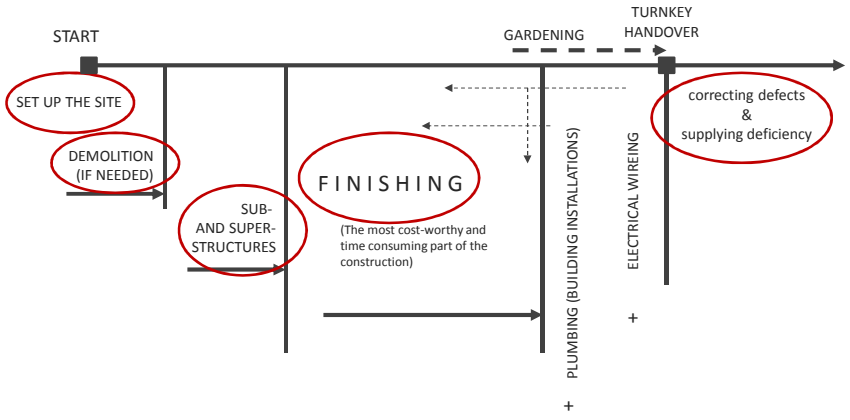
Construction process

CONSTRUCTION PROCESS



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Construction process

SET UP THE SITE

precondition: the client allows work on the site

installation temporary facilities:
• welfare facilities (canteen, toilets, drying rooms), first aid point
•office container
•guard's container
•fence
•lighting
•storage container(s)
•silos (mortar, cement)

handling the networks of public services
•temporary shortcuts (in case of need)
•install temporary transformer box and electric cables
•install temporary sewage and water pipelines, etc.

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Construction process

SET UP THE SITE

appointment of
•the pedestrian and traffic routes (temporary road in case of need)
•the material deposits
•the deposits for temporary structures (formwork, scaffolding, etc.)

setting up the construction equipments
•tower crane(s)
•concreting equipments (in case of need)
•etc.

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Construction process

CONSTRUCTION SITE INDUCTION

the „welcome" process at the site

Providing information for the workers (visitors) on the followings:

•responsible personnel of the site (site manager, site foremen, supervisor)
•welfare facilities (canteen, toilets, drying rooms) + first aid point/first aider
•access of arrangements (pedestrian routs, parking)

•work and fire safety rules, site rules

•emergency procedures (muster point, fire fighting, site reentry after emergency)
•accident procedures (report and recording procedure)

•daily working hazards (hot works, groundwork, working in height, etc.)
•the work activities, that requires permission (not allowed to start without it)
•handling of the equipments

3

Construction process

DEMOLITION WORKS

The execution is depending on

•the scale
•the structures
•the materials
•the states of the structures
•the environment (built/natural)

Different techniques

•man-power
•construction eqipments
•explosives
•complex methods

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Construction process

CONSTRUCTION OF SUBSTRUCTURES

- excavation (groundwork)
- construction of foundations
  - masonry (traditional)
  - formwork
  - concreting
  - slurry wall
  - construction of different kind of piles
- foundation reinforcement works

3

Construction process

CONSTRUCTION OF SUPERSTRUCTURES

- formwork
- concrete reinforcement
- concreting
- masonry (external walls)
- scaffolding
- carpentry

3

Construction process

FINISHING WORKS

the most time-consuming and cost worthy part of the construction

- carpentry
- joinery
- parquet flooring
- roof covering
- sheet metal work
- locksmith's work (ironwork)
- glasswork
- wall- and floor tiling
- painting
- insulation works
- masonry of inner walls, bricklaying
- plastering
- exterior facings
- drywall construction

3

Construction process

FINISHING WORKS

the most time-consuming and cost worthy part of the construction

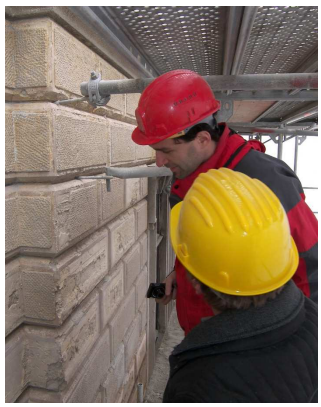
applied arts + restoration technologies

+

- smithcraft
- stained glass
- pargeting, stucco making
- etc.

+

- electrical work
- building installation work



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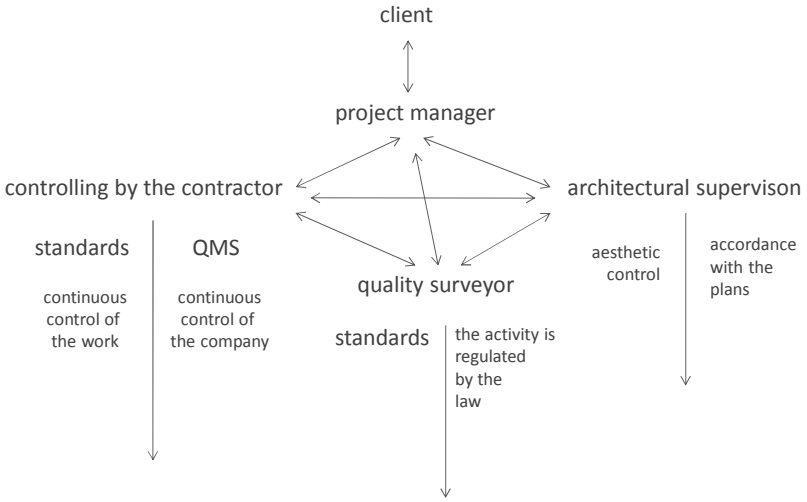
CONTROLLING PROCESS



Controlling

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QUALITY MANAGEMENT - STANDARDS

DEF.:

A **technical standard** is an established norm or requirement.
It is a formal document that establishes uniform engineering or technical criteria, methods, processes and practices.

Controlling

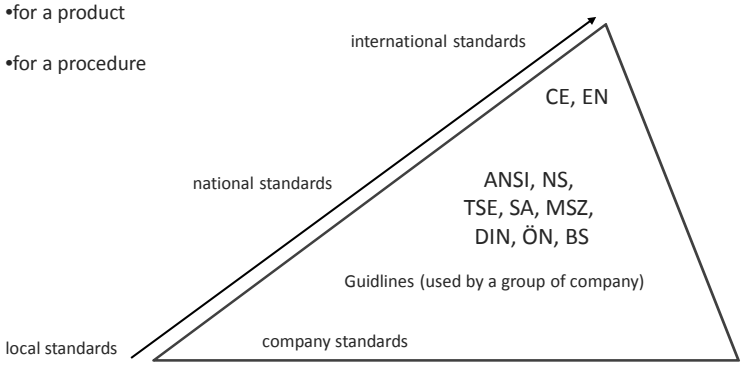
4

QUALITY MANAGEMENT - STANDARDS

Controlling

•for a product

•for a procedure



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QUALITY MANAGEMENT – BUILDING STANDARDS

Controlling

CE = conformance mark

The manufacturer on his sole responsibility declares, that the product mets the EU consumer safety requirements.

Building construction

The building fulfills the EU consumer safety requirements if **all used material** meets with the EU consumer safety requirements :

are marked with CE marking.

or

are uniquely certified.

4

QUALITY MANAGEMENT SYSTEM

QMS = Quality Management System

Quality Management = qualitty control + quality assurance + quality improvement

QMS – the organizational structure, procedures, processes and resources needed to implement for quality magaement.

International Organization for Standardization

ISO 9000 family of standards for QMS

ISO 14000 family of standards for effective environmental management system

TQM = Total Quality Management

Controlling

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