Site organization and management

Introduction

Site management

Site planning

How to do your site plans?
DEFINITION

Site management...

...is the day-to-day on site control of a construction project

- to prepare the site for the construction,
- to keep it within the timescale and budget,
- to tackle with any delays or problems
- to ensure quality and health and safety
- to coordinate communications between all parties involved in the on-site development and with the public.

SITE LOGISTICS

<table>
<thead>
<tr>
<th>Information and management</th>
<th>Material and components</th>
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<tbody>
<tr>
<td>design</td>
<td>delivery</td>
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<tr>
<td>procurement</td>
<td>movement</td>
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<tr>
<td>construction practices</td>
<td>installation</td>
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process optimization ensuring efficiency minimization of waste
SUSTAINABLE WASTE MANAGEMENT

(4R) Reduce, reuse, recycle, revitalize

- material and work safety management
- minimization of waste and damage
- transportation timing
- no construction failure
- plan management

- equipment logistic
- material logistic between construction sites
- separated waste treatment
- waste management, and logistic – extra contracts with recycling co. etc.
- application of recycled materials

- no leftovers on construction site
- neutralize chemically harmful material
- replanting trees, vegetation

WASTE MANAGEMENT ON THE SITE

minimum requirements – separation groups

<table>
<thead>
<tr>
<th>Paper</th>
<th>Glass</th>
<th>Metal</th>
<th>Plastic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>rest</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>construction waste (normal)</td>
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<tr>
<td></td>
<td></td>
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<td>construction waste (health hazard)</td>
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</table>
CONSTRUCTION SITE COMMUNICATION

- information management
- information distribution
- plan utilization
- change management

SITE SECURITY AND SAFETY

- to avoid losses of materials and plant through theft, and vandalism and careless behaviour
- to prevent fire on site
- to prevent health injury, to avoid accident
- to protect equipment and machinery (property)
- to protect public
CONSTRUCTION EQUIPMENT LOGISTICS

• optimal use of material and construction work capacity
• optimal use machinery and equipment
• to minimize/reduce waste
• to minimize material movement

DEFINITION

DEF.: 

Construction site layout planning (site planning):

is a plan for the construction, which is prepared by the contractor as part of their mobilization activities before work on site commences.
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WHAT IS IT USED FOR?

Technical preparation of the construction in case of physically challenging situations

- small/narrow space on plots
- significant inclination
- heavy traffic
- obstacles in material logistic
- heritage protected buildings, objects, zones
- special technical challenges

Supporting quotation documentations

 supporting bids by the buildability and the physical feasibility

Ensuring the continuous (uninterrupted) operation during construction

- hospital
- factory
- museum
- other

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WHAT ARE THE REQUIREMENTS?

Optimization

- time
- cost
- material logistic
- transport

Minimize

- accidents, damage and health injury
- resource consumption
- cost
- transport times
- material loss
- waste

Maximize

- work safety
- work and operation efficiency

It is not a static plan – a process is planned!
SITE PLANNING

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METHODS

Intuitive method

Based on:
- personal experience
- company traditions
- random decisions

Computer aided methods

Based on mathematical models:
- generic algorithm
- fuzzy logic system
- neutral network

SITE PLANNING

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INFLUENCING FACTORS

characteristics of the construction site:
size
soil type
inclination
infrastructure
legal environment
neighbouring buildings and plots
(state, style, size, value, etc.)
traffic options
vegetation

characteristics of the building:
size
function
complexity
structure and material
(age, state – in case of refurbishment)

characteristics of the contractor:
capital
business strategy
risk strategy
machinery and equipment in stock

Construction Site Plan

Vidovszky – BUTE – Department of Construction Technology and Management
### CONTENT

**Drawings:**
- site map
- general site plan
- organizational phase plans
- detailed operation plans

**Written documentations:**
- technical description of the building (information on all kind of input)
- detailed description of the selected technologies
- detailed site description (public roads, storages, depots, materials, facilities, transportation, etc.)
- work safety documentation
- description on machinery, equipment, temporary objects
- waste management documentation
- supporting calculations
- schedule

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**PLANNING CONSTRUCTION**

- Selection of technologies
- Work Breakdown Structure and Schedule
- Cost calculation
- Construction Site Plan

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**SITE PLANNING**

Vidovszky – BUTE – Department of Construction Technology and Management
CONSTRUCTION SITE MAP

(M=1:1000, M=1:5000)

Minimum information:

- environment (estates, properties, buildings, temporary facilities)
- transportation options (railway, highway, road, water)
- topography (widths and gradation of slopes and roads, etc.)
- accessibility (roads, parking places, public transportation)
- material supply (mines, factories in the neighbourhood)
- infrastructure (high and low voltage electric supply, gas, water, wastewater pipes and ducts)
- first aid and medical care (nearest hospitals)

GENERAL CONSTRUCTION SITE PLAN

(M1:500, M1:1000)

Minimum required content (with dimensions and levels):

- floor plan and the requisite sections
- main conflicts identification
- buildings (on the own site and in the neighbouring plots, buildings heights, entrances)
- protected items on the site (building, tree, etc)
- roads near by the site (direction of traffic, widths, gradation of slopes, materials)
- positions of the main equipment and machines (tower crane, auto crane, concrete pump, temporary track parking lots, etc.)
- main depots and working space of the main technologies (pre-erecting on the site)
- temporary and steady roads on the site
- main facilities and temporary buildings (management, social container, first aid, etc.)
- infrastructures (temporary and permanent)
- guarding system
CONSTRUCTION SITE PHASE PLANS

Representing a certain construction phase (e.g. earthwork, slab construction, etc.)

(M1:100, M1:500)

Minimum required content:

The content of the general site plan +
+ exact positions, moving directions and routs of the main machines
+ exact positions of the work spaces (even in the building)
+ exact places of the deposits
+ exact positions and dimension of the welfare and storing facilities (eating, dressing, restroom)
+ roads and traffic areas on the site (entrances, parking lots, moving directions, materials, dimensions, turning radiuses)
+ electricity (lighting, high and low voltage power supply, transformer, etc.)
+ water and gas pipes, wastewater ducts
+ waste containers
+ guarding system (fences, gates, guard container, etc.)

DETAILED OPERATION PLAN

(M1:100, M1:50)

• for a certain technology
• for a short period of time
• floor plan and the requisite sections (general or step by step)
• presenting the movement of the concerned machinery
• detailed drawing about the requisite equipment and temporary structures
• detailed description about the components/elements or element consignation
• step by step description of the technological steps
SITE ORGANIZATION

CONSTRUCTION SITE ZONES

Central zone:
The structure and the closest place around. (Usually place for tower crane, lifting equipment, scaffolding)

Internal zone:
Uploading places, active depots (e.g. formwork, prefabricated elements, etc.)

Intermediate zone:
The tower crane still reaches this zone. Facilities of prefabrication, inactive depots.

External zone:
The tower crane does not reach this zone. Ideal for temporary facilities, staging buildings, parking places, small machine and power tool container, etc.
WELFARE AND OFFICE FACILITIES

Closed and heated space required for:

- management office
- documentation and back-up (archive) office
- subcontractor’s offices
- meeting (conference) room
- toilet (restroom)
- dressing room
- medical (first aid) room
- guard container

STORING FACILITIES

Closed space required for power tools and weather sensitive materials/components (UV, heat, freeze, rain, wind):
- small machines, power-handtool storage
- closed material depot (per each technology per each subcontractor)

Covered space required for slightly weather sensitive materials/components:
- material depots (per each technology per each subcontractor)

Open depot required for negligibly weather sensitive materials/components/equipment:
- scaffolding
- formwork
- reinforcement bars and armature
CONTAINERS

20’ ("basic") container
(approx. 2438 x 6096 mm)

40’ container
(approx. 2438 x 12192 mm)

10’ ("half") container

"double" container

+ extra accessories (e.g. tank, stairs, etc.)
SILOS

Technical data:
• volume: 18m³ / 22m³
• empty weight: 2.4t / 2.7t
• max. capacity 27t / 33t
• max. height 6.6m / 7.2m
• basic area: 3x3m
Requires access for tanker refill!

TRANSPORTATION AND STORING MATERIALS

- Is it necessary to store components or is it possible to lift them directly to its ultimate place?
- Is it necessary to store material or is it possible to distribute it to the place of use?
- Is the size of the component standard and easily transportable or does it need special handling?
- What is the required amount of material? How much is applied at once? Is it worth to deliver separated packages?
- Is it possible to place one onto the other? Which position it have to be stored in? (The same as the ultimate position in the building.) How many packages can be stored on top of each other? How many is reasonable to be stored on each other?
- Is the material sensitive for weather effects as wind, UV radiation, temperature, rain, moisture, etc.?
- Are there alternative materials to reduce cost and/or time?
MOVING MATERIALS
Minimize the elements movement on the site!

How to move the material on the site?

- by manpower
- by palette lifter/palette truck
- by elevator and pushcart
- by crane (grab and lifting spots: optimal if the crane operator can see both)

In case of on-site prefabrication

- the crane should reach the prefabrication area
- the finished, prefabricated element should not decrease the productivity!

TRAFFIC ON THE SITE

Temporary or final roads

- gradient of the slopes: <10% (<15%)
- one track lane: 3,00m
- two track lane: (5,50-)6,00m

- material: compressed soil, crushed stone, concrete, asphalt, etc.
- minimal turning radius: depends of the machinery
- turning of machinery: (around the axis), Y-turn, U-turn, roundabout
- parking space requirement: for the working staff + site management
- entrances: passenger and vehicles separated (keep close to minimum)
**EXTENDING THE CONSTRUCTION SITE**

Additional territories can be rent form the attaching plots
(It is recommended to rent as few as possible.)

 Generally the options:

Hire public area:

- the sidewalks of the attaching streets/roads
- the traffic lanes on the attaching street/road
- park area, green lane, etc.

Hire private area:

- empty plot, part of the neighbouring garden or yard

Functioning buildings can not be blocked during the construction!

**SITE PLANNING STEP BY STEP**

- Step 1
- Step 2
- Step 3...
STEP 1 – SITE GEOMETRY AND TOPOGRAPHY

Existing building on the site

Direction of the traffic

Direction of the traffic

Planned building

Gas, water, wastewater, electricity, etc.

Streets/roads around the site

Streets/roads around the site

Vegetation (trees, bushes)

Inclinations

Neighboring buildings

Topographic lines

SITE PLANNING

STEP 2 – INFRASTRUCTURE AND TRAFFIC
SITE PLANNING

STEP 3. EQUIPMENT AND INSTALLATIONS

- Transportation routes (for machinery, for workers)
- Protection equipment (guard post, fence, gate)
- Temporary structures
- Welfare, office and storing (closed)
- First aid point
- Storing areas and equipment (open)
- Machinery (for material movement, and technology)

SITE PLANNING

STEP 5. CHECKING / RE-PLANNING THE ARRANGEMENT

? ? ?

? ? ?

? ? ?
SIMPLIFIED STEP BY STEP
(for academic use)

1) Collect all the input information and questions about the building
2) Collect all the input information and questions about the site and environment
3) Arrange the site layout, make your decisions:
   a) Mark the neighborhood and the environment (roads, trees, etc.)
   b) Mark the site and the existing elements of the building
   c) Main equipment
   d) Main materials and depots
   e) Inside roads
   f) Welfare facilities (calculated amount)
   g) Health & safety objects
   h) Further materials (e.g. sound proofing) and waste containers
   i) Further equipment (scaffolding, etc.)
   j) Further objects
   k) Infrastructures
   l) Compose the construction description
4) Check the layout, check the activity schedule, check the resource, check the cost

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