

SITE LAYOUT AND CONFINED SITES



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SITE LAYOUT

Planning and organising the site area around the proposed structure to accommodate the resources necessary to construct the project.

Site layout will change along time

- Fencing and security
- Earthworks
- Structure
- Envelope
- Indoor
- Finishing



SITE LAYOUT

Planning and organising the site area around the proposed structure to accommodate the resources necessary to construct the project.

Important aspects to include in contracts

- Who does what
- Plant installed
- Characteristics
- Conditions of use
- Health and safety
- Environment aspects



SITE LAYOUT

Planning and organising the site area around the proposed structure to accommodate the resources necessary to construct the project.

Considerations about:

- Existing services
- Construction methods
- Plant characteristics
- Permissions
- Subcontractors
- Workforce



SITE LAYOUT PLAN

It might include:

- Locations of cranes with radii and capacities.
- Site offices.
- Welfare facilities.
- Off-loading and storage areas.
- Sub-contractor facilities.
- Car parking.
- Entrances, temporary roads, separate pedestrian access.
- Vehicle wheel washing facilities.
- Hoarding details.
- Signage.
- Temporary services:
 - Electrical power.
 - Lighting.
 - Water distribution and drainage.
- Information and communications technology installations.
- Site security systems.
- Temporary works (such as propping solutions to retained structures, sheet piling details etc).
- Areas for the construction of mock-ups for testing.



SITE LAYOUT

SECURITY

Possible problems in boundaries with:

- Adjacent properties
- Encroachment
- Security
- Pollution

Prevention of access by unauthorised persons (CDM Regulations)

Main contractor – define the site boundaries using suitable barriers

Especial consideration required when:

- Rights of way through the site
- Other work areas close
- Occupied houses next
- Children and vulnerable people nearby



SITE LAYOUT

SECURITY

Entrance

Separated access for vehicles and pedestrians

Gates, barriers and bollards

Access control systems and register

Safety guards

CCTV

Lighting

Entrance and exists

Also inside

Fencing (hoarding)



SITE LAYOUT

SECURITY

Hoarding

Temporary or long-term installation

Freestanding or built into the site

Structurally stable (strong wind loads, impact, etc.)

Modular system or a bespoke installation

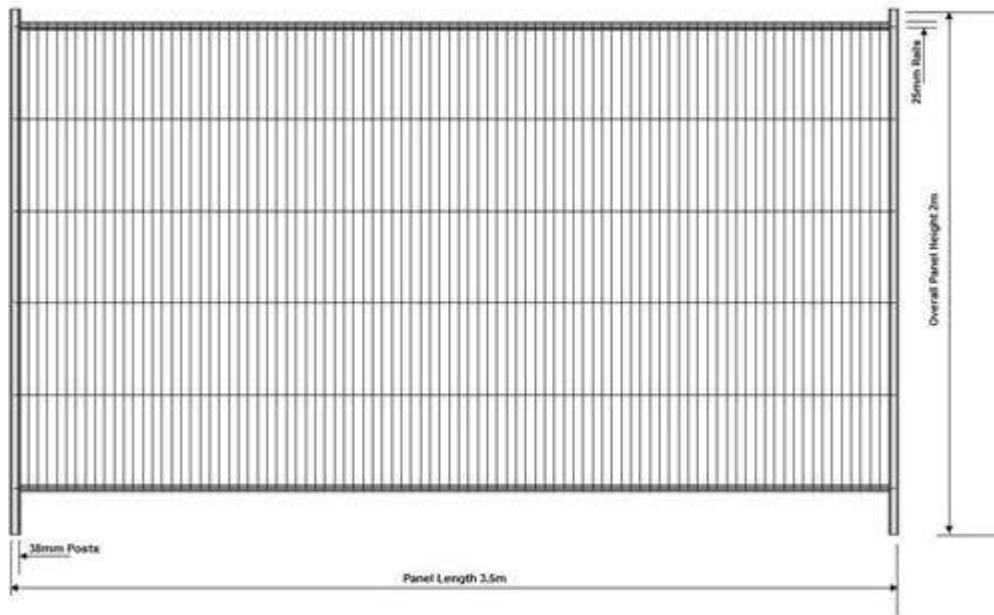
Steel, timber or plywood

Disposable or re-usable

Regularly inspected



Freestanding HERAS fence



Improving
stability



Freestanding HERAS fence



Use of blind metal panels

Stability systems





Freestanding HERAS fence



Use timber panels





Light fences



Plastic barrier

Uses:
Signalling pathways (pedestrians)
Prevent access



Metal barrier



OFFICES

Include:

- Office rooms, cabinets
- Documents' archives, office technology rooms
- Meeting rooms
- Lavatory
- Refreshment rooms, tea-kitchen
- Sub-contractor offices
- Emergency or “clean” room (first-aid room)

All close together, close to the site and in a safe area

Better if they have access from the street. If not, they should have a separate and delimited access



OFFICES



Single container
2.44 x 6.05 m



Double/sized container
4.94 x 6.05 m.

Do you think this is the best place to put these offices?





WELFARE SERVICES

They include:

- Toilets
- Hot and cold water
- Changing facilities
- Drinking water
- A place to rest and eat



Do you think it is a place to rest and eat?



WELFARE SERVICES

Toilets and washing facilities

Clean and tidy toilets

Adequate ventilation and lighting

Separate male and female. If not possible, rooms with lockable doors

Washing facilities:

- Adequate supplies of toilet paper
- Hot and cold running water
- Soap and other cleaning agents
- Towels or another method for drying hands
- Sanitary waste disposal in facilities used by female workers
- Sinks, large enough to allow washing of the face, hands and forearms
- Showers required depending on the nature of the works



WELFARE SERVICES

Changing facilities

For specialist clothing

Separate male and female

Secure areas for storing personal clothing

Facilities for drying wet clothing

Drinking water

Rest facilities

Appropriate number of seats and tables

Method for heating drinks and warming food

Separate to any plant, materials or equipment storage areas



SITE LAYOUT

TRAFFIC MANAGEMENT

Key issues:

Keeping pedestrians and vehicles apart

- Separate entry and exit gateways

- Provide firm, level, well-drained pedestrian walkways

- Crossings. Clearly signed and lit

- Visibility

- Eliminate any obstructions blocking walkways

- Barriers between roadways and walkways

Minimising vehicle movements

- Car and van parking for workforce and visitors away from working area

- Control entry

- Storage areas near entry



SITE LAYOUT

TRAFFIC MANAGEMENT

Key issues:

People on site

All workers are fit and competent to operate the vehicles, machines

Training drivers and operators

Turning vehicles

Avoid need of vehicle reversing

One-way systems

Turning circle

Visibility

Aids for drivers (mirrors, CCTV, reversing alarms)

Signallers

Lighting

Clothing (high-viz clothing)

Signs and instructions



Hambleton Court

7 to 12 243

Priority Court

Edgbaston
(The Warwickshire
County Cricket Club)

When red light shows wait here

P610

P7105

P517

P518

P543

P7001

P645

P573

P573

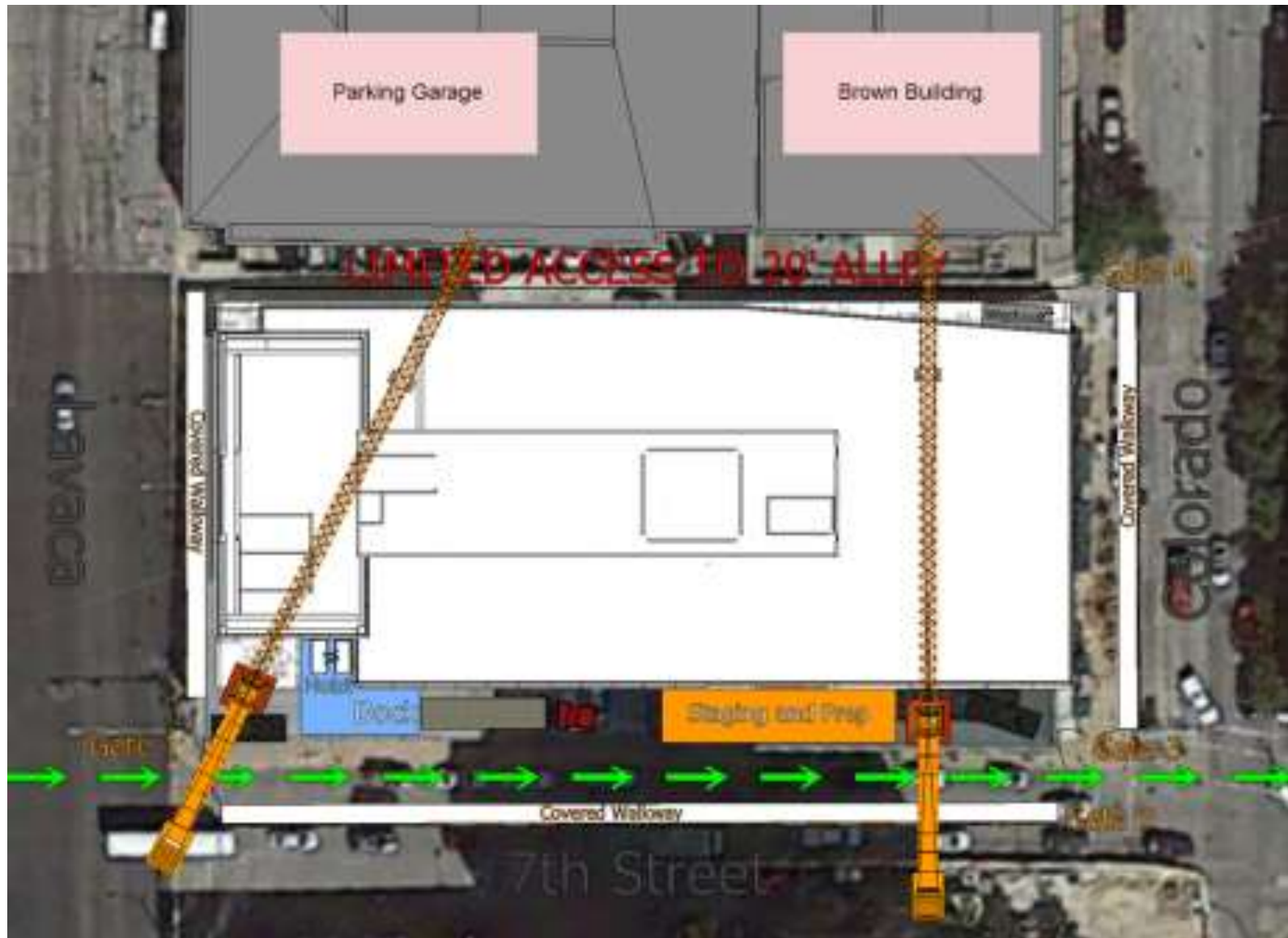
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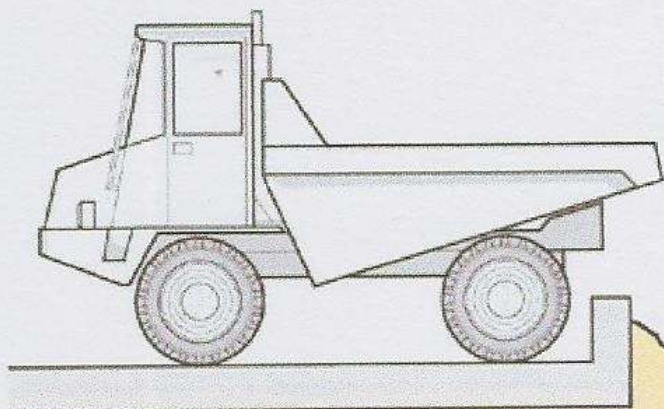




SITE LAYOUT

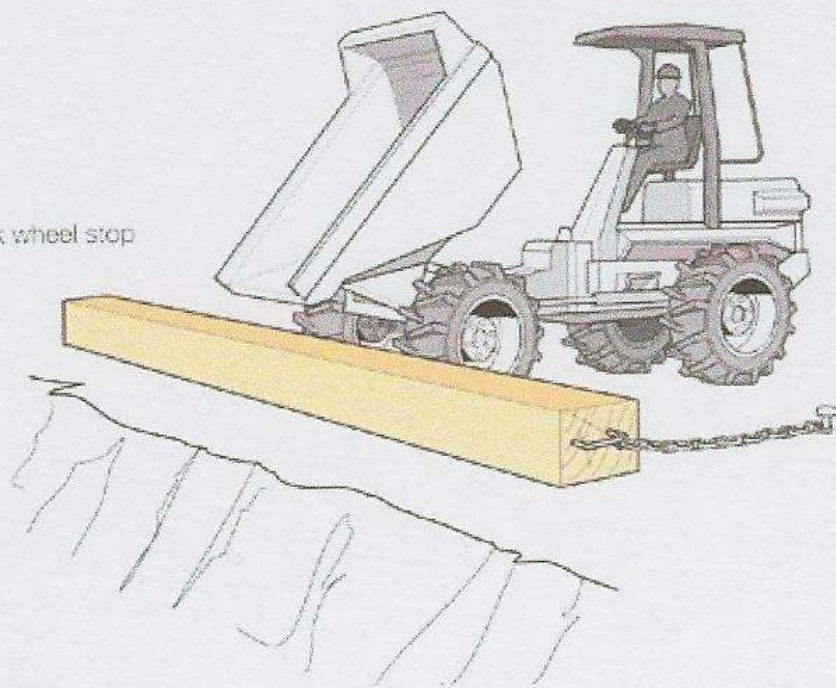






(a) Concrete wheel stop

(b) Timber baulk wheel stop





SITE LAYOUTS AND CONFINED SITES

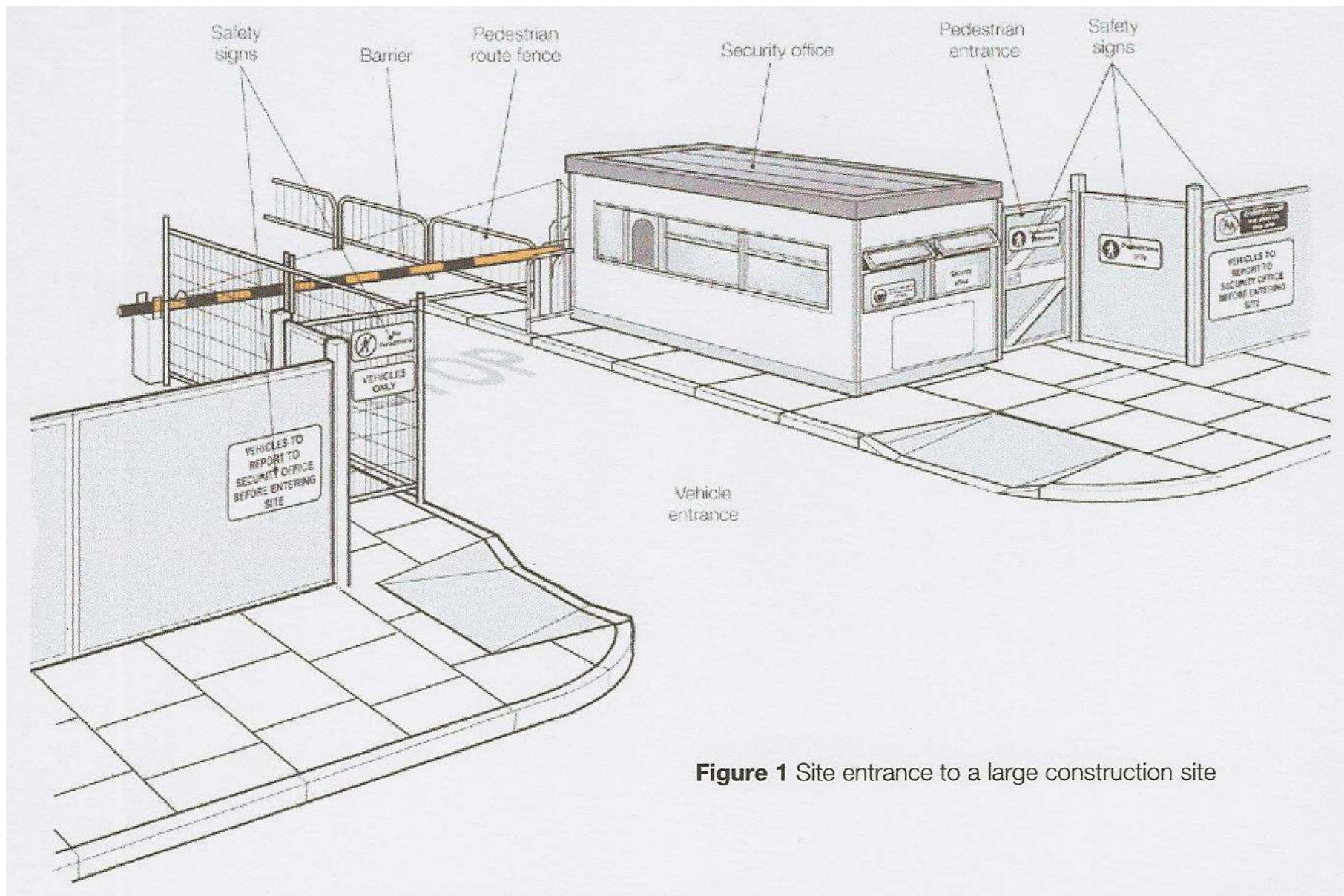
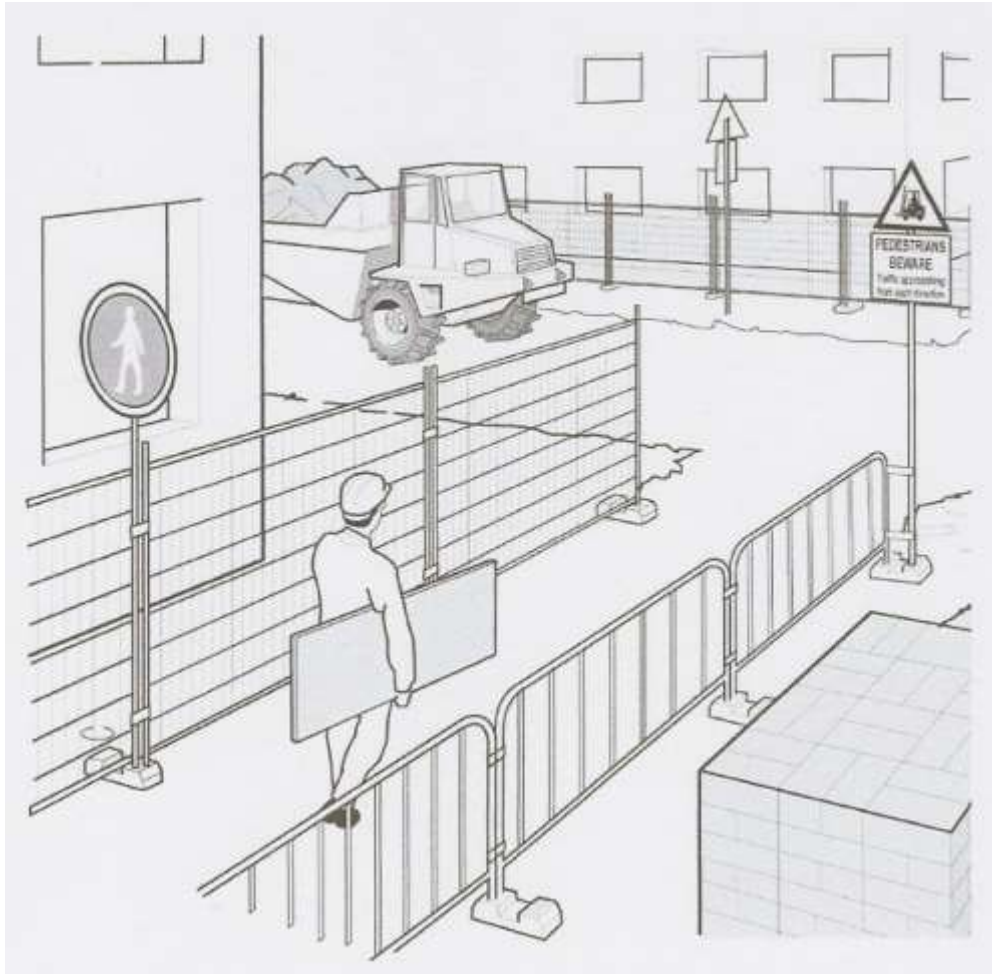


Figure 1 Site entrance to a large construction site



At points where pedestrians cross busy vehicle routes, appropriate traffic control measures should be implemented



RAMPS

The access roads must be adapted to the type of vehicle and load that will use it:

- The width of the roadway
- Radius at the corners
- Slope or grade

Maximum Grade

12% straight, 8% curved

Pedestrian access 8%

12.5% limit for comfortable walking

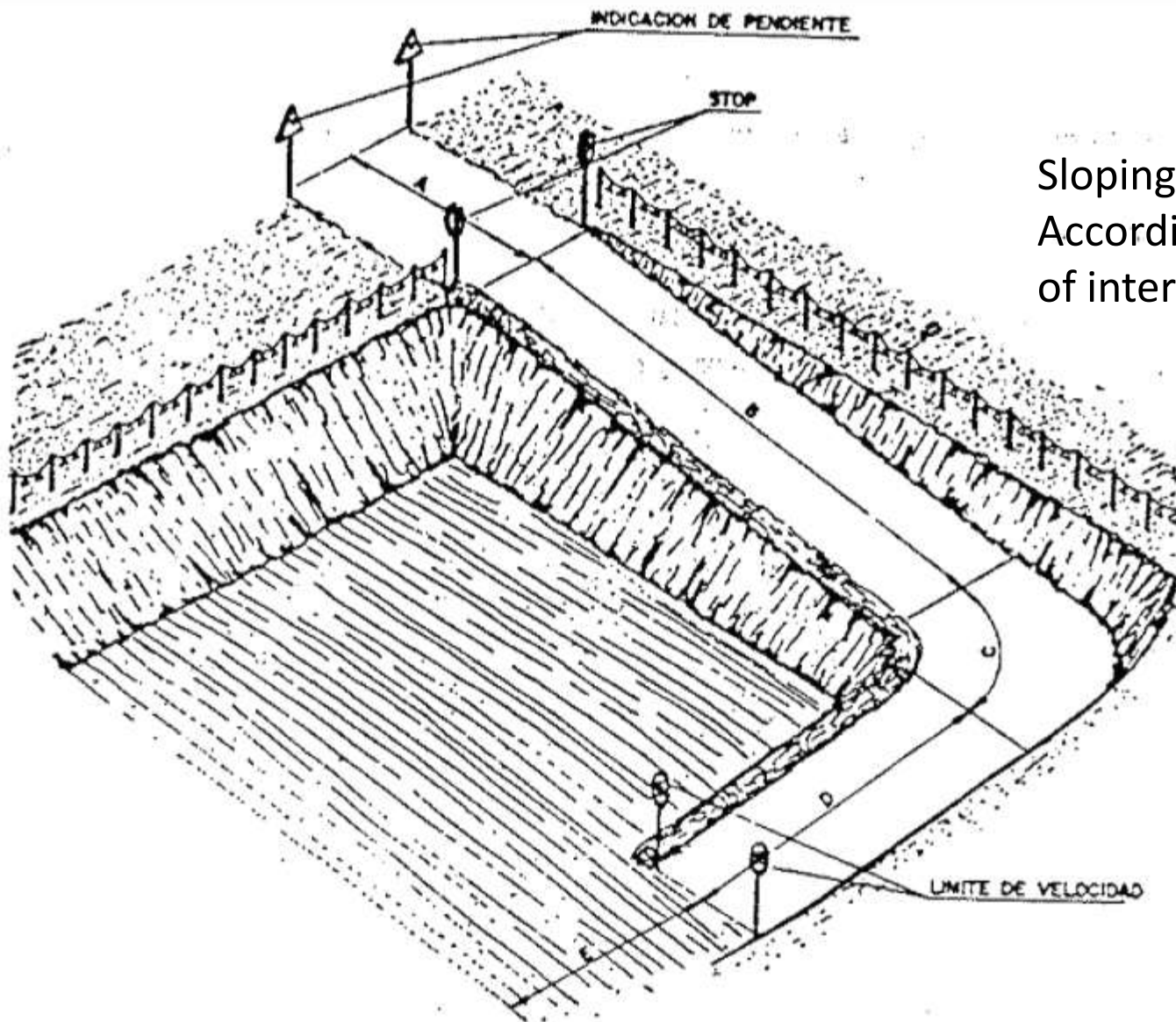
Transitions not more than 6%

Minimum Width

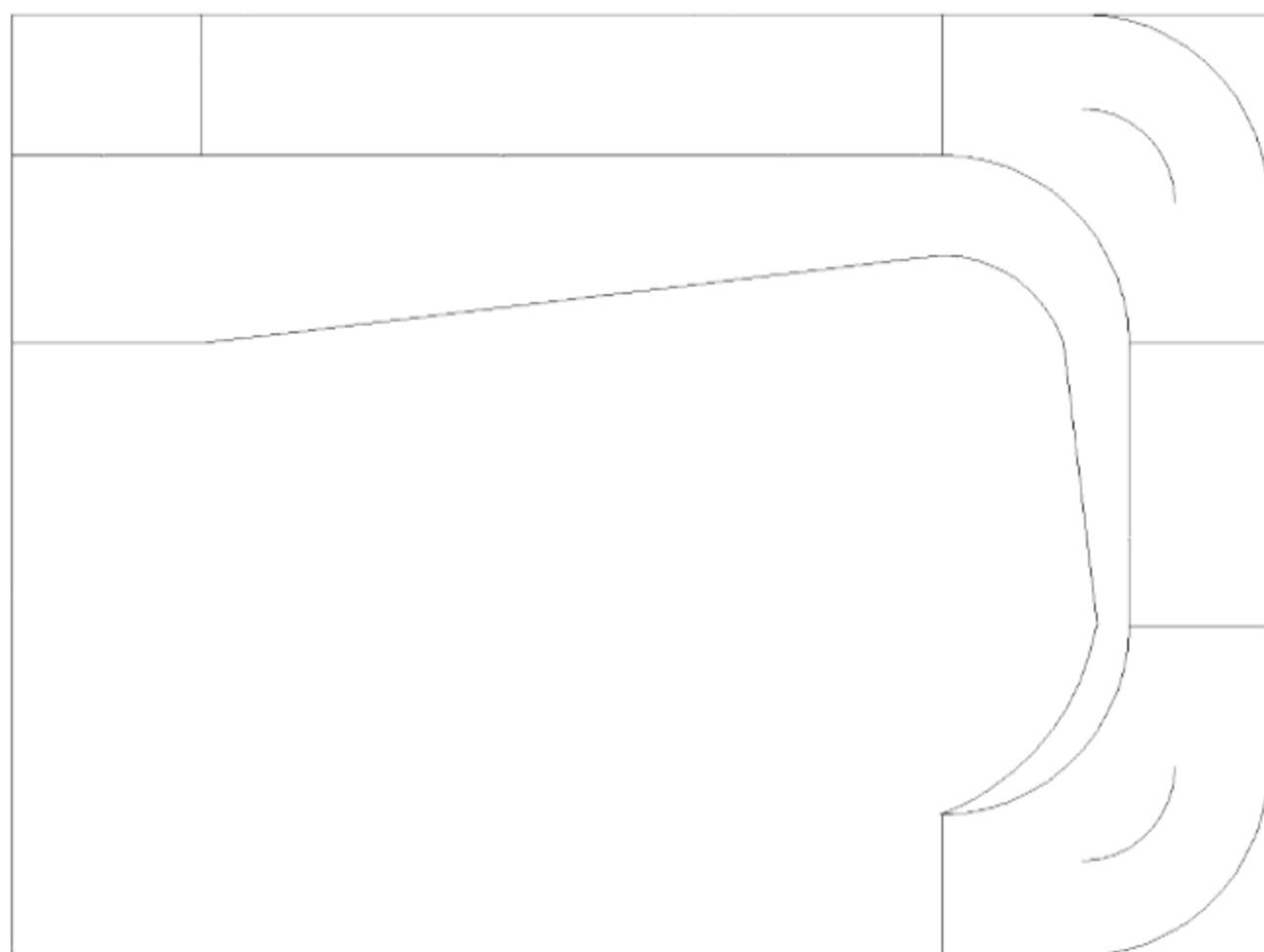
Straight – 4.5 m metres

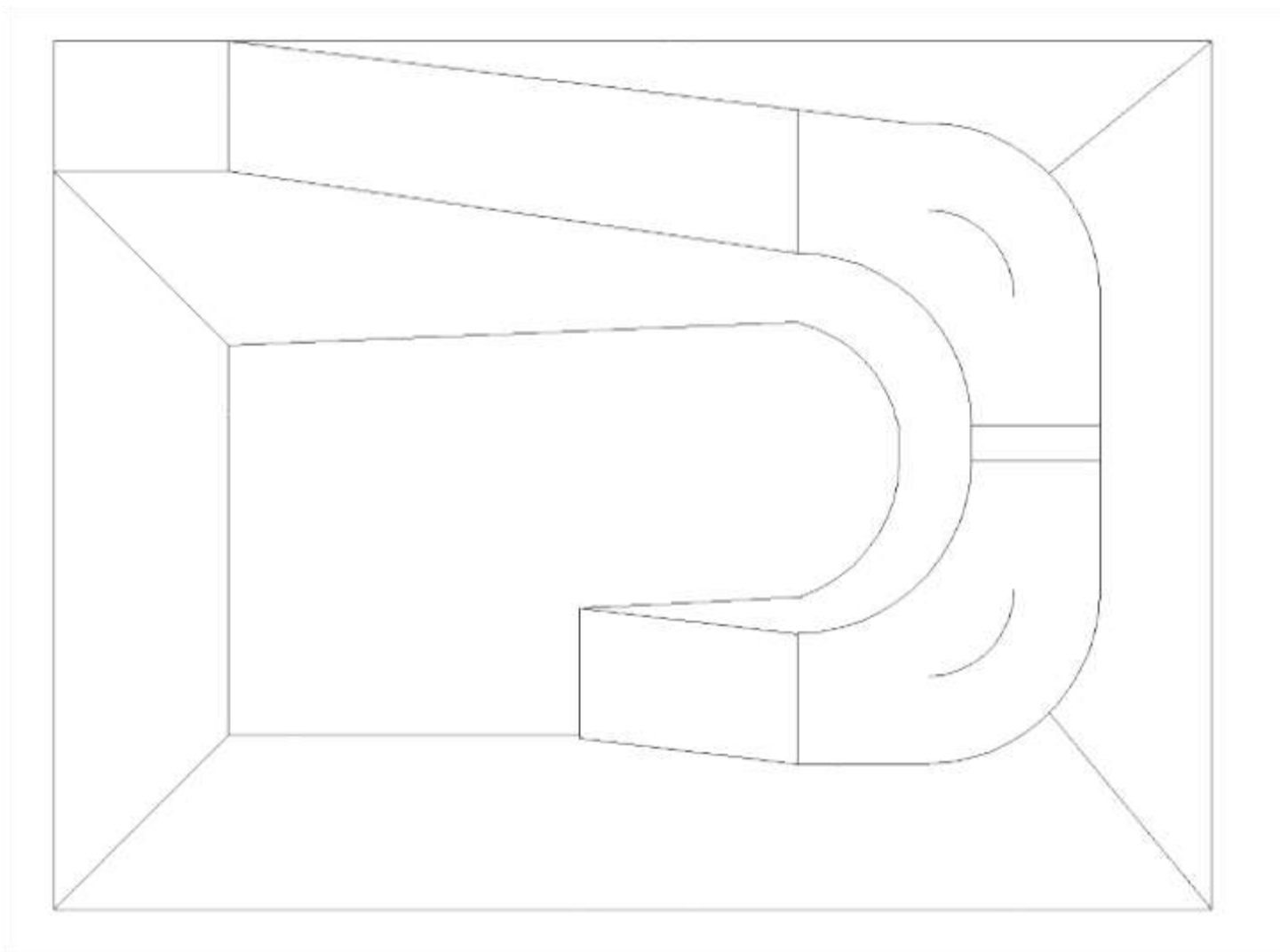
Curve – 6.0 metres





Sloping sides:
According to the angle
of internal friction









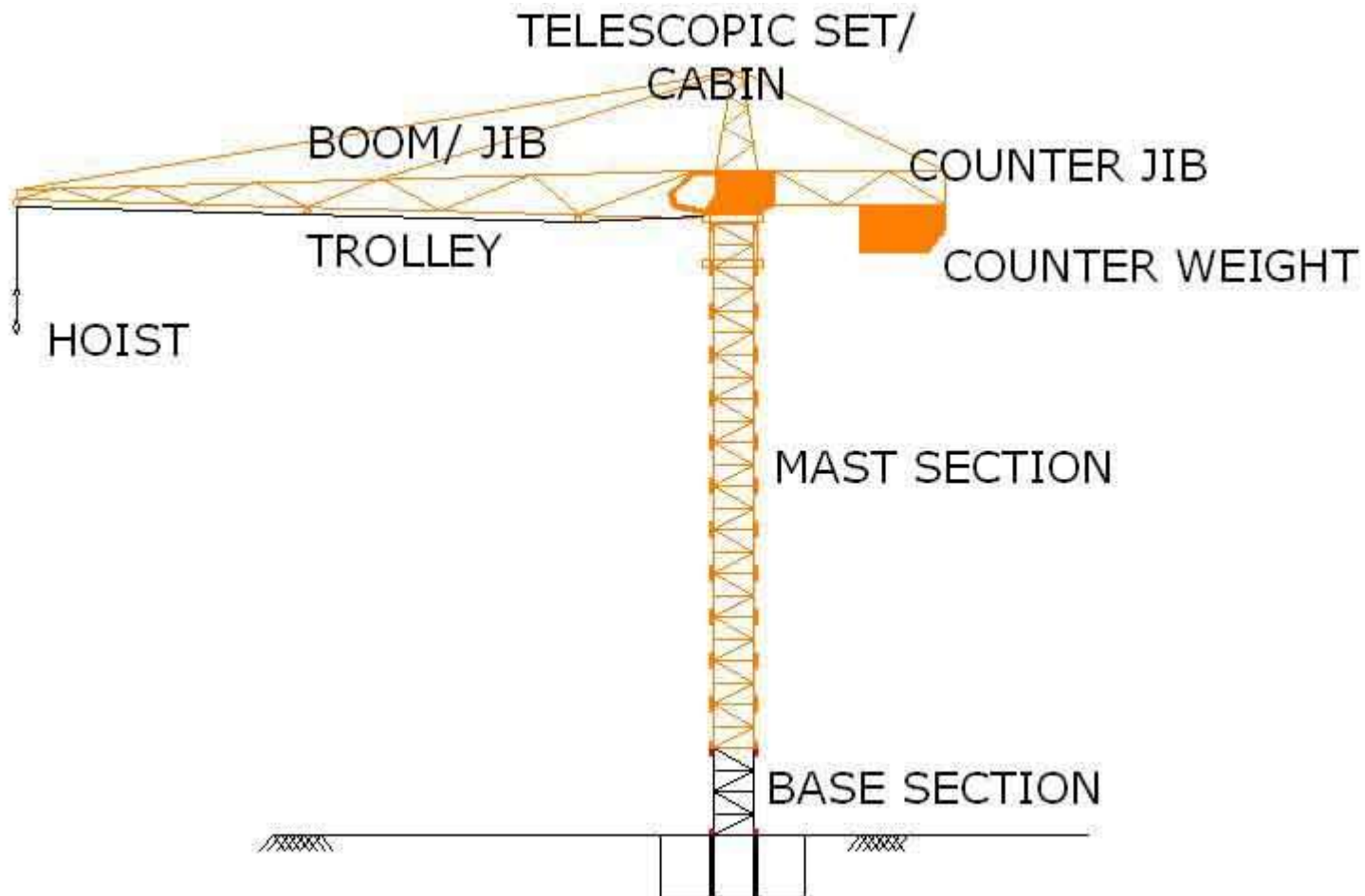


WHAT PROBLEMS CAN YOU SEE?





TOWER CRANES





TOWER CRANES

Conditions:

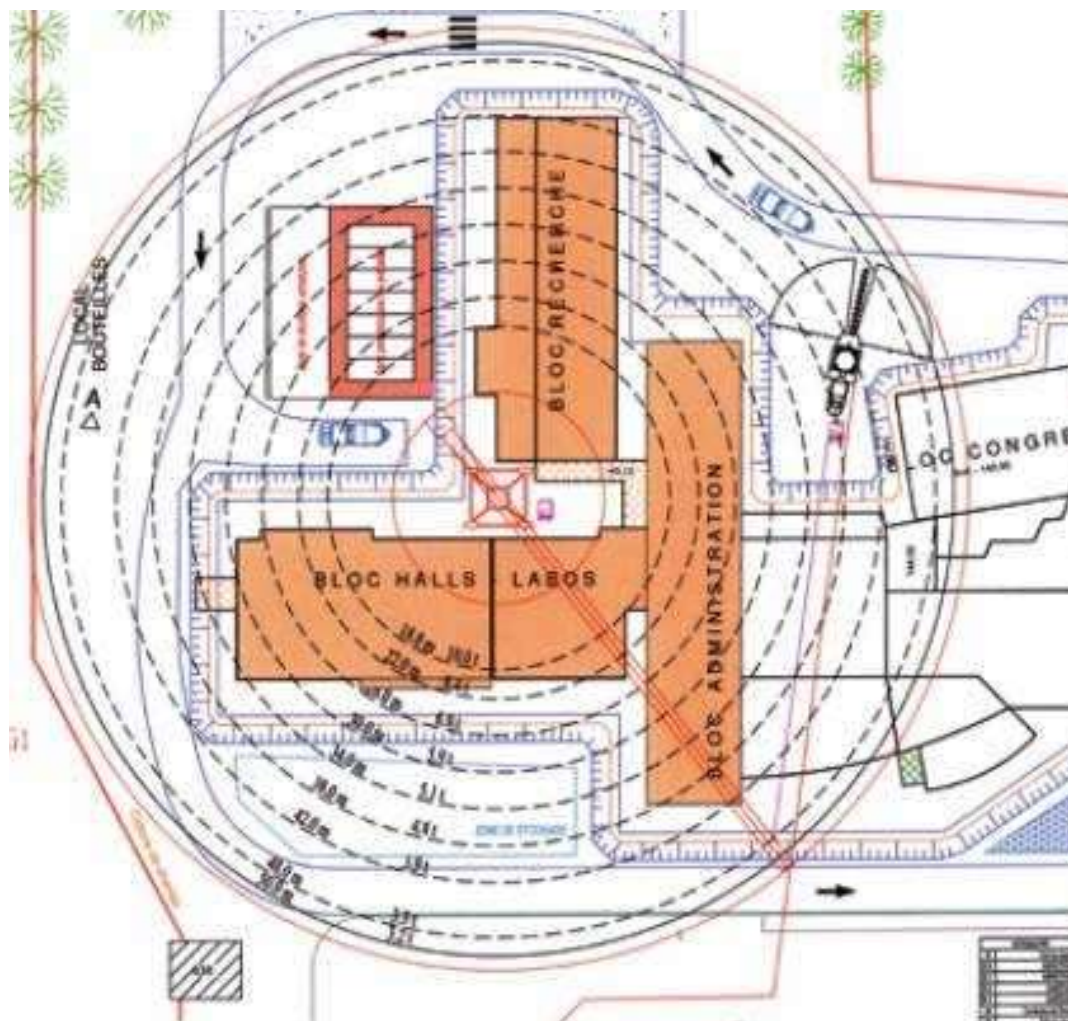
Must cover all the area of the construction

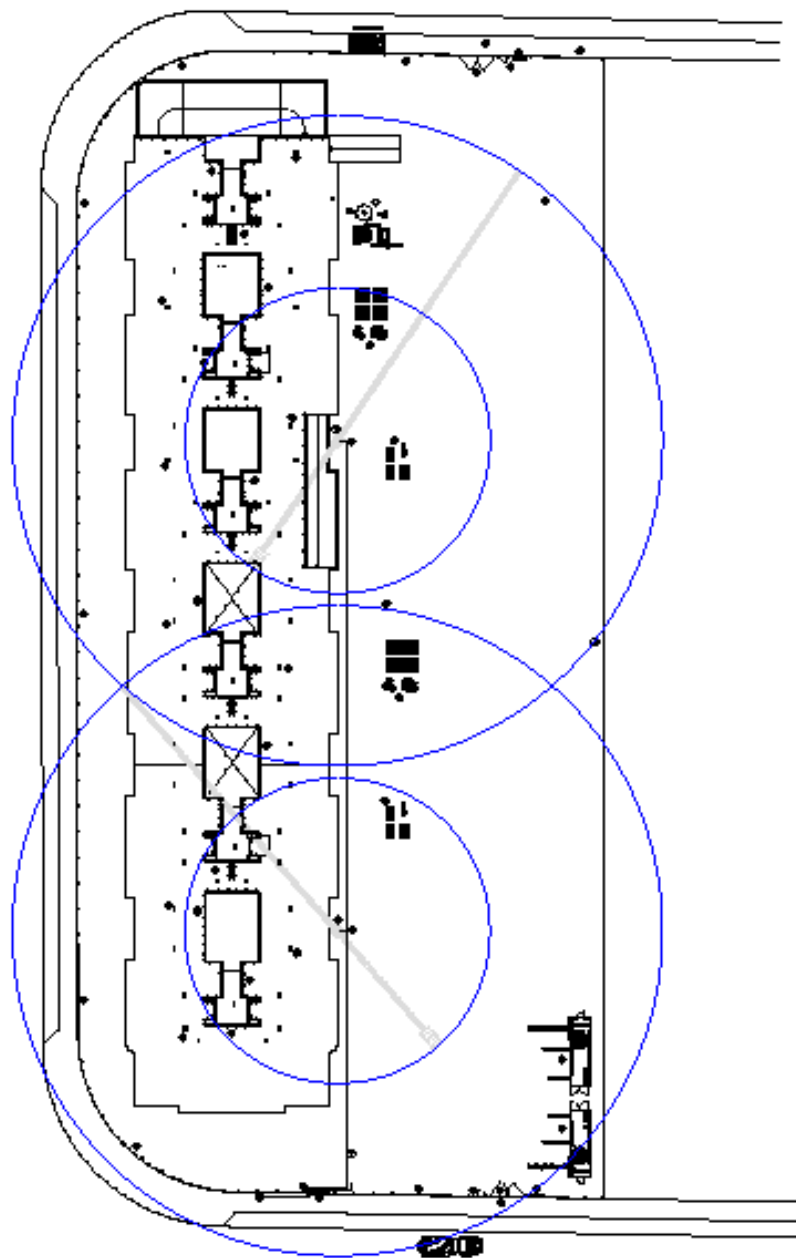
Able to take materials from storage

Preferable not to cross over administration buildings and facilities, nor any other existing buildings

If we have several cranes:

- They will have different heights
- Jibs mustn't cross over any mast
- The counter jibs of lower cranes mustn't cross the way of others

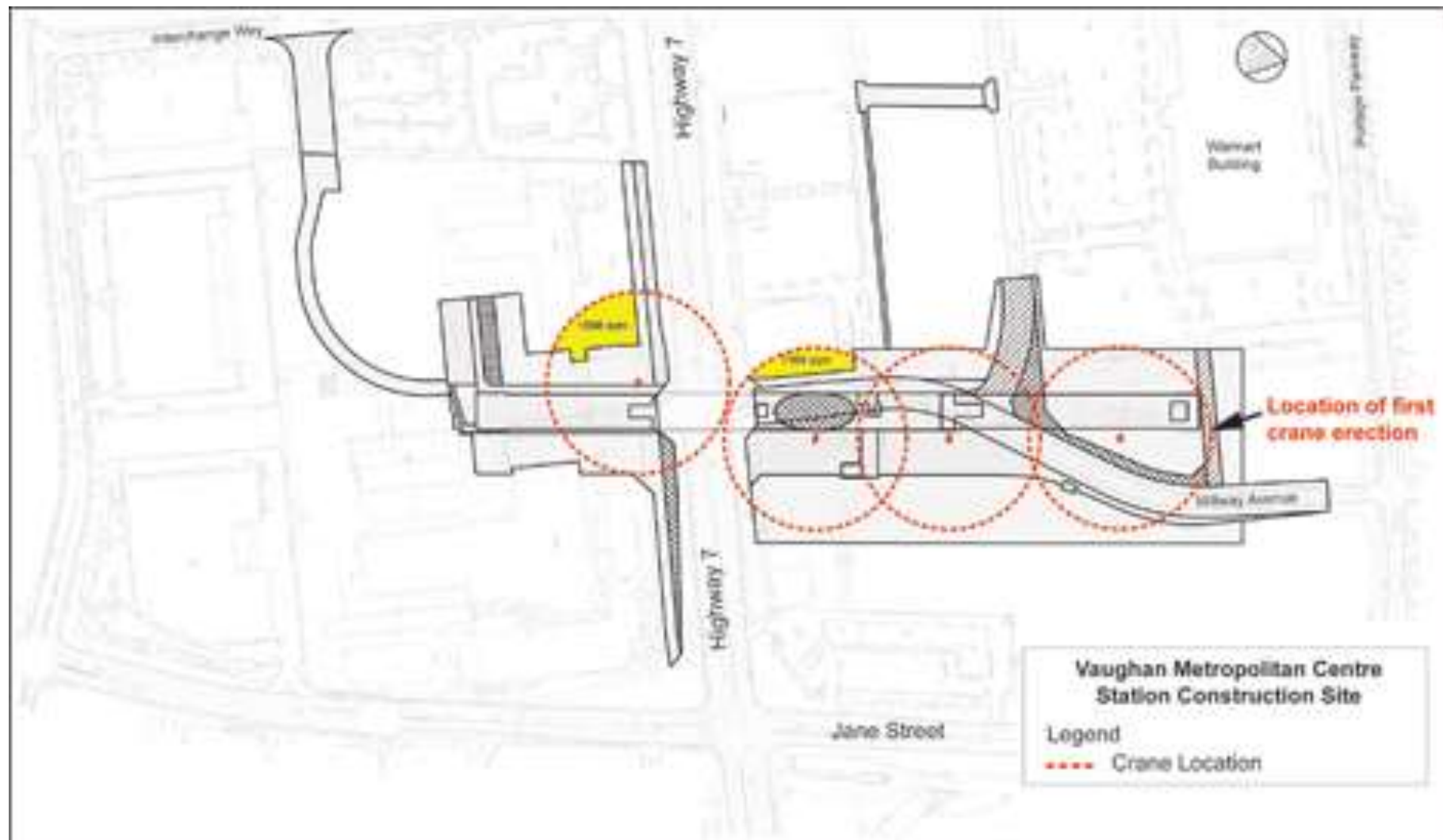


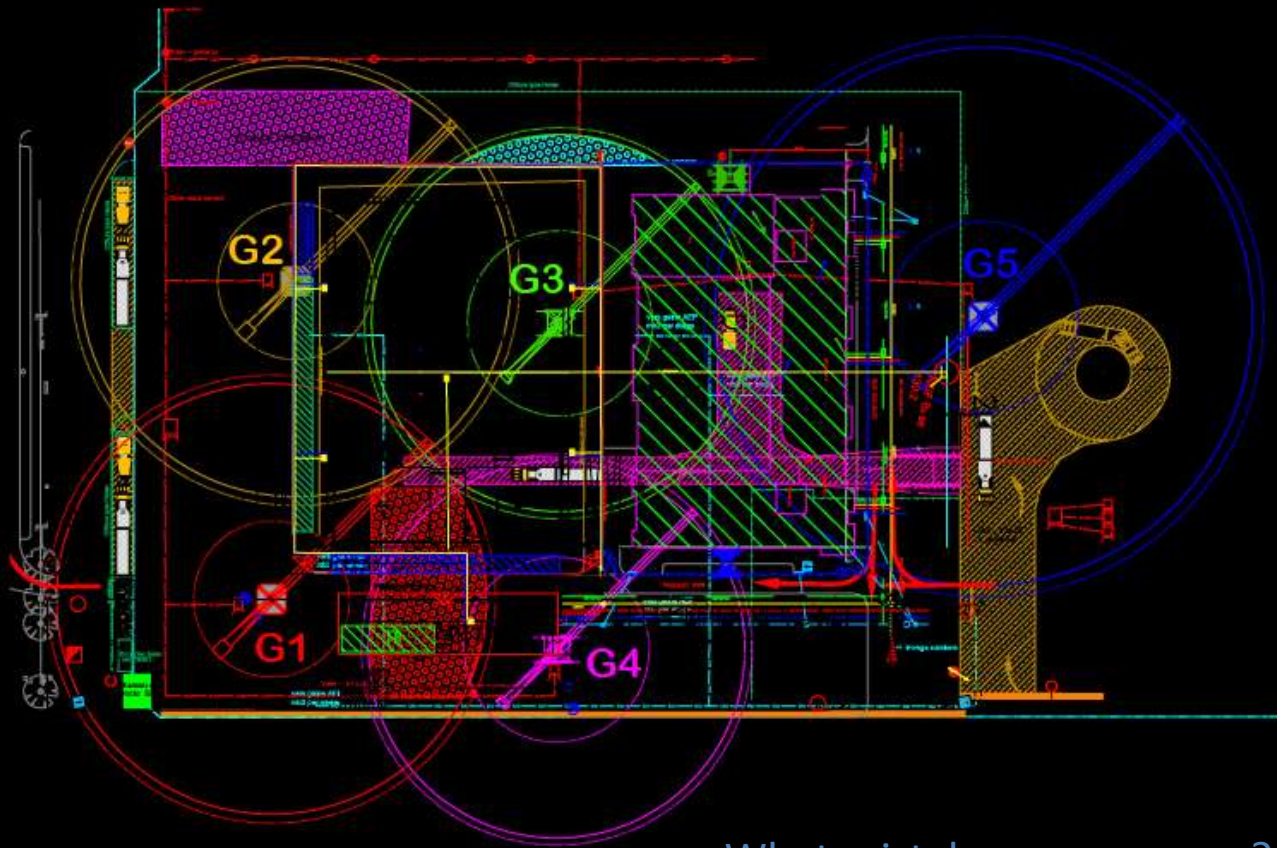


Tabarca Residential Phase 4
Alicante 2003



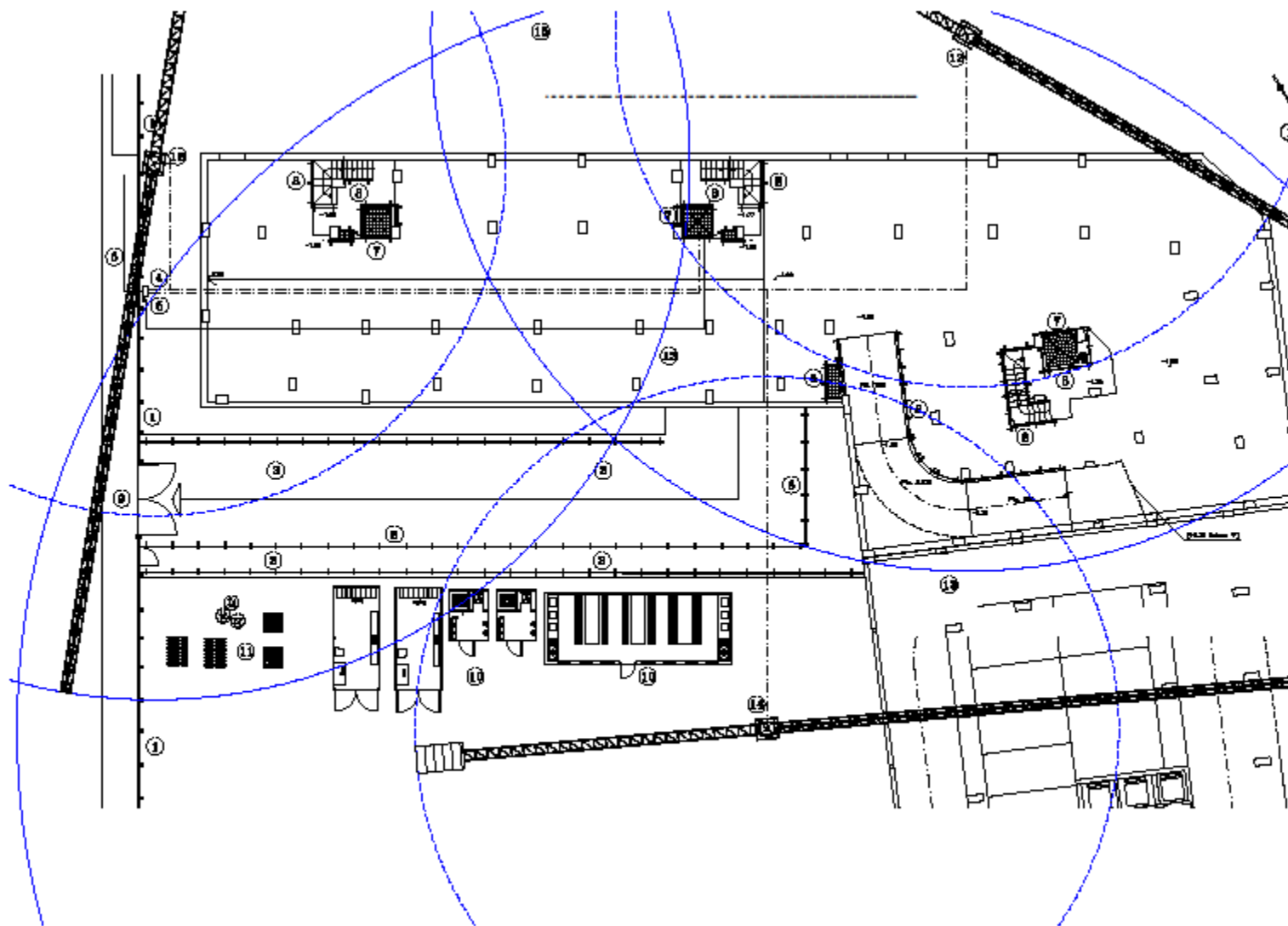
SITE LAYOUTS AND CONFINED SITES





What mistakes can you see?





Kronos. Alicante 2005



TOWER CRANES

Placement of tower cranes

At the least harmful point, taking into account:

- The type of foundation we need
- The mast mustn't struck any part of the construction

Most appropriate places:

- Outside the construction
- Patios
- Lift or other future vertical installations

Sometimes it is impossible. the mast must pass through the slabs, but always the mast must be free, with no obstacle.









TOWER CRANES

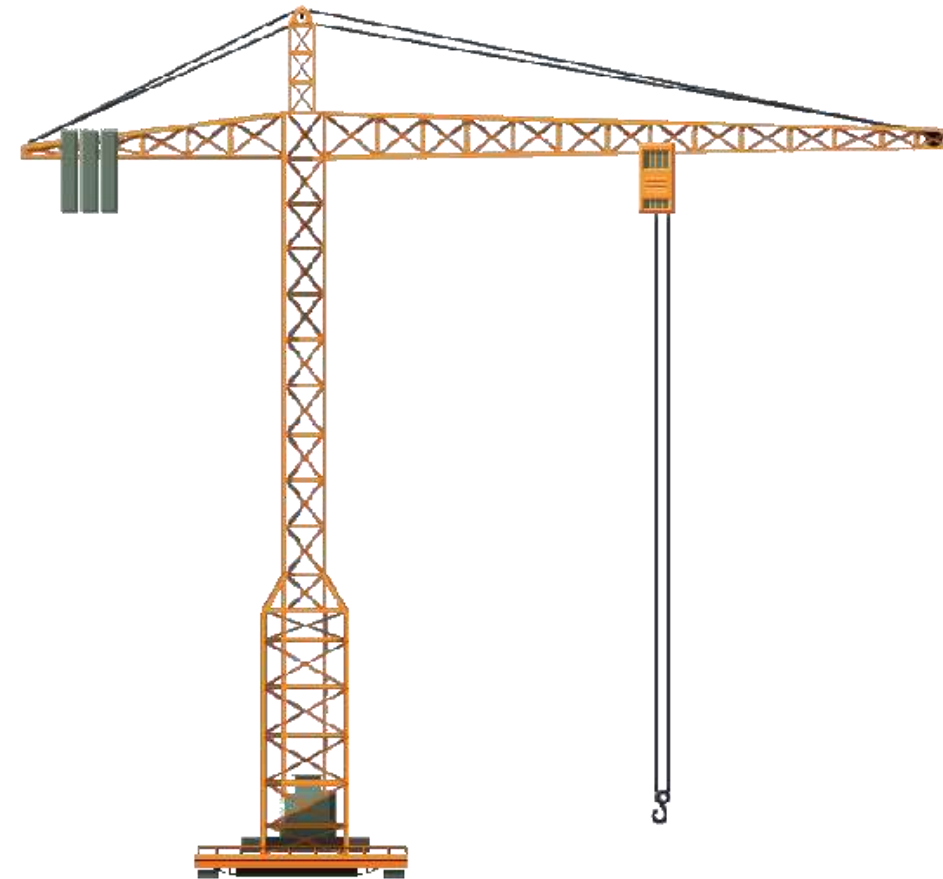
The most important things to define:

- The maximum length to achieve
- The maximum capacity to rise

According to these parameters, we choose the existing commercial crane



PARAMETERS NEEDED TO DEFINE A TOWER CRANE



Maximum capacity

Capacity at maximum jib length

Maximum jib length

Maximum freestanding
hook height

EXAMPLE

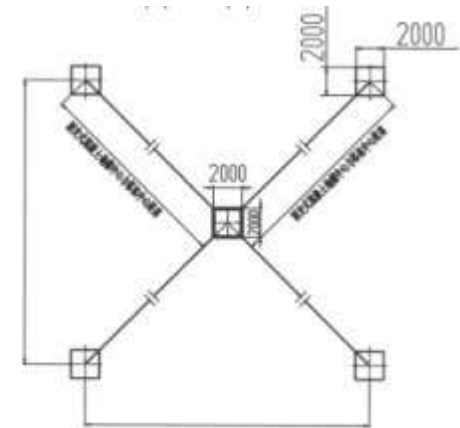
http://www.biggetowercrane.com/tower_crane_charts.html



TOWER CRANES

Mast anchorage

We can increase height and load capacity





MOBILE CRANES

Rail mounted tower cranes





MOBILE CRANES

Vehicle mounted cranes





MOBILE CRANES

Rough terrain cranes





MOBILE CRANES

Crawler cranes





CRANE PLATFORM





CRANE PLATFORM





OFF-LOADING AND STORAGE AREAS

Clearly defined at the start of the project

Ensure that they are enough for the materials required

Do not over-fill them

Perimeter fencing and security staff (avoid theft or vandalism)



OFF-LOADING AND STORAGE AREAS

Store similar materials together and establish the conditions for storage:

- Cement and plaster. Dry zone
- Timber carpentry. Not exposed to climate conditions

Warehouses

Sheltered storage facilities



OFF-LOADING AND STORAGE AREAS

Dimensioning

1. Calculate the quantity of materials you are going to need
2. Estimate when you need them on site
3. Establish a material flow and the quantity for storage
4. Calculate your storage space needed

Take into account:

- Possibilities to move them according to the equipment used
- Loading and unloading operations

Maybe, it is useful to have a dedicated labour team to unload and distribute materials directly to their point of use (avoid double handling)



OFF-LOADING AND STORAGE AREAS

Sometimes you don't have enough space on site for storage.
In that case, you have different solutions:

- Store outside your site
- Occupy public space (under authorisation)
- adapt supplying to immediate production

Avoid double handling as much as possible



SITE LAYOUTS AND CONFINED SITES





WHAT PROBLEMS CAN YOU SEE HERE?
(NOT ONLY FOR STORAGE)



What's wrong?



Is it right?



OFF-LOADING AND STORAGE AREAS

Material logistic plan

Efficient management of materials in construction projects, including cost and resource management

Steps:

1. Identify the responsible people for your MLP
2. Identify materials for your construction project
3. Receiving and storing materials
4. Subcontractors
5. Management on site
6. Review of MLP



EXERCISE

We need to dimension the area we need for brick storage. We know the following:

Brick wall to construct: 15,000 m²

Work developed by 3 gangs. Every gang can build 5 m²/hour

5 working days a week, 8 hours a day

Palletised bricks. Every pallet has bricks for 6m²

Pallet dimensions 1 x 1 x 1.20 m

You can pile up to 2 levels when storing

Every delivery is 30 pallets maximum

You need to order for delivery one week before

Calculate the following:

- The quantity of bricks needed per day
- The area for storage
- The frequency for delivery



WASTE

Must be organised and clean

Traceability of waste

Waste movement – horizontal and vertical (chutes)

Separated storage

Easy access to load and unload

Possibilities for treatment

Special conditions for hazardous waste

Can you see any problems in the following pictures?







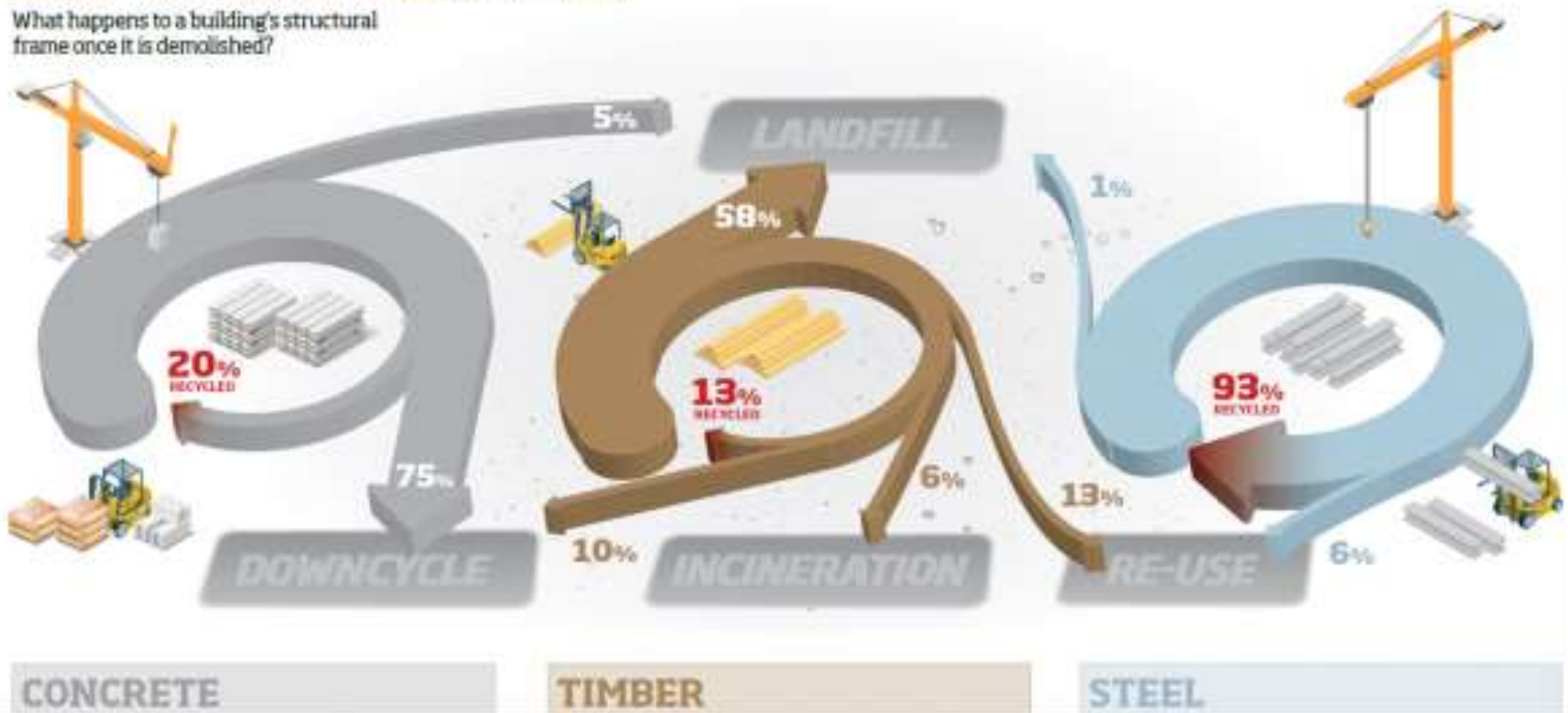




WASTE MANAGEMENT

END-OF-LIFE SCENARIOS

What happens to a building's structural frame once it is demolished?





WASTE MANAGEMENT

Actions conducted to minimise waste impact at the construction site

- Reduction
- Reuse
- Recycle

Traceability of waste

- Waste identification
- Storage
- Collection
- End of life

**Waste Management
Plans needed**



TEMPORARY ELECTRIC SUPPLY

Estimation of demand

W_e : engine/equipment (pile driver, batching plant, tower crane, etc.)

W_t : power tool (power saw, poker vibrator, vibro-hammer, etc.)

W_i : illumination, lighting (lamp, spotlight, reflector tower, sign, office, etc.)

$$W = \Sigma(w_e \cdot k_e) + \Sigma(w_t \cdot k_t) + \Sigma w_i$$

Where k_e and k_t are coincidence factors

If we have only one unit, then $k = 1$

If we have more:

- Tower cranes: $k_e = 0.7 - 0.8$
- Pile drivers: $K_e = 0.6 - 0.8$
- Dewatering pumps: $k_e = 1$
- Power tools: $k_t = 0.2 - 0.3$



EXERCISE 6

Calculate the demand for a construction site in which you have the following:

Tower crane: 20 Kw

Drainage pumps: 1.5 Kw

Tools: 5 Kw

Illumination: 2.5 Kw



TEMPORARY ELECTRIC SUPPLY

Source

- **Low voltage system (0.4 kV)**
(developed dwelling/industrial areas with sufficient power/capacity of local/public supply)
- **Medium voltage system (10-35 kV)**
(insufficient power/capacity of local/public supply)
- **Current generator**
(green/field construction sites or as redundant/emergency source)



TEMPORARY ELECTRIC SUPPLY

Main devices of supply network

- Transformer (when the source is a medium voltage transmission line)
- Electric-supply metre (not necessary when electricity comes from generators)
- Main switch, main fuse panel
- Distribution supply network (with disconnecting switches, fuses and connectors)



TEMPORARY ELECTRIC SUPPLY

Transmission online

- Over head transmission lines (hung or posts)
- Avoid within operation radius of any cranes, and over any steel-yard
- Underground conduits, cables

Connection/jointing

- Single connectors, plugs, sockets
- (in fixed structures, building coupled with switches)
- Jointing/connecting boxes/chambers
- At production areas, on new buildings under construction – with extension cable connections and fuses)





TEMPORARY WATER SUPPLY

Demand

Technology (concrete, plaster, paint, earthworks, etc.)

Sanitary (drinking water, cleaning, washing, etc.)

Fire protection (emergency water tank or water reservoir)

Source

Local supplier

Well (drilled)

Surface water



TEMPORARY WATER SUPPLY

Main elements

Drilled well

Pump + water-tower or hydrophore

Water-measure

Stop and sectioning valves

Water outlets

Distribution pipelines