



CHAPTER ONE

ESTABLISHING THE SITE

1.0 Overview

This chapter deals with the management of a construction project at the pre-contract stage of a project. It is at the pre-contract stage that decisions are made in relation to site layout planning, construction methods and safety procedures to be implemented. The above areas are outlined in relation to a range of site situations.

Site layout planning considerations include the factors to be considered when creating a site layout plan. The importance of crane locations is outlined in relation to a major project in Liverpool.

Site signage is highlighted together with the cost of providing signs as part of the contract preliminaries.

A series of site accommodation situations are illustrated in relation to six projects. Two site layout plans are indicated for both a small and a medium-sized project. Good site practices are highlighted.

The procedures to be followed when visiting a construction project are outlined and the importance of the induction process is covered, together with a summary of the site rules.

An understanding of the build-up of contract preliminaries is essential in order to relate the allowances in the preliminaries bill to the site situation.

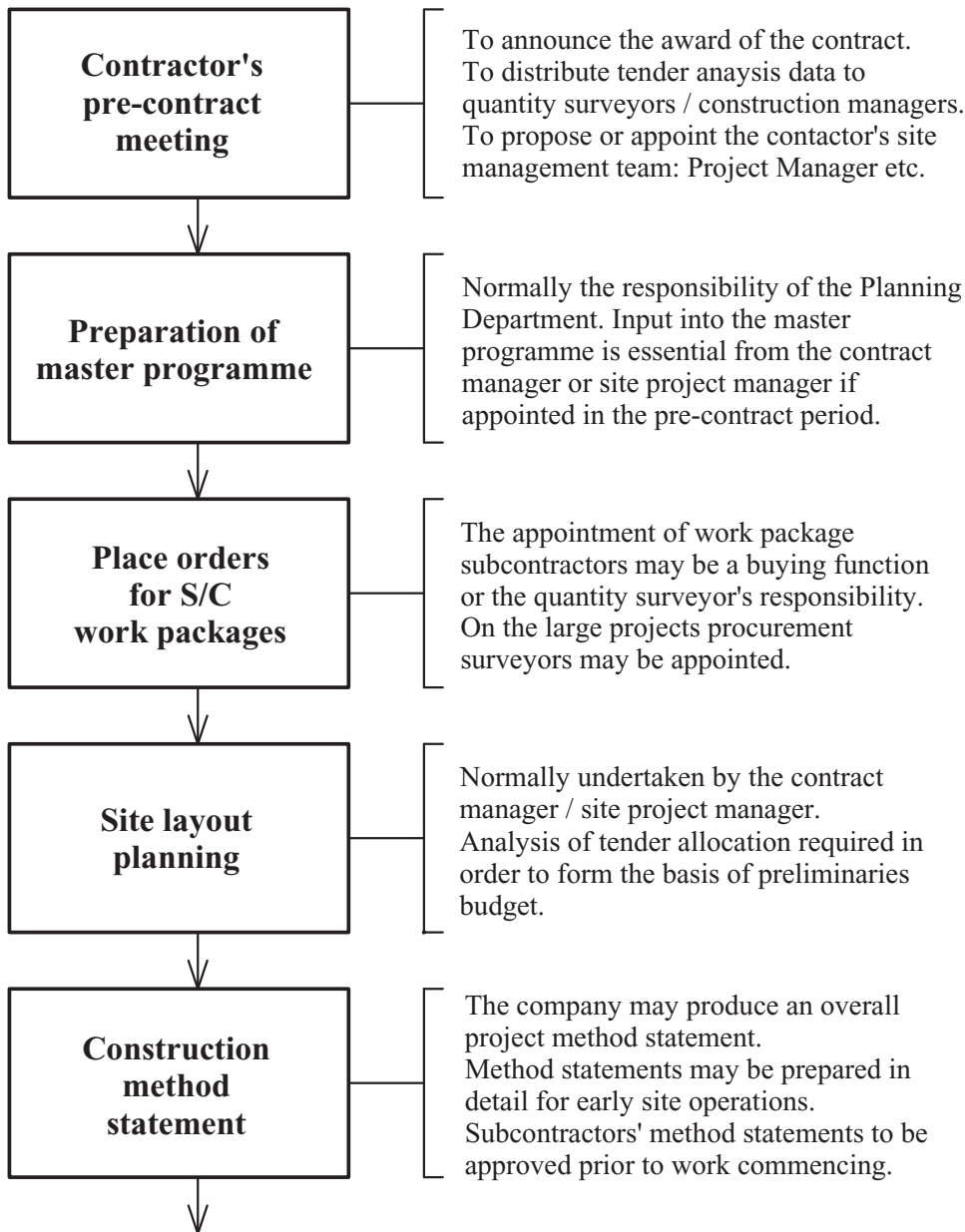
An explanation of time-and fixed-related preliminaries is given together with the build-up of site accommodation costs for a contract at the tender stage.

Site logistical problems in relation to an inner city development are discussed in a practical site situation. Decisions in relation to site access and surrounding buildings are discussed.

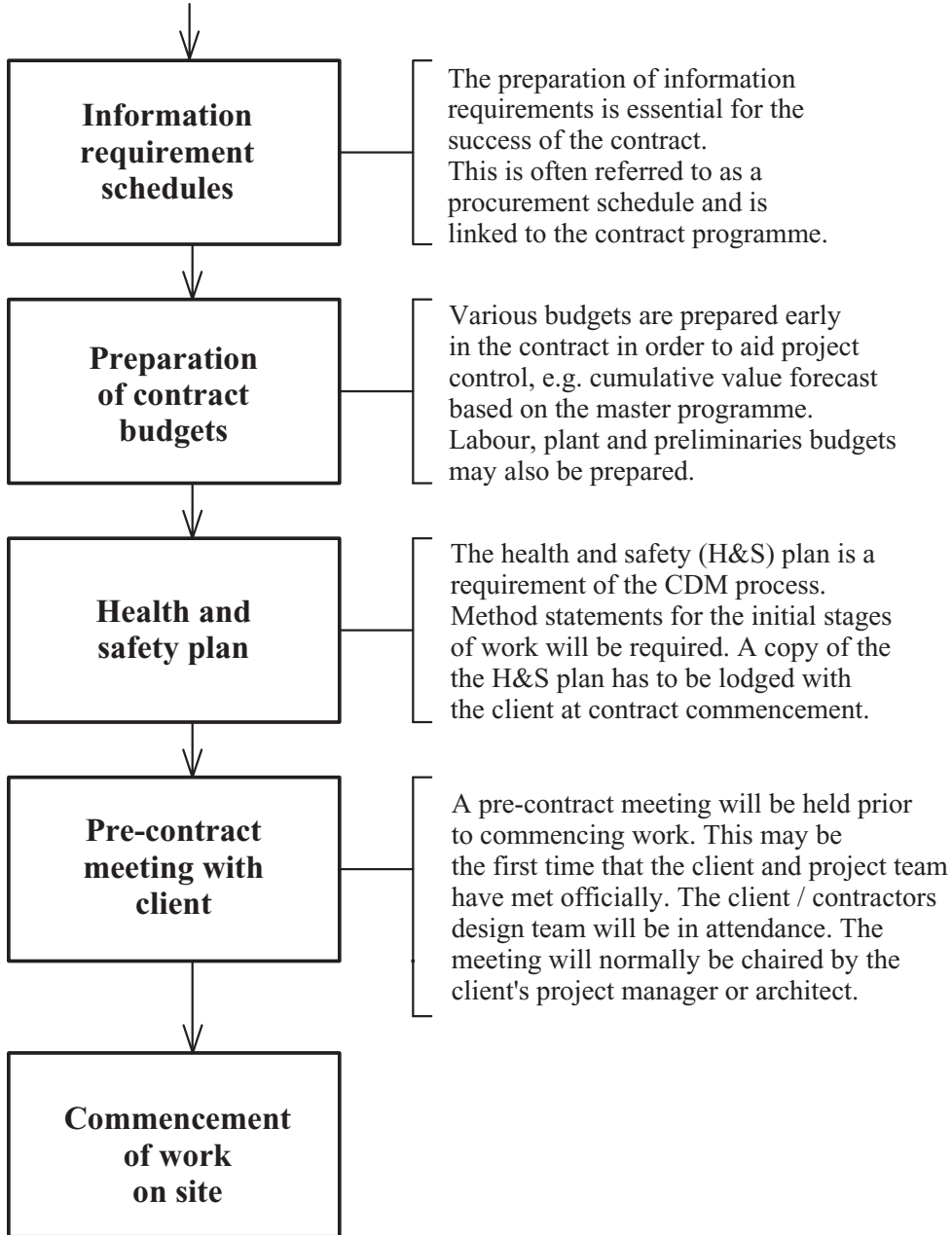
It is considered that site managers must be familiar with allowances in the contract bills for site facilities and services. Far too often the site manager is blamed for overspending on site preliminaries when all the time there were insufficient monies available.



1.1 Procedure prior to commencing a project



Depending on the size of the organisation, the above procedures may occur in a different sequence or be combined activities.



1.2 Site layout planning considerations

There is a direct link between site layout planning and materials management, and this can affect the degree of loss and wastage created on site.

Site layout planning starts at the tender stage of a project. Decisions are made in the preliminaries estimate build-up for allowances to be included in the tender for materials management and site layout proposals. At the tender adjudication stage these allowances may often be reduced in order to make the bid more competitive. Getting the balance right is difficult to achieve in practice.

Once the contract has been awarded, the contractor has to ensure that he keeps within the preliminaries expenditure budget during the contract. Monetary losses on contract preliminaries are a common occurrence in both the medium and large contracting organisations. A preliminaries budget should be prepared prior to commencing the project. The actual preliminaries monetary release should be matched with the preliminaries expenditure on a monthly and cost-to-ate basis.

Considerations at the contract commencement stage

The contractor should consider the following points:

- What allowances have finally been included in the priced bills for preliminary expenditure?
- An analysis of the proposed preliminaries allowances should be provided from the estimating and surveying section.
- What statutory requirements must be provided in respect of the Health and Safety at Work Act—in relation to welfare and site facilities, offices and accommodation to be provided?
- A site layout plan, traffic movement plan and fire plan may be prepared at this stage.
- A site hazard board should be located adjacent to the site mess and office facilities.

A site layout plan should be prepared in order to show the contractor's proposals. The main input into this task is normally undertaken by the contractor's project manager or site manager if appointed prior to the commencement of site work.

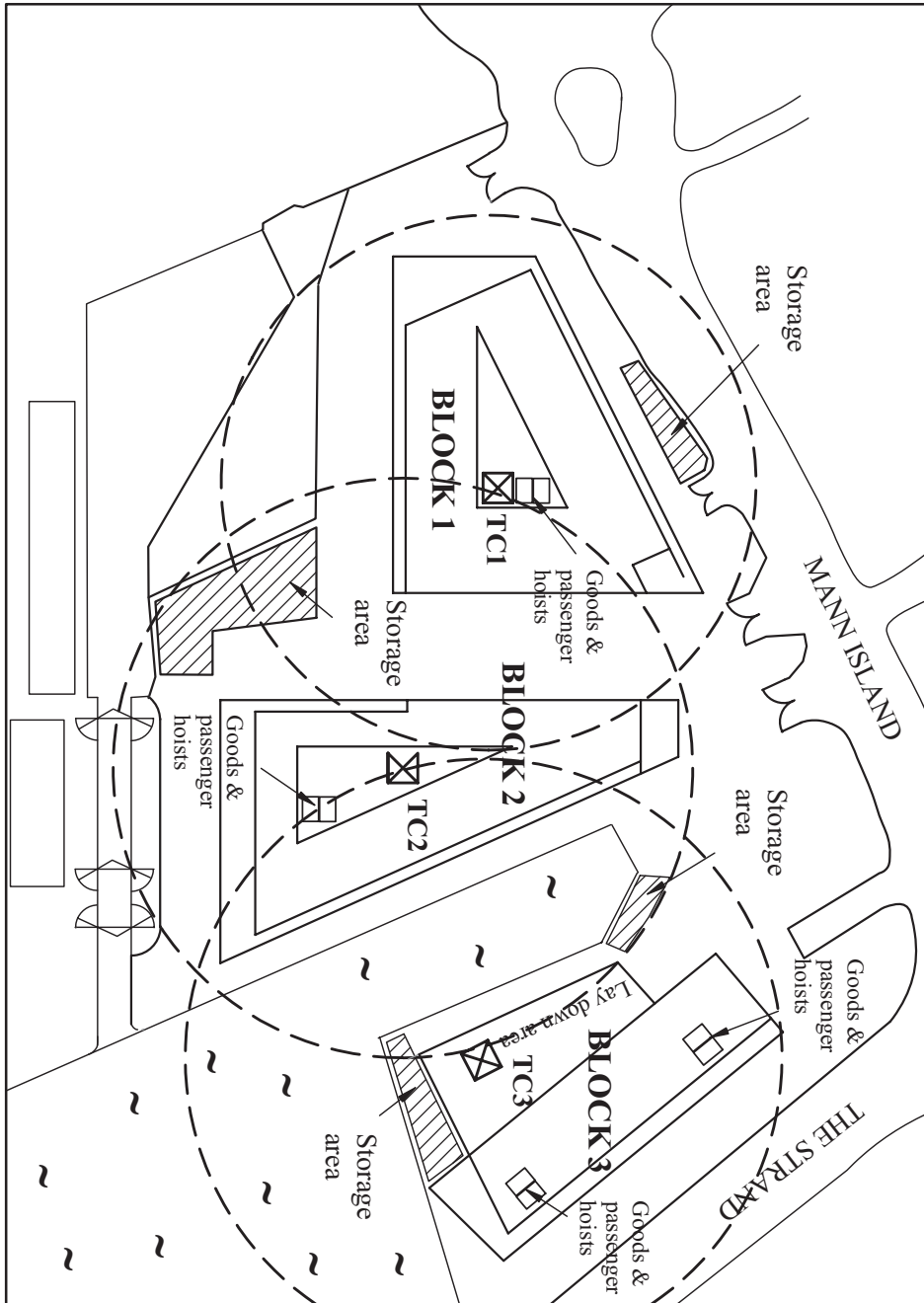
The site layout proposal may need to be approved by the client or his project manager prior to the commencement of work.

The site layout plan may indicate:

- location of offices and accommodation. This includes consideration of the main contractor's accommodation, provision of mess facilities for operatives and subcontractors; requirements for welfare facilities including drying rooms, toilet blocks and signing in facilities. Provision may also be provided for the induction process. Lockable storage containers may also be considered for more valuable materials.
- proposals for site access and egress for delivery vehicles and site personnel, providing directory signs to aid deliveries.
- position of material storage areas adjacent to the works and areas for the disposal of waste materials. Separate areas may be allocated for specific subcontractors' materials e.g. steelwork unloading areas prior to the fixing of the steelwork etc. The need for material storage areas will change during the project—as one operation finishes another will start and more materials will be delivered for the next stage of the works.
- vehicle parking areas for site staff and operatives' vehicles (if site space is available on site). Vehicles parked in streets adjacent to a building site often result in disputes with local residents. The contractor will be responsible for damage to footpaths and verges adjacent to the site.
- pedestrian access routes to the work areas. These should be clearly defined and marked on the item layout plan. These should be pointed out to operatives at the induction stage. Security entry and exit turnstiles may be provided complete with hand recognition equipment.
- space around the building for the provision of scaffolding, hoists and access areas to the base of hoists. Loading platforms require additional space in front of them for loading facilities and plant movement.
- site signage, i.e. directory signs, safety signs and warning signs. A range of signs in current use on construction sites is illustrated in this chapter. The cost associated with the provision of signs should be considered carefully at the preliminaries pricing stage.
- security fencing and site hoardings including secure entry gates. The use of 24-hour video cameras may be considered as part of the security arrangements.
- site mixing areas and mortar silos.

A separate copy of the site layout plan should indicate the provisions for fire safety and access for firefighting equipment. Site operatives should be made aware of the procedures in case of fire at the site induction stage.

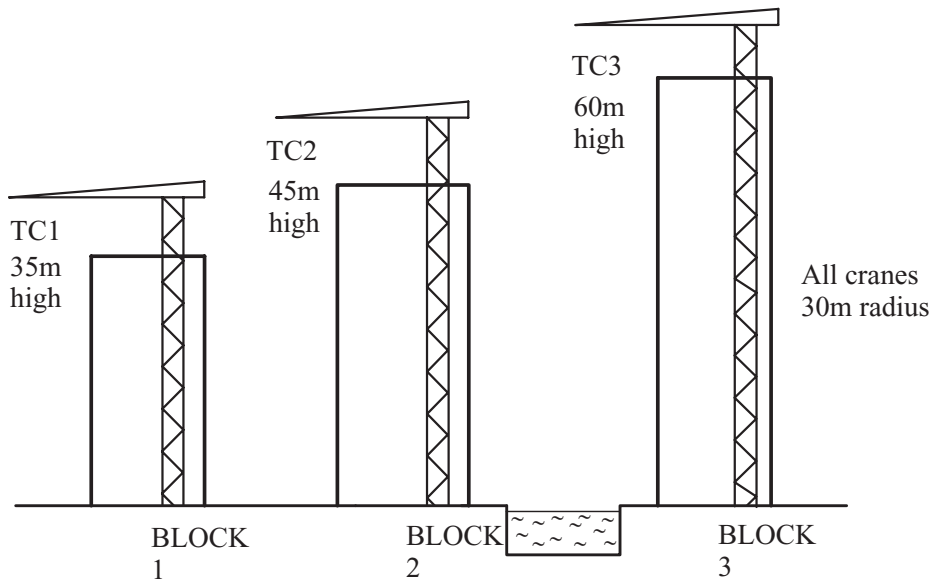
1.3 Location of tower cranes



8 Construction Practice



View of tower cranes





The siting of major plant items such as tower cranes may be shown on the layout plan. The location of the tower crane is critical to site access roads and unloading areas within the radius of the crane. Four main storage areas have been identified on the layout plan illustrated.

On the above £100 million project each of the tower cranes serves an individual block. The single and twin-core staircase towers are each 15 storeys in height (Block 3 on the plan). Concreting operations were undertaken by tower crane and skips.

Lay down storage areas have been indicated together with the location of passenger and goods hoist locations.

1.4 Site signage examples



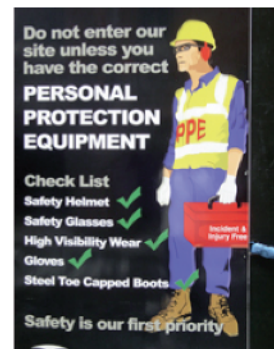
DIRECTORY AND INFORMATION SIGNS



Allowance for provision of site signage costs

The allowance for site establishment, offices, site accommodation and items such as site security are allowed for in the contract preliminaries. Allowance must also be included for site hoardings and protection. Monies must also be included for the provision of site directory, information and safety signage. This latter provision is not a cheap item. Signs have to be purchased, fixed in position and possibly written off during the project as many may be site specific and not reusable.

SAFETY SIGNS



Information signs

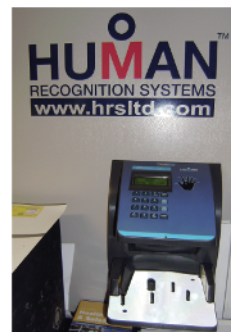


Provision of site signage

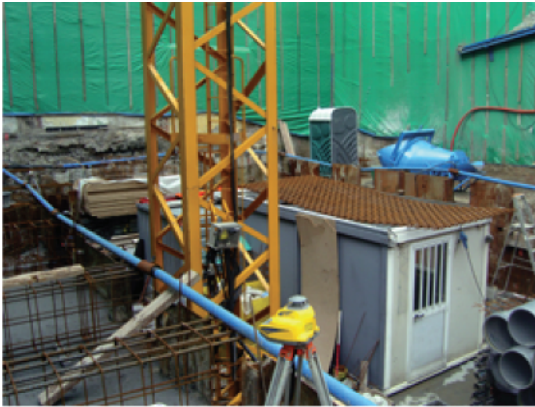
The preliminaries allowance for providing 15 site signs may be built up of :

Cost of providing 15 signs at £50 average	=	£ 750
Labour fixing & removal of signs-15 hrs at £30	=	£ 450
Total prelims allowance for signage	=	£ 1200

Personnel hygiene facilities



1.5 Site accommodation situations



Situation one

Site office facilities located in a basement area—after the pouring of the basement slab and erection of the tower crane. The roof of the office has been used for storing fabric reinforcement. The new building and basement are located in an Amsterdam street between existing four-storey buildings. Access at the front of the building is directly onto the footpath and street.



Situation two

Minimal site accommodation on a £650,000 project. Site offices consist of a site manager's office, a meeting room. Adjacent is a further cabin for the subcontract labour, toilet block and lockable storage container. The photograph shows the piling, subcontractors accommodation, office and mess.



Situation three

Nine stackable office units covering three floors with staircase access. Project involves the construction of an £8m four-storey office block with limited site space. Offices located on adjacent land at rear of project. Car parking facilities for staff are provided on an adjacent area.



Situation four

Site accommodation requirements for a £6m residential housing project. Two two-tier offices with central access stairways. Accommodation consists of site managers' office, meeting room, toilets, operatives' canteen and drying room. Four lockable containers are provided within the compound area.



Situation five

Seven mobile office units on a £20m new college project. Four further similar units on site plus security office and induction room. For the project size and value the number of offices provided appears to be a somewhat expensive solution.



Situation six

Basic site accommodation, toilet and store all in one lightweight mobile unit.

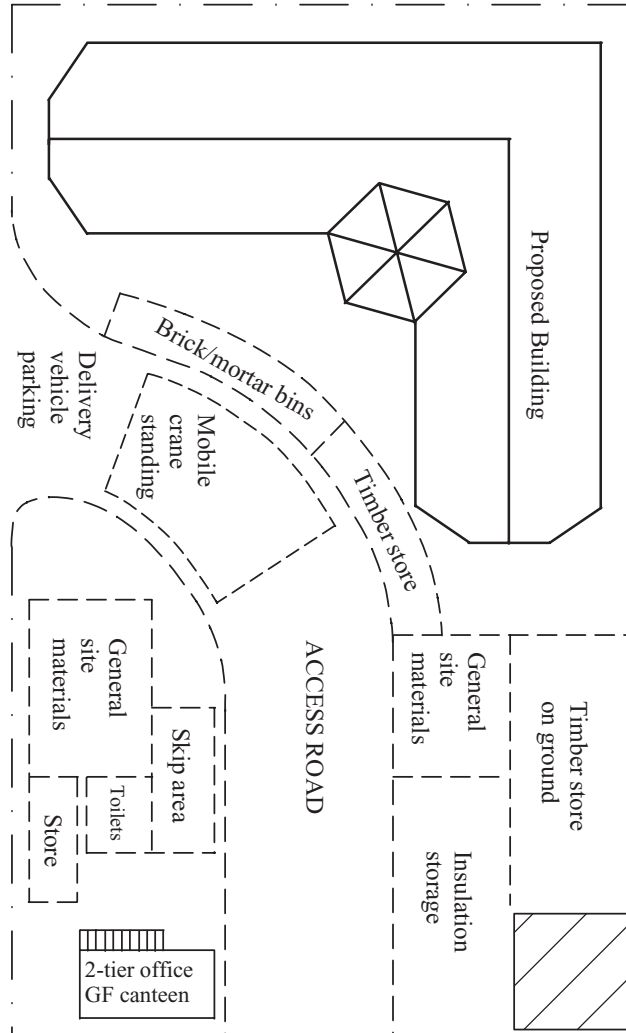
Excellent small mobile unit from the Cabin Centre.

1.6 Site layout planning examples

A more simplistic approach is shown below for the site layout proposals for a new church project on a confined site. The project involved the construction of a timber portal framed building, access road and car park area.

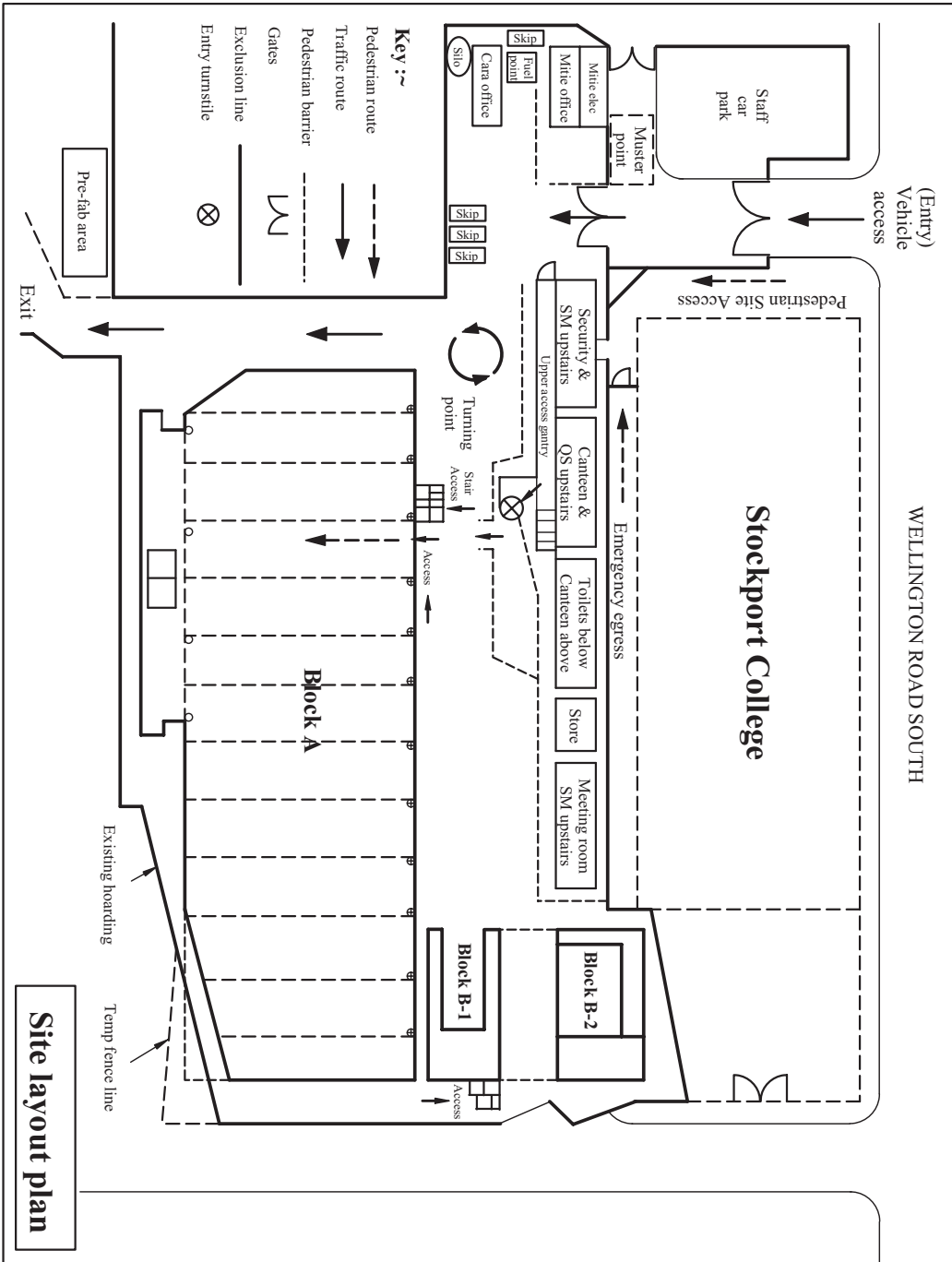
Site layout plan

Scale: 0 2 4 6 metres



Disley church project

The proposed site layout plan opposite is for a £14m college project is illustrated. A separate fire plan for the project was also proposed by the contractor.



Site layout plan



Site office layout on Stockport College project (£14m project)



Client/main contractor's offices

First floor subcontract management offices

Ground floor canteens and operatives' mess

A 'mega' block of site accommodation on a large Liverpool project—sixty mobile offices for client and contractor

As a project moves forward, further operations come on stream. Materials for cladding and glazing come on site.



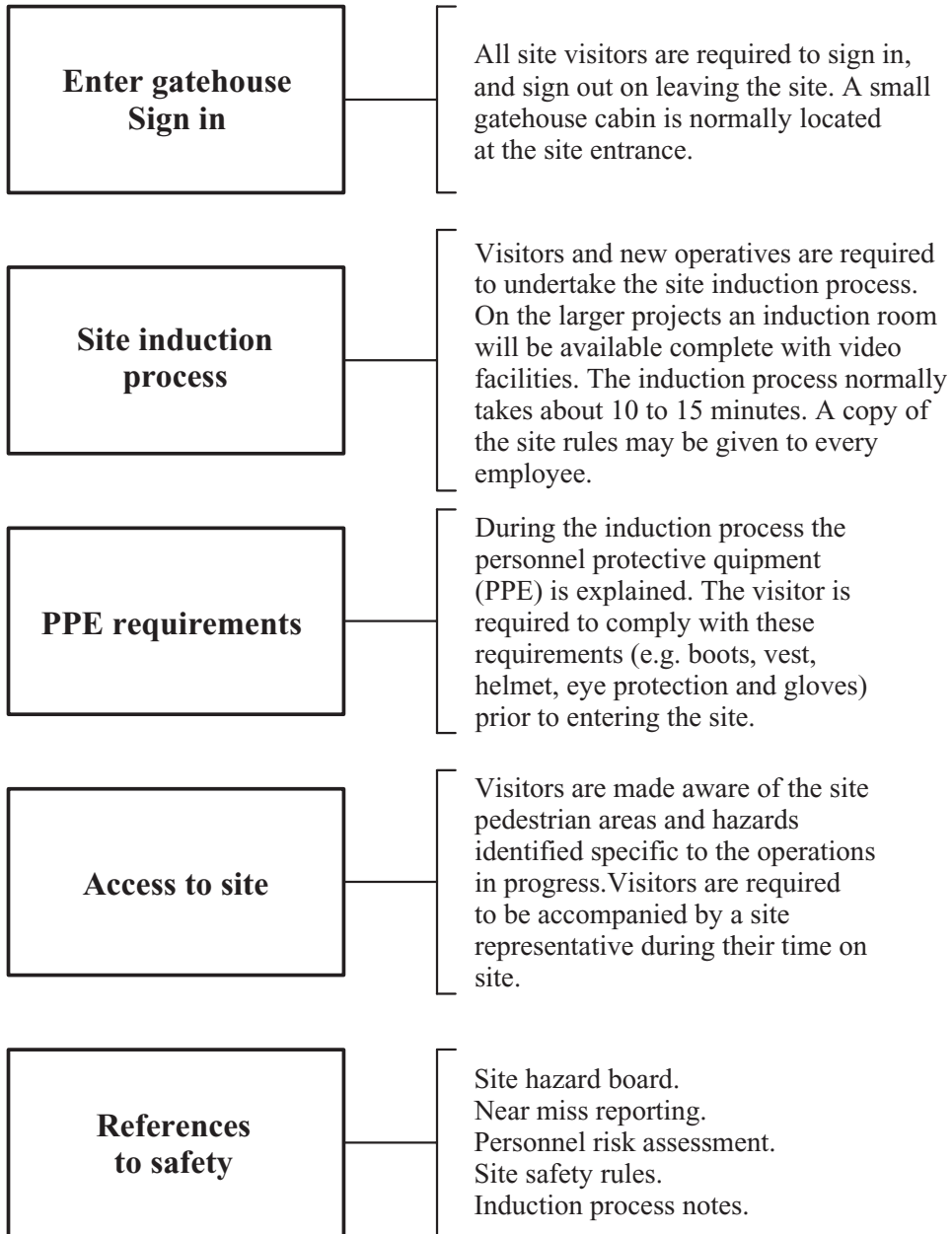
Site storage area for storey height granite external cladding panels



Canti boxes being loaded for positioning in the building

**Good practice
layout plan**

1.7 Procedure when visiting a project



1.8 Site induction procedures

The responsibility for the site induction process is undertaken by a member of the contractor's site management team. This may fall on the site safety representative or be allocated to a construction manager.

On notifiable projects (lasting more than 30 days) it is the principal contractor's statutory duty to ensure that every construction worker on site is provided with a suitable site induction. (EDM 2007–regulation 22/2)

The purpose of the induction process is:

- to indicate the site layout and welfare facilities
- to highlight emergency site procedures
- to identify site hazards and direct attention to the daily hazard boards
- to outline the importance of the site rules as applicable to the project, a copy of which may be given
- to indicate the importance of subcontractors' and main contractor's method statements
- to outline the contractor's safety policy
- to complete the necessary registration procedures for the participant (i.e. competence levels, CSC cards etc.).

The site fire plan will be outlined in order to identify escape routes, muster points and the location of firefighting facilities.

The following is an extract from a set of site rules.

- No person permitted on site unless he has been inducted.
- PPE (personal protective equipment) shall be worn.
- Any person interfering with or misusing fixtures, fittings, scaffold or equipment will be excluded from site.
- Safety signs and notices must be complied with.
- Radios, stereos and iPods are not permitted to be used on site.
- All site personnel are required to comply with their employer's method statements and risk assessments.
- The consumption of alcohol or drugs is prohibited.
- No person to operate any mechanical plant or equipment unless they have been fully trained.
- The wearing of shorts is not permitted.
- Smoking may only take place in designated areas.
- Food is only to be consumed in the designated mess area.
- Every accident or near miss occurrence must be reported.
- Site fire and emergency alarms and equipment must be followed.

Provisions of on-site facilities



Security office at site entrance



Signing in on entry to site



Induction room with video



Safety board in office reception



Hand recognition check system



Gate entry to site

1.9 Contract preliminaries

Terminology

The contract preliminaries section of the bill allows the contractor to enter a sum of money against a preliminary bill item for site accommodation. A single sum of money is entered at the tender stage.

Site accommodation (and site establishment costs) are priced by the estimator on a *fixed-related cost* build up plus a *time-related cost*. The total makes up the single entry in the bill.

The fixed-related costs are the costs:

- setting up the site office compound area
- preparing, hardcoreing or tarmacing the area
- erecting any fencing around the area
- laying on site services—water/drainage/power
- delivery and erection of offices, mess huts, toilets, stores, security cabin etc.
- erection and fit out of the above
- dismantling/removal from site and reclaiming the area.

The time-related costs relate to the number of weeks that the office/equipment are on site with respect to:

- the hire costs of all accommodation
- the weekly servicing costs for the same, i.e. costs of running and maintaining the office services.

The estimator will liaise with the project manager/commercial manager regarding site office and compound requirements. Each contractor preparing a bid will take a different approach to the assessment of staffing levels and site accommodation requirements.

Decisions will have to be made relating to the number of cabins and type of accommodation to be provided. The estimator will be sufficiently experienced to assess site requirements based on the pricing of similar projects. Advice may be available from a contracts manager or the commercial manager in charge of the estimate.

Over-assessment of contract preliminaries will result in the final tender submission being less competitive. Getting the balance right is difficult.

Build-up of site preliminaries costs

At tender adjudication stage, final tender adjustments are the responsibility of senior management. Normally the total cost or value of all contract preliminaries may represent 5–15 per cent of the contract sum. The contractor may be required to submit a preliminaries breakdown or analysis on commencement of the contract. This is to aid the valuation process as fixed cost preliminary items, for setting up the site, will be claimed in the early project valuations.

Pricing for site accommodation—practical case

Project scenario

A contractor is preparing a bid for a £8m office block on a competitive tender.

Practical case

Contract period 40 weeks. The form of contract is to be design and build (client-led design). It is envisaged that the contractor will undertake brickwork and joinery items with his own labour. The remaining work will be undertaken as a series of work packages.

Task

Prepare an assessment of the preliminaries build-up for site establishment tender stage.

Assumptions

Adequate space on site for accommodation based on tiered offices as illustrated opposite.

The proposals for the use of tiered accommodation consisting of six office / cabins with a central staircase access is shown.

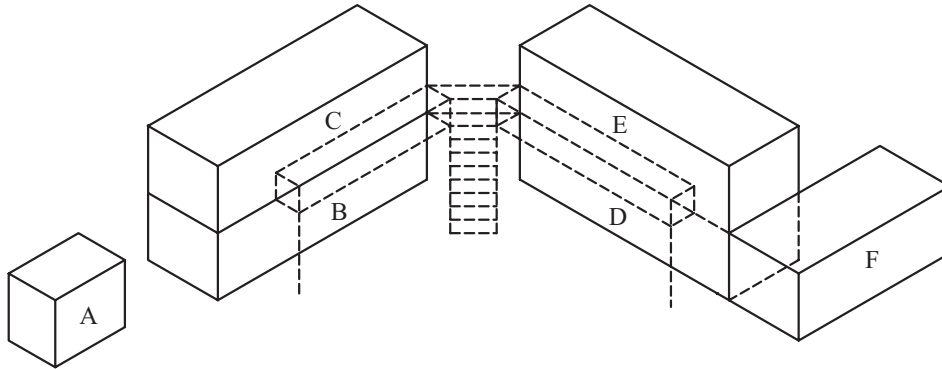
A build-up of the fixed costs of establishing the site and the time-related costs for the hire of the units throughout the contract period of 40 weeks is shown.

The staffing requirements for the project are assumed to be:

- project manager—40 weeks
- assistant project manager—30 weeks
- site manager—40 weeks
- site engineer—18 weeks
- site-based quantity surveyor—40 weeks (part visiting QS role and planner)
- visiting safety management/senior management – head office overhead.

Site accommodation layout proposed

Units B, C, D & E – 9m x 3m



- A – site security/signing in cabin
- B – operatives' mess - including drying room
- C – project manager/assistant project manager
- D – site-based supervisory staff/engineer/visiting QS
- E – Meeting room
- F – toilet block – male/female

Area containing site offices to be formed with timber hoarding/gates. Central area for accommodation of four staff vehicles. All services to compound to be provided.

Hire rate to be based on six units

- 4 No. 9m x 3m mobile office units
- 1 No. 6m x 3m double toilet block
- 1 No. 3m x 3m site security cabin

Hire rates for various types of site accommodation based on late 2009 quotation are as follows:

9m x 3m office	£40/week
9m x 3m canteen/drying room	£40/week
9m x 3m toilet block/sinks	£60/week
9m x 3m store	£20/week
Staircase and balcony platform	£10/week
Delivery including stacking	£500
two- two-stacked offices	
Offices included standard furniture	£150/unit
delivery and installation per unit	

Final build-up of costs for inclusion in tender

Fixed cost areas

- Prepare area for compound/stone up/tarmac
- Perimeter hoarding and gates

- Services—drainage/electricity/water/telephones
- Delivery and erection of tiered accommodation (fully fitted out offices assumed)

- Dismantle offices/remove hoardings—remove from site
- Reclaim compound area

Total fixed costs £14000

Time-related costs / 40 weeks

- 4 No. 9m x 3m mobile units
4 No. at £60/w

- 1 No. 9m x 3m toilet block
1 No. at £60/w
Maintenance costs

- 1 No. 3m x 3m security block
1 No. at £20/w

- Weekly running costs of services/electricity/cleaning costs/week

Contingency

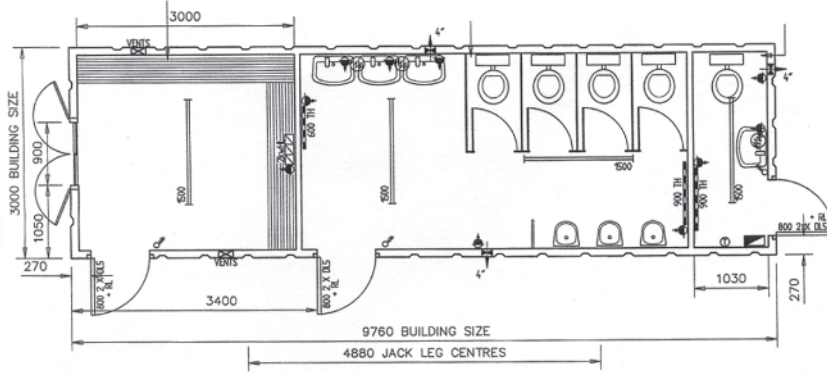
Total fixed costs = £14000

Total time related = £28600

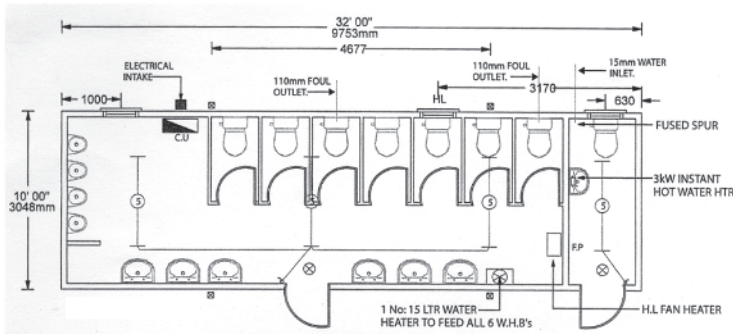
Total time & fixed costs = £42600

Item		2500
Item	£80	6400
80m		
Item		1600
Item	£300	1500
5 units		
Item		1000
Item		1000
	£	14000
Cost/ week		
£160	x 40	6400
£60	x 40	2400
£50	x 40	2000
£20	x 40	800
£400	x 40	1600
		1000
	£	28600

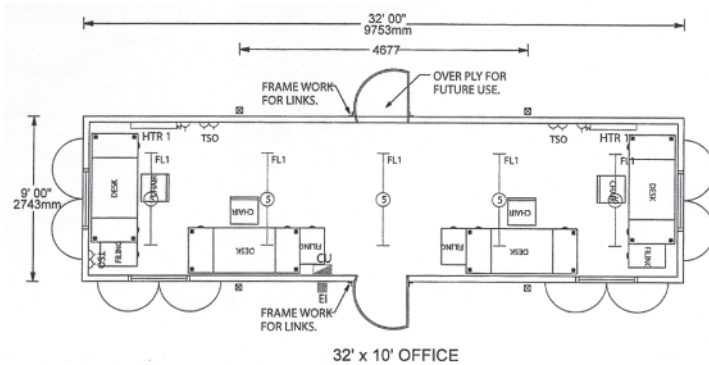
Example of site accommodation availability



Toilets and drying room



Toilets



Office block

1.10 Site logistics

Ten-storey inner city office development

Description of project

The project involves the construction of a 10-storey inner city office block in the heart of the Manchester business centre.

The £8m building is of steel-framed construction incorporating metal deck concreted floors. Externally the building is clad with a glass curtain wall consisting of storey-height glass panels fixed between floors.

The ground floor covers a 6m-deep basement constructed using a bored pile wall.

Site space restrictions

A plan of the existing site is illustrated opposite showing the location of the new building relative to surrounding office buildings and roads.

Buildings A & B adjacent on the east side of the new building require access at all times for office workers.

After the erection of a close-boarded hording around the building perimeter, a space approximately 4 metres wide is left for material storage and building access.

Site logistic problems to be addressed by the contractor

- Protection of the public using Mount Street
- Providing access for staff using buildings A & B on the east side of site
- Siting of project offices and accommodation
- Siting of plant and equipment during the construction process
- Provisions for unloading materials and handling materials on site
- The effect of site restrictions on the construction methods
- Siting of subcontractors' requirements (offices/materials etc.)
- Provision of site security

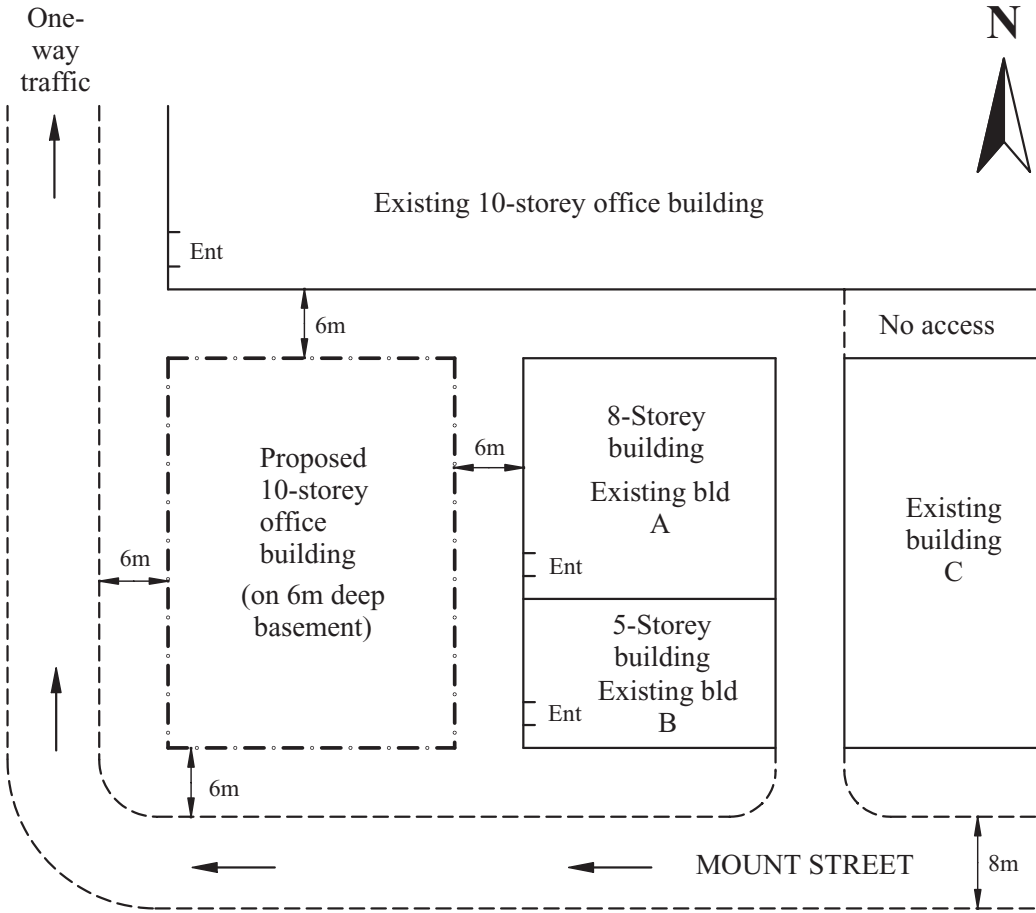
Contractor's proposals

Protection of public

A covered walkway is to be provided forming part of the site hoarding along the west and south sides of the site.

Access to buildings A & B

The site hording is to be extended to provide an access way for office staff and visitors using these offices.



Site plan (existing)

Contractor's proposals (continued)

Siting of offices and accommodation

Due to space restrictions, the contractor's staff are to be located in rented office accommodation adjacent to the site.

On site, two mobile office units are to be situated in location 1 (see diagram opposite). These will be stacked as a tiered unit with operatives facilities' on the ground floor and the contractor's supervisory staff on the upper floor.

This will provide minimum accommodation requirements in order to supervise the basement construction and part erection of the steelwork.

On occupation of the basement roof (i.e. the ground floor slab) accommodation will be set up on part of the ground floor area.

A site security cabin will be provided in location 2 close to the entrance gates.

Siting of plant and equipment

A luffing jib tower crane is to be located in the basement area at location 4.

An application has been made to the local authority to locate an unloading area on Mount Street at location 3. This has been granted, which enables delivery vehicles to be unloaded by the tower crane. It is also to be used for locating a mobile concrete pump when the building floor slabs are to be concreted.

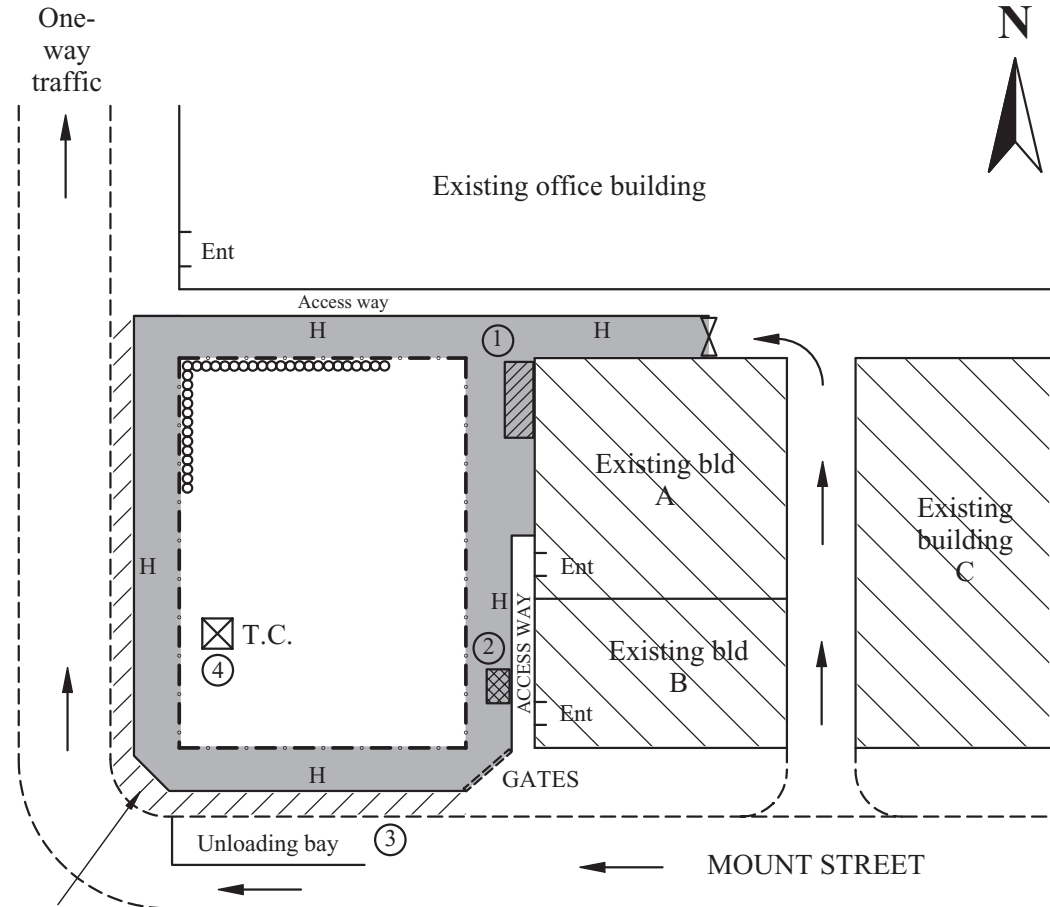
The 4-metre space between the perimeter hoardings and the building will be used for locating mast climbers for erecting the curtain walling.




Provision of material storage areas / handling material

As the building frame is completed, the floor areas are to be used for material storage. Components will be scheduled for delivery on a just-in-time programme. Externally 'canti-boxes' will be used for loading materials into, prior to their being moved to the internal floor area.

During the basement construction the space around the top of the basement will be used for fabrication of reinforcement and formwork.

The tower crane is to be retained for the majority of the project due to the handling of external glazing panels. The external curtain walling support is to be fixed from mast climbers working on each building elevation. The external glazing storey-height panels will be delivered on a just-in-time basis.



- Covered access pedestrians
-  Site office ①
 -  Checking-in post ②
 - Unloading bay ③
 - Tower crane location ④
 -  Space around building

Site layout proposals



Site logistics office development

The image here shows the front elevation of the building under construction.

At the second floor level the building projects forward. This creates construction problems with the external enclosure work due to the restricted site space.

Location of tower crane

The luffing jib tower crane is to be located in the basement adjacent to Mount Street as shown on the proposed layout plan.

The four metres of storage space around the building can be used for the manufacture of form work and pre-fabricated capping beam reinforcement.



Concreting of the basement floor and ground-floor slab will be undertaken by mobile concrete pump, located in the site loading bay in front of the project.

Provision of a vehicular unloading bay in front of the building

Due to site space limitations permission has been granted by the local authority to provide a vehicular loading bay in front of the building. The pedestrian access may be observed alongside it. The loading bay is also to be used for the storage of skips and pre-mixed mortar containers to be used during the works.



Access to the rear of the building

Access to the rear of the building, is at the rear of building A. This allows small vehicles to deliver site materials and light components. Pedestrian access has also been provided for the public around the rear of the site.



General view of the site from Mount Street, showing the proximity of the surrounding buildings.

The tower crane is erected in the basement area as work to the excavation proceeds.

Restricted space during the basement excavation involved 'haymaking' the excavated material from one machine to another. Refer to Excavation work Case Study 4.



General view of work in excavating the basement inside the bored pile wall as work proceeds. Capping beam constructed.

Site space restrictions can be readily observed. Site cabin (two tier) located alongside basement (location 1 on the site layout plan).



Concrete the upper floors, floor pour in progress. Concrete pump located in loading bay in front of building.

Note: Preparation of extended platform at fifth floor level from which to assemble mast climbers from floors 6 to 10. All the curtain wall supports are to be fitted from mast climbers. The full height external glass panels are to be handled into position by the tower crane.

The ultimate site facility: the wheel wash



Contractors are responsible for any damage or mud they deposit on public roads adjacent to the site. The local authority may contra charge them with the costs of cleaning the roads with mechanical road sweepers.

