

Construction OS&H

Welfare & project site



SUMMARY

General principles of the design of site layout and facilities

Site facilities

Participative processes and procedures

Competence, training and induction

The need for good design of the site

The construction site is one of the primary resources available to the contractor. In fact the site becomes the “factory” for the production of the building project. The aim in planning site layout and facilities is to produce a working environment that will maximize efficiency and reflect the organization’s attitude to the project, its commitment to the safety and well-being of the workforce and its determination to satisfy the needs of its customers. The planning and management of construction site layout and facilities should be given priority throughout the construction period. Concentrating on the efficient organization of the “construction factory” maximizes the benefits of innovative techniques such as prefabrication and automation in construction.

The need for good design of the site

The site is an important ‘resource’, so it must be managed effectively

No construction project site can be safe unless the layout and facilities are designed carefully and thoroughly

Some important factors need to be considered if the site and the facilities are to be planned carefully

The site will be ‘home’ to many people during their working hours, so all must have a say in the design and layout

All involved must be suitably competent in their jobs

Things to be considered:
work in groups of 3-4 to complete the table

Factors	Facilities
Access & transport of the workforce	
	Washing facilities

Things to be considered:
let us fill this in during this module

Factors	Facilities
Access & transport of the workforce	
	Washing facilities

Factors to be considered



The size of the labour force required throughout the life of the project. This will usually vary significantly from start to finish, growing to a peak during the project before declining towards the finish.

Factors to be considered

The type of labour force during the project

Consideration must be given to all the needs of the whole workforce: men, women, locally resident or travellers requiring accommodation, physical characteristics, etc.

Facilities required by the workforce during the project

This will depend on many factors, including the location, climate, trades and tasks of the workforce, etc.

Factors to be considered

The changing nature of the work during the project

For example, a typical building project will start with excavation, so there will be a need to control mud and water, and to provide drying rooms for clothing, whereas at the finish most of the work will be inside. In addition, as the work progresses and the permanent works extend across the site, it may be necessary to change the layout and move the facilities.

Access and transport for the workforce

Everyone on site must be able to come on to the site and move about safely.

Factors to be considered

Delivery and storage of materials and components

This must be carefully planned and executed in a safe way.

Location and use of plant and equipment

The location and use of mechanised plant and equipment has major implications for OS&H.

Factors to be considered

The real challenge in the design and management of site layout and facilities is to consider all these factors together. Construction sites can be very crowded places, with people, materials, components and machines all competing for space around and within the permanent works, which themselves are growing as the work progresses.

Take careful notice of the next few slides because you will have to use this knowledge in the major project that follows this module.

What effects who and what

Aspects of site layout and facilities		Primary resources affected		
Main aspect	Related items	Labour	Plant	Material
Safety	Signage			
	First aid			
	Access ways			
	Site cleanliness			
	Lighting			
	Existing services			
	Fire prevention			
Welfare	Canteen/mess rooms			
	Drying/changing rooms			
	Toilets/washrooms			
	Car parking/transport			
	Worker accommodation			
	Time office			
Offices	Major contractor			
	Package contractor			
	Client/design team			

What effects who and what

Access	Delivery access Site access roads Pedestrian access		
Storage, etc.	Off-loading areas Long-term storage Workface storage Tool storage Secure stores Hazardous material store Prefabrication areas Batching plants		
Transportation	Hoists Craneage Horizontal transportation		

What effects who and what

Rubbish removal	Site cleanliness		
Temporary services	Electricity/gas/water		
	Drainage/surface water		
	Existing services		
Testing	On-site laboratories		
Security	Hoarding/fencing		
	Site access		
	Secure stores		
	Identification passes		
Image	Signage		
	Hoarding/fencing		
	Site cleanliness		
	Public relations		

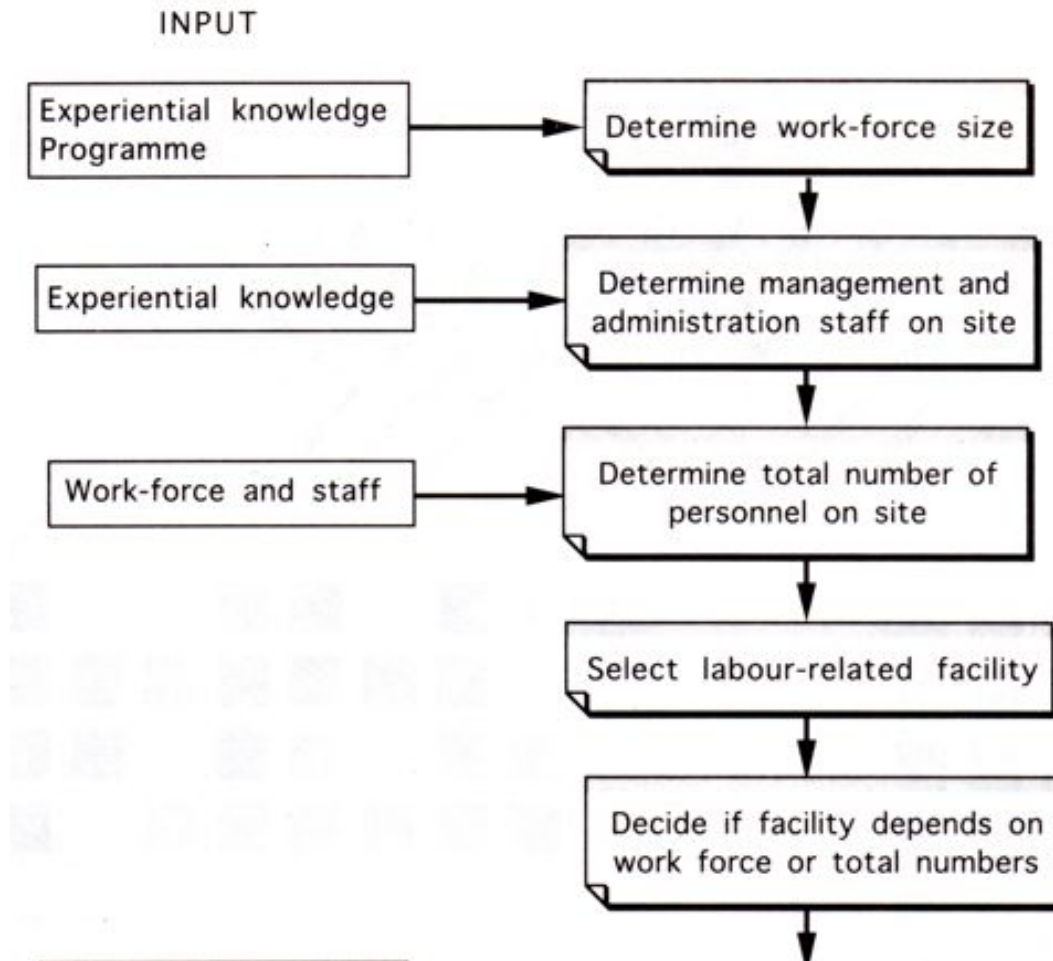
Factors affecting size and location

Facility	Factors affecting sizing of facility					Factors affecting location of facility									
	Statutory requirements	Company policy	Past experience	No. of workforce	Size of site	Site location/Expected usage	Phase of project	Company policy	Past experience	Size of site	Congested/Uncongested site	Location of related facilities	Minimum travel time	Phase of project	
Canteen/Mess room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Drying/Changing Room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toilets/Washroom	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Residential accom.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Car parking areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time office	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Site offices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
First aid room	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personnel hoists	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

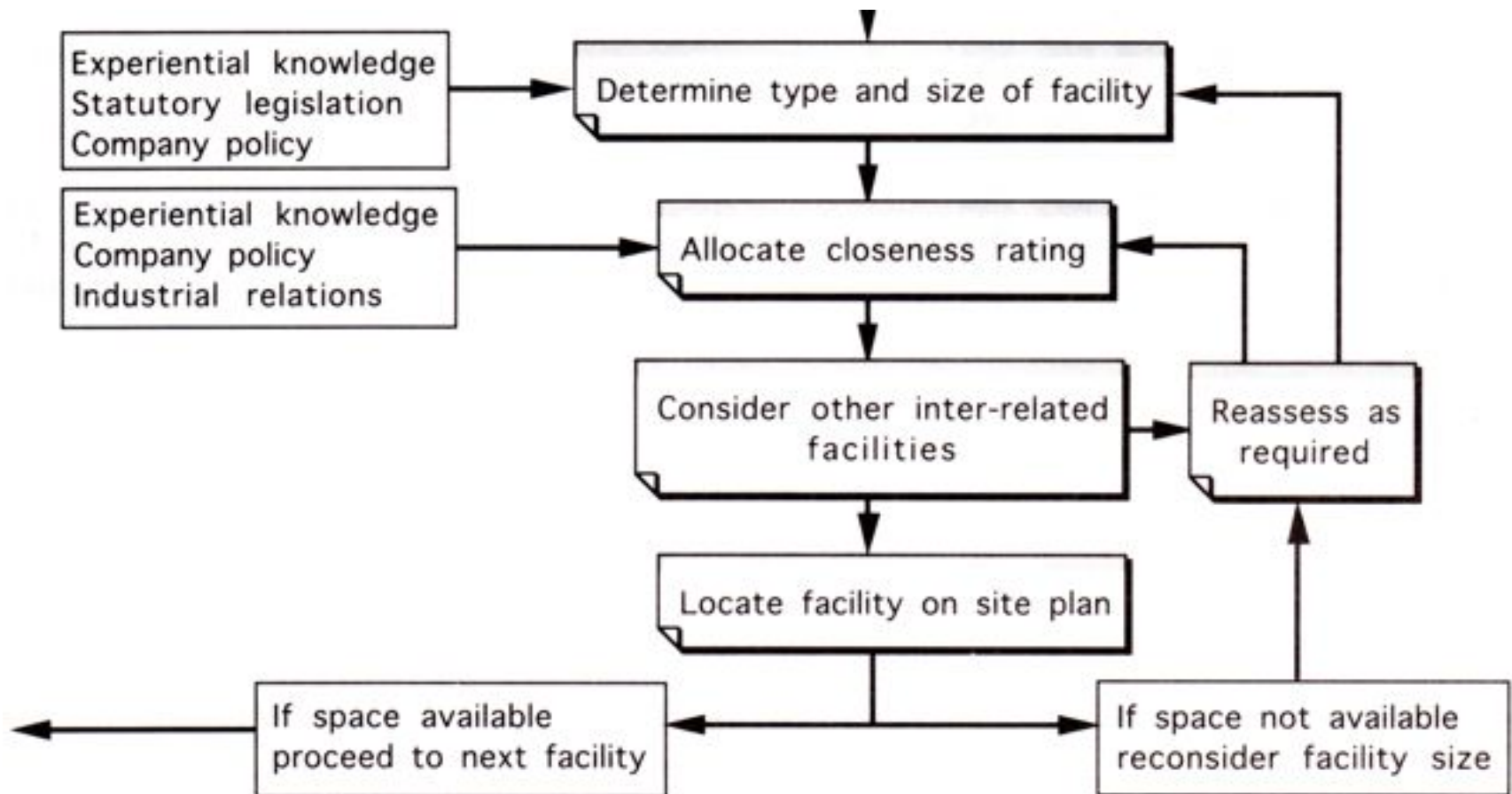
Factors affecting size and location

Facility	Factors affecting sizing of facility						Factors affecting location of facility							
	Company policy	Past experience	Amount of materials	Extent of prefabrication	Size/Weight of materials	Delivery methods	Company policy	Past experience	Site of size	Congested/Uncongested site	Location of related facilities	Location of cranes, etc.	Minimum travel time	Phase of project
Material access														
Storage areas														
Materials hoists														
Craneage														

The site design process 1



The site design process 2



Discussion in groups of 3-4

How do you design a site canteen?

What factors do you have to consider?

What processes do you go through?

(Where do you start and what do you decide next?)

Example

Sizing and locating the site canteen

Determine workforce size:

Assume that peak workforce size is 500 and average is 350.

Determine management and administration staff numbers:

Assume a peak of 100 and average of 75.

Determine total number of personnel on site:

600 maximum, 425 average.

Select facility:

Site canteen: At this stage the manager must decide if the facility will cater for peak numbers or average numbers with alternative measures taken for the overflow at peak. Decide if facility size depends on workforce or total numbers: this will depend on whether staff and workforce will use the same canteen; custom varies in different countries.

Determine size of facility:

Plan area determined by seating requirements and allowance for catering, etc. Most countries have statutory legislation which refers to welfare accommodation. Most temporary units can be stacked and so reduce the area of site taken up, however circulation within the canteen area will be a priority and affect decisions to plan a split-level facility. It is also likely that the facility size can be reduced at the start and end of the project.

Allocate closeness rating:

At this stage the manager must decide the importance of this facility being close to the workplace. This will obviously have an effect on other facilities and the closeness rating is a method of prioritizing the facilities with regard to location. For instance, the use of dispersed canteens located next to the workplace may be considered to minimize workforce travel time at rest breaks. Local practice and industrial relations considerations will be influential here.

Consider other interrelated facilities:

At this stage the manager must relate the canteen to other facilities such as toilets, washrooms and site offices. Decisions on the canteen cannot be made in isolation. The size and closeness rating may need to be reconsidered due to the influence of the other facilities.

Locate facility on site plan:

Allocate the best space to the most important facility. The manager must decide the relative importance of the canteen. The size and closeness rating may need to be reconsidered once more. Avoid moving the canteen during the project unless absolutely essential.

ILO guidance on site layout

“A badly planned and untidy site is the underlying cause of many accidents resulting from falls of material and collisions between workers and plant or equipment.

Space constraints, particularly in urban work sites, are nearly always the biggest limiting factor and a layout which caters best for the safety and health of workers may appear to be difficult to reconcile with productivity.

Proper planning by management is an essential part of preparation and budgeting for the safe and efficient running of a construction operation”.

ILO guidance on site layout

Before work even begins on site, thought needs to be given to:

The sequence or order in which work will be done and to any especially hazardous operations or processes

Access for workers on and around the site. Routes should be free from obstruction and from exposure to hazards such as falling materials, materials-handling equipment and vehicles.

Suitable warning notices should be posted. Routes to and from welfare facilities need equal consideration.

ILO guidance on site layout



Edge protection will be required at the edge of floor openings and stairs, and wherever there is a drop of 2m or more

ILO guidance on site layout

Routes for vehicular traffic. These should be one way as far as practicable. Traffic congestion prejudices the safety of workers, especially when impatient drivers unload goods hurriedly.

Storage areas for materials and equipment. Materials need to be stored as close as possible to the appropriate workstation, e.g. sand and gravel close to the cement-batching plant, and timber close to the joinery shop. If this is not practicable, it is important to schedule the arrival of materials.

ILO guidance on site layout

The location of construction machinery. This is usually dependent on operational requirements so that tower cranes are subject to constraints such as their radius of operation, and pick-up and unloading points. The objective should be to avoid the need to slew the load over workers

The location of trade workshops – these are not usually moved after they are built

The location of medical and welfare facilities. On large sites sanitary facilities for both sexes should be provided at several locations

Artificial lighting at places where work continues or workers pass after dark

ILO guidance on site layout

Site security. The site should be fenced in to keep out unauthorized persons, children in particular, and to protect the public from site hazards. The type of fencing will depend on the location of the site, but in populated areas it should be at least 2m high and without gaps or holes. Overhead protection will be necessary if tower crane loads pass over public thoroughfares.



ILO guidance on site layout

Arrangements to keep the site tidy and for the collection and removal of waste.

The need for low-voltage electric power supplies for temporary lighting, portable tools and equipment.

Training needs of both workers and supervisors.

Point to remember

*The time spent on planning will make for
a safer site and save money*

Some of the things to be considered

Factors	Facilities
Size & type of labour force	Canteen/mess room
Facilities for labour force	Offices and workshops
Access & transport of the workforce	Toilets/washing/changing/drying
Changing nature of work	First aid/general health
Delivery and off-loading	Access/storage/parking

The ILO Guidance on Welfare

- 1. At or within reasonable access of every construction site an adequate supply of wholesome drinking water shall be provided.*
- 2. At or within reasonable access of every construction site, the following facilities shall, depending on the number of workers and the duration of the work, be provided and maintained:*
 - (a) sanitary and washing facilities;*
 - (b) facilities for changing and for the storage and drying of clothing;*
 - (c) accommodation for taking meals and for taking shelter during interruption of work due to adverse weather conditions.*
- 3. Men and women workers should be provided with separate sanitary and washing facilities.*

The ILO on Welfare

Work in the construction industry is arduous; it involves much manual or physical activity. It is also hazardous and dirty. Good welfare facilities not only improve workers' welfare but also enhance efficiency.

Welfare facilities such as the provision of drinking-water, washing, sanitary and changing accommodation, rest-rooms and shelter, facilities for preparing and eating meals, temporary housing, assistance in transport from place of residence to the work site and back, all help to reduce fatigue and improve workers' health. The facilities may be provided and maintained by one contractor for all workers or by individual contractors.

Point to remember:

Welfare facilities improve morale and consequently improve efficiency.

Sanitary facilities



Sanitary facilities: a practical minimum

- A sufficient number of water flush-type lavatories for men when this is practicable, including sufficient urinal accommodation; chemical lavatories may be used otherwise
- A sufficient number of separate water flush-type lavatories for women when this is practicable; again, chemical lavatories may be an alternative
- The accommodation should be designed and constructed so as to screen the occupants from view and afford protection against the weather
- The accommodation should be separate from any mess room or rest-room
- A smooth and impermeable floor
- Effective natural and/or artificial lighting and ventilation
- At least 30m from any well
- Constructed for easy maintenance and cleaned out at least daily.

Washing facilities

Work in the construction industry is often dusty and dirty; it may also involve handling chemicals and other dangerous substances, so that employees need to wash their hands and bodies regularly:

- To prevent chemicals contaminating food and so being eaten during snacks or meals, being absorbed through the skin or being carried home
- To remove dirt and grime, which can also be ingested and cause sickness and disease
- As a basic hygiene measure

Washing facilities

One wash-basin for every 15 workers

Soap

Suitable drying facilities

Where workers are exposed to skin contamination by chemical substances or by oil or grease, a sufficient number of showers, which should be disinfected daily

Facilities should be covered to provide weather protection, and effectively ventilated and lit.

Facilities for supplying food and drink, and eating meals

Point to remember:

Drink water only from sources
clearly marked as ‘drinking
water’



Facilities for supplying food and drink, and eating meals

- Facilities to boil water and heat food
- Facilities (including provision of space, shelter, water, heating and rubbish bins) for vendors to sell hot and cold food and drink
- A canteen supplying cooked meals or serving packed meals, snacks and beverages
- Arrangements with a restaurant or canteen near the work site to supply packaged meals

There should be accommodation with tables and seats, protected from the weather, where one can eat in comfort food brought from home or bought from vendors. It should be situated away from workstations to minimize contact with dirt, dust or dangerous substances.

Facilities for supplying food and drink, and eating meals

Point to remember:

Construction work is physically exhausting, and you need hygienically prepared and nutritious meals at regular times.

Facilities for changing, storing and drying clothes

Secure facilities at the work site for changing from street clothes into work clothes, and for airing and drying the latter, greatly assist workers with their personal hygiene and tidiness and relieve them of anxiety over the security of their possessions.



Rest breaks



Rest breaks

Construction workers begin work early. They start their day alert and productive but their activity level decreases as the day passes. Fatigue develops gradually before it begins to have marked effects. If they rest before they show signs of being really tired, recovery is much faster. Short breaks taken frequently are much better than infrequent long breaks. Productivity improves with frequent rest breaks.

Point to remember:

Breaks which are short and taken often are better than long breaks taken infrequently.

Child care

Working mothers employed at construction sites often need help with caring for their children while they are at work.

Watch the children's movements. Each year there are many tragic deaths of children on construction sites. Children should never be allowed to wander into or play on sites. There are excavations to fall into, scaffolding to fall from and hazardous equipment.



First aid

Article 31: First aid

The employer shall be responsible for ensuring that first aid, including trained personnel, is available at all times. Arrangements shall be made for ensuring the removal for medical attention of workers who have suffered an accident or sudden illness.

There should be a first-aid box and a stretcher and blanket.

On large sites, and always where more than 200 people are employed, there should be a properly equipped first-aid room or hut.

On any construction site of size, at least one person on every shift should have been trained in first aid to a nationally recognized standard.

Ideally, large sites would have a well-stocked medical facility and properly trained staff. These would support general welfare as well as providing an emergency service.



Fire precautions

Fires on construction sites arise from the misuse of compressed gases and highly flammable liquids, from the ignition of waste material, wood shavings and cellular plastic materials, and from the failure to recognize that adhesives and some floor and wall coatings are highly flammable.

Every individual on site should be aware of the fire risk, and should know the precautions to prevent a fire and the action to be taken if fire does break out.

Participation



Participation

Article 6

Measures shall be taken to ensure that there is co-operation between employers and workers, in accordance with arrangements to be defined by national laws or regulations, in order to promote safety and health at construction sites.

Article 10

National laws or regulations shall provide that workers shall have the right and the duty at any workplace to participate in ensuring safe working conditions to the extent of their control over the equipment and methods of work and to express views on the working procedures adopted as they may affect safety and health.

Safety committees

An active safety committee is a great spur to safety.

Its primary purpose is to enable management and workers to work together to monitor the site safety plan so as to prevent accidents and improve working conditions on site.

The safety committee carrying out a site inspection together raises the level of safety consciousness at the site.

The duties carried out by an active safety committee will include:

- Regular and frequent meetings to discuss the safety and health programme on site
- To make recommendations to management
- Consideration of reports of safety personnel
- Discuss accident and illness reports in order to make recommendations for prevention
- Evaluating improvements made
- Examination of suggestions made by workers, particularly by safety representatives
- Planning and taking part in educational and training programmes

Safety representatives

Appointed by workers to represent them in dealing with safety and health matters on site.

They should be experienced workers well able to recognize construction site hazards.

They are likely to require training to acquire new skills in inspection and in using information.

Their functions are to:

- Make representations to the management about matters of concern
- Attend meetings of the safety committee
- Carry out regular and systematic inspections on site
- Investigate accidents with management to find their causes and propose remedies
- Investigate complaints by workmates
- Represent workers in discussions with government inspectors at their site visits

Competence, training and induction

Workers shall be adequately and suitably:

Informed of potential safety and health hazards to which they may be exposed at their workplace

Instructed and trained in the measures available for the prevention and control of, and protection against, those hazards

Informed of potential safety and health hazards to which they may be exposed at their workplace

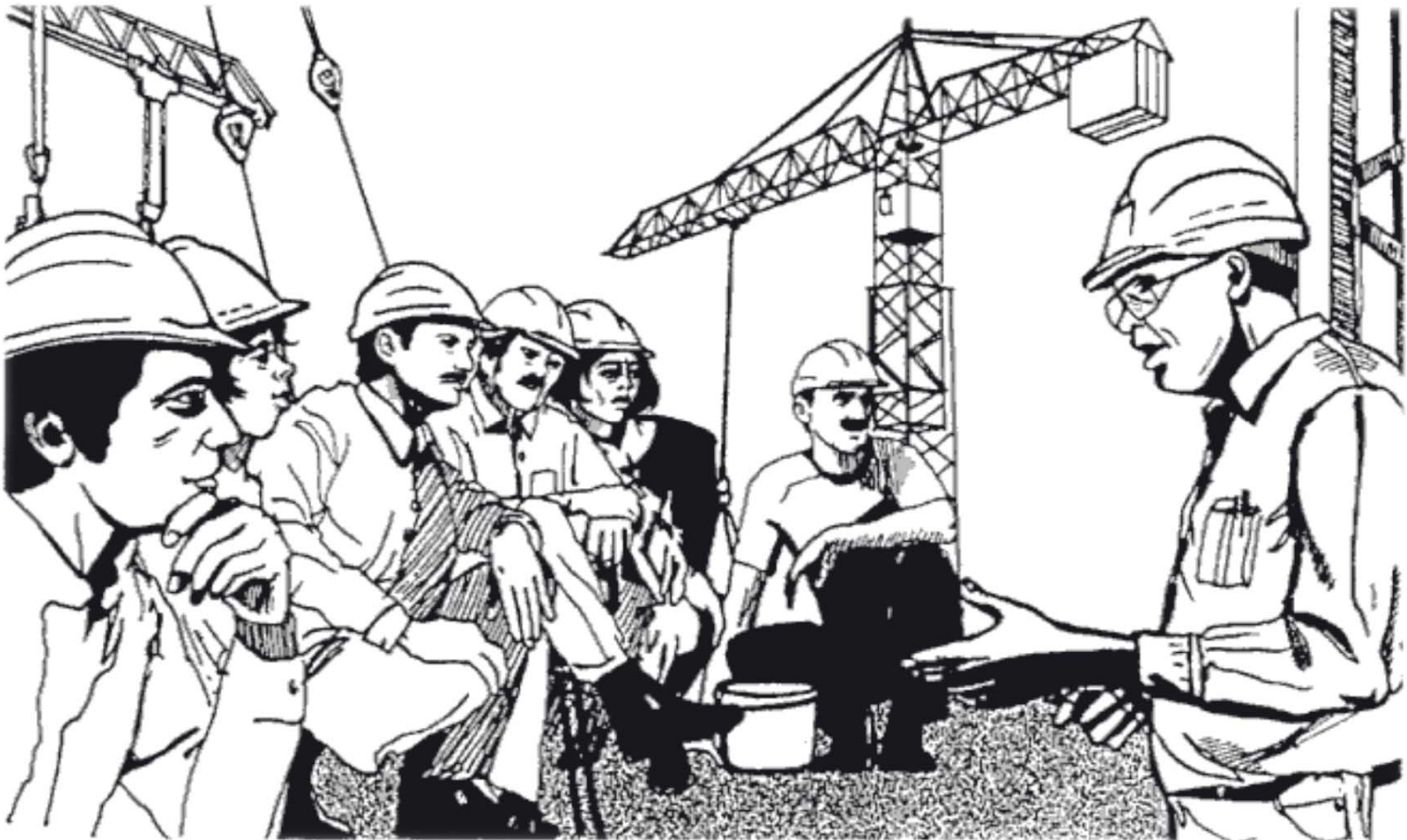
Instructed and trained in the measures available for the prevention and control, and protection against, those hazards.

Competence, training and induction

Every worker should receive instruction and training regarding the general safety and health measures common to the construction site, which should include:

- General rights and duties of workers at the construction site
- Means of access and egress both during normal working and in an emergency
- Location and proper use of welfare amenities and first-aid facilities
- Use and care of the items of personal protective equipment and clothing
- General measures for personal hygiene and health protection
- Fire precautions to be taken
- Action to be taken in case of an emergency
- Requirements of relevant safety and health rules and regulations

Tool-box briefings should be regular and frequent



Induction

Induction to the project site and the way it operates is of crucial importance to those who work on the site, but also to visitors – who will include the Client's representatives and also many of the others involved in the project.

No person should be allowed on the construction site unless they have completed the induction training or they are accompanied at all times by a 'competent' person', who will of course have been through the induction training.

Induction

In groups of 3-4, list the points that should be made in an induction training session for a large building site of two story houses.

Induction

The next slides are an example of an induction programme taken from “Construction safety management” by Howarth and Watson

The ILO is grateful to Tim Howarth and Paul Watson for permission to use these slides.