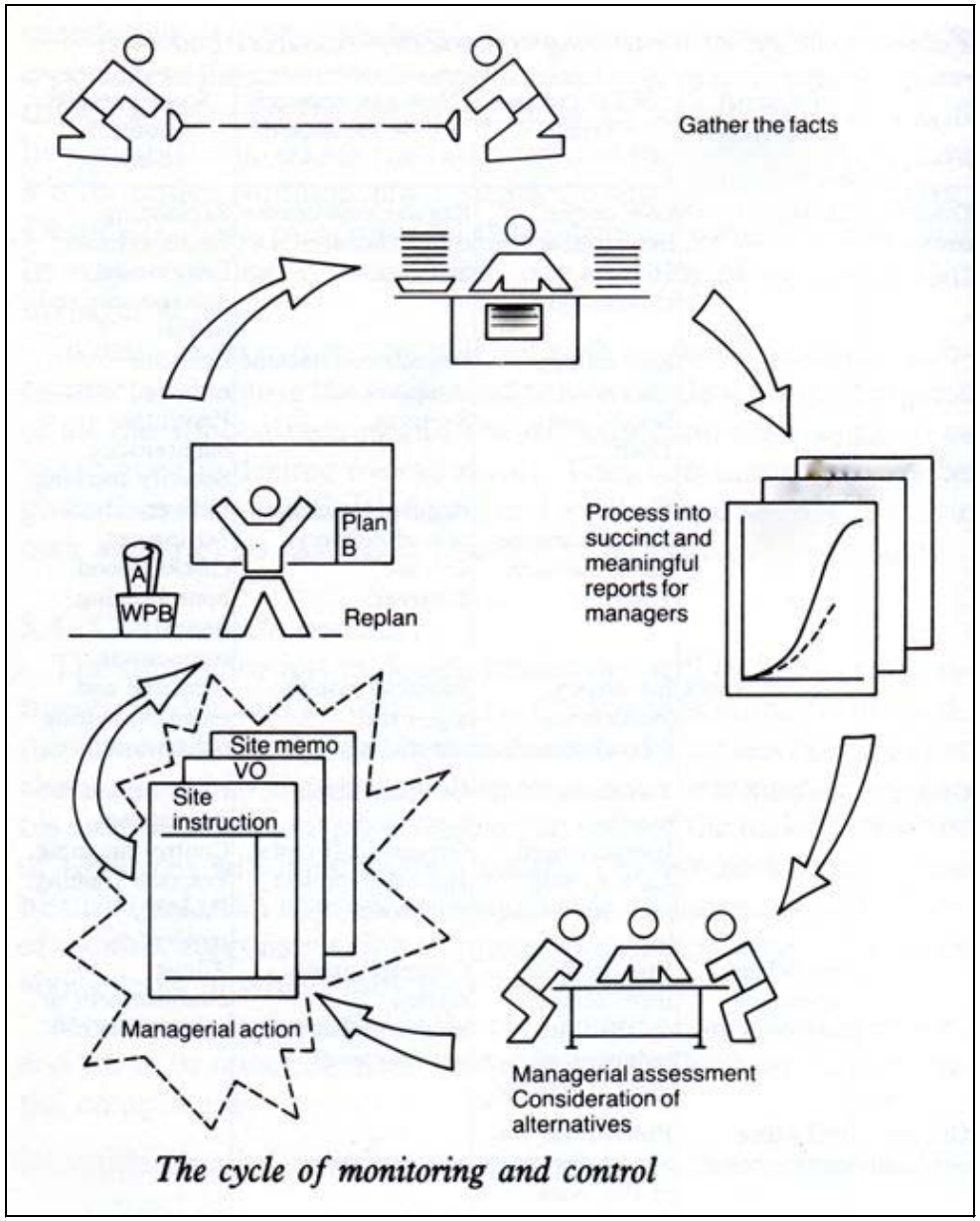


The cycle of monitoring and control

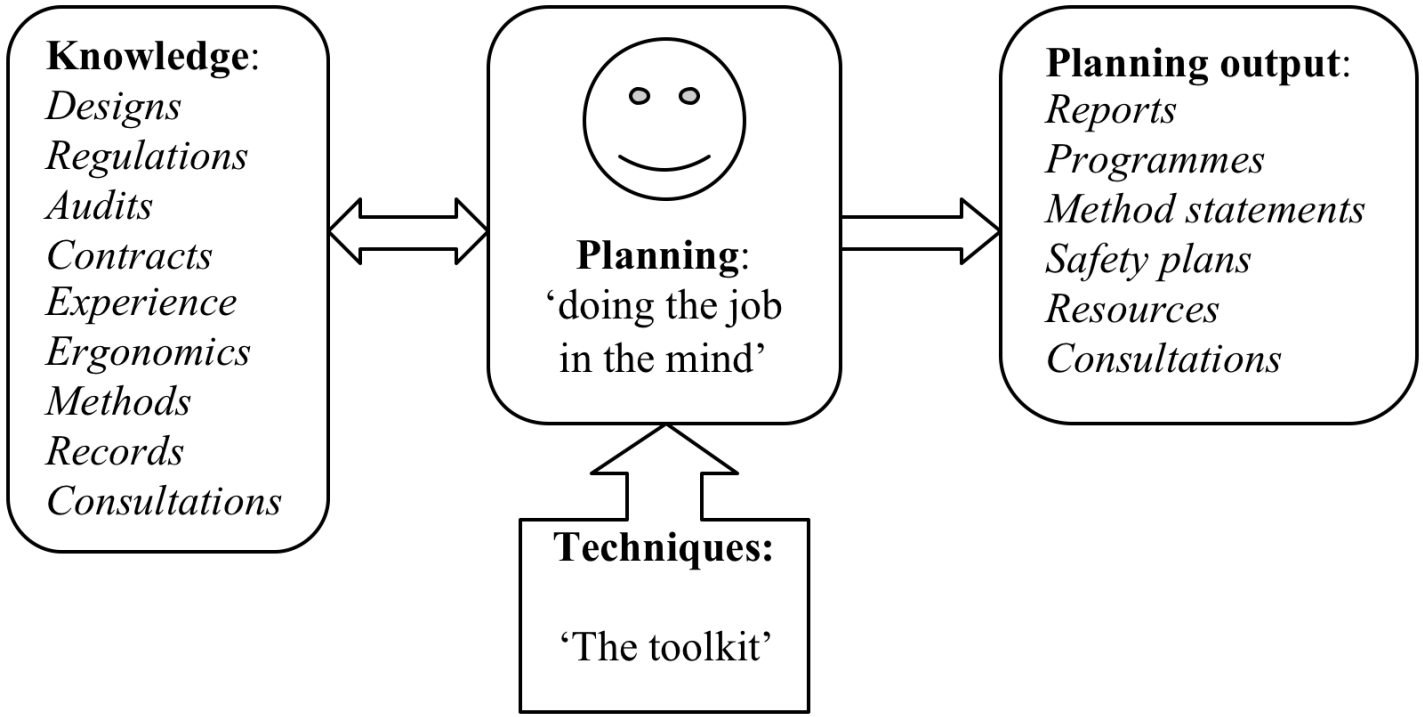
Construction OS&H

Project planning and control for safe OS&H

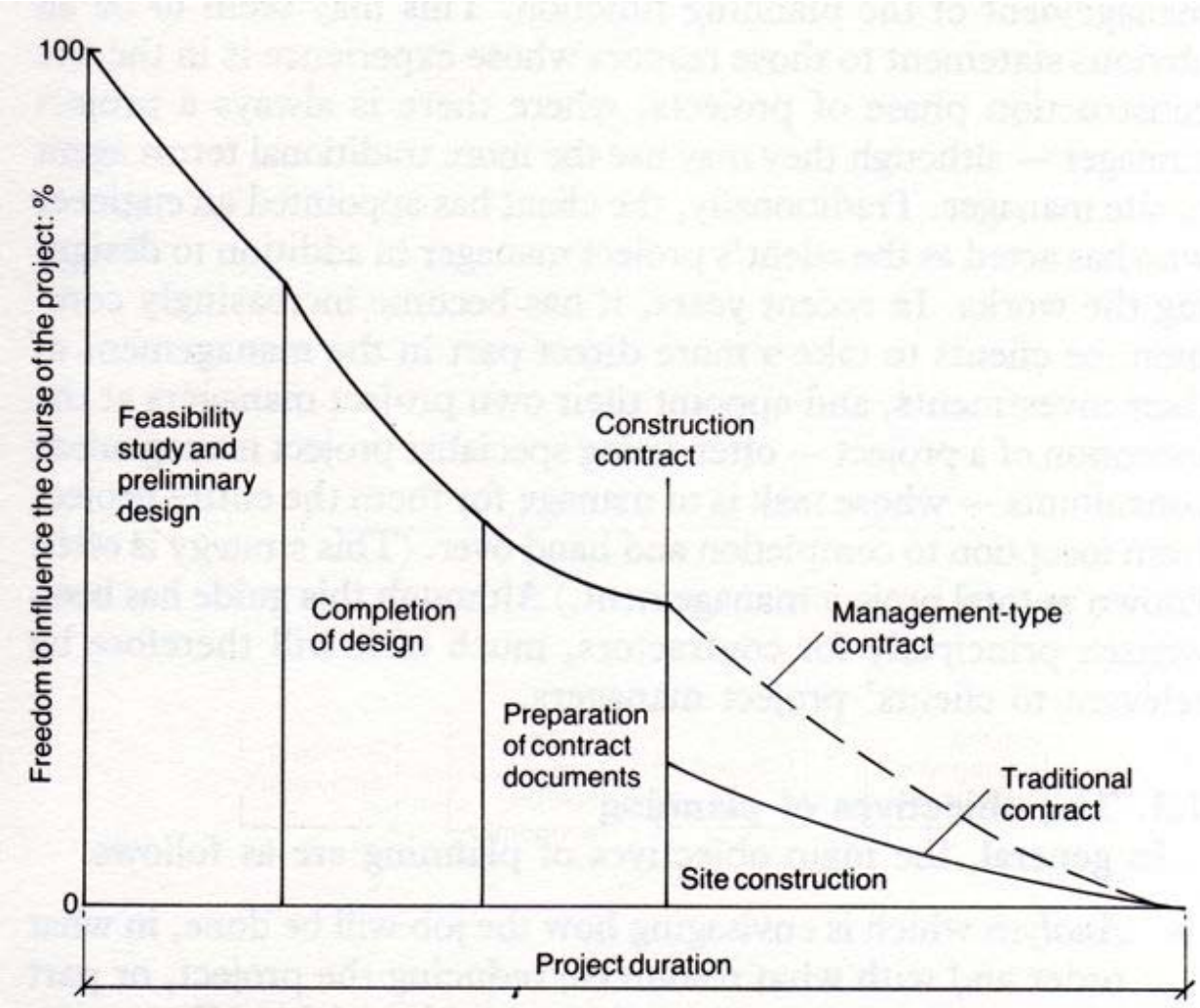
Summary

General principles of project planning and control
OS&H by design as a key element of project planning and control
OS&H performance measurement and management
Role and responsibilities of safety specialists

General principles of project planning and control



Early decisions are very important



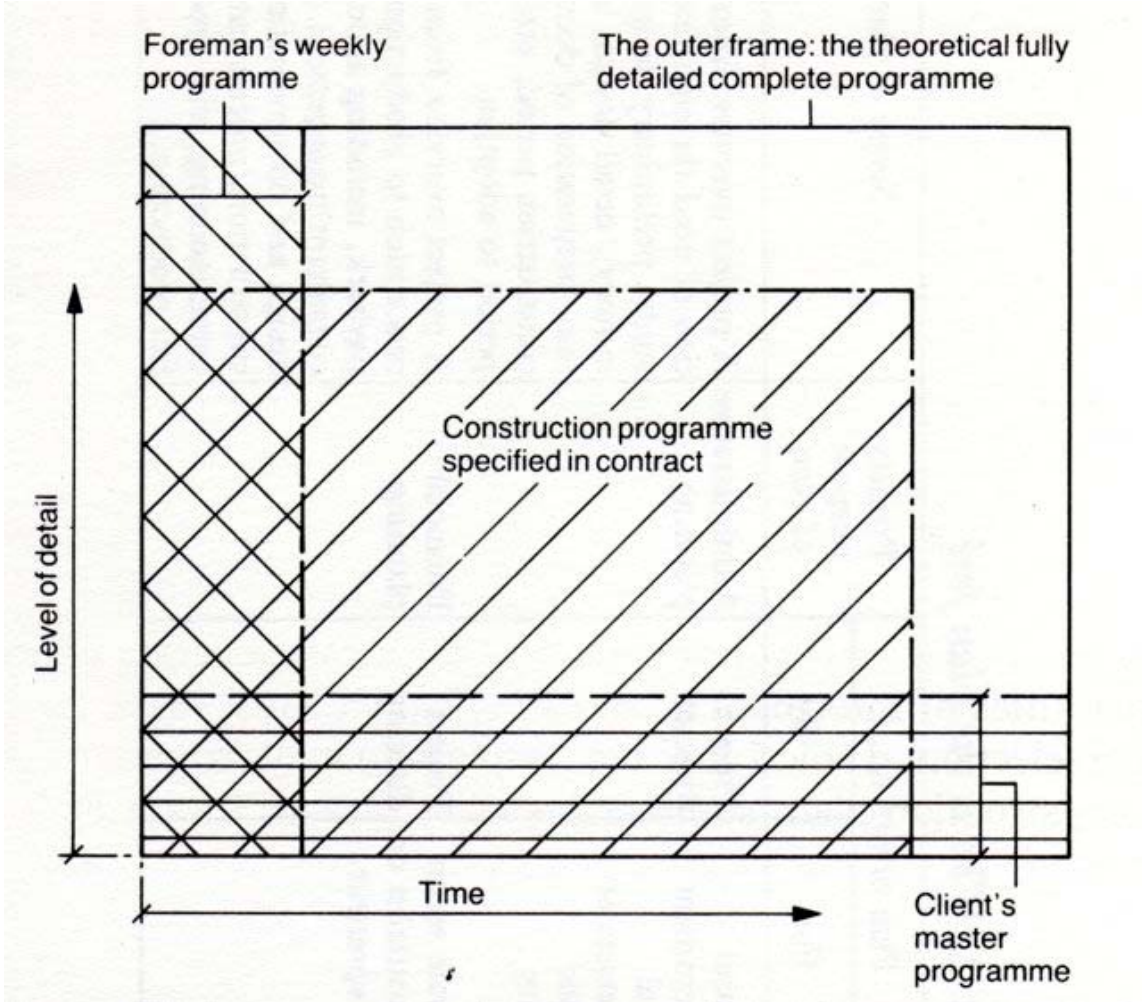
Early decision to prefabricate cladding

Lifting a panel from the special frame on the low-loader.

Early decision to prefabricate cladding

Panel being hoisted into position.

Level of detail



So, planning for OS&H must be to try to assess major hazards and risks at an early stage of the project, so that major decisions can be taken with occupational safety and health in mind, which should aid the detailed hazard and risk analysis at the supervisory level as the construction work is physically undertaken.

OS&H by design

The importance of ‘early decisions’ in the planning of OS&H means that the designers’ role in **Construction OS&H** is crucial. Designers can have a substantial influence on the overall safety and health of the employees on a project, but the necessary systematic processes and techniques are still being developed.

USA ‘Prevention through design’ (PtD)

“What PtD is:

- Explicitly considering the safety of construction workers in the design of a project.
- Being conscious of and valuing the safety of construction workers when performing design tasks.
- Making design decisions based in part on how the project's inherent risk to construction workers may be affected.
- Including worker safety considerations in the constructability review process.”

USA ‘Prevention through design’ (PtD)

“What PtD is not:

- Having designers take a role in construction safety DURING construction.
- An endorsement of future legislation mandating that designers design for construction safety.
- An endorsement of the principle that designers can or should be held partially responsible for construction accidents.
- Implying that the vast majority of U.S. design professionals are currently equipped to design for construction safety.”

Prefabrication or off-site construction

Modules nearing completion, with shrink-wrapped covers and doors protected.

A company in Denmark specialises in the manufacture of off-site bathroom units for hotels and similar applications. The units are absolutely complete when they leave the factory, and are transported by road all over Europe.

Prefabrication or off-site construction

Modules installed at corridor end of rooms, forming most of the end wall.

When they reach the building under construction, they are lifted onto a platform at the appropriate floor by a crane and moved down the corridor on a specially made trolley. This is a well planned operation and is quite safe.

Prefabrication or off-site construction

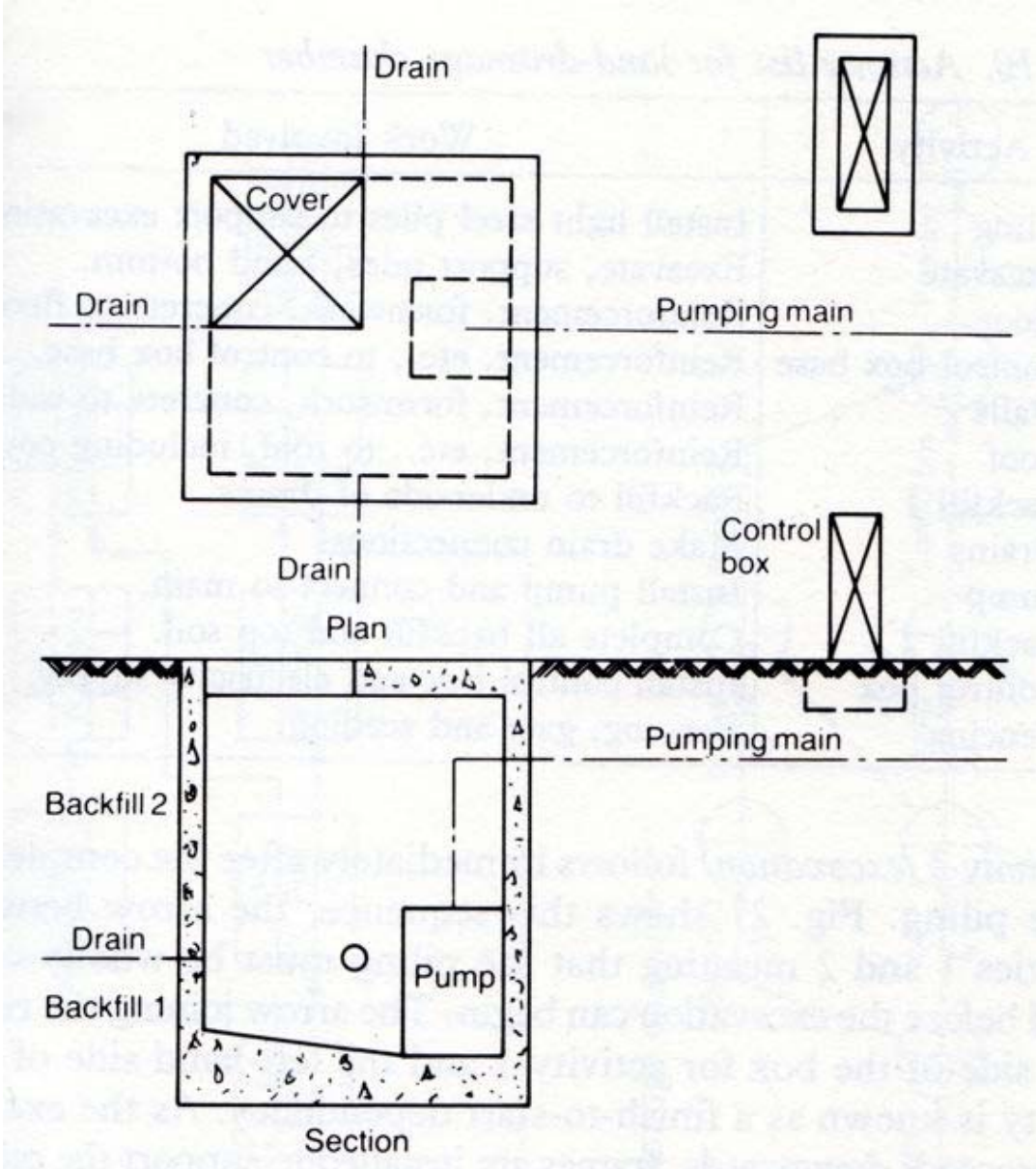
Tiling the base, before fitting the walls. Much easier than working on site.

The workers benefit from factory rather than site conditions, and the ergonomic advantages are obvious from the third photo; had it been on site the tiler would be working in cramped conditions on his knees.

Prevention through design

A scheme to drain low-lying land uses reinforced concrete chambers to collect the water, which is then pumped into drainage channels used for irrigation elsewhere. The internal plan dimensions are 4m square, and the chambers have depths varying form 2m to 5m.

What is the main hazard?

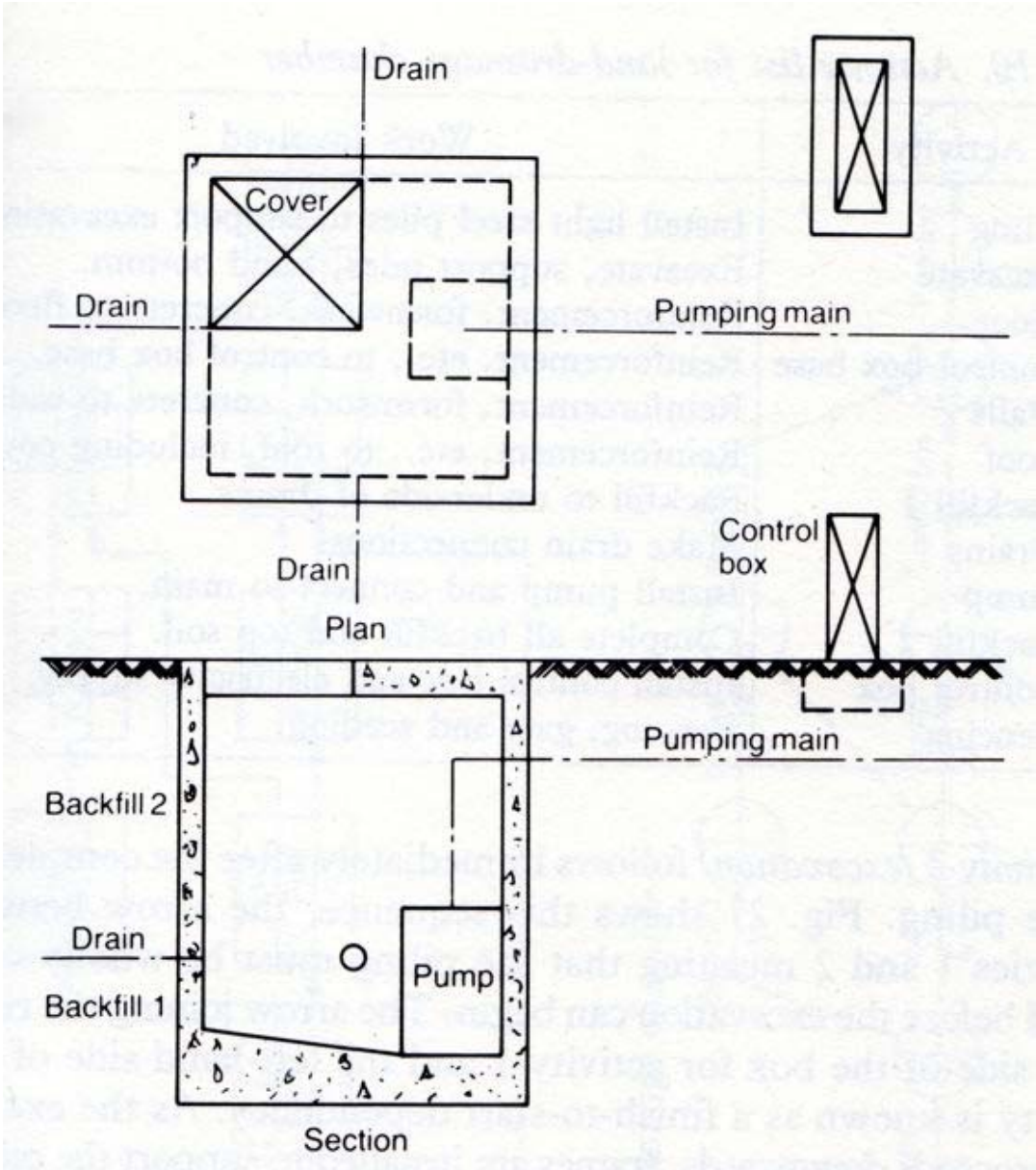


Prevention through design

What is the main hazard?

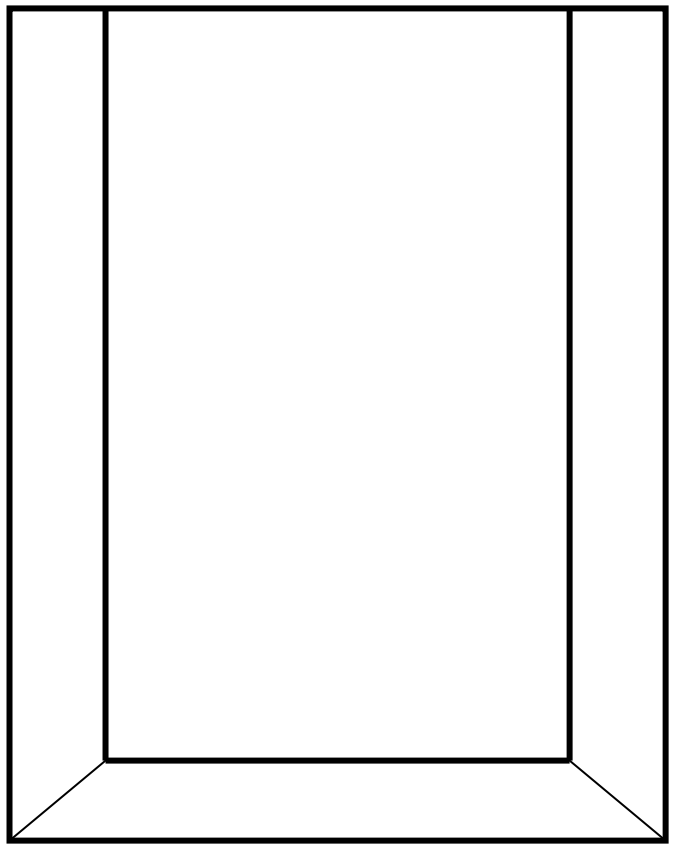
Collapse of the excavation.

How can the risk of this hazard be minimized by design?



‘Caisson construction’

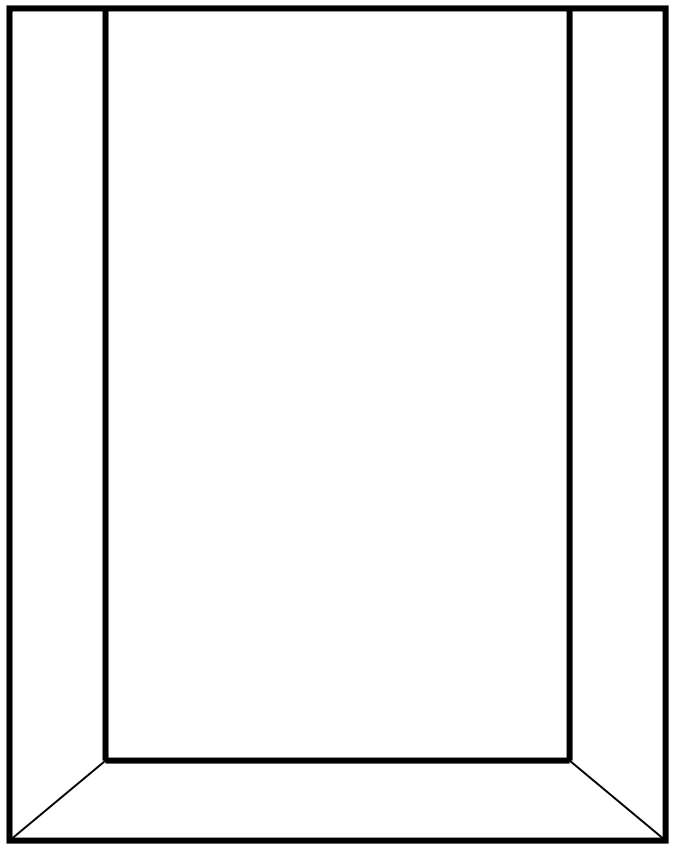
This method allows the rings to be constructed in sections on the ground. Lifts of the reinforced concrete are cast, the first one sitting on top of a concrete or steel ‘cutting shoe’ that is slightly bigger than the external size of the manhole. The manhole is then excavated relatively safely from the inside, and it slides into the ground under its own weight.



The ground is supported throughout by the permanent structure, so eliminating the need for temporary supports.

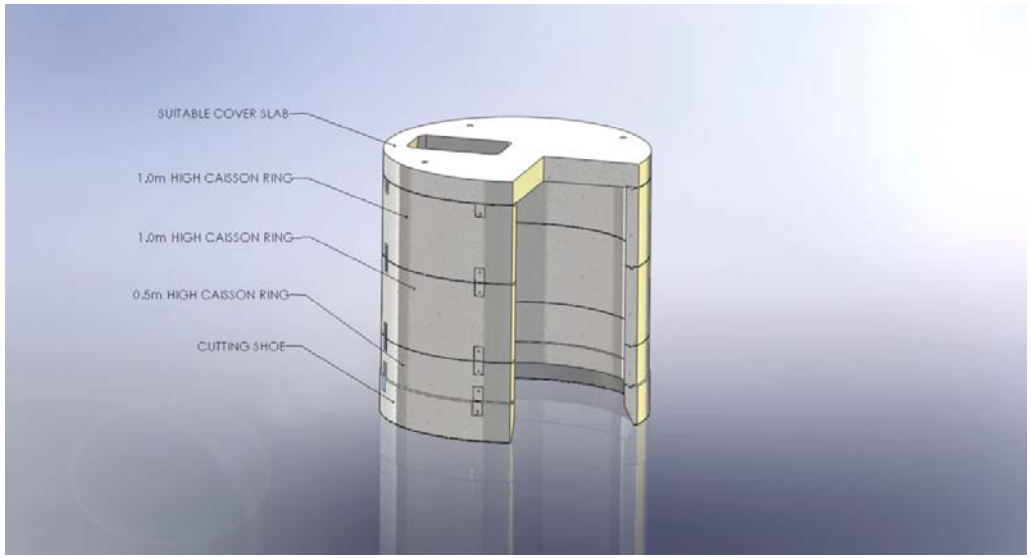
The floor is cast in-situ when the cutting edge of the chamber has reached the required depth.

It should be noted that sinking a caisson safely and accurately is a skilled operation, so an ‘early decision’ would be to give this work to a specialist company.



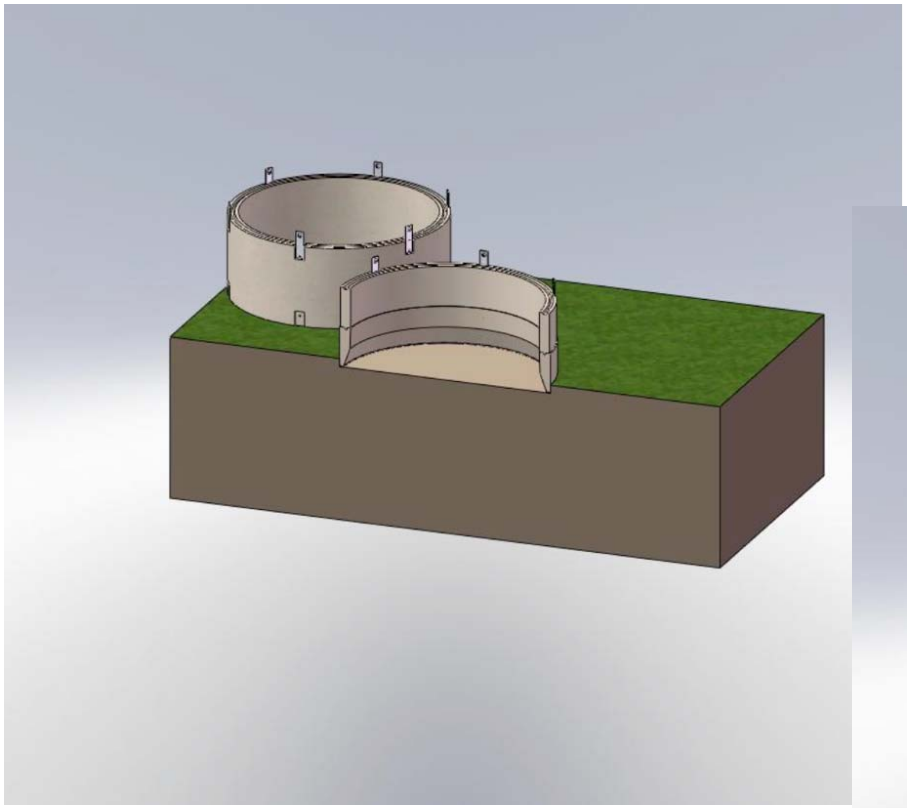
A commercial component example of caisson construction

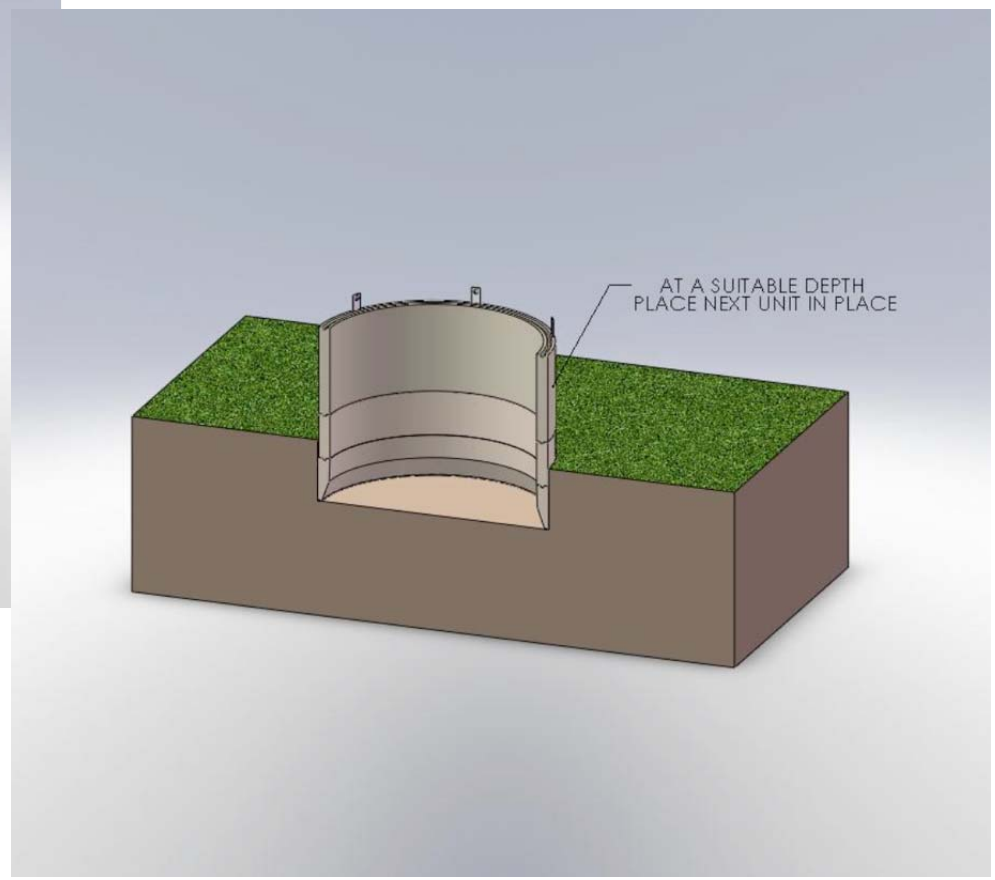
Courtesy of:
www.miltonprecast.com



The method allows the rings to be pre-assembled on the ground. Sitting on top of a concrete or steel ‘cutting shoe’ that is slightly bigger than the external diameter of the manhole. The manhole is then excavated relatively safely from the inside, and it slides into the ground under its own weight. Thus the ground is supported throughout by the permanent structure, so eliminating the need for temporary supports.

Installing a precast concrete caisson - principles





Installing a precast concrete caisson: practical example (1)

Photo shows the caisson and bulk excavation with a clamshell grab

Installing a precast concrete caisson: practical example (2)

Hand excavation at the ‘shoe’. This controls the rate and direction of descent.

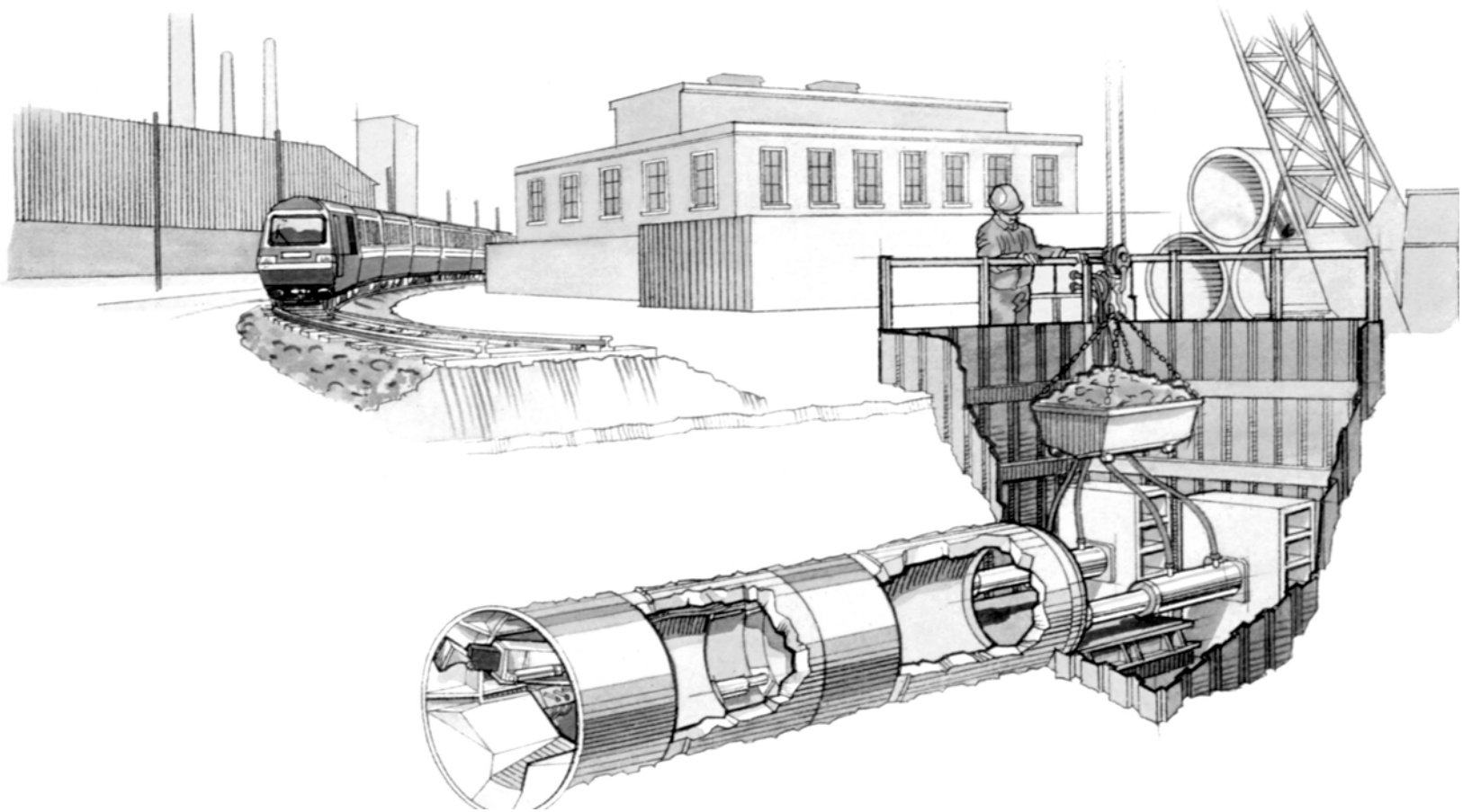
Trenchless pipe-laying (1)

Laying pipes in the ground usually requires excavating a trench to the required depth and laying the pipes in it. Trenchwork is one of the most dangerous construction activities, so methods to eliminate it will be beneficial.

"Pipe jacking, generally referred to in the smaller diameters as micro-tunnelling, is a technique for installing underground pipelines, ducts and culverts. Powerful hydraulic jacks are used to push specially designed pipes through the ground behind a shield at the same time as excavation is taking place within the shield."

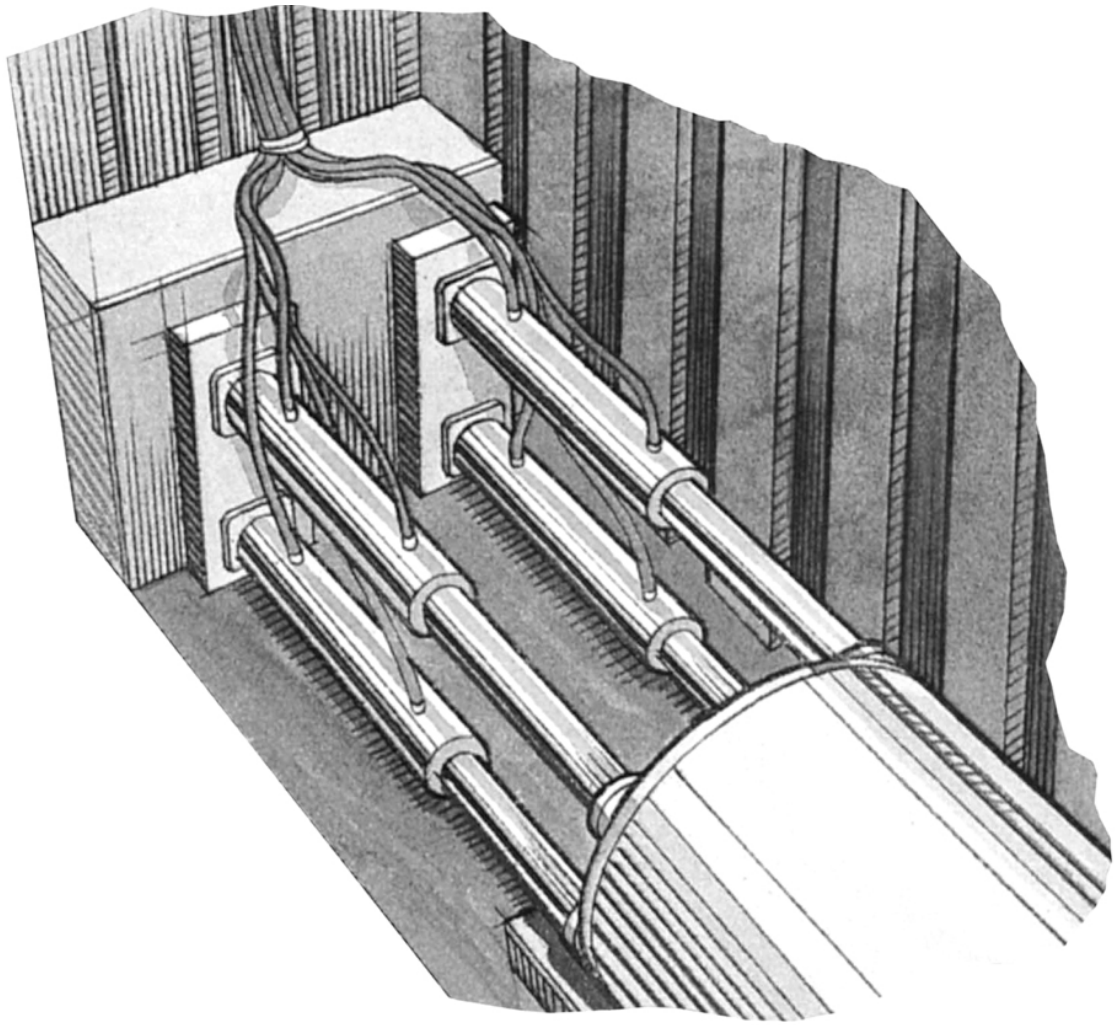
The diagrams on the next slides show how 'trenchless pipe-laying' works. They were supplied by the Pipejacking Association (www.pipejacking.org)

Trenchless pipe-laying (2)



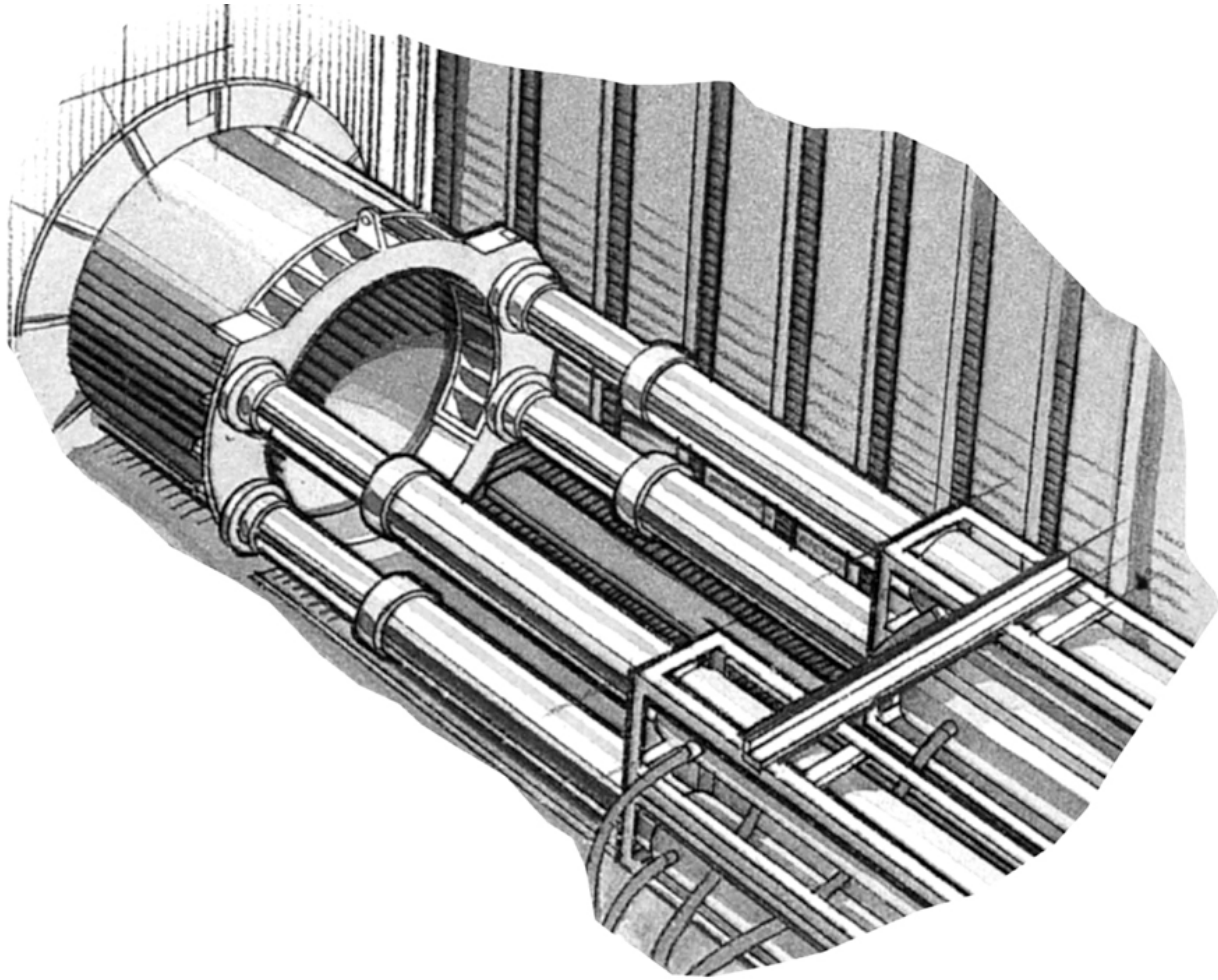
Trenchless pipe-laying (3)

Detail of the thrust wall and jacks



Trenchless pipe-laying (4)

Detail of the thrust ring which transfers the jacking force to the pipe

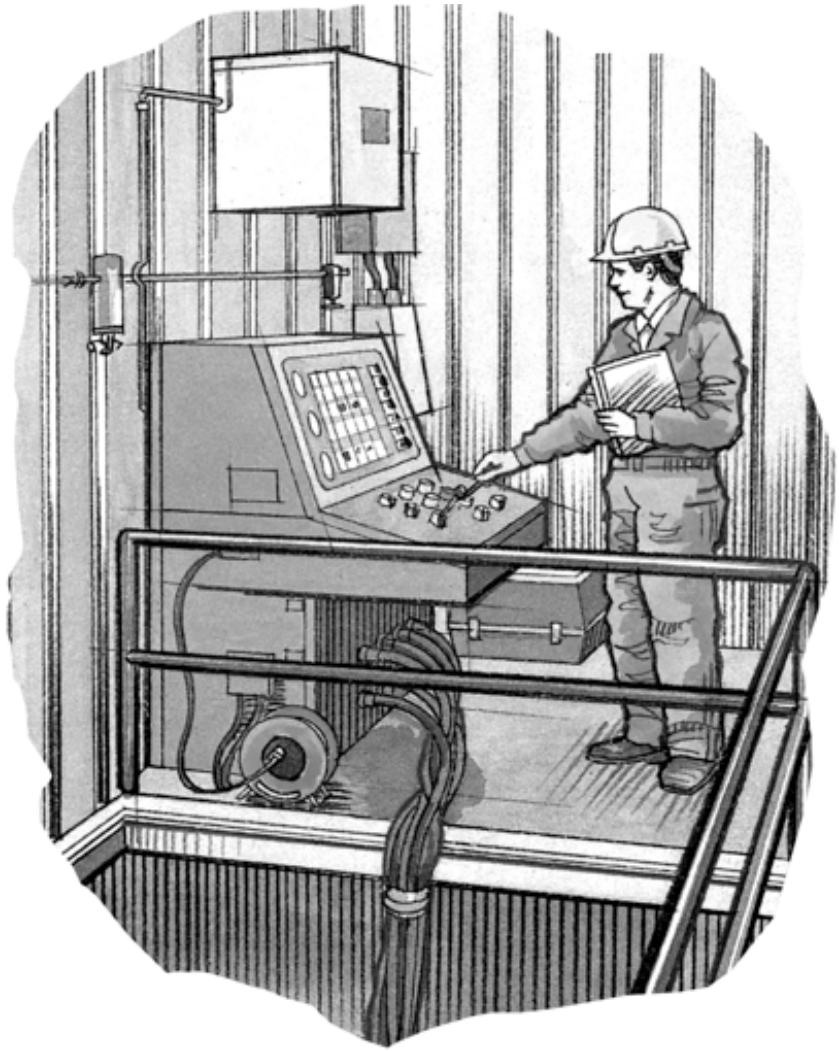


Trenchless pipe-laying (5)

Remote control

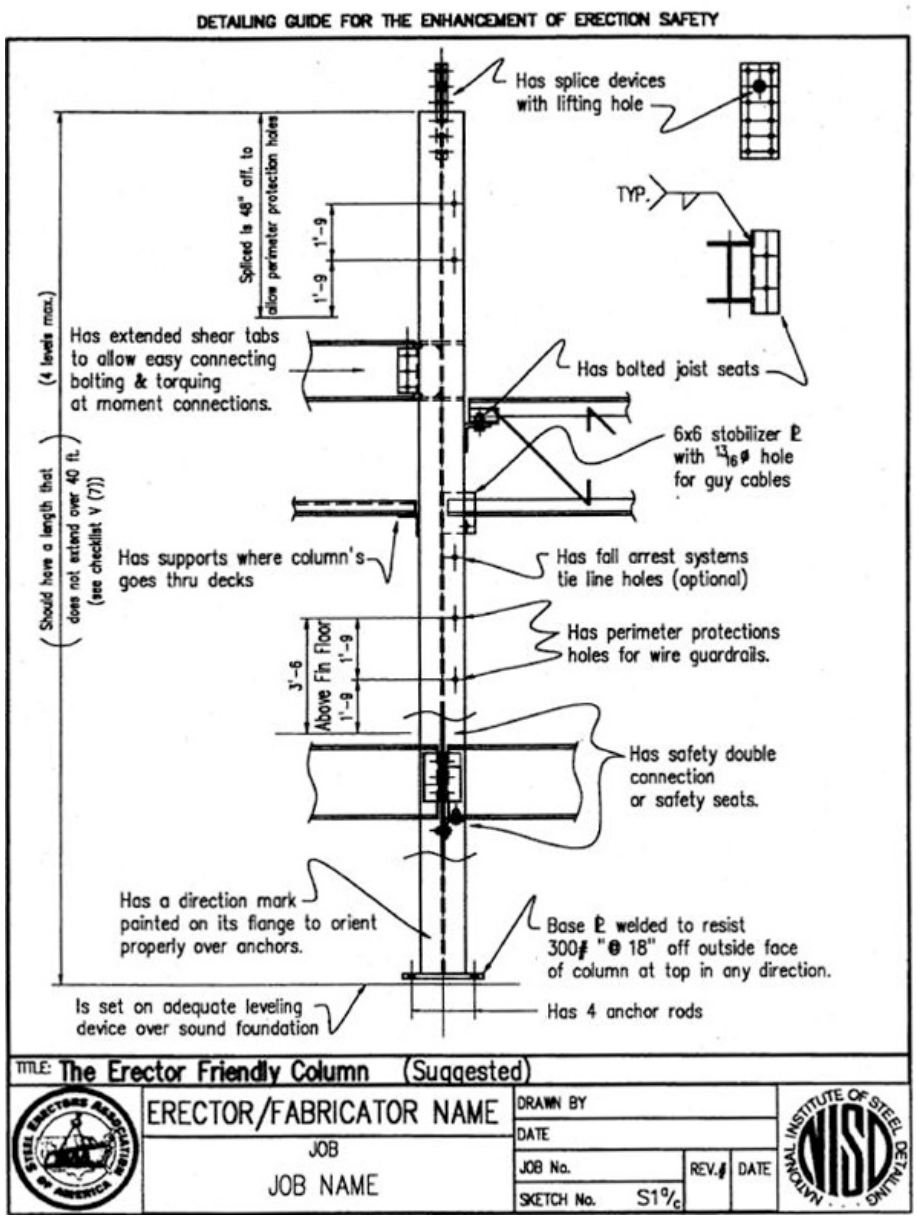
based on electronic

guidance systems

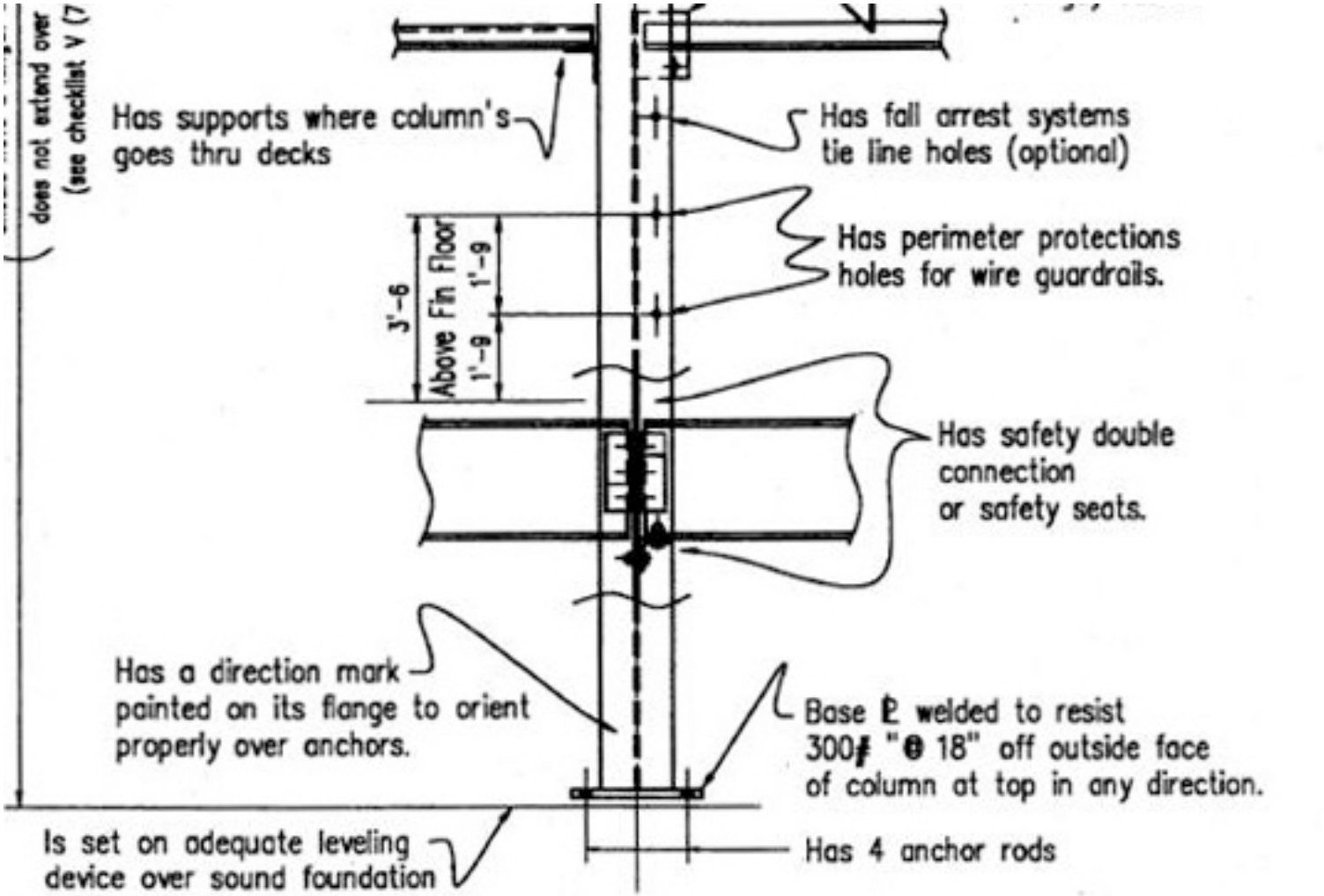


The ‘erector friendly column’

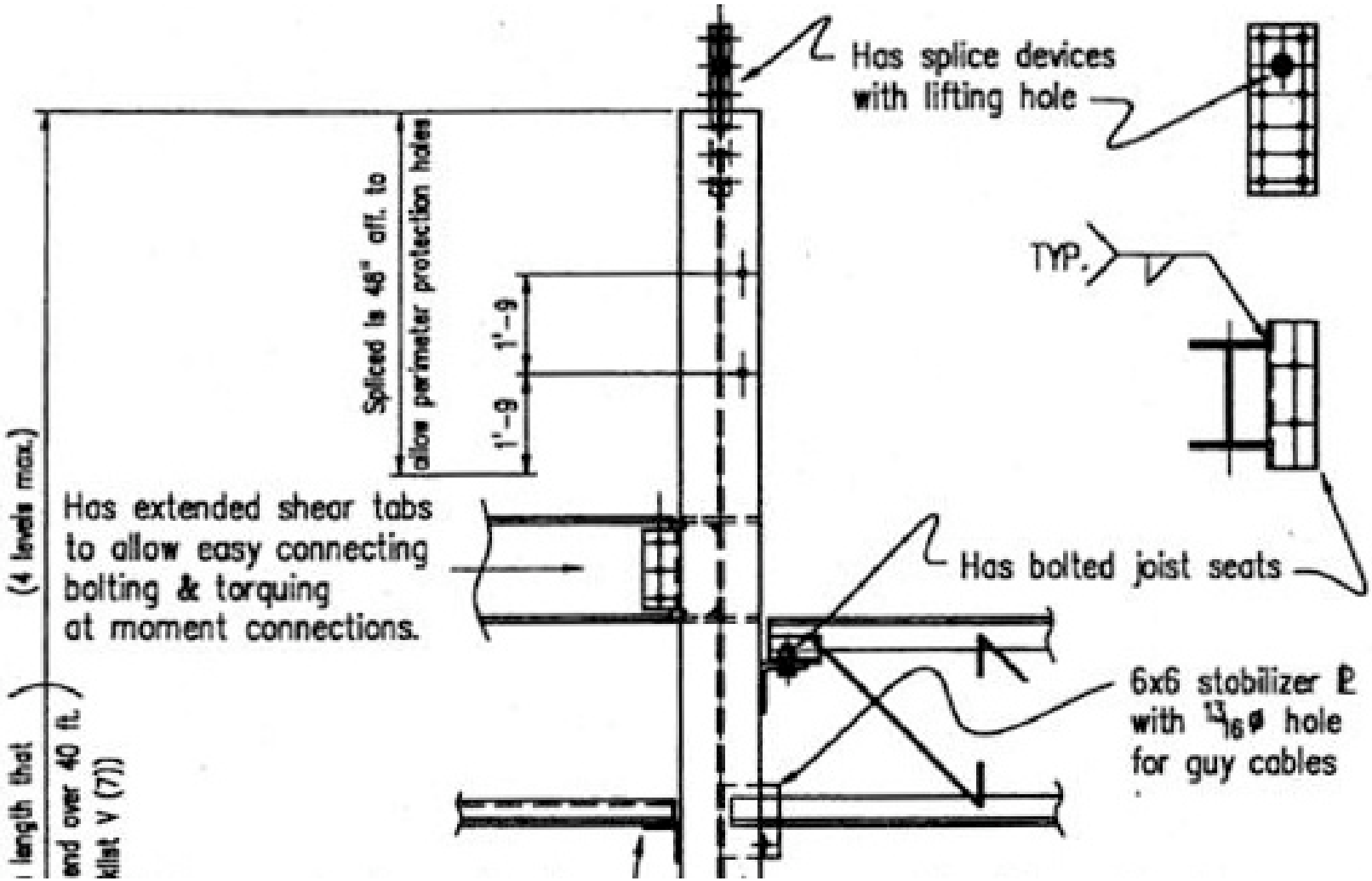
The erector friendly column shows how a simple steel component can be made in such a way that it becomes easier and safer to erect. (This image was taken from the PtD web site)



The ‘erector friendly column’



The ‘erector friendly column’



Other examples

- Indicate on the contract drawings the locations of existing underground utilities and mark a clear zone around the utilities. Note on the drawings the source of information and level of certainty on the location of underground utilities.

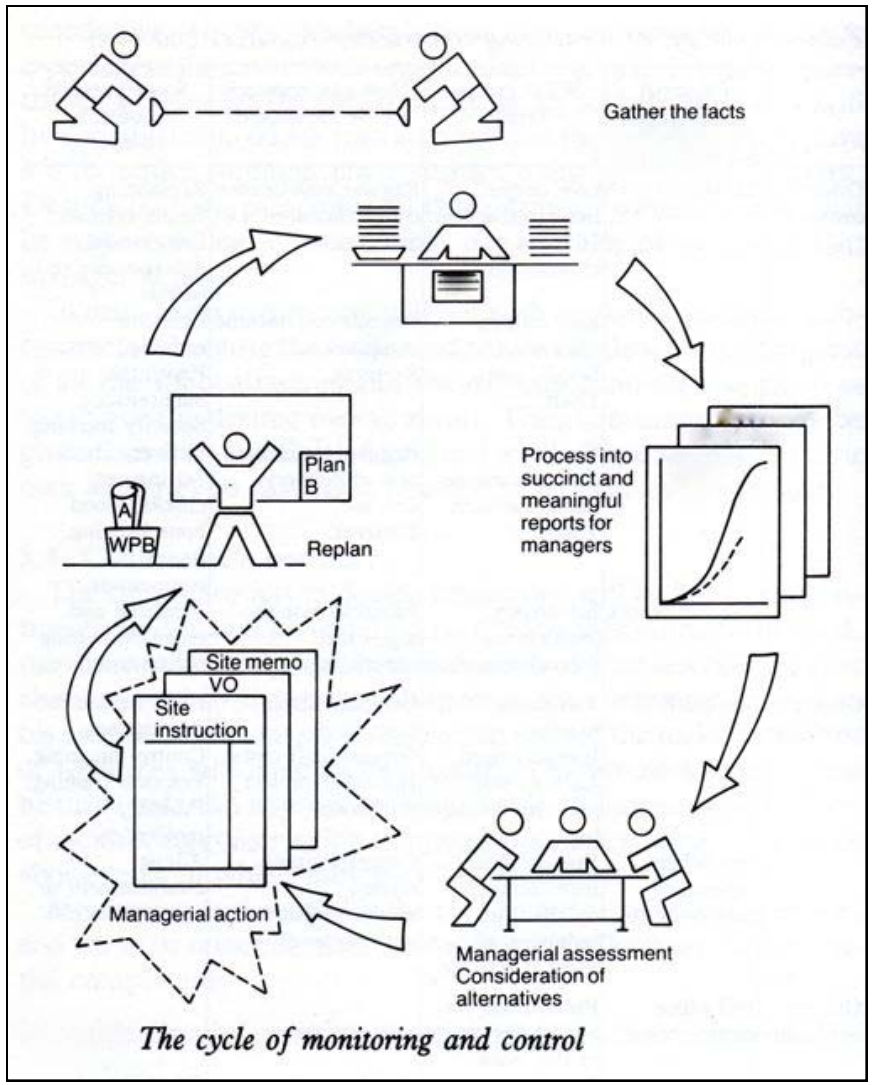
- Design parapets to be 42 inches (1.07m) tall. A parapet of this height will provide immediate guardrail protection and eliminate the need to construct a guardrail during construction or future roof maintenance.

Other examples (2)

- Design columns with holes at 21 and 42 inches (0.54 and 1.07m) above the floor level to provide support locations for lifelines and guardrails.
- Design domed, rather than flat, skylights with shatterproof glass or add strengthening wires.
- Locate rooftop equipment away from the building perimeter to reduce fall hazards while installing the equipment and during future maintenance.

OS&H performance measurement and management

The diagram illustrates the general process of measuring and managing performance – the 'cycle of monitoring and control'. As emphasised in other modules of **Construction OS&H**, this has to be a continuous and relentless process if improvements are to be made and good OS&H performance is to be achieved.



The cycle of monitoring and control

This cycle relies on making plans based on facts and data, and comparing actual performance against the planned performance in order to keep the project on target.

The fundamental basis for the overall management of a project is the ‘Project Brief’, and the fundamental basis for managing OS&H is the ‘Safety and Health Plan’.

The project brief

A clear, comprehensive statement of the client's requirements of the project.
The client 'doing the job in the mind'.
The brief will usually include the following:

- General introduction to the client and the other organisations involved
- General statement of intention (ie an outline description of a building)
- Location and its implications (eg topographic, climatic, social)
- Feasibility and cost studies, leading to the cost plan
- Requirements of authorities and permissions
- Safety and health policy
- Contract documents
- Designs, appropriate to the form of contract
- Overall programme for the whole project
- Other important issues (such as the requirements of fund providers)

A major failing of many otherwise good project briefs is a complete absence of any consideration of safety and health. Many briefs are mainly technical and legal documents that focus on the 'deliverables' of cost, time and functionality.

Under the influence of 'triple bottom line' or 'people, planet, profit' initiatives, OS&H is becoming more prevalent, but the philosophy of **Construction OS&H** is that this must be a major consideration in all project briefs, and consequently in all contract and other relevant project documents.

It is through the project brief that the client of a construction project can begin to exert pressure to achieve a zero incident project.

The OS&H plan

This is the crucial document at the centre of the ‘cycle of monitoring and control’.

An **OS&H Plan** is an essential platform for the management of OS&H

The ‘project matrix’ shows that a number of plans will be required, for all those involved and also for the different stages of the project.

# Indicates those who MUST have OS&H plans

Others may need them also

THOSE INVOLVED	PROJECT STAGES				
	Briefing	Design	Procurement	Construction	Commission
Client	4	4	4	4	4
Authorities	**?**	**?**	**?**	**?**	**?**
Project managers	4	4	4	4	4
Local residents	**&**	**&**	**&**	**&**	**&**
Designers		4			
Contractors			4	4	4
Other consultants	4	4	4	4	4
Sub-contractors			4	4	4
Suppliers	4	4	4	4	4
Workers	**&**	**&**	**&**	**&**	**&**
Users	**?**	**?**	**?**	**?**	**?**

Essential elements of an OS&H Plan

- Title page
- Authorisations
- Introduction
- OS&H procedures
- OS&H hazard and risk assessments
- Technical controls
- Working practices
- Welfare
- Training
- Consultation and communication
- Review, audit and corrective action

Course participants will have to prepare an OS&H plan for the final project of this course

Point to remember:

No safety policy or plan is workable without assigning a specific duty:

- to a specific person
- to be completed at a specific point in time

The safety policy and plan must be transmitted down the line to the workers – it is their safety that the plan is intended to safeguard.

More specific guidance on OS&H plans

Building and Woodworkers International have made a slide show that explains these plans in more detail:

Preparing Site-specific Safety Management Plans
And
Safe Work Method Statements

by Fiona Murie

We shall now show this presentation

Role and responsibilities of safety specialists

"Every construction company of any size should appoint a properly qualified person (or persons) whose special and main responsibility is the promotion of safety and health. Whoever is appointed should have direct access to an executive director of the company. His or her duties should include:"

Discuss this with another person on the course, and list at least five duties.

Role and responsibilities of safety specialists

- The organization of information to be passed from management to workers, including those of sub-contractors
- The organisation and conduct of safety training programmes, including induction training for all workers on the site
- The investigation and review of the circumstances and causes of accidents and occupational diseases so as to advise on preventive measures
- Acting as consultant and technical adviser to the safety committee
- Participation in pre-site planning

To carry out these functions the safety officer should have experience of the industry and should be properly trained and qualified and, where such exists, should be a member of a recognised professional safety and health body.

Construction OS&H duties of safety specialists

Advisory role

Briefing

Policy

Organisation

Consultations

Legal and regulatory

Contractual

Hazards and risk

Project planning

Design development

OS&H planning

Emergency and incident response

Project welfare facilities

Administrative role

Hazard and risk analysis

Authorisations

Monitoring and reporting

Review

Audit

All OS&H systems (including records and reporting)

ICT applications (including communications systems)

Perhaps a new career?

EARNING YOUR STANDING AS

CONSTRUCTION SAFETY SPECIALIST

THE CONSTRUCTION SAFETY SPECIALIST (CSS) program provides verification of a nationally recognized level of competency in relation to construction safety. The CSS program provides practical training in various construction safety management skills and principles.

ELIGIBILITY

TO BE ELIGIBLE FOR THIS DESIGNATION, you must obtain a combination of formal training and three years practical field experience providing a resource to management in the administration and implementation of a company's safety program.

Upon completion of the mandatory training, practical application and experience, an individual may apply to the Construction Safety Network to become a Construction Safety Specialist.

TRAINING REQUIREMENTS

COMPULSORY COURSES:

- Owners' and Managers' Orientation: Safety is Good Business
- Foundation for Health and Safety Excellence
- Auditor Training
- Principles of Health and Safety Management
- Early and Safe Return to Work
- Train the Safety Trainer
- First Aid (minimum Level 1)
- Workplace Hazardous Materials Information System (WHMIS)
- Construction Safety Training System (CSTS)

OPTIONAL:

Confined Space Training is recommended

Construction Safety Network

www.safetynetwork.bc.ca