**Health and Safety Executive**
Health and Safety series booklet (HS(G)32)

# Safety in falsework for in situ beams and slabs

## Contents



London: Her Majesty's Stationery Office

*First published 1987*

HS(G) series
The purpose of this series is to provide guidance for those who have duties under the Health and Safety at Work etc Act 1974 and other relevant legislation. It gives guidance on the practical application of regulations made under the Act, but it should not be regarded as an authoritative interpretation of the law.

Further advice on this or any other HSE publications may be obtained from Area Offices of HSE or from the general enquiry points listed below.

Health and Safety Executive
Library and Information Services
Broad Lane
SHEFFIELD S3 7HQ
Telephone: (0742) 752539 Telex: 54556

Health and Safety Executive
Library and Information Services
St Hugh's House
Stanley Precinct
Trinity Road
BOOTLE
Merseyside L20 3QY
Telephone: 051-9514381 Telex: 628235

Health and Safety Executive
Library and Information Services
Baynards House
1 Chepstow Place
Westboume Grove
LONDON W2 4TF
Telephone: 01-2210416 or 01-2210870 Telex 25683

ISBN O 118839004

## Explanation of terms

**Falsework**

In BS 5975 falsework is defined as "any temporary structure used to support a permanent structure while it is not self supporting".

This document only covers falsework for reinforced in-situ concrete beams not exceeding 1.Om deep and slabs not heavier than solid 300mm thick.

**Category 1 falsework:**

Falseworks which may be constructed from sketches derived from typical solutions, from proprietary manufacturers catalogues or, where the falsework is very simple, based on previous experience of many similar successful schemes.

**Category 2 falsework:**

Falsework schemes with special factors (listed in Table 1) which may require a falsework designer to make technical judgments, to carry out calculations and/or prepare drawings or sketches.

**Falsework contractor:**

The persons, company or organisation undertaking the erection of a falsework. This may form either part or the whole of their work on the site.

**Main contractor:**

The contractor in overall control of the site. This may or may not be the falsework contractor.

**Falsework brief:**

The document which sets out the general requirements, location and purpose of the falsework.

**Site inspection record:**

The document which sets out the site conditions which could affect the choice of falsework and its erection, and confirms the information given in the falsework brief.

**Falsework scheme summary:**

The document which summarises the more important elements of the falsework scheme.

**Falsework detailer:**

The person appointed by the falsework contractor to prepare details of Category 1 falsework (eg from typical solutions proprietary catalogues or in the most simple cases based on experience) for use on a particular site.

**Falsework designer:**

A person who is qualified to prepare a Category 2 falsework scheme.

Falsework co-ordinator

The person nominated to co-ordinate the various aspects of building the falsework, as specified in paras 55-59. The person may be appointed by the main contractor but on smaller falsework contracts the person nominated could be the falsework contractors site supervisor.

## Introduction

1 The failure of any falsework may cause injury or death to those working on or near to it, as well as loss of time and money.

2 Many past failures occurred on fairly simple structures erected by smaller falsework contractors. The causes were forseeable and could have been prevented by proper consideration when planning, erecting, loading or dismantling the falsework. Procedures to encourage a full consideration of these aspects are set out in this document,

3 This document deals only with falsework which provides temporary support to formwork for in-situ concrete beams and slabs. Such temporary supports should be strong enough to safely supports all the various forces associated with the placing of in-situ concrete.

4 It is primaily for the smaller contractor (the falsework sub-contractor or the general contractor who undertakes some falsework construction) who does not employ design staff. However as the principles apply to most falsework schemes, it should be of value to all contractors undertaking this type of work. As a further aid, a leaflet containing a check list for the erection and dismantling all types of falsework has been published to be a companion to this guidance.

5 Falsework should be constructed in accordance with BS 5975 The Code of Practice for Falsework. This guidance both complements the Code of Practice and helps those without design staff by concentrating on safety aspects and by giving detailed advice on a limited range of falseworks. It is important for contractors to be aware of the limitations of the advice in the Note, and to obtain help horn a falsework designer when the structure they are to build is beyond its scope or their capabilities.

6 The guidance does not cover the more general hazards which may occur on falsework sites. Sources of advice on some of these are given in the publications listed in Appendix E.

7 This document is issued by the Health and Safety Executive (HSE) and was prepared in close co-operation with the Construction Industry Advisory Committee (CONIAC) of the Health and Safety Commission (HSC).

## Statutory responsibilities

8 The falsework contractor should be aware of the need not only to prevent the falsework collapsing under load, but to ensure that those constructing and dismantling it may carry out their work, so far as is reasonably practicable without risk to their health and safety. They must also safeguard against risks to the health and safety of others who may be working on, or passing by the construction activity. Such risks could arise for example horn falling materials, wind blown plywood or scaffold battens, noise or toxic dusts.

9 On sites where there is a main contractor and several sub-contractors, the main contractor should ensure the safe co-ordination of all activities on site.

10 All those connected with the construction of falsework have duties under the Health and Safety at Work etc Act 1974. Clients, professional advisors, main contractors, managing contractors, sub-contractors, and operatives are all expected to play their part in preventing accidents. Those supplying plant or equipment also have a responsibility so far as is reasonably practicable, to ensure it is safe and without risks to health when properly used.

11 Contractors also have specific duties under the Construction Regulations (listed in Appendix E). Contractors should be familiar with these Regulations before commencing on site.

## Categories of falsework

12 Falsework varies in complexity from those which can be easily erected and have adequate reserves of strength to carry the applied loads to those which are complicated to erect and must be subjected to close structural analysis. This guidance therefore divides them into two categories.

13 Category 1 falseworks are those which may be constructed horn sketches derived horn

(a) Are the loads to be applied to the falsework fairly uniform, such as a beam of constant section or slab of uniform thickness?

NO –

YES

(b) Are the loads within the range shown in the typical solutions?

NO

YES

(c) Is the height of the falsework within the range shown in the typical solutions?

No

YES

(d) Is the site remote from exposed positions such as near coasts or on exposed hills?

No

YES

(e) Have assurances been given, supported by your own observations, that the falsework will be founded on good ground unaffected by areas of uncompacted fill, or backfilled cellars etc; or on existing concrete structures of confirmed strength or on rock, dense hard packed sands or gravels or firm clays which will not be liable to flooding during the life of the falsework?

NO

Yes

(f) Are only small items of plant and equipment such as small compressors, vibrator motors, etc to be placed on the falsework?

NO

YES

(g) Can the falsework be used without special detailing to allow for plant or vehicles to safely pass underneath or close by it?

- NO

YES

(h) Is any one area of the falsework likely to be erected for less than 1 month?

_ No

YES

(i) Is the falsework to be erected on ground that will not be affected by excavation work during the life of the falsework?

- NO

YES

(j) Is the concrete to be placed in a manner that will not cause shock loads or surges upon the falsework; such as being dropped from a height, rapidly discharged from a ready mixed wagon or which might occur when using some types of concrete pumps?

–NO

YES

(k) Is the total building height to be less than 20m?

- NO

YES

(1) Is the falsework firmly tied to the permanent structure by direct connections and through the stiffness of the decking?

– NO

YES

(m) Will the set concrete be strong enough to support itself when the falsework is struck, without the need for repropping or backpropping?

- NO

YES

Category 1- This Guidance Note may be used

Category 2- A falsework designer should be consulted

**Table 1**

typical solutions, horn proprietary manufactures catalogues or, where the falsework is very simple, are based on the erection teams previous experience of many similar successful schemes.

14 Category 2 falseworks are those with special factors which may require a falsework designer to make technical judgments, carry out calculations and/or prepare drawings or sketches.

15 This guidance only deals with category 1 falsework. Table 1 sets out the conditions which will help to identify whether a falsework is Category 1 or Category 2.

16 Many sites will include both categories of falsework. Falsework contractors must distinguish between areas that are of a different category. Where both categories do occur on one site, there may be an interface problem.

## Preparation

17 Table 2 on page 8 is a guide to the paragraphs concerned with the preparations for work on site. It also provides guidance on the various stages which must be considered to make an orderly start to a contract.

### Control documents

18 Before a falsework scheme is prepared all the available relevant information that may affect the construction and its sequence of loading should be gathered together into three control documents. Typical layouts of such document are shown in Appendices Al, A2 and A3. Appendix Al shows a typical layout of a falsework brief which should be supplied by the main contractor ideally prior to tender. If this document is not available the falsework contractors would need to assemble the information themselves.

19 The falsework contractor should visit the site to gather additional information and prepare a site information and inspection record as shown in Appendix A2. In particular the contractor should examine the condition of the ground, the layout of the site and the progress of other work in the area. Should there be any doubt about the capacity of the ground to carry the weight of the falsework then the contractor must seek advice from the main contractor or a consulting engineer as is most appropriate. Alternatively where the contract allows, the falsework contractor could advise the main contractor of the loads being carried by the falsework standards so that the ground may be prepared by the main contractor to carry these loads. One factor that might affect the load bearing capacity of the ground would be the risk of water flooding the site, causing the soil under the foundation to be washed out or softened. If this is a possible occurance then a falsework designer should be consulted.

20 The exposure of the site and whether unusually high wind or heavy snow loads are possible must be assessed. Where such factors could occur a falsework designer should be employed.

21 During the site inspection the falsework contractor should look for anything that may cause problems in handling equipment and associated plant. Problems could arise from such things as restricted site access, congested working areas or overhead power cables.

22 In areas where there may have been previous workings, the falsework contractor should enquire about the possibility of buried live services, concealed trenches or old unfilled cellars. In certain parts of the country caves or cavities can occur near the surface. These might be expected in limestone, chalk or soft sandstone areas or perhaps where workings for coal, salt, stone or other minerals have taken place near the surface. Where these occur at a site, the falsework should be regarded as Category 2 and a designer consulted.

23 The falsework and main contractor should discuss activities planned for the site but not listed in the falsework brief which may affect the falsework eg, will it carry heavy plant? Are vehicle access ways required through it? What is the programmed erection time for the falsework? Are other works to be carried out near by likely to pose a risk to its stability? What method is proposed for placing the concrete?

### Detailing

24 The following paragraphs give advice on the detailing of falsework schemes using typical solutions for Category 1 falsework.

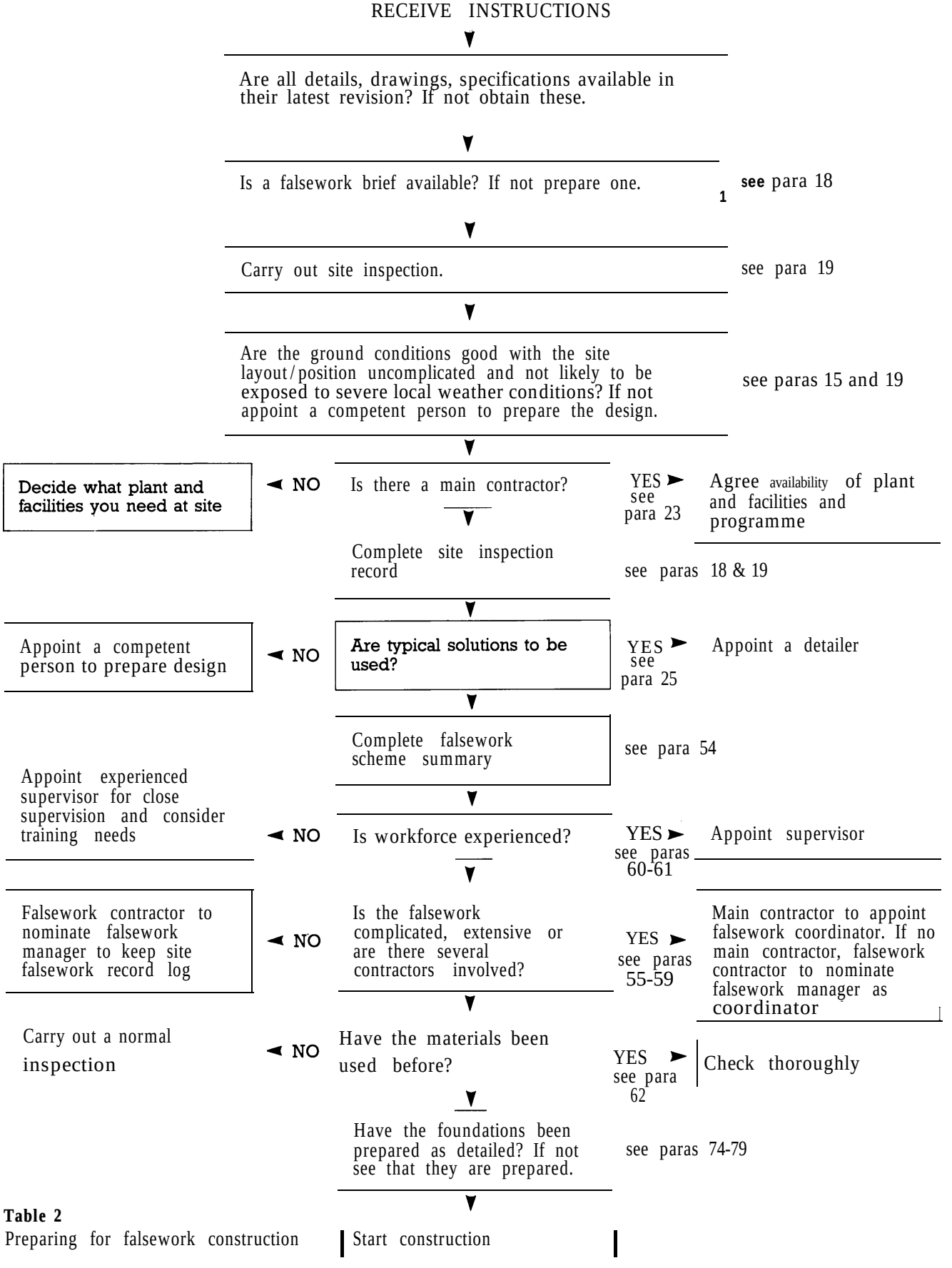



**Table 2**
Preparing for falsework construction

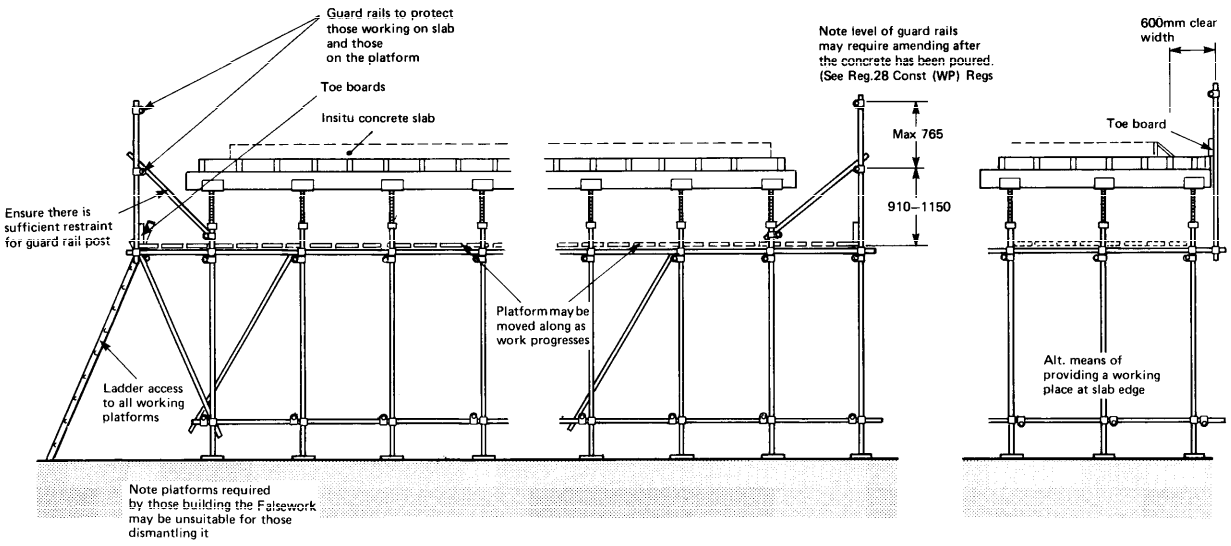



**Fig 1 Areas** where access is required

25 Even though typical solutions are to be used, it is essential for each falsework scheme to be set out formally either in sketches or in other forms of detail for the benefit of the erection team. The details should draw together all the information required for the construction of the falsework. The title falsework detailer describes the person who produces these sketches or details and should therefore be experienced in the type of work being undertaken.

26 The falsework detailer should prepare the details on the basis of the information contained in the falsework brief and the site inspection record.

27 The detailer should not show proprietary materials being used in any other way than that recommended by the suppliers or the manufacturers and should mange for the suppliers' literature to be readily available for those working with it. Any special instructions about the equipment should be included on the site sketches. The detailer should consider the limitations of the proprietary equipment and not extend its use into areas where it is not suitable. When in doubt it is essential to check with the supplier's design department.

28 Drawings, sketches or other details should be given a reference number and dated. If revised they should be given a revision letter and the date of the revision. They should also refer to the sources of the information used in their preparation, such as the falsework brief, site inspection report, drawings, this document or manufacturers' catalogues.

29 The detailer should be aware of the types of materials and equipment that are available for the works.

30 The detailer should note on the information for the falsework erection team, the type of ground conditions assumed to be available to support the falsework, together with any specific ground treatment or preparation necessary to make it suitable to carry the falsework.

31 Proper consideration should be given to providing safe means of access and safe places of work for those erecting and dismantling the falsework. When part of the falsework is being used as a working platform, the detailer should show that a minimum width of 600mm is required. The edges of the platform from which a person could fall more than 2m should be

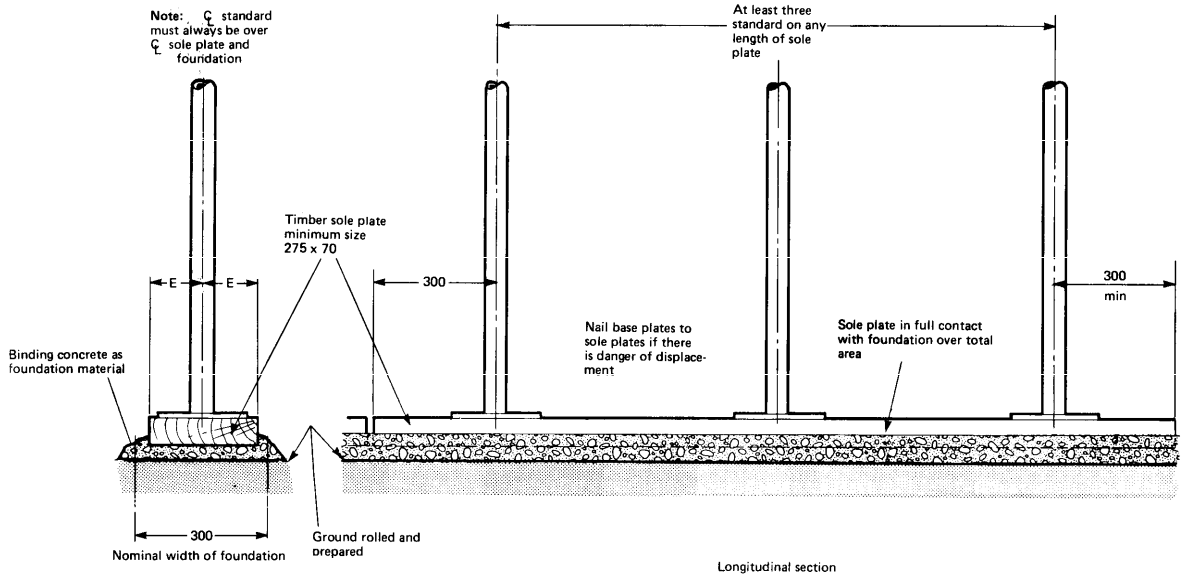

Note: ℄ standard must always be over ℄ sole plate and foundation
At least three standard on any length of sole plate
Timber sole plate minimum size 275 x 70
E
E
300
300 min
Binding concrete as foundation material
Nail base plates to sole plates if there is danger of displacement
Sole plate in full contact with foundation over total area
300
Nominal width of foundation
Ground rolled and prepared
Cross section of typical foundation to standards
Longitudinal section

**Fig 2**

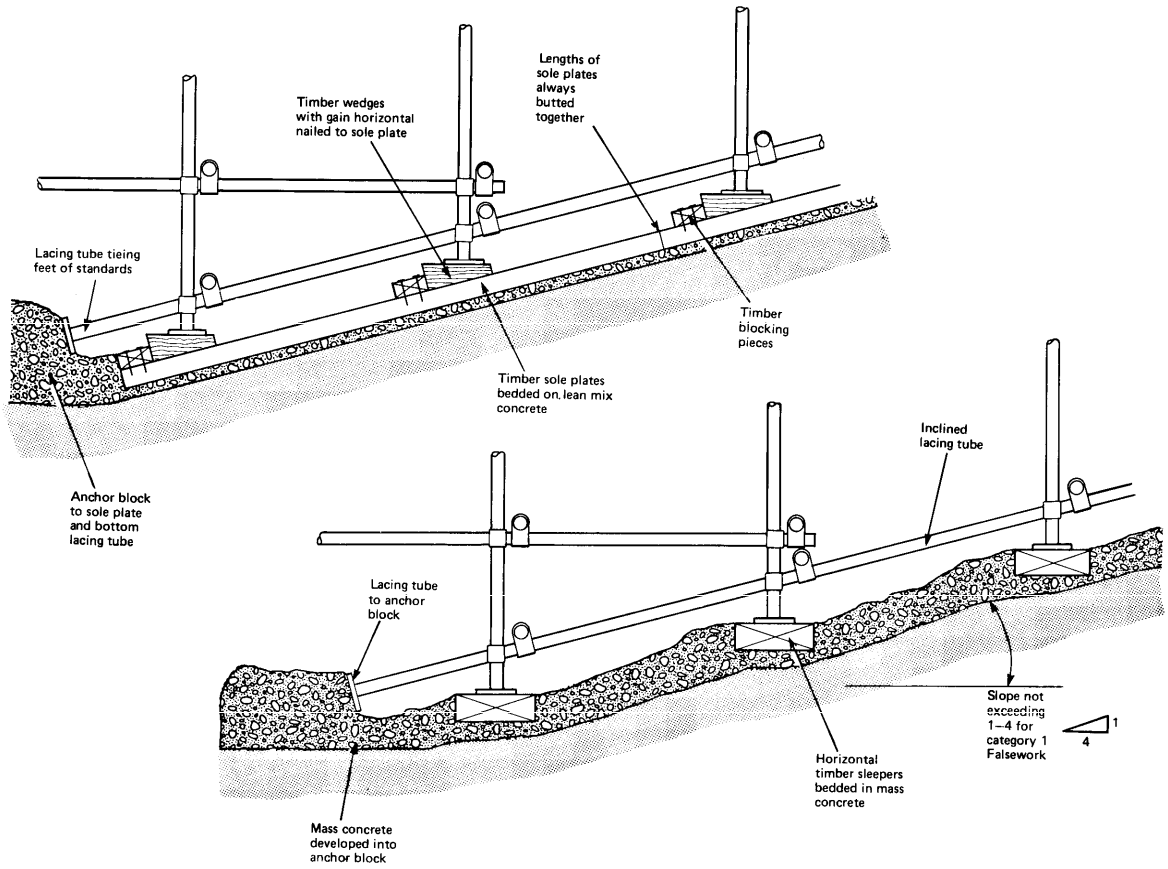

Lengths of sole plates always butted together
Timber wedges with gain horizontal nailed to sole plate
Lacing tube tieing feet of standards
Timber blocking pieces
Timber sole plates bedded on lean mix concrete
Anchor block to sole plate and bottom lacing tube
Inclined lacing tube
Lacing tube to anchor block
Slope not exceeding 1–4 for category 1 Falsework
1
4
Horizontal timber sleepers bedded in mass concrete
Mass concrete developed into anchor block

**Fig 3**

properly guarded with guard rails and toe-boards as set out in the Construction (Working Places) Regulations.

32 The lacing tubes which tie the standards together could act as guard rails if properly located. Where no lacing tubes are provided, temporary guard rails should be detailed. When the formwork decking has been placed and persons are working on it, its edges should be fitted with guard rails and toe-boards. Typical layouts are shown in Fig 1.

33 If any permanent foundations or structures of concrete, brick or steel are to be used to support the falsework, the detailer should enquire whether they have been thoroughly investigated by a suitably qualified person, to ensure that they can safely carry the falsework loads.

34 The table in Appendix B gives advice on the maximum loads suitable for certain types of ground. It should be read in conjunction with the typical solutions shown in Appendices C and D.

35 The detailer should specify that all loose materials, top soil etc, should be removed horn ground which is to support the falsework foundations. Unconsolidated areas should be compacted by a vibrating roller.

36 The detailer should be aware of the danger from water either softening the ground or scouring out the supporting from under the standards. On cohesive soils, standing water could soften the ground, while on non cohesive soils running water or cross flow could cause scour. In either case blinding concrete should be detailed covering the ground together with any necessary cut-off trenches or diversion ditches.

37 Falsework base plates should be detailed to rest on sole plates which in turn should rest on prepared foundations. These will not be required if they rest on permanent works which have been verified to be capable of supporting the loads from the base plate. Foundations for the falsework should normally consist of either lean mix concrete or a crusher run stone aggregate (or stone graded from 18mm down to dust) laid and compacted by rolling in 50-75mm thicknesses. See Fig 2.

38 Where bases have to be located along an inclined surface, tapered timber blocks should be detailed so that the bases are properly seated on the sole plates. Alternatively swivel bases specially designed to carry heavy falsework loads, could be detailed, provided that the detail also shows a suitable method of securing them to the sole plates. Lacing tubes should be detailed at the bottom of the standards to resist any tendency of the bases to slide down the plate. See Fig 3.

39 Where the standards are scaffold tubes whether of ordinary tube or parts of a system scaffold, they should always be detailed as being tied together with other scaffold tubes acting as lacing. As a minimum requirement such lacing tubes should be positioned both near the heads and near the feet of the standards.

40 Adjustable steel props should be detailed with a minimum of a single set of lacing tubes fixed to the inner section of the prop between immediately above the junction with the outer to one third the way up the inner section. However the distance between either the head or the foot of the prop and the lacing tube must not exceed the maximum unsupported length of standard noted in the tables for the typical solutions. No adjustable prop should be detailed at a greater length than 3.Om unless a designer has been consulted. See Fig 4.

41 Care must be taken when detailing standards at the edge of a slab, either where the slab forms the support to the standard or is supported by it. Tolerances should be allowed in the setting out dimensions so that the bearing plate on the standards will not overhang the slab edge losing some of its bearing area. Care should be taken that it will not have to be placed out-of-plumb to pick up the slab edge timbers. Timbers to be placed outside but parallel to the slab edges, should have falsework standards detailed to carry them. See Fig 5.

42 The falsework should be detailed so that it is stable at all stages of construction both during erection and when dismantling. This will usually require each standard to be restrained in at least two directions by lacing tubes which in turn are braced or tied back to the permanent structure.

43 When scaffold tubes are used as braces or lacings in lengths that need joining, the joints

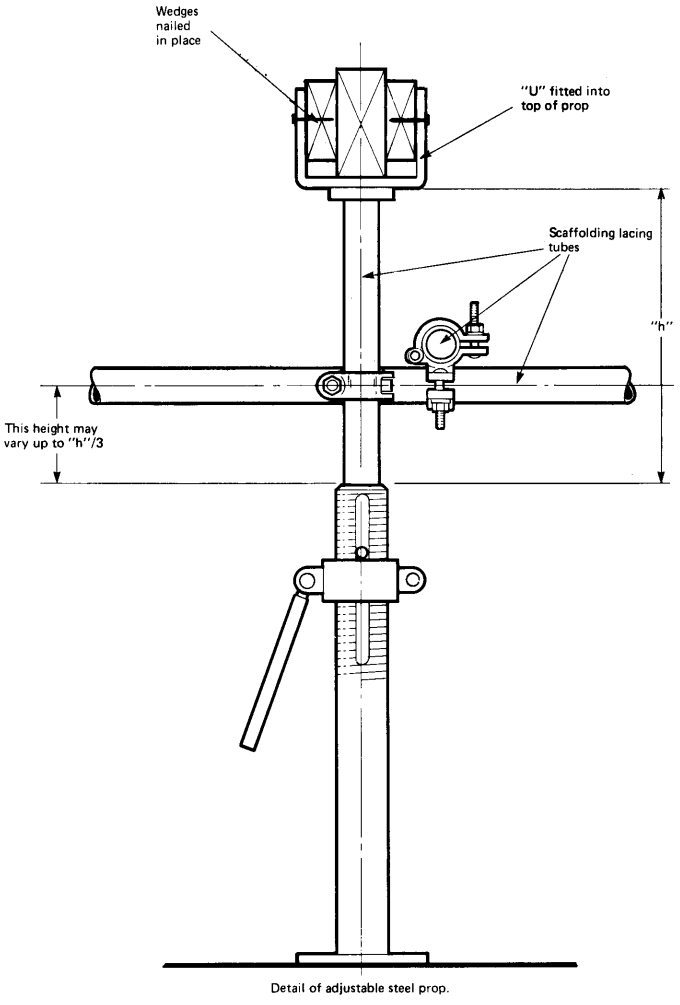



**Fig** 4

must be specified to be staggered amongst the various members. See Fig 6. It is a prudent practice for any joints in the braces or the lacing tubes to be fitted either with splice tubes or lapped, as well as being connected with sleeve couplers.

44 All couplers should be detailed to be right angled or swivel couplers. Where necessary the actual model of the coupler may be specified.

45 Where the standards are longer than the maximum unsupported height indicated in Appendices C and D, they should be detailed so that they are tied together by a sufficient number of properly braced lacing tubes, at vertical centres not exceeding the maximum height noted. This arrangement is shown on the sketches for the typical solutions. In no cases should standards made of different materials, such as steel and aluminium, be used in the same falsework.

46 In a birdcage falsework, bracing tubes should normally be fitted at no greater intervals than every sixth leg and extend the full height of the falsework. No brace should be set at an angle greater than 70° or less than 30° to the horizontal. If the lacing tubes can be rigidly tied to a part of the permanent structure this may be assumed to be an effective line of bracing. See Fig 6.

47 Most base or head jacks should be detailed to extend by not more than 250mm, unless they are of a specific manufacture having known load bearing capacities at greater extensions. See Fig 7. Those with pillars whose diameter is less than 25mm should only be extended 150mm before being braced. Where greater extensions cannot be avoided the jack should be braced in two directions. See Fig 8.

48 Lacing tubes should be detailed to be fitted within a specified distance from the base plate or bearing surface of the head jack. In no case should this distance exceed a quarter of the maximum unsupported height of the standard as described by the typical solutions.

49 Where the permanent structure is to be used to provide anchorage for ties or braces the detailer should ensure a check has been made of its ability to safely absorb any forces that may arise.

50 Falsework should be detailed so that the instability of one member will not cause adjacent ones to become unstable and lead to their overturning. Members with a depth to width ratio greater than 3.0 require restraint to prevent overturning. The width used in calculating the ratio should be the width of the units bearing where this is narower than the width of the unit itself. Care should be taken when detailing how the ends of these restraints should be secured, to ensure that they do not simply pass on an overturning tendency to adjacent members that might cause these also to overturn. See Figs 9 and 10.

51 Instability might also occur as a framework is constructed. The detailer should be aware that a

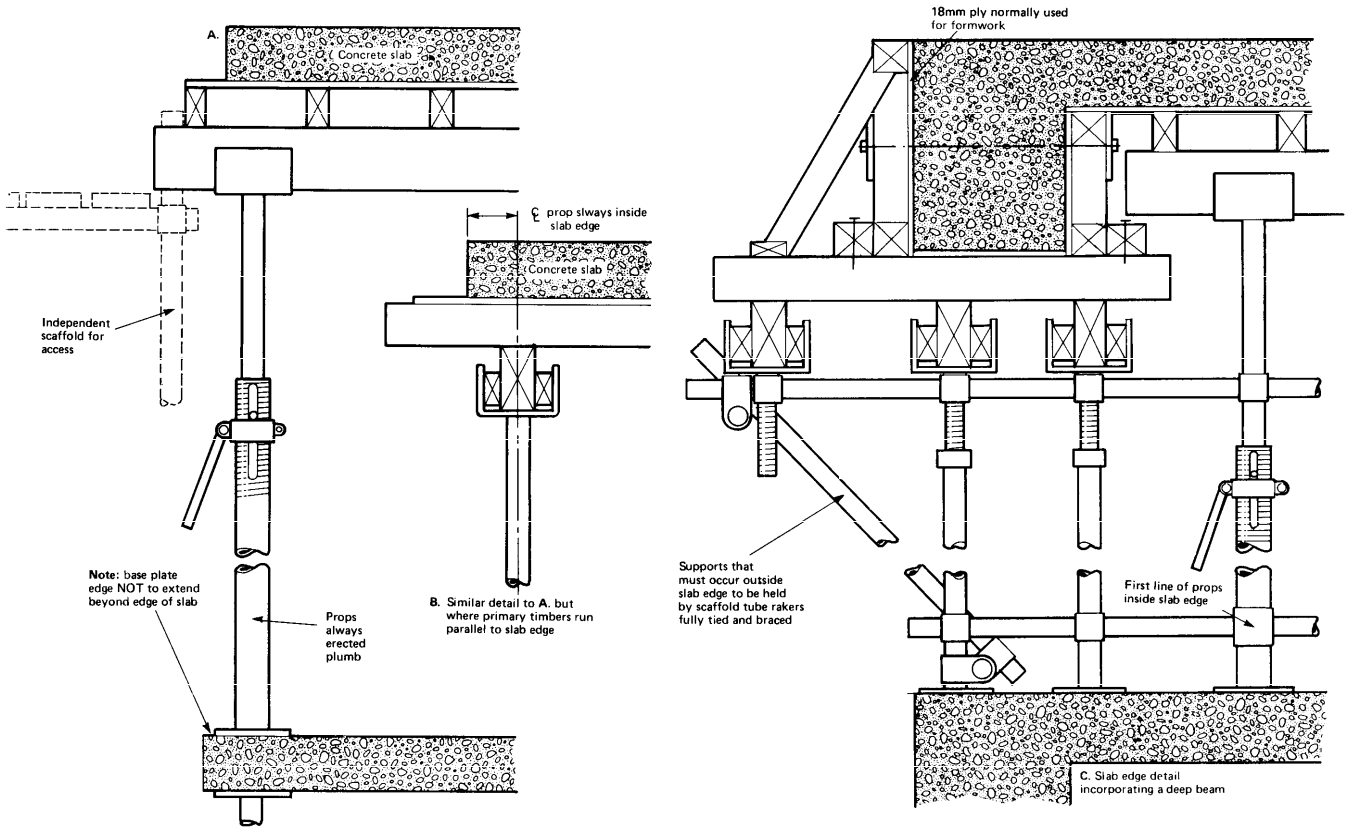



**Fig** 5 Use of props at slab edge (lacing tubes omitted for clarity)

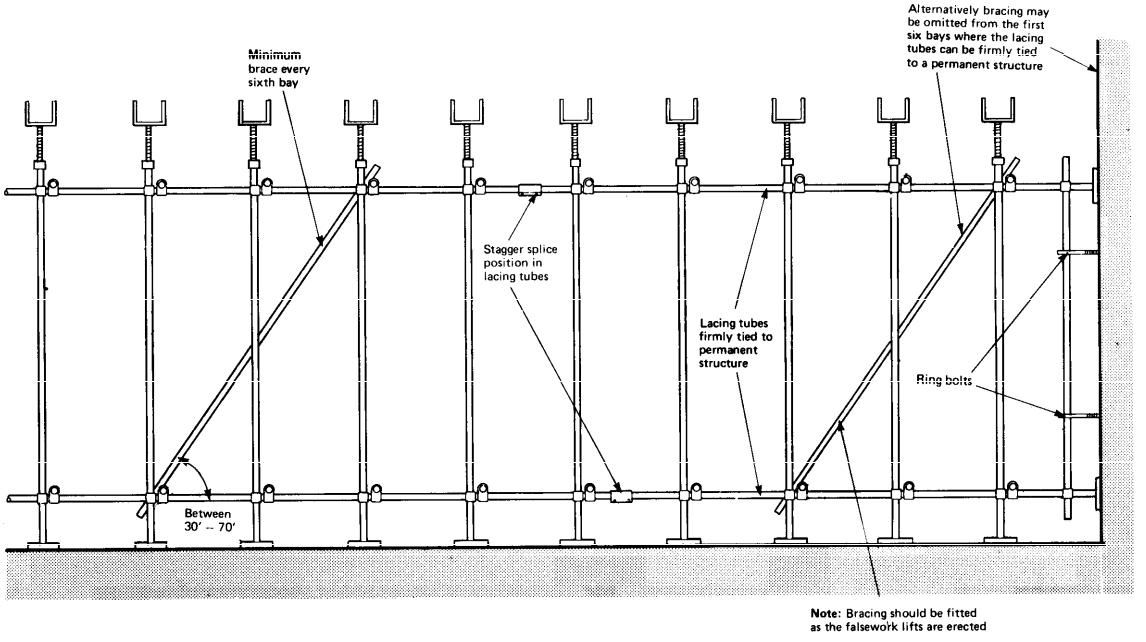



**Fig 6**

**Fig 7** Detail of extension allowable at jack heads

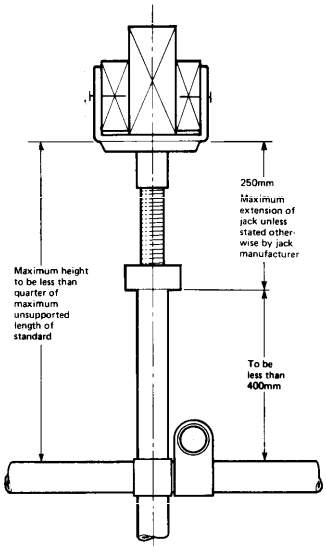
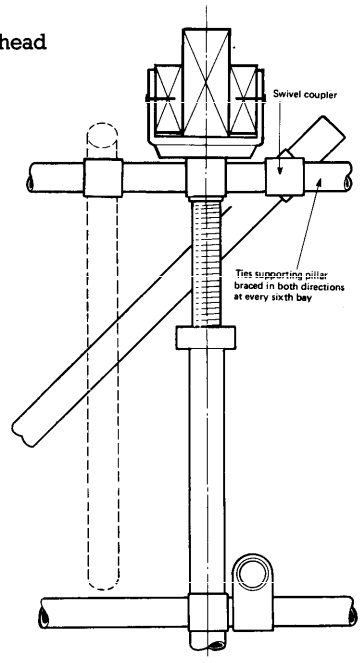



**Fig 8** Bracing to jackhead



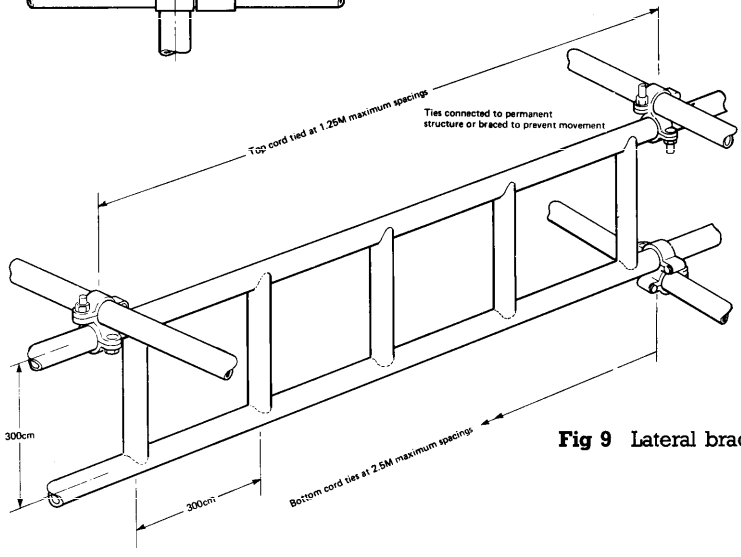




**Fig 9** Lateral bracing to deep slender beams

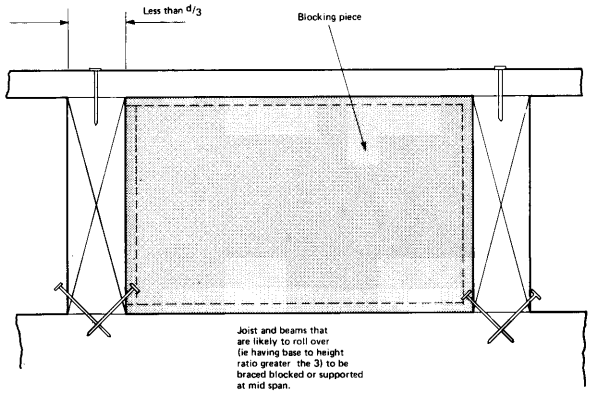



**Fig 10a**

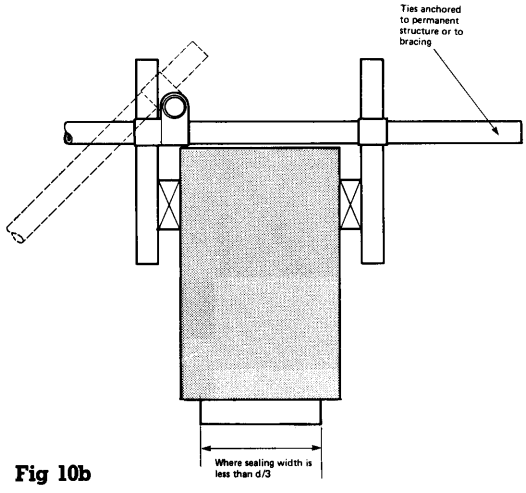



**Fig 10b**

high slender structure could be overturned if not given lateral support as it is constructed. This is a particular concern where temporary eccentric loads may be applied or cantilever access brackets used before the full dead weights are applied to make the falsework stable.

52 When several levels of concrete slabs are being cast propping may be required to support the floors which are to carry the erected falsework in some circumstances. However, such factors as the sequence of building the falsework, the loads on this, the age and strength of the supporting suspended slabs and the positions of the props themselves could cause the backprops to have detrimental effects on the completed parts of the permanent structure. Therefore a designer should be consulted for approval of any back propping proposals.

53 The detailer should also consider methods by which the falsework may be dismantled and where necessary include details to facilitate this in the design.

54 After completing the falsework details, the detailer should sketch and summarise the falsework scheme. A suitable form for the falsework scheme summary is shown in Appendix A3. This summary should be checked to see if a Category 1 falsework is still suitable. The falsework brief, the site inspection record, and the falsework scheme summary should be distributed to all who need the information.

## Co-ordination

55 A person should be nominated to co-ordinate the various aspects of building the falsework. The main contractor should normally nominate the co-ordinator as described in BS 5975, especially on sites where there is more than one contractor involved with the falsework construction. The co-ordinator should carry out the duties listed in paragraph 59.

56 On smaller sites the duties listed in paragraph 59 should still be carried out but the nominated person could be the falsework contractors site supervisor who may perform this function simply be keeping a record log in the site office. The record log would note the instructions the site was working to, any revisions to the original scheme and the authority sanctioning those revisions. The log would also record who checked the falsework and on whose decision it was loaded, dismantled or backpropped. Such a system would be reliable only where the falsework scheme was straightforward and where few persons were involved.

57 The nominated person should have had experience of constructing falsework and have been instructed in the duties described in the following two paragraphs, and in section 10.2 of BS 5975. Whenever possible nominated persons should be trained before taking up their posts on site.

58 The nominated persons role is to ensure that everyone concerned with the falsework is working to the same information, that before it is loaded it has been properly completed and has been thoroughly checked. It is essential that all site proposals for changes in the design, construction or loading of the falsework are made through the nominated person to those who detailed or designed it. Time must be allowed for all parties to consider the proposals and respond. Replies or amendments from the detailer should then be fed back through the nominated person. Where sites are large or where there are a number of contractors involved in the construction, all the information should be passed on by written instructions.

59 The primary functions of the nominated person are to ensure that:

(a) all concerned with the construction of the falsework are made aware of the up-to-date factors affecting it;

(b) all are working to the most up-to-date drawings and that these are consistent with the detailers' or the falsework designers' instructions;

(c) the falsework details have been checked by a second person;

(d) all are working with the same programme towards the same loading time and date;

(e) the interface areas between different parts of the falsework structures, different contractors, or different categories of

falsework, have been fully considered and detailed or specified;

(f) any alterations in construction materials or methods have been agreed by the detailer and others concerned;

(g) the erected falsework has been checked before loading;

(h) loading permits are issued;

(i) permits for the dismantling of the falsework are given;

(j) records about the falsework construction are kept including any decisions that altered its size or layout;

(k) the load on the falsework is not likely to be affected by any variations made in the layout of the permanent structure, since the falsework design was completed.

## Site supervision

60 The erection and dismantling of the falsework should be carried out by a team who are either experienced and familiar with the equipment or who are instructed and closely supervised. Adequate training must be provided for all the workforce especially when an unfamiliar falsework system is to be used.

61 The person supervising the erection and dismantling, must be competent having previous experience of this type of work. This person should be available on site at all times or when significant parts of the construction process are in hand. The falsework contractor's site supervisor should be supplied with all the relevant information concerning the equipment on site, so that this may be safely used.

## Materials on site

62 Most falseworks are constructed from materials or equipment which have been used previously. Therefore it is important that these should be carefully examined before each use to ensure they are of a suitable quality and condition. A checklist for such an examination is given in Table 3.

63 The falsework contractor must use identical material and equipment to that specified in the details and in the manner shown. Should the materials or equipment be unavailable no substitution should be made without the agreement of the detailer who should be given precise information about the proposed replacement items. When considering any such request the detailer may have to seek further advice horn a designer about the proposed substitute parts.

64 When not in use all equipment should be neatly and carefully stacked on pallets or bearers with timber battens between any tiers. It is also important that the items should be handled carefully to prevent undue damage, and not thrown to the ground or tipped into heaps.

65 Each time equipment is erected it should be given a visual check to see that it is undamaged. Any defective items should be immediately removed to an area designated for damaged equipment.

66 Site management should not overlook the possibility of defective equipment or material other than that specified being delivered to site. Therefore all materials should be checked before use, whether or not they are new or claimed to have been refurbished. New materials should be given a nominal visual inspection, while used material should be checked by a thorough visual examination of a proportion of the components and a visual inspection of the remainder to see that they appear to be of the same quality.

### Timber materials

67 Timber products should be checked for overall soundness to discover rot, splits damage and whether any part has been reduced in size by burning, notching, splits or by holes being drilled or cut through it. Preformed members with nailed, butted and glued joints should be examined to see if they are still sound. Timber products which will be exposed to severe conditions for a long period, should be considered for treatment by preservatives. Plywood should be of an external quality and where intended for use in a typical solution, should be at least 18mm thick. Structural timber members should be at least of grade SC3 material. Further information on the visual inspection of timber to check if it is of this grade

Checklist for the site inspection of used equipment

(a) The equipment when delivered should be a complete system for its designed use;

(b) where the materials are delivered from different sources and/or of different manufacture, they should be cheked to ensure they are compatable;

(c) items of proprietary equipment should be checked to see that they are in a condition suitable for the work;

(d) where necessary prior to delivery the equipment should have been grit blasted to remove old concrete or mortar to allow any welds to be properly inspected;

(e) units should have been checked for overall straightness and that they are true to shape. Any bearing plate, box or tubular members with noticeable bends, buckling or dents, should not be included in the delivery;

(f) welded connections should be sound particularly those around any fittings which are intended to support the weight of the unit;

(g) bracing members which are part of individual units should be intact with their end properly fastened into the member as in the original specification;

(h) where units have been repaired, they should be to a standard equal to the other units in the delivery batch. Rewelded areas should be checked for excessive weld metal that might prevent the use of the member or be a hazardto those handling it. Where this is so then the weld should be smoothed off;

(i) all moving parts on the units should be checked for ease of movement. Screw adjustments should be able to operate along their full thread and telescoping movements should be unhindered. In addition all moving parts should be properly oiled;

(j) units should have adhesive labels giving information about fixing and loading where this would be normal for a similar new item. Where such labels are worn and difficult to read, new ones should be fixed;

(k) it is a legal requirement that all necessary instructions are ready available for proprietary systems including information about the safe methods of erection, stacking and handling, limits of use and safe working loads, with full translation of any instructions not written in the English language.

**Table 3**

may be obtained in the TRADA leaflet 'Simplified rules for the inspection of secondhand timber for load bearing use'.

Steel or iron products

68 Steel or iron products should be checked to see whether their cross section has been markedly reduced by corrosion. If so, they should not be used until it has been confirmed by an engineer or designer that they still have a sufficient reserve of strength. Sections that have been bent, buckled, welded or drilled for bolt or service holes may have had their strength characteristics seriously affected and should not be used until expert advice has been sought.

Miscellaneous materials

69 Alloy members should be checked for significant pitting and galvanic corrosion.

70 Fibre glass or plastic units should be checked for damage that may have weakened their edges and reduced the bearing area.

Proprietary items

71 The falsework contractor should ensure that hired equipment is suitable for the purposes intended, and is safe to handle and use. The suppliers should have given any information necessary to identify the various components, and where appropriate the correct method of erection and dismantling. Any factors that might limit the safe use of the equipment should have been clearly stated.

72 Framed units and proprietary items, such as adjustable steel props and centres, must be examined, be in good condition and be reasonably clean. Items such as high tensile bearing pins should only be replaced by identically sized high tensile components. Welds must be thoroughly checked especially those supporting cantilever arms whose failure would cause a sudden and dangerous collapse. Moving parts should be oiled and checked to see they operate fleely. Bent members in times should be replaced if they are more than a quarter of the thickness of the member out of line. Buckled end bearing or base plates should be replaced, bearing end plates on flooring centres should be complete and flat. When items cannot be cleaned or repaired to a satisfactory standard on site, they should be sent back to the. depot.

73 Proprietary units of different manufacture should not be mixed in the same area of work unless the suppliers have agreed that they are comparable.

## Erection

**Foundations and setting out**

74 The details, sketches or drawings showing the layout of the falsework should state the assumed ground conditions and the erection supervisor should check if these assumptions are still valid.

75 All top soil, loose fill and other unsuitable material should be removed from the ground area intended as the site for the falsework.

76 The foundation should be set out carefully in accordance with the details. Time and effort spent on thorough and careful preparation at foundation level will in most cases, produce an overall saving in time. It will also help to ensure both the continuing stability and the safe erection of the falsework structure.

77 Sole plates to support the falsework standards should be accurately laid out on the foundations both to line and spacing. Wherever possible the sole plates should be laid horizontally. In certain cases, depending on the type of falsework being used, it may be necessary to control the relationship of the level of one sole plates with another. Where the sole plates are laid up an inclined surface, each length of plate should be fully butted against the next in any particular run, and the lower end of the run should fully rest against some form of anchor block to ensure that slipping cannot occur. In all cases, the sole plates should be fully bedded into their foundations. See Fig 3. Where the incline exceeds 1 in 4 as indicated in Fig 3, the falsework should be regarded as Category 2.

78 Base jacks or plates supportiing the falsework standards should be set out along the centre line of the sole plates. Where the falsework framework is relatively light and might be easily displaced, then the base plates should be nailed

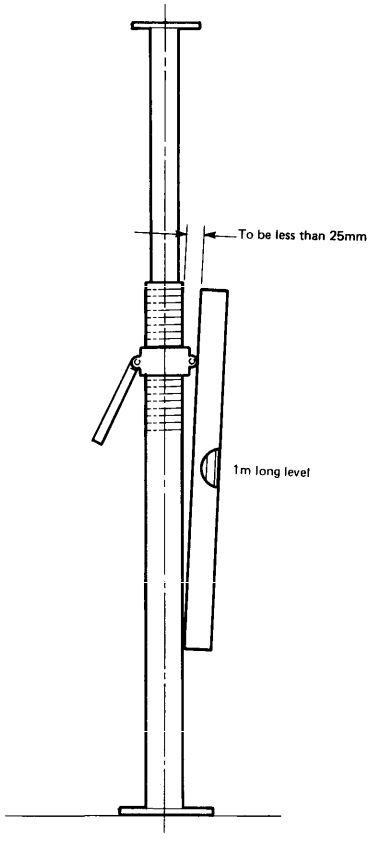



Fig 11

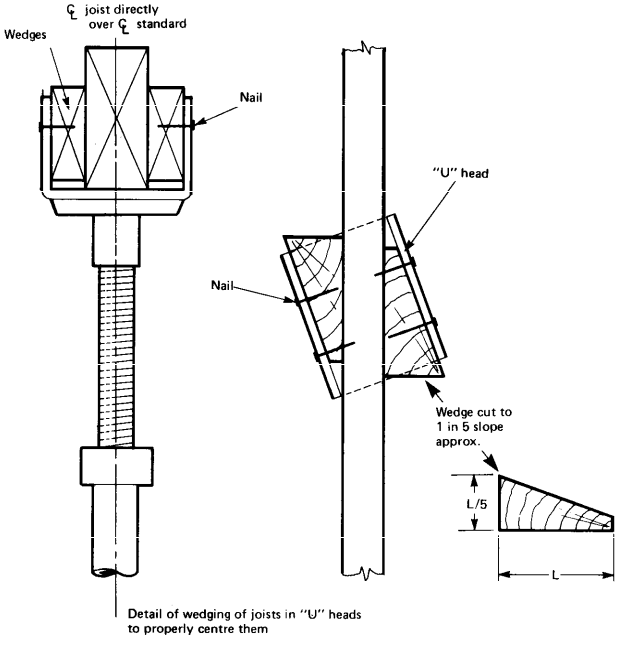



Fig 12

to the sole plates. See Fig 2. Final tightening of the base jacks should only take place after the bracing to the falsework has been fitted.

79 When tapered blocks are being used to give a full bearing to base plates resting on inclined sole plates these should be firmly nailed to the sole plates. They should be cut from sound timber and carefully shaped to match the inclination of the sole plate. The grain in the block should be arranged to be in line with the base plate, ie horizontal.

The framework

80 The standards should be carefully erected to be vertical, and any rakers inclined at the angle specified by the detailer. If they have been properly set out then simply sighting along the rows will show any that significantly deviate horn line or verticality.

81 All horizontal lacing members must be fitted to the standards at the specified heights using right angled couplers. All types of vertical members suffer a reduction of load carrying ability if used in unsupported lengths greater than specified.

82 Every attempt should be made to erect scaffold standards and adjustable props vertically within the tolerance shown in Fig 11.

83 It is most important that loads are placed on the standards directly over or equally about their centrelines, and these loads are then passed onto the foundations through their centre within detailed tolerances. Failure to do this will result in the standards having a reduced load carrying capacity. For this reason bearers and joists held in forkheads on the standards should be carefully wedged to hold them centrally with the wedges tightly driven home and nailed. See Fig 12. Normally when timber joists are placed lapped to give continuous runs, no single lengths of timber can be used over more than three standards while still maintaining concentric loading on these.

84 Where forkheads are not being used and joists are supported on flat end plates they should be either nailed through the holes provided in the plates or secured in some other way to ensure they always remain central over the

standard and have adequate restraint to prevent the joist rolling off the prop head. This could be done by framing the joists together as if in a panel.

85 Edges of completed falsework from which a person might fall more than 2.00m, should be guarded by handrails and toeboards, except where work is being carried out from or at those edges. See Fig 1.

86 When sections of the falsework are left temporarily incomplete they might still be used by others as a means of access or as a working place. Warning notices should therefore be fixed to them stating they are unsafe.

**Checking**

87 A checklist for Category 1 falsework is shown in the leaflet which is a companion to this Guidance Note.

88 All falseworks should be carefully checked during their construction and have a thorough final check prior to being loaded. The contractor should bear in mind that if a falsework is not checked during construction, rectification of early errors found by a final check could be difficult or impossible to achieve without dismantling.

89 It would be beneficial if the final check was earned out by some experienced person unconnected with those who constructed the falsework, as their fresh observations may pick up errors unnoticed by the erection team. After final checking using a formal checklist, some form of written permit to load should be issued even if this only consists of a note in the site diary.

90 After casting suspended slabs it is important not to load them with heavy materials or equipment, such as brick packs etc other than those described in the falsework brief, until the concrete has gained sufficient strength.

## Dismantling

91 The sequence of dismantling should be as noted by the detailer or as required by the permanent works engineer.

92 Care should be taken to ensure that the falsework structure remains stable at all times during dismantling. Where the falsework could become unstable because of the nature of its construction and sequence of dismantling, temporary guy ropes or raking struts should be fitted to adequately secure it.

93 When decking is being struck, sentries or warning notices should be posted to keep persons clear of areas where formwork materials may fall. Formwork and falsework should be carefully dismantled and not stripped by removing lower members to produce a sudden collapse.

94 Striking should be carried out in accordance with a pre-planned sequence which has been agreed with the detailer, and agreed with the permanent works designer. Where decking units incorporate “quick strike” facilities, the person striking the units should note that the decking correctly drops into the secondary resting position at each pillar before striking the next in the planned striking sequence.

95 Thought should be given to the means of access and places of work required during the dismantling process. In some cases they will be different from those required during the erection of the falsework. For instance, during erection material may be placed horn above but during dismantling will have to be stripped out from below.

## Appendix A Suggested layout of control documents

This appendix contains examples of documents that should be used to bring together the information about the falsework. They have been designed for the specific situation where a main contractor is employing a falsework sub-contractor. Complete sets of the documents should be issued to those who requested the falsework, those directing its construction, the co-ordinator, and any contractors working with the falsework (eg, main contractor steel erectors, concretors, formwork contractors).

Falsework brief

*Information to be given to the falsework contractor*

*General*

1 Estimate or contract no.

2 Name of main contractor

3 Address of site

4 Name, address and telephone no of consulting engineer / architect :

5 Section of site where the falsework is required
(Give levels and grid references as appropriate).

6 Description of the work to be carried out and the limits of the falsework contractors work area and responsibilities :

(Specify the point of the construction where falsework contractor is to start work, what is to be prepared beforehand, and what work, if any, is to be undertaken by others, eg ground made ready by main contractor and waffle formers laid by formwork contractor).

7 List of permanent work drawings issued to falsework Contractor with schedule of drawing numbers and revision number :

8 Other load such as heavy plant that could be placed on the falsework, apart from the permanent structure shown on the drawings :

9 List of plant and equipment the main contractor will make available to the falsework contractor by mutual agreement :

10 Details of any openings, clearances etc required through the falsework :

11 Programmed erection dates and finish dates :

12 Preferred concreting sequence :

13 Any other information :

*Note* Some of this information may not be available at the time of awarding the falsework contract. In such cases the brief should indicate if the information will become available at the site inspection stage (see Appendix A2), when the main contractor could be on site.

**Site information and inspection record**

To be completed by the falsework contractor (any soil survey reports should also be noted together with information from trial pits where these have been dug).

1 Nature of the ground on which the falsework is to stand (check that there is no marked variation with the information given in the falsework brief).

2 Liability to flooding, proximity of water courses and ditches.

3 Location of old workings, trenches cellars etc.

4 Access to site, will this restrict the type of vehicles using it? (eg perhaps because of loading, width, overhead power lines or nature of the environment?).

5 Requirements of cranes or other plant to cover the working area. (Confirm who will supply this).

6 Exposure of site (note possible excessive wind loads) or other environmental factors:

7 Any other information

Falsework scheme summary

To be completed by the falsework detailer as a summary of the scheme prepared.

1 Location of the section of falsework detailed:

2 Vertical loading

(a) from permanent structure

(b) from any plant and equipment

(c) from construction loads

(d) Allowance for self weight of falsework/formwork

*3* Method and rate of pouring the concrete

4 Category of falsework (ie 1 or 2 as para 15 of the GN).

5 If Category 2- Name of designer.

6 Description of the foundations.

7 Type of falsework system to be used including spacing and height of standards.

8 Maximum load estimated to be on each standard.

9 What formwork system has been assumed.

10 Drawing numbers sketches and specifications prepared by the detailer.

*To be completed by the falsework contractor (in conjunction with the detailer)*

11 Experience of workforce necessay for the proposed system - Note of any training that is proposed before the falsework is constructed.

12 Degree of supervision required.

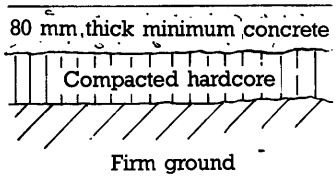
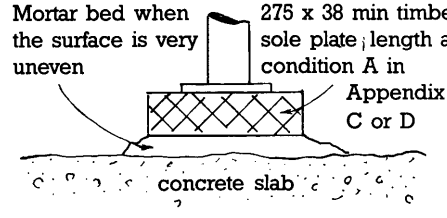
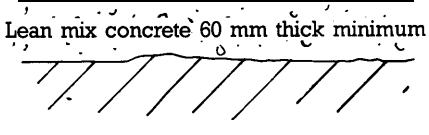
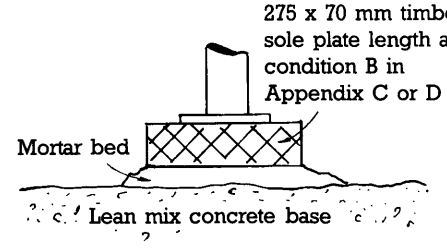
13 Name, address and telephone numbers of detailer.

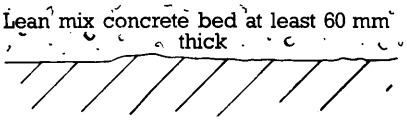
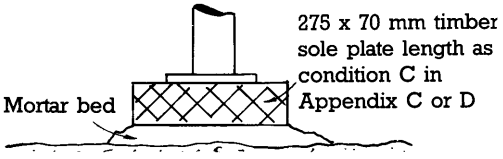
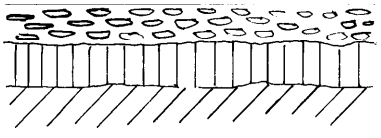
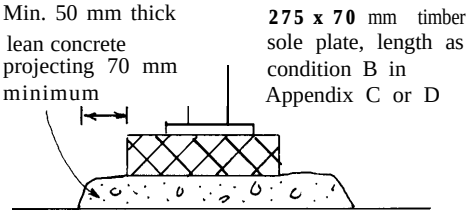
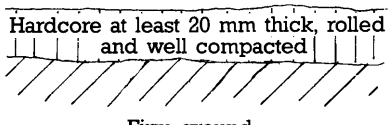
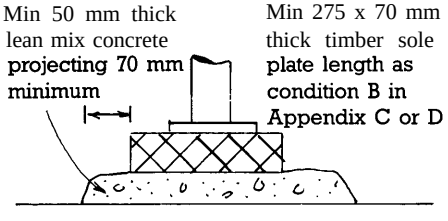
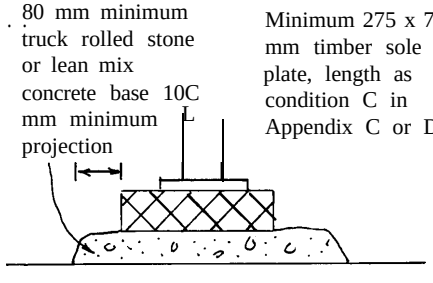
14 Name, address and telephone number of designer if employed.

15 Name, address and telephone number of nominated a co-ordinator. (If it is not proposed to nominate a co-ordinator explain how the function is to be carried out).

# Appendix B Suggested foundation details to suit various ground conditions

This appendix gives advice on how a foundation for a standard should be built off various ground/support conditions. It only covers the more reliable types of condition and if a contractor is expected to build the falsework on other conditions then a designer should be consulted. It is intended that the Appendix should be read in conjunction with Appendix C or D and therefore the references to conditions A, B and C referred to below, are further described in those appendices. In producing this Appendix it was assumed that ground condition A could support at least 5000 kg/m$^2$, condition B at least 2500 kg/m$^2$ and condition C, 1200 kg/m$^2$.

| *Ground/support conditions* | *Actions to be taken* | *Foundation details* |
|---|---|---|
| (a) Existing structures or foundations. | Submit the proposed layout and loadings on the standards to the consulting engineer and obtain confirmation that these loads can be carried. | Use timber sole plates if required by main contractor who should specify their minimum length. |
| (b) New foundations or structures. | Submit proposals as above to main contractor or the consulting engineer and obtain confirmation that loads can be carried. | Use timber sole plates if required by main contractor who should specify their minimum length. |
| (c)   | Submit falsework load and layout to the main contractor.<br>Detail the foundation for the falsework erectors. | Use timber sole plates if required by main contractor who should specify their minimum length.<br>   |
| (d)   Stiff clays or well compacted sands or gravels | Submit falsework loads and layout to the main contractor and request details of the required foundation.<br>OR<br>Detail the foundation for the falsework erectors.<br>Note: At least three standards to be supported off each length of sole plate | Build to the contractor detail which should specify their minimum length.<br>   |

| *Ground/support conditions* | *Actions to be taken* | *Foundation details* |
|---|---|---|
| **(e)** **truck**<br>  <br><br>Firm clays or reasonably well consolidated sands or gravels | Submit falsework loads and layout to the main contractor and request details for the foundation<br><br>OR<br><br>Detail the foundation for the falsework electors.<br><br>Note: At least three standards to be supported off each length of sole date | Build to the contractor detail which should specify the length of the sole plates.<br><br>  <br> |
| *(f)*<br>Tarmac on rolled hardcore, total thickness at least 200 mm<br>  <br>Firm ground | Submit falsework loads and layout to the main contractor and request details for the foundation.<br><br>OR<br><br>Detail the foundations for the falsework erectors after first checking the area is sound.<br><br>Note: At least three standards are to be supported off each sole plate | Build to the contractors details which should specify the length of the sole plates.<br><br>  <br> |
| **(9)**<br>  <br><br>Firm ground | Submit falsework loads and layout to the main-contractor and request details for the foundation<br><br>OR<br><br>Detail the foundation for the falsework erectors after first checking the area is sound.<br><br>Note: At least three standards to be supported off each length of sole plate | Build to the contractors details which should supply the length of the sole plates.<br><br>  <br> |
| (h) Hard firm ground of stiff clay or well compacted sands or gravels. | Submit falsework loads and layouts to the main contractor and request details of the foundation.<br><br>OR<br><br>Detail the foundation for the falsework . . . . . erectors after first checking the area is sound.<br><br>Note: At least three standards are to be supported off each length of sole plate | Build to the contractors detail which should specify the minimum length of sole plates.<br><br>  <br> |

Where the ground does not appear to reach the quality indicated in this table or where there is any difficulty in compacting it because of the soft nature of the ground experienced advice must be obtained. Such advice should also be obtained if the ground could be adversely affected by water or by freezing.

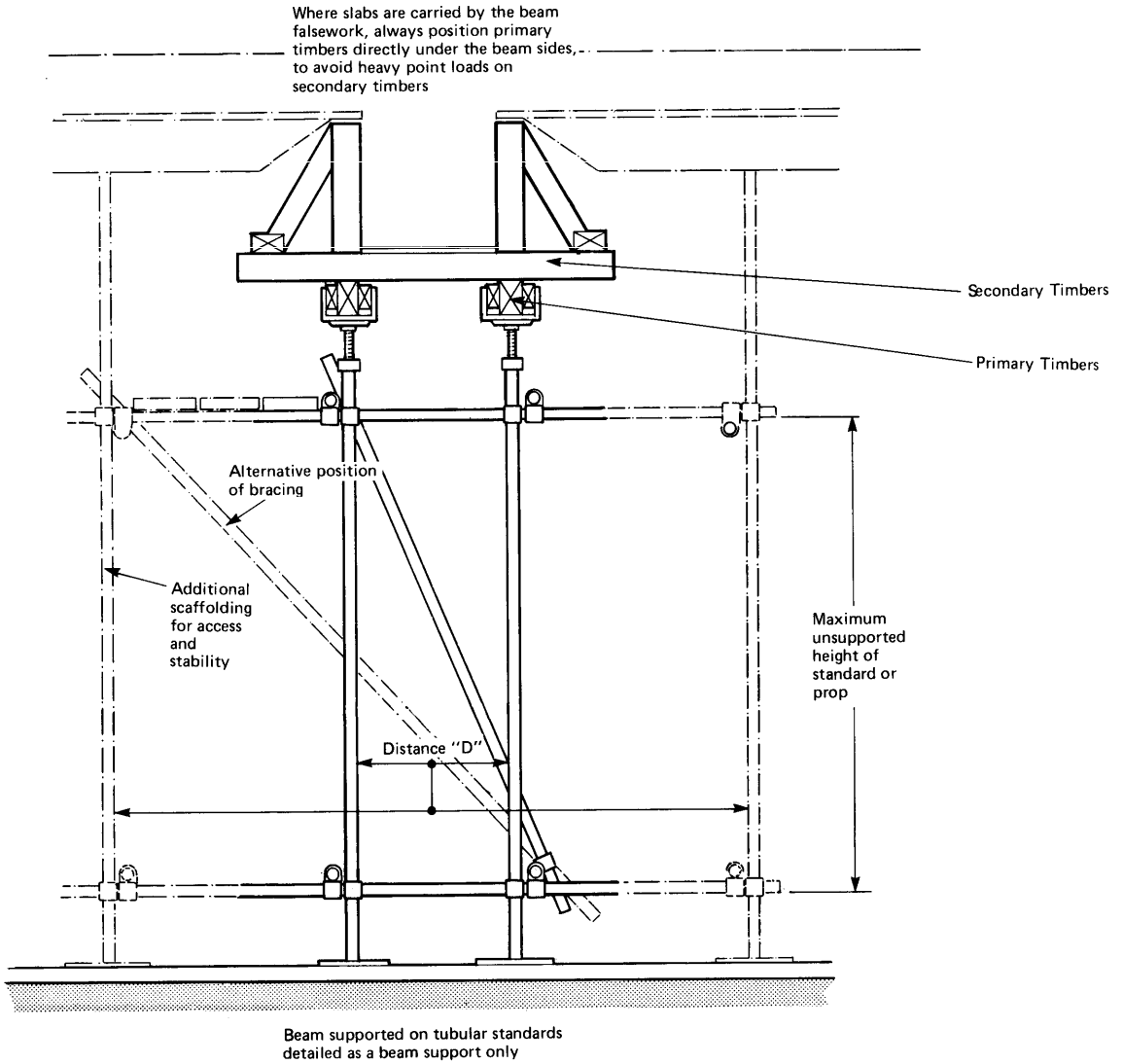
## Appendix C Typical solutions for falseworks to support in situ concrete beams

This Appendix gives some typical solutions for falseworks that are intended to carry insitu concrete beams up to l.Om deep either when they are individual units or where the beam falsework also supports an area of suspended floor slab.

The solutions are based on one general layout for the falsework. The sizes of the members vary according to the load to be carried, the type of materials to be used, and the height of the falsework up to a maximum height of 3.Om at the forkhead, as shown in the tables. In addition information is given that allows some variation in the size of the foundation detail supporting the falsework standards, depending on the type of ground as listed in Appendix B. Finally, worked examples are given showing how to use the tables.

It is stressed that the information given in the general layout for the typical solution, the design tables, the worked examples and in Appendix B are all inter-related. No details purporting to be a typical solution should be prepared which only uses parts of the information in the Appendix, perhaps blending this with other sources of information, without first getting advice from a falsework designer. Detailers must similarly work only within the range of loads and typical examples shown in the tables, unless a designer advises that it is safe to do otherwise.

General arrangement of falsework for the support of insitu concrete beams. This detail to be read in conjunction with the table and worked example on the on the following pages



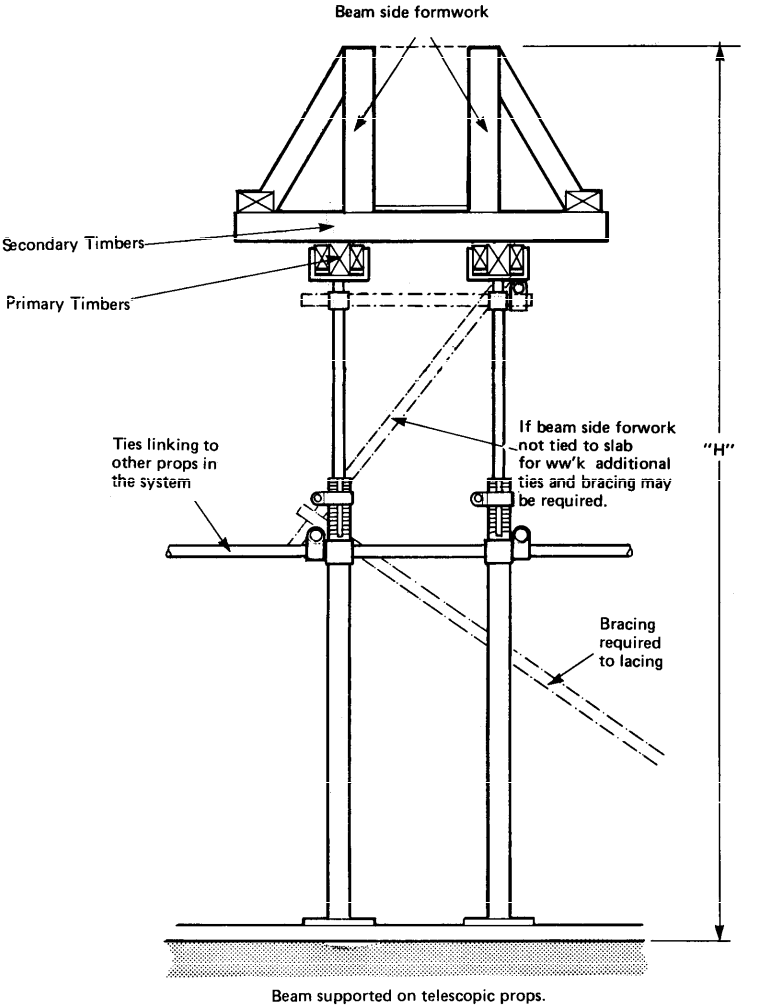

NOTES

1 The detail has been produced on the assumption that 18 mm thick, exterior quality plywood will be used to support the beam soffite.

2 Either scaffold tube, proprietary tube or telescopic prop may be used for the standards, except that as noted on the Table, props should not be detailed as Category 1 falsework for the heaviest loaded examples.

3 The Tables and details assume that only good quality structural timbers will be used to support the concrete.

4 It is assumed that the falsework will only be expected to carry the concrete load for less than four weeks. If a longer time is anticipated then the falsework is Category 2.




Beam supported on telescopic props. detailed as part of a birdcage type support system

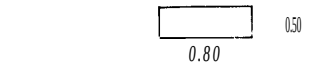
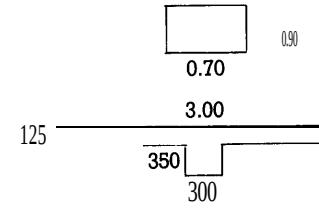
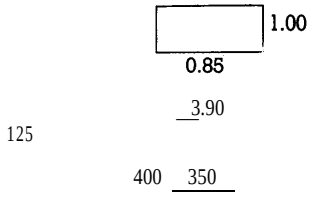
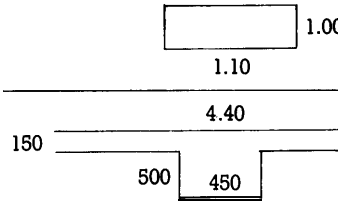
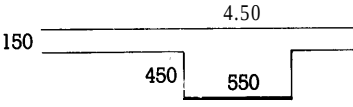
**5** The width of the falsework and scaffold frame supporting the insitu beam D must be at least $\frac{H}{3}$.

**6** Where the Table says that the minimum sole plate length is NA, this means not applicable and the falsework is Category 2.

**7** Timbers assumed to be simply supported. Secondary timbers are to be nailed to the beam soffite plywood.

**8** NA in Tables means that the case is not applicable for Category 1 falsework.

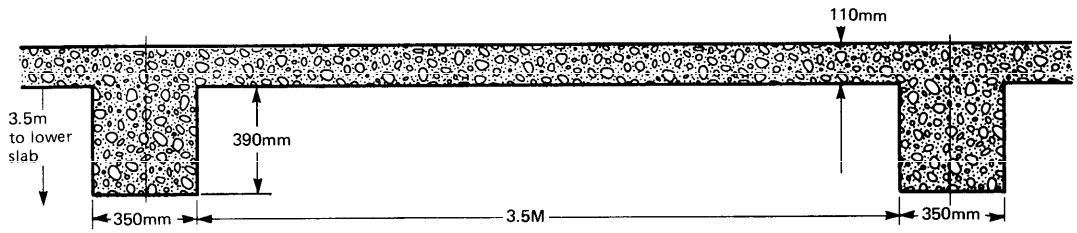
# Table of typical solutions for Falseworks to support insitu concrete beams

| Loading<br>Load not to exceed | Examples of the form of construction which could give this load:- | Span of plywood decking = spacing of secondary |
|---|---|---|
| 1200 kg/m |  | 305 |
| **1800** kg/m |  | 305<br>405 |
| 2400 kg/m |  | 305<br>405 |
| 3000 kg/m |  | 240 |
| **3600** kg/m |  | 350 |

Note = for standards marked - * - only use adjustable props when laced together
- ** - do not use adjustable props.

| second timbers | | Primary timbers | | Max. unsupported length of standard m | Minimum sole plate length (mm) assuming 25 mm MIN width of sole plate | | |
|---|---|---|---|---|---|---|---|
| size of section (mm) | Max. span of member (M) | Size of section (mm) | Max. span of member (M) | | Condition A | Condition B | Condition c |
| 50 x 75<br>50 x 100<br>100 x 75 flat | .500<br>.700<br>.800 | 75 x 100 | .950 | 2.75 | 0.500 | 0.600 | 1.400 |
| | | 75 x 150 | 1.450 | 2.75 | 0.500 | 0.900 | 2.200 |
| 50 x 75<br>50 x 100<br>100 x 75 flat | .450<br>.650<br>.700 | 75 x 150 | 1.150 | 2.75 | 0.500 | 1.100 | 2.600 |
| | | 75 x 200 | 1.550 | 2.50 | 0.700 | 1.400 | N.A. |
| 50 x 100<br>75 x 100<br>75 x 150 | .550<br>.700<br>1.200 | | | | | | |
| 50 x 75<br>100 x 75 flat<br>75 x 100 | .500<br>.700<br>.800 | 75 x 150 | 1.000 | 2.750 | 0.600 | 1.200 | N.A. |
| | | 75 x 200 | 1.350 | 2.250 * | 0.800 | 1.600 | N.A. |
| 50 x 100<br>75 x 100<br>75 x 150 | .550<br>.650<br>1.050 | 75 x 225 | 1.500 | 2.250 * | 0.900 | 1.800 | N.A. |
| 50 x 100<br>75 x 100<br>75 x 150 | .700<br>.850<br>1.400 | 75 x 150 | .900 | 2.50 | 0.700 | 1.400 | N.A. |
| | | 75 x 200 | 1.200 | 2.00 | 0.900 | 1.800 | N.A. |
| 50 x 100<br>75 x 100<br>75 x 150 | .500<br>.600<br>.950 | 75 x 225 | 1.350 | 2.00 * | 1.000 | 2.000 | N.A. |
| | | 75 x 200 | 1.100 | 2.00 | 1.000 | 2.000 | N.A. |
| | | 75 x 225 | 1.250 | 1.75 * | 1.100 | 2.200 | N.A. |
| 50 x 100<br>75 -x 100<br>75 x 150 | .500<br>.550<br>.900 | | | | | | |

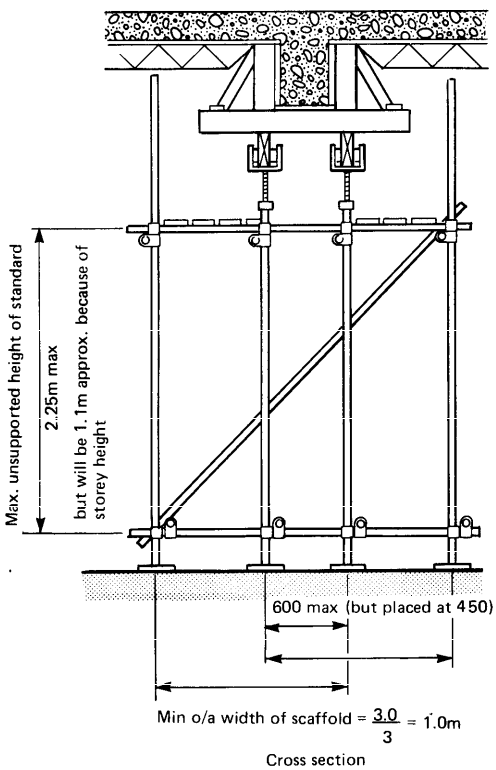
## Example showing use of the table of typical solutions



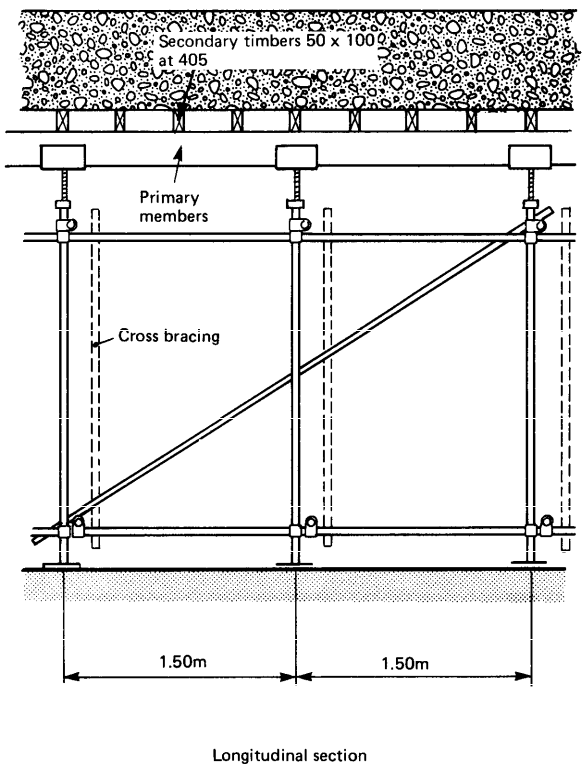

The contract is for the construction of a falsework system to support 110 mm deep slab carried by 350 x 500 mm deep overall beams at 3.5 m centres.

The storey height in the building is **3.5** m.

Assumptions - the contractor wishes to use 50 x 100 and 75 x 150 or 75 x 225 timbers which are available in sufficient quantity of a suitable quality.




Cross section




Longitudinal section

**Alternative 1** Design a system where the slab form work is carried on the beam side shutters.

**Step 1** From the examples listed in the Table, the appropriate design row is the one for loads not exceeding 2400 kg / m. Bottom half of the row.

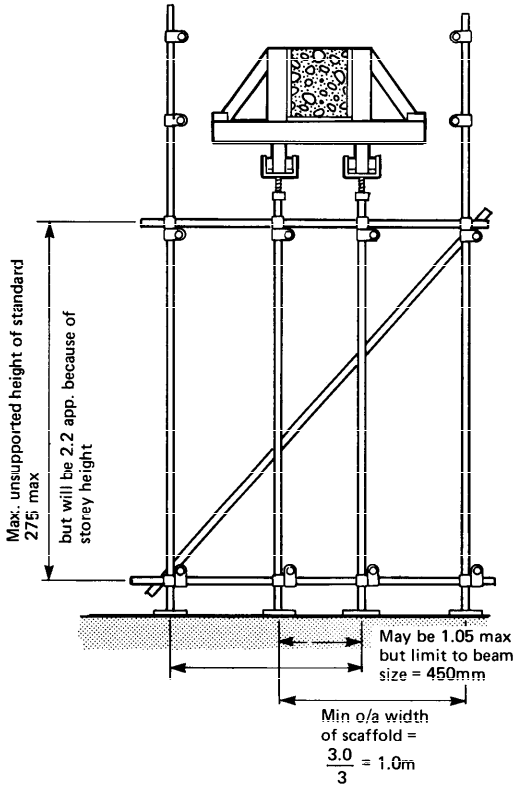
**Step 2** Plywood decking. The max span of the plywood is 405 mm, this therefore is the maximum spacing of the secondary timbers.

**Step 3** Secondary timbers. 50 x 100 timbers; these may span up to 550 mm but should be placed to suit the beam width.

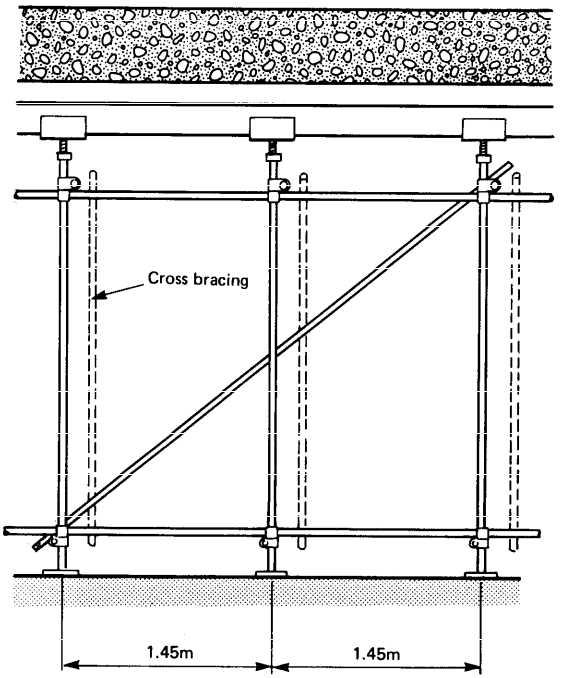
**Step 4** Primary timbers. These will be spaced at 550 mm and when using 75 x 225 timbers may span up to 1.50 m.

**Step 5** Max unsupported height of standard. With 75x 225 timbers spanning 1.50 m, this height is limited to 2.25 m. Either scaffold tube or telescopic props.

**Step** 6 Sole plate lengths. These may be a minimum length of either 0.900 m for condition A or 1,80 m for B. Condition C is not Category 1.




Cross section




Longitudinal section

**Alternative 2** Design a system where only the beam is carried, ie the slab will be carried by an independent falsework.

**Step 1** From the examples listed in the Table the appropriate design row is the one for loads not exceeding 1200 kg / m.

**Step 2** Plywood decking. This is to span 305 mm which will be the spacings of the secondary timbers.

**Step 3** Secondary timbers. 50 x 100 timbers may span up to 0.70 m, ie this is the max spacing of the primary timbers.

**Step 4** Primary timbers. 75 x 150 members, these may span up to 0.95 m.

**Step 5** Max unsupported height of standards. When using 75 x 150 primary timbers at 0.95 m span, max unsupported height is 2.75 m.

**Step 6** Sole plate lengths. These are for

condition A -500 mm

condition B -600 mm

condition C - 1.400 m

# Appendix D Typical solutions for falsework to support insitu concrete slabs

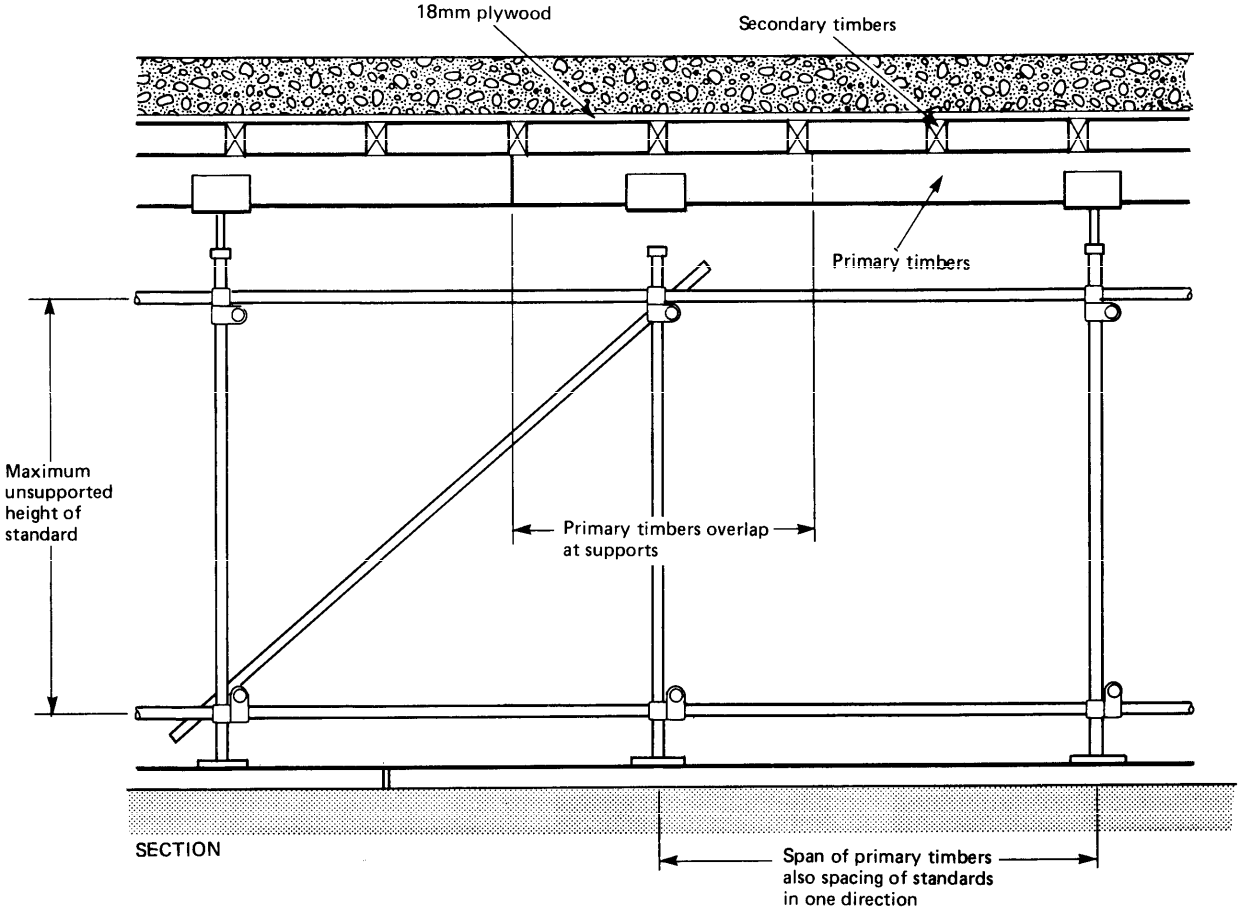
This Appendix gives some typical solutions for falseworks that are intended to carry insitu concrete slabs of weights up to the equivalent of 300m thick solid concrete.

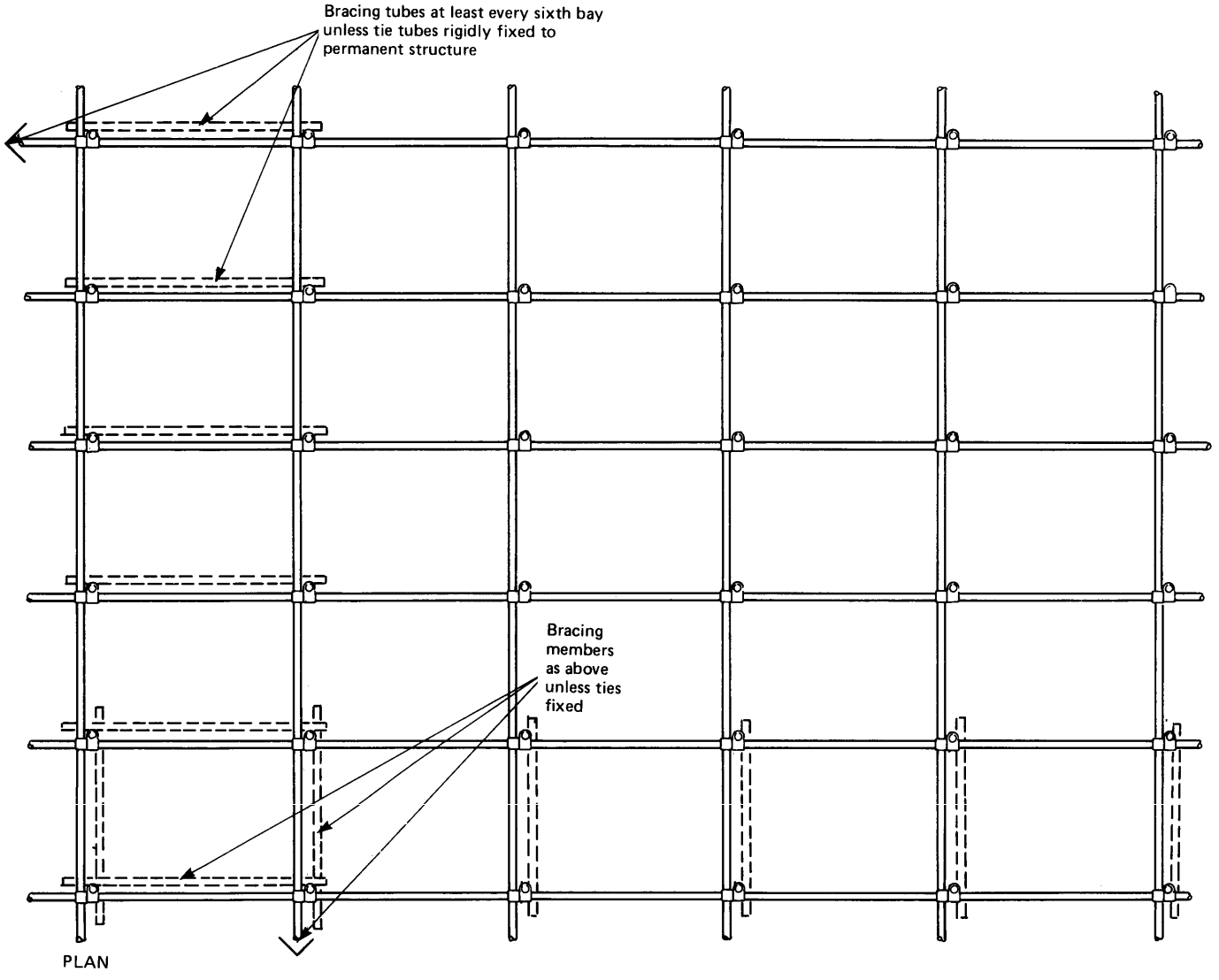
The solutions are based on one general layout for the falsework. The sizes of the members in this layout vary accordingly to the load to be carried, the type of materials to be used and the height of the falsework as shown in the tables, up to a 3.00m maximum height at the forkhead. The size of the primary timbers is used to decide which table should be used.

In addition information is given that allows some variation in the size of the foundation detail supporting the falsework standards, depending on the type of ground as listed in Appendix B. Finally a worked example is given, showing how to use the tables.

It is stressed that the information given in the general layout for the typical solution, the design tables, the worked examples and in Appendix B are all inter-related. No details purporting to be a typical solution should be prepared which only uses parts of the information in the Appendix, perhaps blending this with other sources of information, without first getting advice horn a falsework designer. Similarly detailers must work completely within the range of loads and typical examples shown in the tables unless a designer advises that it is safe to do otherwise.

**General arrangement of falsework for the support of insitu concrete slabs. This detail to be read in conjunction with the table and worked example on the following pages**






NOTES:

1 Secondary timbers have been assumed to be fully continuous therefore they must have their ends lapped at least 450 mm, and the position on the laps staggered in relation to adjacent lengths. End timbers in a row of secondary members should be cantilevered over the last support by at least one fifth of maximum span. Timbers are also to be nailed to the plywood.

2 The detail has been prepared on the assumption that 18 mm thick, exterior quality plywood will be used to support the slab soffite, even where trough and waffle formers are to be used.

3 Either scaffold tube, proprietary system scaffold tube or telescopic props may be used for standards, except that as noted in the Tables props should not be detailed for Category 1 falseworks in the most heavily loaded examples.

4 The Tables have been prepared on the assumption that only good quality structural timbers will be used.

5 It is assumed that the falsework may only be expected to carry the concrete load for less than four weeks. If a longer period of time is anticipated then the falsework is Category 2.

6 Where the notes about the sole plate length in the Tables says NA, this means 'not applicable' and the falsework is Category 2; 'ns' means not suitable as the size of timber gives unsuitable spans.

7 Primary timbers are assumed to be simply supported.

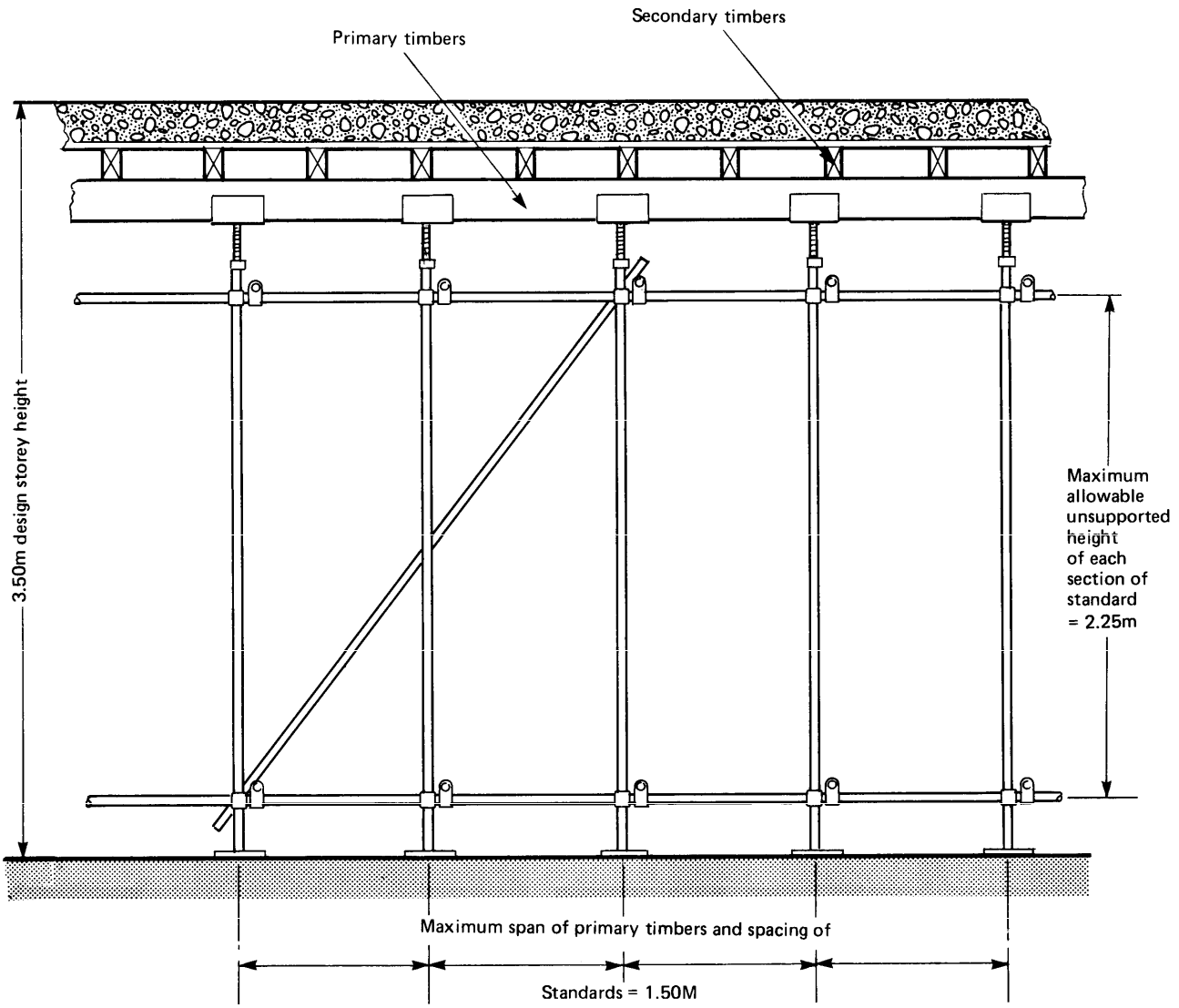
# Appendix D Table of typical solutions for Falseworks to support insitu concrete slabs.

Note standards marked - * - use adjustable props only when laced together.

| | | | LOADS - not exceeding - (ie combined dead and live loads) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | **450** kg/mz | | | | **550** kg/mz | | | |
| | | | 100 mm thick solid concrete | | | | 150 mm thick solid concrete | | | |
| Span of 18 mm thick plywood (ie spacing of secondary timbers | | | 610 mm | | | | 610 mm | | | |
| Details of secondary timbers | | size (mm) | 50 x 75 | 50 x 100 | 75 x 100 | 75 x 150 | 50 x 75 | 50 x 100 | 75 x 100 | 75 x 150 |
| | | span(m) | 0.95 | 1.30 | 1.60 | 2.45 | 0.85 | 1.15 | 1.45 | 2.20 |
| Primary timbers = 75 x 100 | Max. span of primary (m) | | 1.05 | 0.90 | 0.80 | n.s. | 1.00 | 0.85 | n.s. | n.s. |
| | Max. unsupported height of standard | (m) | 2.75 | 2.75 | 2.75 | - | 2.75 | 2.75 | - | |
| | Minimum sole plate length (m) | Condition A | 0.50 | 0.50 | 0.50 | - | 0.50 | 0.50 | - | |
| | | Condition B | 0.50 | 0.60 | 0.60 | - | 0.50 | 0.60 | - | |
| | | Condition C | 1.10 | 1.30 | 1.50 | - | 1.20 | 1.40 | - | - |
| Primary timbers = 75 x 150 | Max. span of primary (m) | | 1.65 | 1.40 | 1.25 | 1.00 | 1.55 | 1.35 | 1.20 | 0.95 |
| | Max. unsupported height of standard | (m) | | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 | 2.75 |
| | Minimum sole plate length (m) | Condition A | 0.50 | 0.50 | 0.50 | 0.60 | 0.50 | 0.50 | 0.50 | 0.60 |
| | | Condition B | 0.70 | 0.80 | 0.90 | 1.10 | 0.80 | 0.90 | 1.00 | 1.20 |
| | | Condition C | 1.80 | 2.00 | 2.20 | N.A. | 1.80 | 2.10 | 2.40 | N.A. |
| Primary timbers = 75 x 175 | Max. span of primary (m) | | 1.90 | 1.65 | 1.50 | 1.20 | 1.80 | 1.55 | 1.40 | 1.15 |
| | delayed height of | (m) | 2.75 | 2.75 | 2.75 | 2.50 | 2.75 | 2.75 | 2.75 | 2.50* |
| | Minimum sole plate length (m) | Condition A | 0.50 | 0.50 | 0.60 | 0.70 | 0.50 | 0.50 | 0.60 | 0.70 |
| | | Condition B | 0.80 | 1.00 | 1.00 | 1.30 | 0.90 | 1.00 | 1.10 | 1.40 |
| | | Condition C | 2.00 | 2.40 | N.A. | N.A. | 2.10 | 2.40 | N.A. | N.A. |
| Primary timbers = 75 x 225 | Max. span of primiary (m) | | 2.50 | 2.15 | 1.95 | 1.55 | 2.35 | 2.05 | 1.85 | 1.4 |
| | Max. unsupported height of standard | (m) | 2.75 | 2.50 | 2.50* | 2.25* | 2.75 | 2.50 | 2.25* | 2.25* |
| | Minimum sole plate length (m) | Condition A | 0.60 | 0.70 | 0.70 | 0.90 | 0.60 | 0.70 | 0.80 | 0.90 |
| | | Condition B | 1.10 | 1.30 | 1.40 | 1.70 | 1.10 | 1.30 | 1.50 | 1.80 |
| | | Condition C | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |

| 700 kg/mz | | | | 950 kg/m$^2$ | | | |
|---|---|---|---|---|---|---|---|
| 200 mm thick solid concrete | | | | 300 thick solid concrete | | | |
| 405 mm | | | | **405** mm | | | |
| 50X75 | 5OX1OO | 75 X1OO | 75 X 150 | 150 X 75 | 50 x 100 | 75 x 100 | 75 x 150 |
| 0.95 | 1.25 | 1.60 | 2.40 | 0.80 | 1.10 | 1.35 | 2.10 |
| 0.85 | n.s. | n.s. | n.s. | 0.80 | n.s. | n.s. | n.s. |
| 2.75 | - | | | 2.75 | - | | |
| 0.50 | - | | | 0.50 | - | | |
| 0.60 | - | - | | 0.60 | - | | |
| 1.40 | - | | | 1.50 | - | | |
| 1.30 | 1.15 | 1.00 | 0.80 | 1.20 | 1.05 | 0.95 | 0.75 |
| 2.75 | 2.75 | 2.75 | 2.50 | 2.75 | 2.75 | 1.75 | 2.25* |
| **0.50** | **0.50** | 0.60 | **0.70** | **I 0.50** | 0.60 | 0.60 | 0.80 |
| 0.80 | 1.00 | 1.10 | 0.80 | 10.90 | 1.10 | 1.20 | 1.50 |
| 1.90 | 2.50 | N.A. | N.A. | 2.30 | N.A, | N.A. | N.A. |
| 1.55 | 1.25 | 1.20 | 0.95 | 1.35 | 1.15 | 1.10 | 0.90 |
| 2.75 | 2.75 | 2.50 | 2.25* | 2.75 | 2.75 | 2.50* | 2.00* |
| 0.60 | 0.60 | **0.70** | 0.80 | 10.60 | 0.60 | **0.70** | **0.90** |
| 1.10 | 1.10 | 1.30 | 1.60 | 1.10 | 1.20 | 1.40 | 1.80 |
| N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |
| **2.00** | **1.75** | 1.55 | 1.25 | 1.85 | 1.50 | 1.45 | 1.15 |
| 2.50 | 2.25* | 2.25* | 2.00* | 2.50* | 2.25* | 2.00* | 1.75* |
| 0.70 | 0.80 | 0.90 | 1.10 | 0.70 | 0.80 | 1.00 | 1.20 |
| 1.30 | 1.50 | 1.70 | 2.10 | 1.40 | 1.60 | 1.90 | 2.30 |
| N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. | N.A. |

## Example showing use of the table of typical solutions



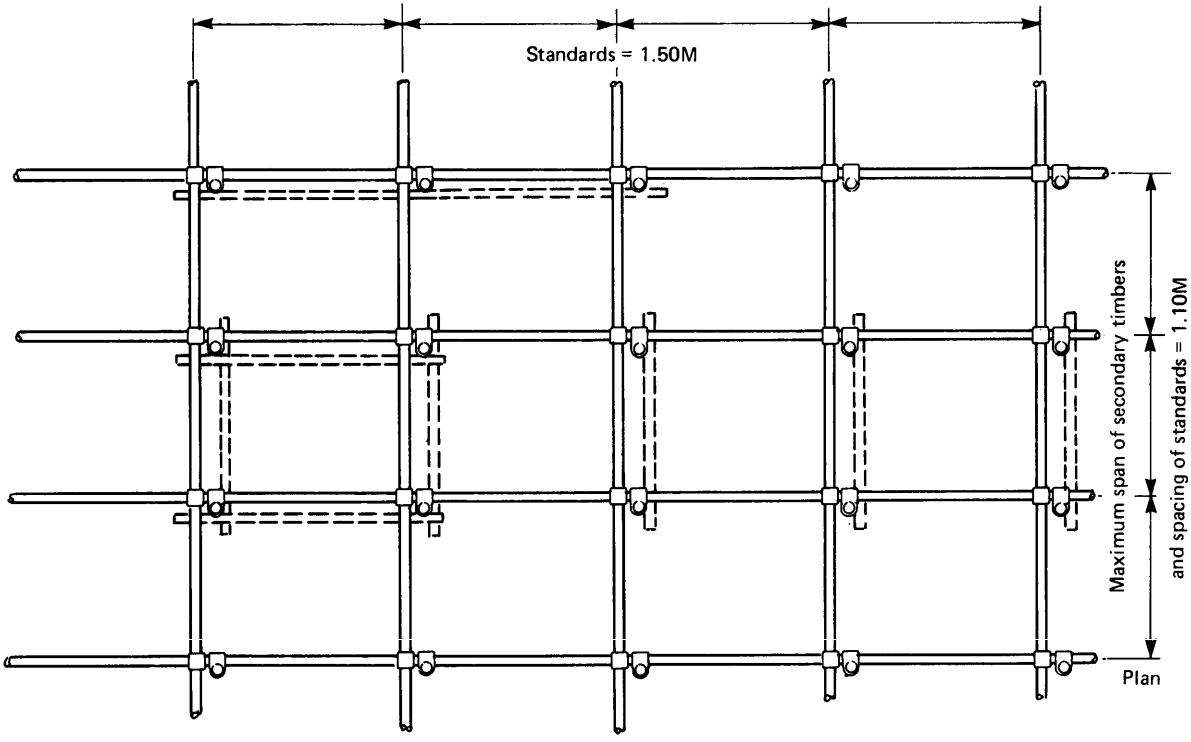

The contract is for the construction of a falsework to support a 250 mm thick insitu concrete slab. The storey height of the building is to be 3.80 m.

Assumptions. The contractor wishes to use 75 x 225 and 50 x 100 timbers which are available in sufficient quantity of a suitable quality.

Stage 1 Turn to Tables. From the examples given in the Table the appropriate design column is for loads not exceeding 950 kg/m$^2$.

Stage 2 Secondary timbers. In the 2nd vertical column at this load, 50 x 100 mm secondary timbers may span up to 1.10 m when spaced at 405 mm c/c (ie max span of plywood).

Stage 3 Primary timbers. With secondary timbers at max span, on page 5 the span of the 75 x 225: primary timber may be 1.50 m maximum.




Stage 4 Height of standards. When secondary and primary timbers are at their max span; the max unsupported height of the standards is 2.25 m which can be constructed from scaffold tube or telescope props if laced together.

Stage 5 Sole plate design. The sole plates should be at least 0.80 m long (condition A) 1.60 m long (condition B). Condition C, this case is not Category 1 falsework.

# Appendix E Statutory requirements and references

This Appendix lists some of the documents where further advice can be found, which may be of concern to those building falseworks. Also listed are the principle Regulations or legislation that deals with this topic.

1 Statutory requirements

Health and Safety at Work etc Act 1974

Factories Act 1961

Construction (General Provisions) Regulations 1961

Construction (Working Places) Regulations 1966

Construction (Lifting Operations) Regulations 1961

Construction (Health and Welfare) Regulations 1966

Construction (Metrication) Regulations 1984

Woodworking Machines Regulations 1974

Abrasive Wheels Regulation 1970

2 Sources of further advice

(a) Those concerned with the design and construction of temporary structures should make themselves familiar with the following publications:

British Standards

British Standard Code of Practice 5973 *Access Scaffolding*

British Standard Code of Practice 5975 *Falsework*

British Standard 5268 *Strutural Use of Timber*

**Guidance Notes**

**GS 2** *Metrication of Construction Safety Regulations*

*GS 15 General access scaffolds*

*GS 31 Safe use of ladders, step ladders and trestles*

PM 28 *Working platforms on forklift trucks*

*GS 42 Tower scaffolds*

TRADA - Simplified rules for the inspection of secondhand timber for load bearing use.

(b) When arranging a safe system of work the following publications should be useful:

Guidance Notes

GS 5 *Entry into confined spaces*

GS 10 *Roofwork prevention of falls*

PM 9 Access to tower cranes

Health and Safety at Work booklet No 47- *Safety in the stacking of materials.*

(c) Where working with plant and equipment:

Guidance Notes

PM 14 *Safety in the use of cartridge operated tools*

PM 16 *Eyebolts*

PM 17 *Pneumatic nailing and stapling tools*

PM 21 *Safety in the use of woodworking machines*

PM 22 *Mounting of abrasive wheels*

PM 24 *Safety at rask and pinion hoists*

PM 27 *Construction hoists.*

**Health and Safety Guidance Booklets**

HS(G)16 *Safety in working with lift trucks*

HS(G)l 7 *Safety in the use of abrasive wheels*

*HS(G)19 Safety in working power operated mobile work platform.*

(d) When working with or near electricity:

Guidance Notes

GS 6 *Avoidance of danger from overhead electric lines*

*GS 24 Electricity on construction sites*

PM 32 *The safe use of portable electric apparatus.*

(e) When there could be dangers from fire or toxic materials:

Guidance Notes

GS 8 *Articles for substances for use at work*

CS 4 *The keeping of LPG in cylinders and similar containers.*

*CS 6 The storage and use of LPG on construction sites*

EH 7 *Petroleum based adhesives in building operations*

EH 35 *Probable asbestos dust concentrations at construction processes.*

CIRIA Report No 16 *Safe use of chemicals on site.*

**Health and Safety booklets: Guidance**

HS(G)l *Safe use and storage of flexible foam polyurethane.*

HS(G)3 *Highly flammable materials on construction sites.*

*HS(G)18 Portable grinding machines - control of dust.*

(f) Other general duties to the workforce and to the public:

GS 7 *Accidents to children on construction sites*

Code of Practice 4 under section 16 of the HSW etc Act - Health and Safety (First Aid) Regulations 1981

Health and Safety booklets: Regulations

HS(R)5 *The notification of accidents and dangerous occurrences*

HS(R)6 *A guide to the HSW Act*

HS(R)9 *A guide to the Woodworking Regulations 1974*

HS(R)l 1 *First aid at work.*

Printed in the UK for HMSO 10M 6/87