Construction Industry Council CDM Guidance for Designers

Designing to make management of hazards associated with temporary works equipment easier

Technical Guidance Note

T 20.006

INTRODUCTION

1. Designers can play a major part in making it easier to manage the hazards associated with temporary works equipment [TWE].

2. Temporary works are provided either to provide access to the workplace or to support the permanent works, until design strengths have been achieved. If designers ignore their responsibility in this area, the provision of adequate temporary works could become impossible and workers using them could potentially be put at risk.

3. Except for special circumstances, designers do not need to tell a contractor how to build something or to anticipate the actual method of construction. However, they should be able to demonstrate that their design can accommodate a method of construction, which is safe.

4. There are two reasons why designers ignore issues associated with temporary works:

a) Some consider them to be a contractor's problem;
b) Others do not understand what is required.

5. However, designers can no longer ignore these issues, because there are hazards associated with temporary works, which designers should be aware of. Such knowledge would help designers to facilitate the provision of safe temporary works. This guidance deals with the issues associated with temporary works equipment

HAZARDS ASSOCIATED WITH TEMPORARY WORKS EQUIPMENT [TWE]

6. The hazards associated with TWE include:

a) Instability of the temporary works;
b) Manual handling: heavy loads, awkward shapes - mainly for falsework; and
c) Falling from height: people and objects.

WHAT DESIGNERS SHOULD DO

7. Although control of many of the hazards associated with TWE are a contractor's responsibility, designers of the permanent works should give consideration to measures, which would assist a contractor in controlling them, including Providing:

a) TWE lateral stability attachment points;
b) fall protection attachments;
c) Information on loads to be carried where the design requires retention of structural components, especially load bearing ones;
d) Information on capacities of structural components, which could be used to support temporary works, eg:
    i) suspended floors under props;
    ii) ground under TWE bases;
    iii) lateral stability requirements, eg, for beams carrying formwork, for trusses carrying stacks of roof sheets, etc;
    iv) Back-propping requirements;
e) Information on lateral thrusts exerted by permanent works, which TWE will support until the structure is complete, eg:
    i) from portal frames, which are resisted in the permanent state by tying into the floors,
    ii) from arches;
f) Important information about the restrictions on the use of the permanent works that [is known] will be used to support the temporary works for following on works, eg:
    i) strength gain of masonry walls carrying joist hangers;
    ii) strength gain of rc floors;
    iii) steelwork, which relies on lateral restraint from other connected members;
g) Adequate space around the permanent works for TWE. For example:
    i) The width of scaffold can be in the range 600mm[access only]– 1200mm [heavy duty], depending on the duty rating;
    ii) Where scaffold cannot be attached to the permanent works, stabilisation by rakers is possible but this needs additional space;
    iii) Mobile towers can be 1.2 x 2.4 m in plan, excluding outriggers;

BACKGROUND INFORMATION ON TEMPORARY WORKS EQUIPMENT

8. While temporary works are governed by the same design rules as permanent structures, they are different enough to have their own dedicated design standards (British or European). Many temporary works are still constructed according to custom-and-practise, and the best of these practises are included in the standards.

9. Designers should read these standards, to gain a better understanding of safe use of temporary works.

10. Temporary works fail for a multitude of reasons. For example, collapse resulting from components essential for their stability being omitted, or in some cases, these omissions resulting from careless erection. In other reported cases, the form of the permanent works made their installation virtually impossible. For example, it is extremely difficult to tie a scaffold to a glass façade, unless provision has been made for it.

11. This guidance covers **scaffolding, edge protection, falsework** and **mobile access towers**, which have rules for safe use that designers should be aware of. Some of these rules are set out below.

Scaffolds

12. Design of scaffolds is covered in BS 5973, which requires the following for their stability:

Frequent tying

13. Therefore, designers should consider providing tying points, capable of supporting 10 kN applied horizontally:

a) For tube and fitting scaffolds:
   i) at least every 40m^2; or
   ii) for scaffold < 8 m high, ensure there is clear space around a scaffold to install rakers inclined at 1 in 4;
b) For prefabricated scaffold systems, this is required on every standard [approximately] every 4m;

And inform the contractor about what has been provided.

14. Scaffolds can cantilever a maximum of 2 m above a tied lift. Therefore, if it is required to use a scaffold in this way, eg, for building masonry walls, detail the masonry so that it can be built up in 2 m lifts.

Control of loading

15. In some cases, eg, with blocks, bricks, etc, control of loading is normally out with a designer's control. However, where it is within their control, eg, glazing units, lintels, etc, they should consider minimising their weight and/or provide information about their weight.

Good foundations

16. Therefore, service runs requiring excavations should, if possible, be kept away from areas where it is assumed scaffolds will be erected.

Stability of Scaffolds

17. Where it is not possible to use the structure to tie scaffolds, designers should inform contractors about this, consider the possibility that buttresses or outriggers could be used instead and ensure that there is enough space to install them – see **13** a) ii).

Edge Protection

18. While provision of edge protection is a contractor's duty under law, designers should consider how its provision could be facilitated, by design, into the permanent works. For example: 50mm ID × 100mm long tubes welded to steel or cast into rc, wherever there is an edge, eg, building perimeters, stair and lift wells, etc; at 3 – 6 m centres, would be suitable for most configurations of edge protection. Prefabricated systems are available and information on how these can be incorporated into the design can be obtained from manufacturers.

19. Overhanging eaves and gables present problems, but they can be solved, because much of the prefabricated edge protection currently available has been developed for connection to the permanent works. Therefore, consider discussing possible solutions with suppliers before developing a design.

20. Parapet walls incorporated into the design could act as edge protection. However, they must be at least 950mm high, to comply with the Law.

21. Welding a small bracket on to columns, would allow edge protection to be attached to the columns. The bracket could then be used for gutter support.

22. Roofs with slopes in excess of 30^0 are difficult to provide edge protection for, because existing systems will harm the person sliding into it.

23. BS 1139: Part 3 [implementing HD 1000] covers requirements for edge protection:

24. Where provision of barriers is not practical, the law allows the use of personal protection systems [PPE]. Information on designing for the provision of fall arrest systems is covered in Technical Guidance Series **T 20.007 Use of PPE**.

Falsework

25. Designers should produce schemes, which do not, as far as possible commit contractors to:

a) Providing falsework that is so heavily loaded it has to be closely spaced and makes movements in and about it difficult;
b) Regular movement of plant close to or in between falsework, eg:
   i) By requiring falsework solutions close to excavations for drains, foundations, etc;
   ii) By requiring the erection of other structures close to falsework;

   Generally plant should be given a clearance of its slewing radius + 600mm from any falsework
c) Fabricating complicated shapes, which could require people to work at height for long periods;

26. In addition, designers should:

a) Incorporate as much as possible of the falsework into the permanent works, eg:
   i) Sheet-piles into sub-terranean walls;
   ii) Permanent shuttering;
b) Make available any information about site conditions, eg, wind, geotechnical, tidal, etc;
c) Ensure that the permanent structure can carry any falsework loads that will be applied, eg:
   i) In multi-storey construction the floor at level n can carry the loads from constructing the floor at level n+1;
   ii) For temporary propping, that the structure under the prop(s) will carry the concentrated prop loads;
d) For internal façade retention schemes, ensure that any cross-connections will not interfere with plant movements inside the building.

27. BS 5975 covers the design of falsework.

Mobile access towers

28. Mobile access towers [MATs] are prone to toppling therefore, designers should:

a) Inform the contractor if the intended operation will require significant physical effort, eg, pulling cables through ducts;
b) Allow sufficient clear space around areas where use of MATs is intended and include for outrigger extensions, eg, in corridors;
c) Avoid locating obstacles, eg, steps in floors, holes, etc, in areas where the use of MATs is anticipated;
d) Be aware that the use of MATs on uneven or soft formations should be avoided;
e) MATs should not be used free-standing if they are higher than 8m outdoors and 12m indoors;
f) MATs come in pre-set module sizes. Check that module sizes, including a 1 m guard-rail, will fit into the vertical space allocated while offering a comfortable working stance;
g) Be aware that using free-standing MATS on exposed sites is potentially hazardous.

29. BS 1139:part 3 covers Mobile Access Towers.