50

BUILDING DIGEST

CENTRAL BUILDING RESEARCH INSTITUTE INDIA

UNIT FRAME SCAFFOLDING

General

In any building construction, maintenance or repair work, provision of a satisfactory scaffolding is a must. A practice, though old but still prevalent largely, is to resort to timber scaffolding. With the production of steel tubes in the country metal scaffoldings and shutterings are becoming increasingly common. The main advantages of metal scaffoldings lie in larger reuse, quickness and ease in erection and dismantling, greater rigidity and stability.

A unit frame type of steel scaffolding has been developed at the Institute (figure 1). It consists of simple unit frames and light members (heaviest single unit weighs 7 kg) which can be handled by an individual. Since its overall dimensions are small it can be easily transported from site to site. Its simplicity lies in the fact that there are no couplers or threaded joints and it can be easily assembled by an unskilled worker. Towers can be erected quickly by adding unit frames one over another with a phase difference of 90°. The bottom of a unit frame envelopes the top of the lower unit for a length of 150 mm and fixed pins of the lower unit prevent any rotation of the members. The materials used are steel tubes, mild steel bar and mild steel plate. A novel feature—double decking, at working levels has been adopted. By this arrangement the material is kept at a height af 600 mm above the standing level of the workman. This was adopted after it was found by a work-study that the supply of material at higher level than the standing level of the workmen substantially increases the productivity.

Components

In all there are eight components as given in figs. 2 (a) to (h). The base plate (a) and base pin (b) are made of mild steel. All other units are made of seamless or heavy duty welded steel tubes. The joining unit (c) is used at ground level. It maintains a clear distance of 2000 mm between two towers or 3000 mm from the centre of one tower to the centre of the other tower. Thus normally available lengths of the deck planks can easily suffice. The sizes of unit frames (d) and (e) have been arrived at from the requirements of rise in height for brick laying and plastering and the width required for men and material at any scaffold level. Normally for brick laying, height of the scaffold has to be increased after every 1000 mm. In case of plastering the height has to be changed after every 1500 mm. The size of unit have therefore been so kept that unit (d) can raise the height of the tower by 1000 mm and units (d) and (e) together can raise by 1500 mm. A total width of about 850 mm is required for a man to stand and have his material behind him. For brick laying the man has to be nearer the wall and for plastering about 100 mm away. Both these units provide a working width of about 950 mm covering the needs of brick laying and plastering. Double deck units (f) provide two planes, the lower one for the workman to stand and the other 600 mm above for stacking material. The braces (g) and (h) are simple connecting members.

Assembly

At any work site, the ground is levelled for a width of 1250 mm by the side of the wall to be constructed. Base plates (a) are provided 150 mm away from the wall and are spaced 1000 mm apart for each tower. When two towers have to be supported by a jointing unit, base plates of the towers are laid 2000 mm apart. For improving the stability of the towers base pins (b) are driven in the ground through the spike holes in the base plates. After placing base plates on the ground, joining units (c) are placed over it. The bars of the base plates get covered by bottom of the joining units (c), which provides enough fixity. Unit frames (d) are placed thereafter. In case two towers are required to be placed at a distance other than 3000 mm apart, it can be done by dispensing with the joining units.

For brick laying, towers are raised by adding unit frames (d) every time. For plastering operation the unit frame (e) (500 mm) is made use of in conjunction with unit frame (d) (1000 mm) to achieve the desired working level in steps of 1500 mm. It is desirable to commence work from a level 300 mm higher than the standing level of the mason. It may not be possible to achieve this in the beginning but as the construction progresses this can be well maintained. The tower should therefore be erected upto a level 300 mm less than the height of the wall. At this level double deck units (f) are mounted on the unit frames (d) or (e) whichever of the two is erected on top and planks provided at both the deck levels. Every time when the height of the tower is raised of lowered double deck units (f) are taken out and remounted on top of unit frames (d) or (e) as the case may be. Bracing (g) is used to connect the two top free ends of the double deck units (f) of a tower, while bracing (h) is used for similar free tops of two towers. This ensures better stability.

This type of unit frame scaffolding can be used upto two storeys without providing any lateral support. For greater heights some support should be provided at every storey height. This can be done from the building under construction, or any existing structure, or with the help of guy ropes.

There is a demand for short notes summarising available information on selected building topics for the use of Engineers and Architects in India. To meet the need, this Institute is bringing out a series of Building Digests from time to time and the present one is the 50th in the series. Readers are requested to send to the Institute their experience of adopting the suggestion given in this Digest.

UDC 69.057.62

Compiled by : B.C. Srivastava & S.A. Siddiqui

Published by P. L. De,

SCAFFOLDING ASSEMBLY

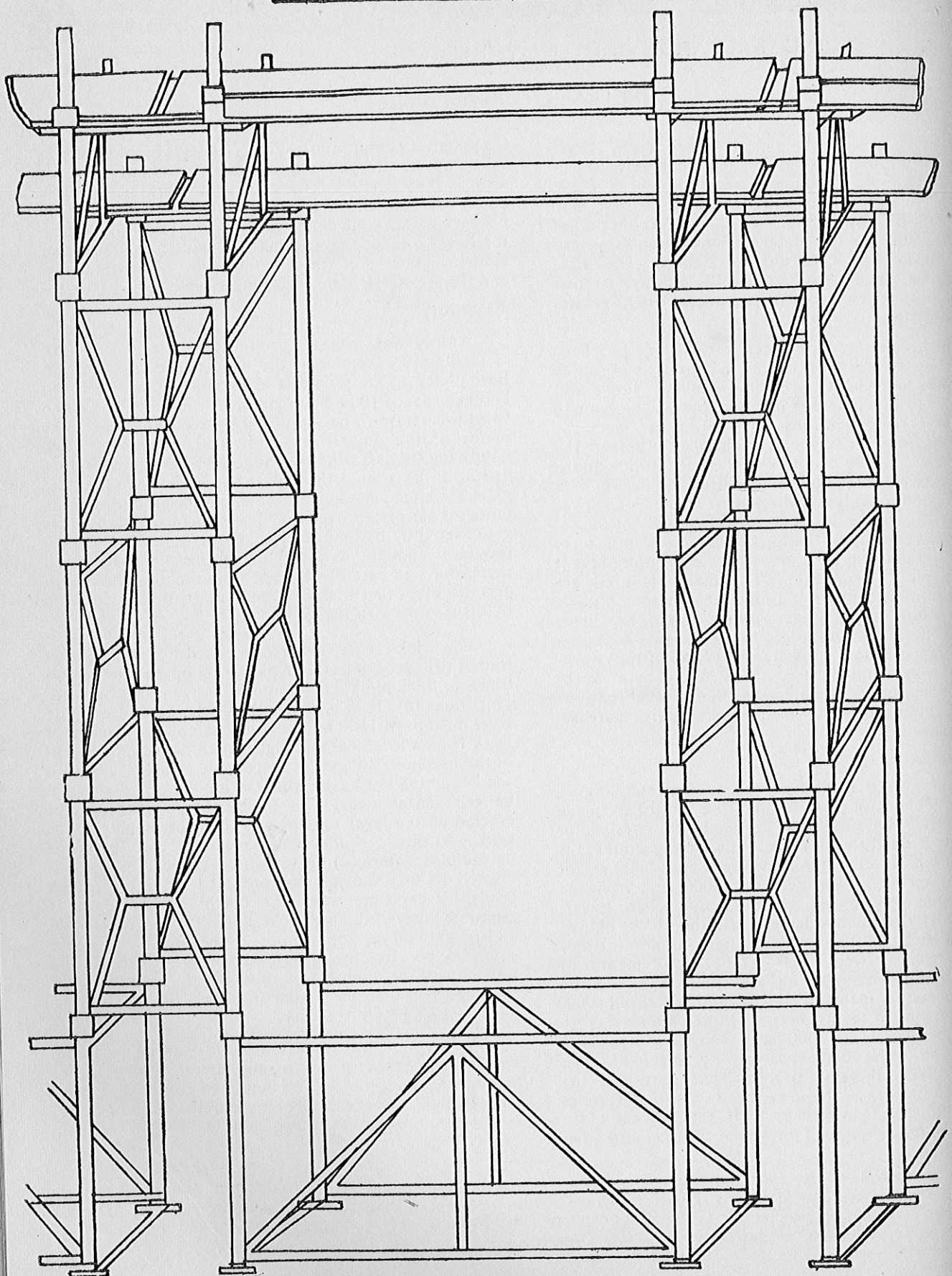

FIG. 1.

SCAFFOLDING COMPONENTS

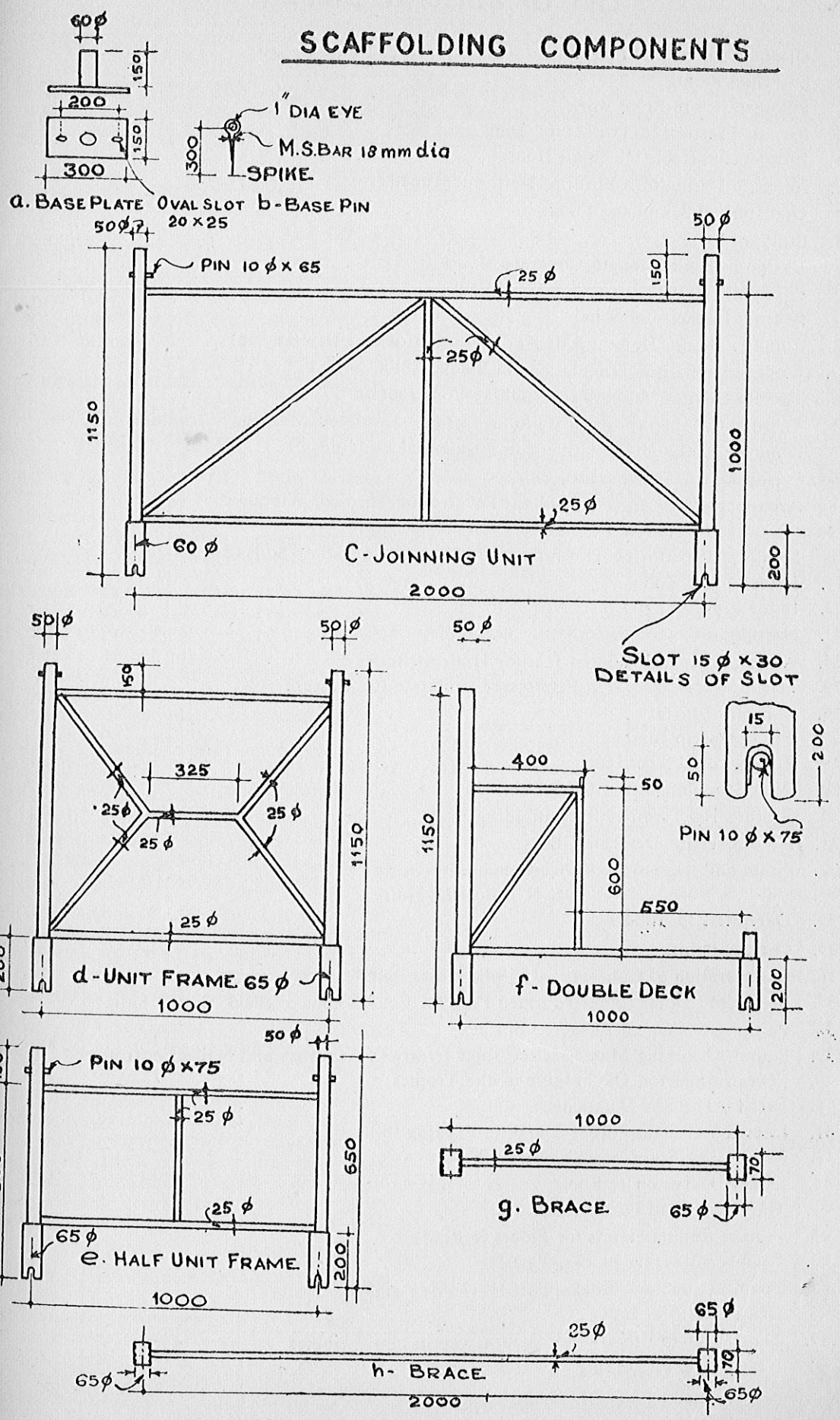

FIG. 2.

LIST OF BUILDING DIGESTS

1. Orientation of Building
2. Emulsion Paints
3. Efflorescence in Brick work
4. Precast Prestressed Trusses for Long span roofs
5. Inexpensive Roofs for Small Houses
6. Acoustic Design of Auditoria, Halls and Theatres
7. Undisturbed Sampling of Soils
8. Building Lime
9. Design of High Strength Concrete Mixes
10. Painting woodwork
11. Bearing Capacity of Soils
12. Climatic Design Data and its Application (Hot and Dry Region)
13. Under-reamed Pile Foundations in Black Cotton Soils
14. Termite Control Measures in Building Construction
15. Thermal Considerations in Building Design—Insulated Massonry Structures.
16. Economy in the Use of Cement in Residential Buildings
17. Prefabricated Timber Hut
18. Architectural Control of Sunlight Penetration Through Windows
19. Reinforced Concrete Frames for Doors & Windows
20. Stendard Penetration Test for Bearing Capacity of Sandy Soils
21. Folded Plate Roofs
22. Index to Building Digests Nos. 1 to 21
23. Northlight Sawtooth Roofs in the Tropics
24. A Prefabricated Insulated Hut for High Altitudes
25. Selection and Design of Prestressed Concrete for Flexure
26. Masonry Mortars
27. Friction Grip Joints
28. Prefabricated Steel Hut
29. Water-proofing of flat RCC Roofs
30. Eradicating Termites from Buildings
31. High Strength Deformed Bars
32. Noise and its control, Part I-Community Noise
33. —do— Part II-Industrial Noise
34. Dampness in Buildings
35. Cement Paints
36. Deterioration of Concrete in Sulphate and Soft Waters
37. Single and Double Under-rermed Piles for Foundations in Black Cotton Soils
38. Painting of Cement Plastered Surfaces
39. Sound Absorbing Materials and thier Utility in Acoustics and Noise Control
40. Fenestrations for Daylighting in the Tropics,
    Part I—The Sky Component.
41. Insertion of Damp-proof course in Existing walls
42. Removal of Stains from Concrete Floors
43. Doubly Curved Tile Roofs
44. Hardboard and Particle Board
45. Precast Cellular Units for Floors & Roofs
46. Foamed Concrete Blocks, Part I
47. Foamed Concrete Blocks, Part II—Laying and Rendering
48. Brick Earths of India
49. The Design of windows for natural ventilation in tropics
50. Unit Frame scaffolding.

NOTE :

Registration fee for inclusion in the Mailing List of Building Digest is Rs. 5.00 (valid for 10 issues) to be sent to Director, CBRI by M.O. Back issues (Nos. 1-18) can be had for