अनुक्रमणिका
Table of Contents




AB SAVA

GOVERNMENT OF MAHARASHTRA

**BUILDINGS AND COMMUNICATIONS DEPARTMENT**

# STANDARD SPECIFICATIONS



NAGPUR
GOVERNMENT PRESS
1972

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# INTRODUCTION

It has often been experienced that there is no uniformity in the wording of items and specifications in the tender papers prepared by various officers. In several cases, particularly where architectural features are involved the local officers are not in a position to bring out the full requirements of these features in the wording of items or in the specifications.

This situation gives rise to avoidable extra items during execution. It is also noticed that cropping up of extra items is mostly due to incorrect and ambiguous wording in the items of tender papers and specifications and in some cases due to not adhering to the details in the drawings. Similar situation exists in connection with road and bridge works. Although in the case of bridge works some headway has been made by the Design Organisation, even here, the approach has been mostly from the design point of view. It is necessary to have standardised items and specifications in the case of bridges also. In road works also, there is a large amount of diversity in the expressions used in the items and the specifications.

In the past, attempts were made in this direction but somehow or the other, this question was not pursued further.

Considering all the above difficulties and in view of urgency and importance of this matter, the post of Special Officer for Standard Specifications and Draft Tender Papers was created.

The work in the present form was started with the appointment of Shri A. G. Naik, Retired Superintending Engineer as Special Officer and two Assistants—Shri A. G. Borkar, Assistant Engineer and Shri K. S. Agashe, Deputy Engineer.

In view of the statutory obligation of adopting metric system the specifications have been drawn up in metric system alone on the basis of metric standards wherever they had been already evolved and adopting improvised equivalents where they were not available.

The Standard Specifications have been grouped into six main sections as below:—

(1) Basic Materials.
(2) General Items.
(3) Bridge Work.
(4) Cross Drainage Works.
(5) Road Work.
(6) Building Work.

These specifications will guide the technical staff of Buildings and Communications and Irrigation and Power Departments in construction works and in adoption of metric system.

K. V. JOGLEKAR,
Chief Engineer.

Bombay, 1st January 1964.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

## INSTRUCTIONS

The Standard Specifications have been grouped under the following sections:—

A. Basic Materials.

B. General Items.

BR. Bridge Work.

CD. Cross Drainage Works.

Rd. Road Work.

Bd. Building Works.

The first two sections cover specifications for Basic materials and General Items pertaining to all normal construction work. The other sections include specification for the various items of work which are required under those respective sections. The specifications under each section are distinguished by the prefix mentioned against each. The list of items under each section is given at the beginning of that section. Indian Standards have been adopted and referred to wherever necessary. A list of such Standards referred to, is given at the beginning of each section. These Standards should be available in the Divisions.

The wording of the items has been standardised to form the basis for preparing the list of items for the Standard Schedule of Rates. In order to avoid repetition and to keep down the volume of write up, different alternatives like type of stone, type of mortar (cement or lime), proportion of mix of each type of mortar etc. which have to be actually used in a particular item of work have been included in the same item either as alternatives for deleting the unwanted alternatives or as blanks to be filled in while preparing the list. For purposes of Schedule of Rates, each item mentioned in the Specifications will have to be split up into a number of separate items to provide for each alternative or combination of alternatives and for each figure that will have to be filled up in the blanks, where left. Whatever the alternative or combination of alternatives that may be retained in the item of the schedule and whatever figures may be included in the blanks for that item, the specifications drawn up for the item will be applicable for all the split up items.

For every one of such split up items, the number of the specification to be quoted in the tender and referred to will be the single number of the corresponding combined item which provides for all the alternatives and blanks in the Standard Specifications. The reference should include the prefix of the particular section, letter of the particular group and the serial number of the item. Thus in Bd.G.5, Bd. will refer to the section of Building Work, G will refer to Brick work group in that section and 5 will refer to the item No. 5 in the list of the items in that group.

The specifications for each item covers:—

(i) general scope of the item,

(ii) materials required,

(iii) processing of the materials,

(iv) construction operations,

(v) finishing,

(vi) all the elements which are included in the item, and

(vii) mode of measurement, deductions to be made etc., and payment.

If specifications are to be added for any new items, they may be drafted likewise.

The analysis of scheduled rate for any item will be framed to cover all the elements included in that item, as specified in the Standard Specifications.

These specifications shall be thoroughly studied before deciding whether any addition to the Standard Specifications is required or some portion is required to be modified due to new materials, different processing, architectural ornamentation, etc. Such additions or modifications shall be included in the special provisions to be mentioned in the specifications for the particular items, in addition to the reference made to the Standard Specifications.



अनुक्रमणिका
Table of Contents

Where necessary, the specifications have been supplemented by sketches for clarity. The Engineer shall also supply detailed drawings where required. When, however, any discrepancy is found between the drawing and the estimates or the specifications, the Engineer's decision as to which shall be followed shall be final. "Engineer" shall mean the Executive Engineer in charge of the work and shall include the superior Engineer Officers of the Engineering Department of the Government of Maharashtra, i.e., the Superintending Engineer, Chief Engineer, etc.

Metric system has been adopted throughout these specifications for weights, measures, etc., but their equivalents in foot-pound-second units have also been given in brackets in most cases to give a proper idea of metric weights and measures. Rationalised metric standards have been adopted wherever they have been evolved or in use.

# GENERAL TABLE OF CONTENTS

## Section A

PAGE

(1) BASIC MATERIALS—
Items A.1 to A.17 .. .. .. .. .. .. .. 1

## Section B

(2) GENERAL ITEMS—
Items B.1 to B.21 .. .. .. .. .. .. .. .. 21

## Section BR.

(3) BRIDGE WORK—
Items BR. 1 to BR. 58 .. .. .. .. .. .. .. 83

## Section CD.

(4) CROSS DRAINAGE WORKS—
Items CD. 1 to CD. 24 .. .. .. .. .. .. .. 145

## Section Rd.

(5) ROAD WORKS—
Items Rd. 1 to Rd. 62 .. .. .. .. .. .. .. .. 161

## Section Bd.

(6) BUILDING WORK—
Items Bd. A.1 to Bd. W. .. .. .. .. .. .. .. 235

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# SECTION A

# STANDARD SPECIFICATIONS

# FOR

# BASIC MATERIALS.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# SECTION A

## Basic Materials

CONTENTS


| | | PAGE |
|---|---|---|
| 1. | List of Indian standards referred to .. .. .. .. .. .. | 1 |
| 2. | Specifications for Basic Materials :— | |
| A.1. | Lime .. .. .. .. .. .. .. .. | 5 |
| A.2. | Cement .. .. .. .. .. .. .. .. | 5 |
| A.3. | Surkhi .. .. .. .. .. .. .. .. | 6 |
| A.4. | Neeru .. .. .. .. .. .. .. .. | 6 |
| A.5. | Water .. .. .. .. .. .. .. .. | 7 |
| A.6. | Fine Aggregate .. .. .. .. .. .. .. .. | 7 |
| A.7. | Coarse Aggregate .. .. .. .. .. .. .. | 8 |
| A.8. | Stone for masonry .. .. .. .. .. .. .. | 9 |
| A.9. | Bricks .. .. .. .. .. .. .. .. | 11 |
| A.10. | Mild steel bars for reinforcement .. .. .. .. .. | 12 |
| A.10. | (*a*) High Tensile steel bars .. .. .. .. .. .. | 12 |
| A.10. | (*b*) High Tensile steel wires .. .. .. .. .. .. | 12 |
| A.10. | (*c*) Crimped or Indented High Tensile steel wires .. .. | 12 |
| A.11. | Structural steel .. .. .. .. .. .. .. .. | 12 |
| A.12. | Cast steel .. .. .. .. .. .. .. .. | 13 |
| A.13. | Cast iron .. .. .. .. .. .. .. .. | 13 |
| A.14. | Wrought iron .. .. .. .. .. .. .. .. | 14 |
| A.15. | Mild steel wire .. .. .. .. .. .. .. .. | 15 |
| A.16. | Timber .. .. .. .. .. .. .. .. | 15 |
| A.17. | Oil paints .. .. .. .. .. .. .. .. | 17 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

*List of Indian Standards referred to.*

1. I. S. 75-1967—
   Linseed Oil, Raw, for Paints.
2. I. S. 77-1968—
   Linseed Oil, Boiled, for Paints.
3. I. S. 77-1968—
   Linseed Oil, Pale Boiled, for Paints.
4. I. S. 85-1950—with Amendment No. I.
   Methods of Test for Oil Pastes for Paints.
5. I. S. 86-1950—with Amendment Nos. I and II.
   Oil Paste for Paints to Indian Standard Colour, Nos. 101, 102, 103, 104, 169, 216, 217, 219, 352, 353, 354, 358, 359, 360, 361, 362, 363, 364, 410, 443, 444, 628, 629, 630, 631, 632, 633, 634.
6. I. S. 87-1950—with Amendment No. I.
   Oil Paste for Paints to Indian Standard Colour No. 105, Oxford Blue.
7. I. S. 88-1950—with Amendment No. I.
   Oil Paste for Paints to Indian Standard Colour No. 106, Royal Blue.
8. I. S. 89-1950—with Amendment No. I.
   Oil Paste for Paints to Indian Standard Colour No. 411 Middle Brown.
9. I. S. 90-1950—with Amendment No. I.
   Oil Paste for Paints to Indian Standard Colour No. 414, Golden Brown.
10. I. S. 91-1950—with Amendment No. I.
    Oil Paste for Paints to Indian Standard Colour Nos. 218, 220, 222, 223, 224, 225, 226, 227, 221, 267.
11. I. S. 92-1950—with Amendment No. I.
    Oil Paste for Paints to Indian Standard Colour Nos. 537, 538, 540, 541, 570.
12. I. S. 93-1950—with Amendment No. I.
    Oil Paste for Paints to Indian Standard Colour Nos. 445, 446, 448, 449, 451, 473.
13. I. S. 94-1950—with Amendment No. I.
    Oil Paste for Paints to Indian Standard Colour Nos. 355, 356, 358, 557.
14. I. S. 95-1950—with Amendment Nos. I and II.
    Oil Paste for Paints, Exterior, White.
15. I. S. 96-1950—with Amendment Nos. I and II.
    Oil Paste for Paints, Interior, White.
16. I. S. 97-1950—with Amendment Nos. I and II.
    Oil Paste for Paints, Jointing purposes, etc., White Lead.
17. I. S. 98-1950—with Amendment No. I.
    Oil Paste for Paints, Zinc Oxide.
18. I. S. 99-1950—with Amendment No. I.
    Oil Paste for Paints, Zinc Oxide, Reduced.
19. I. S. 100-1950—with Amendment No. I.
    Oil Paste for Paints for General Purposes, Black.
20. I. S. 101-1964—with Amendment No. I.
    Methods of Test for Ready Mixed Paints and Enamels.
21. I. S. 102-1962—with Amendment No. I.
    Ready Mixed Paint, Brushing, Red Lead, Nonsetting, Priming.
22. I. S. 103-1962—with Amendment No. I.
    Ready Mixed Paint, Brushing, White Lead, for Priming and General Purposes.
23. I. S. 104-1962—with Amendment No. I.
    Ready Mixed Paint, Brushing, Zinc Chrome, Priming, for use on Aluminium Light Alloys.
24. I. S. 105-1950—
    Ready Mixed Paint, Brushing, Priming, for Enamels, for use on Metals.
25. I. S. 106-1962—with Amendment No. I.
    Ready Mixed Paint, Brushing, Priming, for Enamels, for use on Wood.
26. I. S. 107-1950—
    Ready Mixed Paint, Brushing, Red Oxide-Zinc Chrome, Priming.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



27. I. S. 109-1968—
Ready Mixed Paint, Brushing, Priming, Plaster, to Indian Standard Colour No. 361 Light Stone.

28 I. S. 110-1968—
Ready Mixed Paint, Brushing, Grey Filler, for Enamels, for use over Primers.

29. I. S. 111-1950—with Amendment Nos. 1, 2 and 3.
Ready Mixed Paint, Brushing, Undercoating, Exterior, to Indian Standard Colour Nos. 101, 216, 352, 358, 443, 632.

30. I. S. 113-1950—with Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing Undercoating, Interior, to Indian Standard Colour Nos. 101, 216, 352, 358, 443, 632.

31. I. S. 115-1950—with Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Undercoating, Exterior, Matt Finish, to Indian Standard Colour Nos. 352, Pale Cream No. 632, Dark Admiralty Grey.

32. I. S. 117-1964—with Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Exterior, Oil Gloss, for General Purposes, to Indian Standard Colour Nos. 101 to 104, 169, 216, 217, 219, 352, 353, 354, 358 to 364, 410, 443, 444, 628 to 634.

33. I. S. 118-1962—with Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour Nos. 355, 356, 368, 557.

34. I. S. 119-1962—with Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour Nos. 218, 220, 221, 222, 223, 224, 225, 226, 227, 267.

35. I. S. 120—1962.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour Nos. 537, 538, 540, 541.

36. I. S. 121-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour No. 414—Golden brown.

37. I. S. 122-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour No. 411, Middle Brown.

38. I. S. 123-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour Nos. 445, 446, 448, 449, 451, 473 and red oxide.

39. I. S. 124-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour No. 105, Oxford Blue.

40. I. S. 125-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, to Indian Standard Colour No. 106, Royal Blue.

41. I. S. 126-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Exterior, Oil Gloss, for General Purposes, to Indian Standard Colour, No. 671, Middle Graphite and Dark Graphite.

42. I. S. 127-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Exterior, Oil Gloss, for General Purposes, White.

43. I. S. 128-1962—Amendment No. 1.
Ready Mixed Paint, Brushing, Finishing, Oil Gloss, for General Purposes, Black.

44. I. S. 129-1962—with Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Finishing, Interior, Oil Gloss, for General Purposes. to Indian Standard Colour Nos. 101 to 104, 169, 216 to 219, 352 to 354, 358 to 364, 410, 443, 444, 628 to 634.

45. I. S. 133-1965—Amendment No. 1.
Enamel, Brushing Interior (1) Undercoating, (2) Finishing Colour as required.

46. I. S. 137-1965—Amendment No. 1.
Ready Mixed Paint, Brushing, Matt Finish, Interior, to Indian Standard Colour Nos. 101 to 104, 169, 216, 217, 219, 352 to 354, 358 to 364, 410, 443, 444, 628 to 635.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



47. I. S. 148—1965—Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Undercoating, Stoving, for Enamels and General Purposes, Colour as required.

48. I. S. 154-1965—Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Dead black, for use on Metal.

49. I. S. 155-1965—Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Matt Black, for use on Wood.

50. 156-1965—Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, for use on Floors, Colour as required.

51. I. S. 157-1965—Amendment No. 1.
Ready Mixed Paint, Brushing, Acid and Alkali Resisting, Lead-Free, for General Purposes, to Indian Standard Colour Nos. 446, 537 and 632.

52. I. S. 158-1968—
Ready Mixed Paint, Brushing, Bituminous, Black, Lead-Free, Acid, Alkali, Water and Heat Resisting, for General Purposes.

53. I. S. 159-1950—
Ready Mixed Paint, Brushing, Acid Resisting, for Protection against Acid Fumes. Colour as required.

54. I. S. 161-1968—Amendment Nos. 1 and 2.
Ready Mixed Paint, Brushing, Matt, Heat Resisting, Colour as required.

55. I. S. 162-1968—Amendment No. 1.
Ready Mixed Paint, Brushing, Fire Resisting, Silicate Type, for use on Wood, Colour as required.

56. I. S. 164-1968—Amendment No. 1.
Ready Mixed Paint, Brushing, for Road Marking, to Indian Standard Colour No. 356, Golden Yellow and White and Black.

57. I. S. 2339-1963—
Aluminium Paint, Brushing, for General Purposes, in Dual Container.

58. I. S. 167-1950—with Amendment Nos. 1, 2 and 3.
Ready Mixed Paint, Thick White, for Lettering.

59. I. S. 168-1965—
Ready Mixed Paint, Brushing, Quick Drying, Matt, Lead-Free, for General Purposes, to Indian Standard Colours.

60. I. S. 210-1962—Amendment Nos. 1 and 2.
Grey Iron Castings.

61. I. S. 1521, I. S. 1608, I. S. 1663, I. S. 1894—
Tensile Testing of Metals (Ferrous).

62. I. S. 226-1969—
Structural Steel.

63. I. S. 2107, I. S. 2108—
Malleable Iron Castings.

64 I. S. 269-1967—Amendment No. 1.
Ordinary, Rapid Hardening and Low Heat-Portland Cement.

65. I. S. 280-1962—Amendment No. 1.
Mild Steel Wire.

66. I. S. 287-1960—
Recommendations for Maximum Permissible Moisture Content of Timber used for Different Purposes in Different Climatic Zones.

67. I. S. 383-1963—
Aggregates from natural sources for concrete.

68. I. S. 432-1966—in two parts with Amendment Nos. 1 and 2 to Part I.
Mild Steel and Medium Tensile Steel Bars and Hard-Drawn Steel Wire for Concrete Reinforcement.

69. I. S. 456-1964—
Code of Practice for Plain and Reinforced Concrete for General Building Construction.

70. I. S. 515-1964—
Natural and Manufactured, Aggregate for use in mass Concrete.

अनुक्रमणिका
Table of Contents

71. I. S. 533-1954—with Amendment Nos. 1 and 2.
Gum Spirit of Turpentine (Oil of Turpentine).

72. I. S. 712-1964 with Amendment Nos. 1 and 2.
Building Limes.

73. I. S. 800-1962—Amendment Nos. 1 and 2.
Code of Practice for use of Structural Steel in General Building Construction.

74. I. S. 883-1966—
Code of Practice for use of Structural Timber in Building (Material Grading and Design).

75. I. S. 1030-1962—Amendment No. 1.
Steel castings for General Engineering Purposes.

76. I. S. 1077-1966—
Common Burnt clay Building bricks.

77. I. S. 1124-1966—
Water absorption of Natural Building-Stone-method of test.

78. I. S. 1141-1966—
Code of Practice for Seasoning of Timber.

79. I. S. 1148-1964—Amendment No. 1.
Rivet Bars for Structural Purposes.

80. I. S. 1344-1968—
Surkhi for use in mortar and concrete.

81. I. S. 1542-1968—
Sand for plaster.

82. I S. 1624-1968—
Field testing of Building Lime and Lime Mortar.

83 I. S. 1785-1966—Part I.
Plain hard drawn steel wire for prestressed concrete.

84. I. S. 2090-1967—Part II.
High tensile steel bars used in prestressed concrete.

अनुक्रमणिका
Table of Contents



## A.1. LIME.

A.1.1. *General.*—The specification covers eminently hydraulic limes (in their hydrated states) and moderately hydraulic limes and fat limes in their unhydrated and hydrated states used in building construction.

A.1.2. *Classification.*—As per I. S. 712-1964, the Building limes shall be classified as—

*Class A.*—Eminently Hydraulic lime used for structural purposes.
*Class B.*—Semi-Hydraulic Lime used for masonry work.
*Class C.*—Fat lime used mainly for finishing coat in plastering, white washing and with suitable admixtures such as surkhi, or any other pozzolanic material, to produce artificial hydraulic mortar.

A.1.3. *Chemical Composition.*—For different classes of limes, the chemical composition shall be as per I. S. 712-1964.

A.1.4. *Physical Requirements.*—They shall comply with I. S. 712-1964 for class A, class B and class C limes. All impurities, ashes or pieces improperly burnt shall be screened or picked out before slaking. The lime shall be slaked with water not less than one week or more than two weeks before use. The slaked lime shall be screened through I. S. 240 sieve for mortar used for concrete or masonry and first coat of plaster and I. S. 120 sieve for second and third coats of plaster.

A.1.5. *Storage.*—Storage shall comply with I. S. 712-1964. The slaked lime if stored, shall be kept in a weather-proof and damp-proof closed shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. The lime shall be used when fresh, i.e., within 14 days of its removal from kiln.

All lime that has been in any way damaged by rain, moisture, dirt, air-slaking or any other cause shall be rejected and all rejected material shall be removed from the work site, forthwith.

A.1.6. *Sampling and testing.*—According to I. S. 712-1964. Somple of lime shall be got approved by the Engineer who shall keep it in his office for reference.

A.1.7. *Field Testing.*—According to I. S. 1624-1968.

A.1.8. *Measurement.*—When required to be measured, measurement shall be by volume with cu. metre as the unit.

## A.2. CEMENT.

A.2.1. *Cement.*—Cement shall conform to I. S. 269-1967.

The type of cement as to whether it shall be Ordinary Rapid Hardening or Low Heat shall be specified. When no type is specified, Ordinary Portland cement shall be used.

A.2.2. The weight of Ordinary Portland cement shall be taken as 144 kg. per cu. m. (90 lbs. per cubic foot) and Rapid Hardening Portland cement as 121 kg. per cu. m. (80 lbs. per c. ft.). The measurement of proportion of cement should normally be on the basis of weight and whole bags, each undisturbed and sealed 50 kg. bag being considered equivalent to 35 litres (1.2 cu. ft.) in volume. When part bag is required, cement shall be taken by weight. When the basis of mix. is by volume, cement will be taken by weight, assuming 35 litres to be equal to 50 kg. (1 c.ft. equal to 90 lbs.). Care should be taken to see that each bag contains full quantity of cement.

A.2.3. *Tests.*—When tests are considered necessary, they shall be carried out as indicated in I. S. 269-1967. The contractor should ensure that the cement is of sound and required quality before using it.

A.2.4. *Storage.*—Cement required for use shall be as fresh as possible and stored on planks raised 15 to 20 cm. (about 6″ to 8″) above the floor and stacked 30 cm. (about 12″) away from the walls in suitable closed weather-proof buildings at the work site or at the selected approved site, in such a manner as to prevent deterioration by dampness or moist atmosphere or intrusion of foreign matter. Cement shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt, *i.e.*, first received being first used. Not more than 15 bags shall be stacked vertically in one pile and maximum width of the piles should not be more than 3 metres (10′ approx). Any cement which has deteriorated, caked or which has been damaged shall not be used. Cement concerning which there is doubt shall not be used pending testing and satisfactory results. Cement that is condemned shall be immediately removed from the work site. When temporarily stored in the open for use within 48 hours, it shall be kept on a platform of planks about 15 cm. to 20 cm. (about 6″ to 8″) above ground and covered with a tarpaulin. Ordinary cement stored for more than 2 months from

अनुक्रमणिका
Table of Contents

A.4.4.

the date of receipt from the factory shall be subjected to test and used only if found satisfactory. The cost of tests shall be borne by the agency responsible for the storage after two months from receipt. Different kinds or brands of cement or cement of the same brand from different mills should be stored in separate groups and should not be mixed during use except when directed in writing by the Engineer. Cement shall be kept in a store under double locking arrangement so that it can be taken out or fresh stock admitted with the knowledge of supervising staff of the Department. A board indicating stock and daily transactions of cement shall be kept in each room of the cement store. Daily account of receipt and use of cement bags shall be maintained by the Contractor in the proforma approved by the Engineer. This shall be kept in the store for verification by the supervising Departmental staff. Copies of the records shall be supplied to the Engineer regularly.

A.2.5. The cement shall not be stored for unduly long periods. It should not be handled in such a way as to impair its strength or useful characteristics.

A.2.6. *Measurement.*—When required to be measured, measurement shall be by weight with tonne as the unit.

## A.3. SURKHI.

A.3.1. *Materials.*—Surkhi is to be made by grinding burnt bricks, brickbats, burnt clay balls, broken tiles or pottery to powder. The bricks, etc., to be used shall be prepared from selected clay approved by the Engineer. They shall be fully burnt and in no case under-burnt. The quality shall conform to I. S. 1344-1968.

A.3.2. *Preparation.*—(*a*) The surkhi to be used for surkhi cement mortar shall be prepared by grinding or pounding the burnt bricks, brickbats, burnt clay balls, broken tiles or pottery preferably in a mechanical disintegrater to a fine powder passing through I. S. sieve No. 9 with a residue not exceeding 10 per cent. by weight.

(*b*) For preparing surkhi for lime surkhi mortar, burnt bricks, brickbats or burnt clay balls shall first be broken to a size of 25 mm. to 40 mm. (about 1″ to 1½″). Surkhi need not be in the form of powder in this case but the brickbats shall be ground to powder in the ghani or mortar mill to pass through I. S. Sieve No. 100 while preparing the lime mortar.

A.3.3. *Storage.*—Surkhi shall be free from any admixture of clay, dust or any other foreign matter and shall be stacked in a closed shed on a brick paved, wood or other suitable platform so as to be adequately protected from such admixture. It shall be kept quite dry and clean and shall be well protected from rain and contact from any other water, dampness or atmospheric moisture.

A.3.4. *Measurement.*—When required to be measured, measurement shall be either by weight or by volume with tonne or cu. metre as the respective unit.

## A.4. NEERU.

A.4.1. *General.*—These specifications cover neeru to be used for plaster finishes in building work.

A.4.2. *Materials.*—(1) *Lime.*—Class C lime (i.e., pure fat lime) as mentioned in I. S. 712-1964 shall be used. Lime shall comply with specification No. A-1 in all respects.

(2) *Water.*—Water shall conform to specification No. A.5.

(3) *Sand.*—Sand shall conform to specification No. A.6.

All sand shall pass through I. S. sieve No. 60 (0.599 mm.).

A.4.3. *Preparation.*—Lime shall be slaked and mixed with sufficient water to form a thick paste. It shall be reduced to a fine paste by grinding. It shall then be passed through a fine sieve (3 mm. mesh) to remove all unslaked particles and foreign matter and allowed to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be allowed to run off. The slaked lime paste thus formed shall be used for preparing neeru.

The neeru shall be prepared by mixing together 4 parts of this lime paste and 1 part of fine sieved sand by volume. Jute fibre finely chopped shall be added to the above mortar at the rate of 4 kg. of jute to every cu. metre of lime-sand mixture (or 1 lb. of jute for every 4 c. ft. of lime-sand mixture). The mixture shall then be properly ground to a fine paste between two stones or a mill.

The neeru thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at a time.

A.4.4. *Measurement.*—When required to be measured, measurement shall be by volume with cu. metre as the unit.

## A.5. WATER.

(*a*) *Water for mixing cement/lime mortar or cement/lime concrete.*—Water for mixing cement/lime mortar or concrete shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil, acid and injurious alkali, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause afflorescence or attack the steel in R. C. C. Water shall be obtained from sources approved by the Engineer. Sources of water shall be maintained at such a depth and the water shall be withdrawn in such a manner as to exclude silt, mud, grass or other foreign materials. Containers for transport, storage and handling of water shall be clean.

If required by the Engineer, it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I. S. 269-1967. Any indication of unsoundness, change in time of setting by 30 minutes or more, or decrease of more than 10 per cent. in strength of mortar prepared with the water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water tested. Sea water shall not be used.

Water fit for drinking will generally be found suitable for mixing cement/lime mortar or concrete.

(*b*) *Water for curing cement/lime mortar or concrete.*—Water for curing mortar or concrete should not be too acidic or too alkiline. It should have a pH value ranging between 4.5 to 8.5. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces. Hard and bitter water containing more than 100 p. p. m. of sulphates shall not be used for curing purpose.

Sea water and water containing over 3 per cent. of chloride salts should not be used for curing reinforced concrete work.

Potable water will generally be found suitable for curing cement/lime mortar or concrete.

## A.6. FINE AGGREGATE.

A.6.1. *General.*—All fine aggregate shall conform to I. S. 383-1963 and relevant portion of I. S. 515-1959 as directed by the Engineer.

A.6.2. Sand for use in concrete work shall be natural sand or crushed stone screenings. Sand shall be clean, well graded, hard, strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soft or flaky particles, shale, alkali, salts, organic matter, loam, mica or other deleterious substances and shall be approved by the Engineer. The maximum size of particles shall be limited to 5 mm. (about 3/16″). Where best trap sand available in the region contains murum or laterite particles, such particles may be allowed up to 5 per cent. Zeolite crystals may also be permitted up to 4 per cent. If the fine aggregate contains more than 4 per cent. of clay, dust or silt it shall be washed. When the quality of fine aggregate is doubtful, it shall be tested for clay, organic impurities and other deleterious substances as laid down in I. S. 383-1963. It shall not contain deleterious materials in such quantity as to reduce the strength or durability of the mortar or concrete or to attack the reinforcement in the case of reinforced concrete work. Sea sand shall not be used.

A.6.3. The fine aggregate for concrete shall be graded within limits given in table III or table IV in paragraph 5-2 of the I. S. 383-1963. The fineness modulus may range between 2-6 to 3.6. If substitution of a certain quantity of stone screenings will improve the quality of concrete, the Engineer may allow it.

A.6.4. The fine aggregate for cement mortar for masonry and first coat of plaster should generally satisfy the following gradings:—

| I. S. sieve | Percentage by weight passing sieve |
|---|---|
| 480 | 100 |
| 240 | 80—95 |
| 120 | 70—90 |
| 60 | 40—85 |
| 30 | 5—50 |
| 15 | 0—10 |

The fineness modulus shall not exceed 3.0.

अनुक्रमणिका
Table of Contents



A.7.2.

A.6.5. The fine aggregate for cement mortar for fine joints of Ashlar masonry, pointing and second coat of plaster may have the following grading:—

| I. S. sieve | Percentage by weight passing sieve |
|---|---|
| 480 | 100 |
| 240 | 100 |
| 120 | 75—100 |
| 60 | 40—85 |
| 30 | 5—50 |
| 15 | 0—10 |

The fineness modulus shall not exceed 1.6.

I. S. 1542-1960 shall generally apply for sand for plaster.

A.6.6. *Gradation.*—The gradation of materials from any one source shall not vary in composition beyond the range of values that governs, in selecting source of supply. For determining the degree of uniformity, determination of fineness modulus shall be made upon representative samples furnished by the contractor from such sources as he proposes to use. Fine aggregate from any one source having a variation in fineness modulus greater than $\pm$ 0.20 from the average fineness modulus of the representative samples submitted by the contractor shall be rejected or may be accepted subject to such changes in the proportion of aggregate as the Engineer may direct.

A.6.7. *Storage.*—The fine aggregate should be stacked carefully on a clean, hard surface so that it will not get mixed up with deleterious foreign material.

Sand shall not be stacked in high conical heaps so that segregation of heavier particles by sliding down may be prevented. It shall be placed in layers not thicker than those resulting from lorry loads dumped on the same plane.

A.6.8. *Tests.*—The aggregate shall satisfy the tests referred to in I. S. 383-1963. Samples of sand to be used for a particular item shall be got approved by the Engineer who shall keep it in his office for reference.

A.6.9. *Royalty.*—The contractor shall be responsible for observing the laws, rules and regulations imposed under the Minor Minerals Act and such other laws and rules prescribed by Government Departments such as Forest and Revenue and by competent Local Authorities Royalty, etc. payable for securing the material shall be paid by the contractor subject to general conditions of contract.

Where rules permit refund of Royalty for use of the materials in Government work the Engineer will pass a certificate for the quantity so used.

No royalty shall be charged when the material is allowed to be obtained from Departmental quarry.

A.6.10. *Measurement.*—When required to be measured, measurement shall be by volume with cu. metre as the unit. No deduction shall be made for the voids.

## A.7. COARSE AGGREGATE.

A.7.1. Coarse aggregate shall consist of crushed or broken stone and be hard, strong, dense, durable, clean, of proper gradation and free from skin and coating likely to prevent proper adhesion of mortar. The aggregate shall generally be cubical in shape and as far as possible flaky, elongated pieces shall be avoided. It shall generally comply with the provisions of I. S. 383-1963 and I. S. 515-1959. Unless special stones of particular quarries are mentioned in the special provisions, aggregates shall be broken from the best trap/granite/quartzite/gneiss stones in that order available in the region and approved by the Engineer. Stone shall have no deleterious reaction with cement Shingle of the appropriate grading may be permitted to be substituted for some proportion of the metal without price adjustment if it is shown that thereby strength of concrete is increased and workability improved.

A.7.2. The maximum size of the aggregates may be up to 80 mm. (about 3″) and well graded between the sizes 5 m.m. to 80 mm. (about 3/16″ to 3″) in such proportions as to give maximum density to the concrete. The maximum size should be as large as possible within the above limit but should not exceed $\frac{1}{4}$ of the minimum thickness of the member, provided however this size presents no difficulty in the case of R. C. C., to surround the reinforcement thoroughly and fill up the corners of the form work satisfactorily. In the case of general concrete work, a maximum size of 40 mm. (about $1\frac{1}{2}$″) is used and in R. C. C. work a maximum size of 20 mm. (about $\frac{3}{4}$″) will be found satisfactory; but it should be restricted to 6 mm. (about $\frac{1}{4}$″) less than the minimum lateral clear distance between bars or 6 mm. (about $\frac{1}{4}$″) less than the cover, whichever is smaller.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



The crushing strength of aggregate will be such as to allow the concrete in which it is used to build up the specified strength of concrete.

A.7.3. Approximate range in grading of coarse aggregate may be as under:—

| Maximum size of aggregate (1) | Nominal range (2) | Percentage of coarse aggregate fraction: 40 mm to 80/mm (1½" to 3") (3) | 20mm to 8+0mm (¾" to 1½") (4) | 5mm to 20mm (3/16" to ¾") (5) | 10mm to 20mm (⅜" to ¾") (6) | 5mm to 10mm (3/16" to ⅜") (7) |
|---|---|---|---|---|---|---|
| 20 mm. (About ¾") | .. | .. | .. | 100 | 55—67 | 33—45 |
| 40mm. (About 1½") | .. | .. | 40—50 | 50—60 | 28—40 | 18—30 |
| 80mm. (About 3") | .. | 20—36 | 16—36 | 35—44 | 10—30 | 13—29 |

Grading tests shall be taken in the beginning and at change of source or machinery or type of metal. Where required by the Engineer, tests indicated in I. S. 3831963 and I. S. 456-1964 shall be got carried out in an approved laboratory at the contractor's cost to show the acceptability of the material.

A.7.4. Coarse aggregate of a porous nature where absorption of water after 24 hours' immersion in water, is more than 5 per cent. by weight, shall not be used.

A.7.5. Limits of deleterious substances shall not exceed those prescribed in 2.3.1.1 and 2.3.1.2. of I.S. 515-1959.

A.7.6. *Storage.*—The aggregates of different sizes shall be stored separately and handled in such a manner as to prevent intermixing of different sizes of aggregates required separately for grading purposes. No foreign matter shall be allowed to be mixed up with aggregates. If covered with dust, etc., they shall be washed clean before use.

A.7.7. *Royalty, etc.*—The contractor shall be responsible for observing the laws, rules and regulations imposed under the Minor Minerals' Act and such other rules prescribed by Government Departments such as Forest and Revenue and by competent Local Authorities. Royalty, etc, payable in connection with securing the materials shall be paid by the contractor subject to general conditions of the contract.

Where rules permit refund of Royalty for use of the materials in Government work, the Engineer will pass a certificate for the quantity so used.

The contractor shall be entirely responsible for operating existing quarries or opening new quarries including removal of over-burden and shall bear all costs pertaining to them.

In the case of Departmental quarries, operations shall be carried out in such a way that their further usefulness is not affected. No Royalty will be charged when the material is allowed to be obtained from a Departmental quarry.

When the quarries are not owned by the Department, the contractor shall be responsible for securing the written consent of the land owners for opening new quarries or working old ones and for payment of all compensation, Royalty, etc.

Samples of coarse aggregates required for the work shall be got approved by the Engineer both regarding quality and grading and shall be kept in the Engineer's office. The coarse aggregate to be used shall conform to those samples.

A.7.8. *Blasting.*—Blasting shall be carried out according to instructions laid down in specification No. B.2.

A.7.9. *Measurement.*—When required to be measured, the measurement shall be by volume with cu. metre as the unit. No deduction shall be made for voids.

## A.8. STONE FOR MASONRY.

A.8.1. Stone to be used in the masonry shall be trap, granite, quartizite, gneiss, laterite or any other type of good stones that may be specified in the item. In the absence of mention of a special type in the item or the special provision, good trap, granite, quartzite or gneiss stones in that order available in the region and known to be satisfactory in use in view shall be used. The stone shall stand weathering well and when immersed in water for 24 hours shall not absorb water more than 5 per cent. of its dry weight when tested according to I. S. 1124-1957. The stone of the required quality shall be obtained from quarries specified in the contract or quarries approved by the Engineer. All stones shall generally be freshly quarried,



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



A.8.8.

Laterite stone should be compact in texture and the mottled and streaked colours pervading it should not be very unevenly distributed. Those types in which white clay occurs should not be used as building stone. Laterite stones exposed to weather to harden for some time should be preferred. It should not be used where subject to great pressure and liable to be soaked with water.

A.8.2. *Quality of face stones.*—The stones to be used in the face shall be tough, hard, dense, sound and durable, resistant to weathering action, reasonably fine-grained, uniform in colour and texture and free from seams cracks or other defects which would adversley affect their strength, durability or appearance. They shall also be free from weathered portion and skin. The exposed faces shall be entirely free from any type of discoloration. Preferably stone shall be from a quarry the product of which is known to be of satisfactory quality in use. Stones shall generally be freshly quarried with clean faces and sharp edges all round and shall be of such a character that it can be wrought to such lines and surfaces, whether curved or plane as may be required. Size and shape of stones shall be as per the requirements of each item.

A.8.3. *Quality of rubble stones.*—Rubble stones for hearting shall be of approved quality, sound, hard, dense and durable, free from segregation, seams, cracks, weathered portions and other structudal defects or imperfections tending to affect their soundness and strength. Stones shall generally be freshly quarried with sharp edges and clean faces. They shall be free from rounded, worn or weathered surfaces or skin or coating which prevents the adherence of mortar. Size and shape of stone shall be as per the requirement of each item.

A.8.4. *Quality of other stones.*—Stones to be used as headers, pinheaders, quoins, copings, etc., shall comply with the reuirements of facing and hearting stones as may be relevant and shall further comply with the requirement of size and shape stipulated under the relevant item.

A.8.5. *Samples.*—Samples of stones to be used in the work shall be got approved by the Engineer before the work is started and such samples shall be maintained in the Engineer's office.

A.8.6. *Royalty, octroi duties, etc.*—Royalties, compensation, octroi duties, etc., payable in connection with securing the stones shall be paid by the contractor subject to conditions laid down in the general conditions of contract. The contractor shall be responsible for observing laws, rules and regulations imposed under the Minor Minerals Act and such other rules, etc., laid down by Government Departments and Local Authorities.

Where rules permit refund of royalty for use of the materials in Government work, the Engineer will pass a certificate for the quantity so used. No royalty will be charged when the materials are allowed to be obtained from Departmental quarries. In the case of Departmental quarries, operations will be carried out in such a way that their further usefulness is not affected.

The contractor will be entirely responsible for operating existing quarries or opening new quarries including removal of overburden and shall bear all costs pertaining to them.

Where the quarries are not owned by the Department the contractor shall be responsible for securing the written consent of the owners for opening new quarries and working old ones and for payment of all compensation, royalty, etc. The stones whatever their source shall be of the specified quality.

A.8.7. *Blasting.*—Blasting shall be carried out according to instructions laid down in specification No. B. 2.

A.8.8. *Measurement.*—When required to be measured, measurement shall be by volume, length of numbers as the case may be with cu. metre, metre and one as the respective unit.

In case of rubble the measurement shall be by volume of stacks without deductions for voids.

In case of Khandkies the measurement shall be by length.

In case of stones such as the quoins. arch stones, etc., the measurement shall be by numbers for specified sizes.

In case of stones such as the slabs, coping stones, etc., the measurement shall be by volumes for specified dimensions.



अनुक्रमणिका
Table of Contents

## A.9. BRICKS

A.9.1. *First-class Bricks.*—First-class bricks shall be of regular and uniform size, shape and colour, uniformly well burnt throughout but not overburnt. They shall have plane rectangular faces with parallel sides and sharp, straight and right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10 mm. depth on one of their flat faces.

A.9.1.1. They shall give a clear metalic ringing sound when struck.

A.9.1.2. They shall show a fine grained, uniform, homogeneous and dense texture on fracture and be free from lumps of lime, laminations, cracks, airholes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance or usefulness for the purpose intended. They shall not have any parts under-burnt. They shall not break when thrown on the ground on their flat face in a saturated condition from a height of 60 cm. (about 2′).

A.9.1.3. *Size.*—(*a*) The size of the conventional bricks may vary from $8\frac{3}{4}'' \times 4.3/16'' \times 2.5/8''$ (about 22.23 cm. × 10.64 cm. × 6.67 cm.) to $9'' \times 4\frac{1}{4}'' \times 3''$ (22.86 cm. × 10.80 cm. × 7.62 cm.). Only bricks of one standard size, shall be used on one work unless specially permitted by the Engineer. The following tolerances are permitted in the standard conventional size adopted on a particular work:—

Length—*plus* or *minus* 3 mm. (about 1/8″).
Breadth—*plus* or *minus* 1.5 mm. (about 1/16″).
Depth—*plus* or *minus* 1.5 mm. (about 1/16″).

(*b*) When I. S. bricks are used they shall comply with I. S. 1077-1966.

A.9.1.4. *Absorption.*—After immersion in water, absorption by weight shall not exceed 20 per cent. of the dry weight of the brick when tested according to I. S. S. No. 1077-1966.

A.9.1.5. *Crushing strength.*—The load to crush the brick when dry shall not be less than 43.7 kg./sq. cm. (about 40 tons per sq. ft.) and when thoroughly soaked, shall not be less than 32.8 kg./sq. cm. (about 30 tons per sq. ft.).

A.9.1.6. *Tests.*—When bricks are to be used in high load bearing walls, where the load coming on the walls is of the order of 4.37 kg. per sq. cm. (about 4 tons per sq. ft.) and more, where there is a doubt about the crushing strength of the bricks, the Engineer may order the compression tests as laid down in I. S. 1077-1966. If different kilns use different materials and methods of burning, one test shall be made for each group of kilns using the same type of materials and methods of burning. If the average strength is less than that mentioned in A.9.1.5, the bricks from the kiln represented by the sample shall be rejected. All tests shall be done at the cost of the contractor.

A.9.2. *Second-class bricks.*—(*a*) Second-class bricks shall be similar to first-class bricks except that they may be slightly overburnt and may not have very sharp edges. Tolerance in depth shall be *plus* or *minus* 3 mm. (about 1/8″). Absorption of water when immersed in water shall not exceed 22 per cent. when tested according to I. S. 1077-1966. Crushing strength may be 10 per cent. less than that prescribed for I class bricks.

All other provisions specified for first-class bricks shall also apply to second-class bricks.

(*b*) When I. S. bricks are used they shall comply with relative provisions for second-class bricks in I. S. 1077-1966.

A.9.3. *Sundried Bricks*—

A.9.3.1. *General.*—Sundried bricks shall be made from the same kind of clay as will give good bricks on being burnt. They shall be sand moulded. Special care shall be taken to see that the earth used for making sundried bricks is free from efflorescing salts and all traces of white ants. If cracks appear in drying they indicate too little sand and such bricks with cracks shall be rejected.

A.9.3.2. *Size.*—The bricks shall be normally of the size of conventional bricks or I. S. moulder size 19 cm. × 9 cm. × 9 cm. or of any other size ordered by the Engineer. Only bricks of one standard size shall be used on one work unless specially permitted by the Engineer. The bricks shall be of uniform size as far as possible. Their surfaces may not be quite plane or edges sharp. But the defect in uniformity of shape shall not be such as to cause difficulty in obtaining uniform courses, lines and levels with their use.

A.9.3.3. *Drying.*—All bricks shall be thoroughly dry before being used.

A.9.3.4. *Protection.*—Sundried bricks should be protected from rain and contact with water at all times. They should be handled and stacked carefully to avoid damage.

अनुक्रमणिका
Table of Contents



**A.11.1.**

A.9.3.5. *Tests.*—If bricks break on being thrown on their flat face on the ground from a height of about 30 cm. (12″), such bricks shall be rejected.

A.9.4. *Measurement.*—When required to be measured, the measurement shall be by numbers with 1,000 as the unit for all the above types of bricks.

## A.10 MILD STEEL BARS FOR REINFORCEMENT

A.10.1. *Material—Mild Steel reinforcement bars.*—Mild steel bar reinforcement for RCC work shall conform to I.S. 432-1966 and shall be of the tested quality of not less than Grade I. It shall also comply with the relevant part of I. S. 456-1964.

All the reinforcement shall be clean and fee from dirt, oil, paint, grease, mill scale or loose or thick rust at the time of placing.

The contractor shall produce a test certificate of the manufacturer.

If independent tests are considered necessary, they shall be carried out according to I. S. 1521 and 1608-1960. The cost of such tests shall be borne by the contractor if the results are unsatisfactory and by the Department if the results are satisfactory. In case of untested steel, the cost of the tests shall invariably be borne by the contractor.

Bars or rods rerolled from scrap steel shall not be used unless tests show that they fully comply with the I. S. 432-1966.

A.10.2. *Storage.*—Reinforcement steel shall be stored above ground surface upon platforms, skids or other supports to avoid distortion and sags of long lengths and shall be protected as far as practicable, from surface deterioration by direct contact with undesirable elements or by exposure to conditions producing rust and corrosion. All bars of the same designation shall be stacked separately in racks and distinctly marked.

A.10.3. *Measurement.*—When required to be measured, measurement shall be by weight with quintal or tonne as the unit. The bars may be directly weighed or the weights shall be calculated according to standard weights mentioned in the ISI Hand Book correct up to 0.10 kg.

## A.10. (*a*) HIGH TENSILE STEEL BARS

The high tensile steel bars for use in prestressed concrete work shall conform to I. S. 2090-1962.

The storage shall conform to A.10.2.

The tensile strength of the high tensile steel bars shall be as specified in the special provisions of the item. In the absence of the given strength the minimum ultimate strength shall be taken as 100 kg./sq. mm. (about 63.497 tons/sq. inch).

Measurement shall conform to A.10.3.

## A.10. (*b*) HIGH TENSILE STEEL WIRES

The high tensile steel wires for use in prestressed concrete work shall conform to I. S. 1785-1967.

The storage shall conform to A.10.2.

The tensile strength of the high tensile steel wires shall be as specified in the special provisions of the item. In the absence of the given strength the minimum ultimate strength shall be as given in para. 6-1 of the I. S. 1785-1967.

Measurement shall conform to A.10.3.

## A.10. (*c*) CRIMPED OR INDENTED HIGH TENSILE WIRES.

The crimped or indented high tensile steel wires for use in prestressed concrete work shall conform to the physical characteristics specified in I. S. 1785-1967.

The storage shall conform to A.10.2.

Measurement shall conform to A.10.3.

## A.11. STRUCTURAL STEEL

A.11.1. All structural steel shall conform to I. S. 226-1962 and I. S. 800-1962. The steel shall be free from defects mentioned in I. S. 226-1962 and shall have a smooth uniform finish. It shall be straightened if necessary, in the mill before shipment. Material shall be free from loose mill scale, rust-pits or other defects affecting its strength and durability. Rivet bars shall conform to I. S. 1148-1964.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



A.11.2. *Storage.*—Structural steel shall be stored above surface of the ground upon platforms, skids or other suitable supports to avoid distortion of sections in long length and shall be protected as far as practicable from surface deterioration by direct contact with harmful elements or exposure to conditions producing rust and corrosion. It should be so stored and handled that the material will not be subject to excessive stress and damage.

A.11.3. *Straightening.*—All deformed structural material will be properly straightened by methods which are not injurious prior to being laid off, punched or otherwise worked in the shop. Sharp kinks and bends shall be cause for rejection.

A.11.4. *Tests.*—When the steel is supplied by the contractor, test certificates of the manufacturers shall be produced. If further tests be necessary, they will be done according to I. S. 226-1969 and I. S. 1521-1960, 1608-1960 ; the cost of such tests will be borne by the Department if the results are satisfactory and by the contractor if the results are unsatisfactory.

A.11.5. *Measurement.*—The sections shall be supplied in specified exact lengths, smoothly cut to the required lines. The lengths of sections shall be measured correct to a centimetre and weight calculated on the basis of standard weights prescribed by I. S. I. for each relevant section correct up to 0.10 of a kg. Tolerances mentioned in I. S. 226-1969 shall be applicable unless other tolerances are prescribed in the specifications of any particular item.

The contract rate shall be for a unit of one quintal (220 lbs. approx.) or one tonne (2,200 lbs. approximately.).

## A.12. CAST STEEL

12.1. *General.*—The specifications cover the requirements of cast steel for engineering castings such as its chemical composition, physical and mechanical properties, casting process, rectification of the defects, heat treatment, finishing, tests, etc.

The cast steel shall conform to I. S. 1030-1962.

A.12.2. *Measurement.*—When required to be measured, measurement shall be by weight with quintal or tonne as the unit. Weight shall be recorded correct up to 0.1 kg.

## A.13. CAST IRON

A.13.1. *General.*—The specification covers the requirements of cast iron for Engineering purposes regarding its process of manufacture, chemical composition, moulding, freedom from defects, different tests, inspections, etc.

A.13.2. *Grey Iron castings.*—Grey Iron castings shall comply fully with I. S. 210-1962. The maximum percentage of phosphorous and sulphur may be specified by the Engineer if so required for a particular job.

All cast iron used on the work shall be of the best, tough, close grained, grey metal, clean, sound without admixture of deleterious matter and castings true to section with the required thickness of metal throughout conforming to design, free from air holes, sand holes, flaws, distoration or defects of any kind and with sharp or rounded edges where so shown on plans and with an even surface. The fracture should show a uniformly diffused dark grey colour having a good lustre. It shall be sufficiently soft to admit of being cut by either chisel or drill and shall be machinable by the normal methods for the grade of iron concerned. The castings shall be true to pattern in form and dimensions, out of windings, with sharp arrises, free from pouring faults, sponginess, cracks, blow holes and other defects in positions affecting their strength and value for the service intended. Castings shall be boldly filled at angles and the curves shall be perfect as shown in the plans.

The parts requiring machining shall have to be oversize so that dimensions of the machined and finished parts may conform to those shown in the plans.

Stopping or plugging with lead, putty or paint shall be prohibited. Castings shall not be painted until they have been passed by the Engineer.

Holes for bolts, etc., shall be drilled out or cast in the castings as may be directed in each case.

*Tests.*—Tests shall comply with I. S. 210-1962.

A.13.3. *Malleable Iron Castings.*—Malleable Iron Castings shall comply with I. S. 2107-1962 and 2108-1962 and additional provisions included in specification No. A.13-2.

A.13.4. *Measurement.*—When required to be measured, measurement shall be by weight with quintal or tonne as the unit. Weight shall be recorded correct up to 0.1 kg.

अनुक्रमणिका
Table of Contents

A.14.6.

## A.14. WROUGHT IRON

A.14.1. *General.*—These specifications cover the requirements of wrought iron for Engineering purposes.

A.14.2. *Grades.*—Wrought iron shall be of grade A, B or C according to the results of tests which they satisfy for strength and elongation mentioned below under "tests". The Engineer shall specify the grade. When not specified grade 'B' shall be used.

A.14.3. *Chemical composition.*—The iron shall not contain more than 0.1 per cent. of manganese for Grade A and not more than 0.15 per cent. for Grade B. The carbon shall not exceed 0.15 per cent. in the iron.

A.14.4. *Freedom from defects.*—Wrought iron shall be well and cleanly rolled to dimension specified by the Engineer and shall be sound and free from flaws, cracks, blisters, scales, laminations and other defects.

A.14.5. *Tests*—(1) *Tensile tests.*—The results of tensile tests for grade A and B should give a tensile strength of 33 kg./sq. mm. to 37.8 kg./sq. mm. (21 to 24 tons per square inch) for rounds and squares up to 50 mm. (about 2") diameter or side and flats and angles, and 31.5 kg./sq. mm. to 37.8 kg./sq. mm. (20 to 24 tons per sq. inch) for rounds and squares 62 mm. (about 2½") diameter or side and over, and plates with the grain. For plates across the grain these figures should be 26.8 kg./sq. mm. to 33.1 kg./sq. mm. (17 to 21 T/sq. inch). For Grade C, the tensile strength of rounds and squares up to 50 mm. (about 2") diameter or side should be 33.1 kg./sq. mm. to 39.4 kg./sq. mm. (21 to 25 T/sq. inch) and the same strength for flats 100 mm. (4") wide and up to 12 mm. (about ½") thick and angles up to 12 mm. (about ½") thick.

For other sizes and plates along the grain, the tensile strength should be 31.5 kg./sq. mm. to 37.8 kg./sq. mm. (20 to 24 T/sq. inch). For plates across the grain this strength should be from 26.8 kg./sq. mm. to 33.1 kg./sq. mm. (17 to 21 T/sq. inch).

The grades vary in elongation per cent. under test, the Grade A giving the greatest minimum elongation per cent. and the greatest minimum reduction of area per cent. of original area and Grade C the least. For Grades A and B the elongation on 20 cm. (about 8") long specimen shall not be less than 20 per cent. for 50 mm. (about 2") diameter or less, and not less than 25 per cent. for over 50 mm. (about 2") diameter.

(2) *Cold bend test.*—The test piece shall, without showing signs of cracks or fracture on the outside of the bend, withstand being bent cold through an angle of 180° round a former having a diameter equal to the diameter or thickness of the test piece, until the limbs of the test piece are parallel for Grade A. For Grade B, the former shall have a diameter equal to 1½ times the diameter or thickness for the same test and for Grade C with the same former thickness, the bending will be through 90° only for all round and square bars and for flats up to 32 mm. (about 1¼") thick. For flats over 32 mm. (about 1¼") thick, the former is twice the thickness of test piece and the bending is through an angle of 135°.

*Bending angles.*—The bending round a former 25 mm. (about 1") diameter and angles of bending shall be as under:—

| Thickness of [illegible] | 6 mm (¼") | 10 mm (⅜") | 12 mm (½") | 16 mm (⅝") | 20 mm (¾") | 22 mm (⅞") | 25 mm (1") |
|---|---|---|---|---|---|---|---|
| | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *With grain*— | | | | | | | |
| Grade A .. | 90° | 62° | 45° | 34° | 28° | 23° | 20° |
| Grade B .. | 80° | 58° | 42° | 32° | 25° | 22° | .. |
| Grade C .. | 70° | 50° | 35° | 27° | 21° | 17° | .. |
| *Across Grain*— | | | | | | | |
| Grade A .. | 40° | 28° | 20° | 14° | 12° | 9° | 6° |
| Grade B .. | 35° | 25° | 17° | 13° | 10° | 8° | .. |
| Grade C .. | 30° | 20° | 15° | 12° | 10° | 7° | .. |

(3) *Nick and Bend Test.*—In Grades A and B, a test piece lightly and evenly nicked on one side and bent steadily should show fibres free from slag, dirt or coarse crystalline spots or streaks.

A.14.6. *Measurement.*—When required to be measured, measurement shall be by weight with quintal or tonne as the unit. The wrought iron may be directly weighed or weights shall be calculated correct up to 0.10 kg. according to standard weights mentioned in the I. S. I. Hand Book for mild steel standard sections and further reduced by the factor 0.98 for corresponding wrought iron sections.

अनुक्रमणिका
Table of Contents



## A.15. MILD STEEL BINDING WIRE

A.15.1. The mild steel wire shall be of 1.63 mm. or 1.22 mm. (16 or 18 gauge) diameter and shall conform to I. S. 280—1962.

The use of black or galvanised wire will be permitted for binding reinforcement bars. It shall be free from rust, oil, paint, grease, loose mill scale or any other undesirable coating which will prevent adhesion of cement mortar.

A.15.2. *Storage.*—The wire coils shall be stored above ground on platform or other supports and protected from surface deterioration by direct contact with harmful elements or by exposure to conditions producing rust or corrosion.

A.15.3. *Measurement and Payment.*—No measurements will be taken of the wire used for tying reinforcement bars. The rate for reinforcement steel and its fabrication shall include the cost of the binding wire.

A.15.4. *Measurement.*—When required to be measured, measurement shall be by weight with quintal or tonne as the unit. The wire shall be weighed correct up to 0.10 kg.

## A.16. TIMBER

A.16.1. *General.*—The specifications cover the requirements of good quality timber to be used for various works. When the kind of wood is not specially mentioned, good Indian teak (Tectona Grandis) alone shall be used.

A.16.2. *Quality.*—Timber to be used in building works shall be from the heart of a sound tree of mature growth, the sapwood being entirely removed. It shall be uniform in substance, straight in fibre, free from large, loose, dead or cluster knots, flaws, shakes, warp, cup, spring, twist, bends or defects of any kind. It should be free from spongy, brittle, flaky, or brushy condition, sapwood and borer holes.

All timber shall be seasoned and be free from decay, rot, harmful fungii and insect attacks and from any other damage of harmful nature which will affect the strength, durability, appearance or its usefulness for the purpose for which it is required.

A.16.3. *Colour.*—The colour should be uniform as far as possible, the darkness of colour amongst coloured species of timber being generally a sign of strength and durability.

A.16.4. *Kinds.*—Timber shall be of the species mentioned in the tender items. Normally for doors, windows, roof, scantlings, trusses, etc., in all permanent and first class works, Indian Teak Wood (*Tectona Grandis*) of the best quality like that from Dandeli, Ballarshah, and Bulsar shall be used. Properly seasoned and treated Nana (*Lagarstroemia Lanceolata*) wood can be used as an alternative to teak wood when so specified. Adequately seasoned and properly treated timber of Haldu (*Adma Cardifolia*), Anjan (*Hardwickia binata*) and Bijasal (*Pterocarpus marsupium*) can be used in place of teak for specified items of wood work when so stipulated in the tender. Seasoned rose wood (*Dalbergia Latifolia*) can be used for internal fittings for first class work and furniture. Where junglewood or hardwood is mentioned for interior or temporary works and where economy is the sole consideration, following species of timber may be used:—

| Serial No. (1) | Trade Name (2) | Botanical Name (3) |
|---|---|---|
| 1 | Poon .. .. .. | *Calophyllum spp.* |
| 2 | Pali .. .. .. | *Dischopsis spp.* |
| 3 | Silver oak .. .. .. | *Grevillea Robusta A (unn).* |
| 4 | Bija Sal .. .. .. | *Pterocarpus Marsupium.* |
| 5 | Sal .. .. .. | *Sborea Rubusta Gaertn.* |
| 6 | Kindal .. .. .. | *Terminalia Paniculata.* |
| 7 | Laurel or Ain .. .. | *Terminalia Tomentosa.* |
| 8 | Kalam .. .. .. | *Mitra gynana paryifolia.* |
| 9 | Dhaura .. .. | *Anogeissuc lifolia wall.* |
| 10 | Haldu .. .. .. | *Adiona Cordifolia Hoop.* |
| 11 | White cedar .. .. | *Dyso Xylum Malabaricum.* |
| 12 | Benteak or Nana .. .. | *Lager spoemia Lanceolata.* |
| 13 | Mundani .. .. .. | *Acrocarpus Trascinefolious* |
| 14 | Gurjun .. .. .. | *Ritecracarpus Indicus* |
| 15 | Malabar Red Pine .. .. | (*Piney*) (*Hardwickia Pinnata*) |
| 16 | Dhaman .. .. .. | *Grewia filia folia.* |
| 17 | Jamba .. .. .. | *Xylia Xylocarpa.* |
| 18 | Anjan .. .. .. | *Hard wickia binata.* |
| 19 | Salai .. .. .. | *Boswelia serata Raxb.* |

अनुक्रमणिका
Table of Contents

**A.16.12.**

The samples of species to be used shall be deposited by the contractor in the office of the Engineer.

A.16.5. *Seasoning.*—Only properly seasoned timber shall be used for first class work. Seasoning of timber shall be judged from its moisture contests as laid down in I. S. 287-1960. The timber should be well seasoned in the log before being cut into scantlings and thereafter also in scantlings as long as possible. Care must be taken to see that warping or cracking does not set in during seasoning.

The maximum permissible moisture contents for timber for various purposes shall be as under:—

*Climatic Zones as per I. S. 287—1960.*

| | Zone I Dry Area Annual rainfall below 50·0 cm. (20″) | Zone II Moderately Dry Area Annual rainfall 50·0 cm. to 100 cm. (20″ to 40″) | Zone III Moderately Humid Area Annual rainfall 100 cm. to 200 cm. (40″ to 75″) | Zone IV Humid area Annual rainfall over 200 cm. (75″) |
|---|---|---|---|---|
| | Moisture content (Percent of, over dry weight of timber). | | | |
| (1) | (2) | (3) | (4) | (5) |
| (*a*) For roof and floor timbers, roof and weather boarding and other carpenter's work. | 12 | 14 | 17 | 20 |
| (*b*) For joinery including frames, stair-cases, moulding and other joiner's work. | 10 | 12 | 14 | 16 |
| (*c*) Floor and match boarding | 8 | 10 | 10 | 12 |

*Note.*—The above limits may be relaxed for timber intended for temporary construction such as shorings from work, bullies, and the like.

A.16.6. *Grading.*—Grading for structural timber shall be as per clause 5 of I.S. 883-1966.

A.16.7. *Stacking.*—As soon as the foundations of a building are laid, all necessary timber scantlings shall be brought to site and stacked as laid down generally in I. S. 1141-1966 and kept under cover and allowed to remain till required.

A.16.8. *Inspection.*—Timber for building work shall not be wrought until seen and approved by the Engineer, who may reject defetive timber shall be immediately removed from the site of work. Any effort like plugging, painting, using any adhesives or resinous materials to hide defects shall render the pieces rejectable by the Engineer. Timber presented for inspection shall be clean and free from dust, mud, paint or other material which may conceal the defects. Cut off ends for protection can be done after inspection with raw linseed oil or any other material approved by the Engineer. No timber work shall be painted, tarred or oiled without the previous permission of the Engineer.

A.16.9. *Sawing.*—All scantlings, planks, etc., shall be sawn in straight lines and planes and of uniform thickness and of full measurement from end to end and shall be sawn in the direction of the grain. They shall be sawn with such sufficient margin as to secure specified dimensions, lines and planes after being wrought.

A.16.10. *Tolerances.*—The Engineer may allow tolerances in the defects permissible as per I. S. 883-1966, clause 5.2 and table II in it, if in his opinion any particular permissible defect does not reduce the usefulness of the piece for the purpose for which it is required. The tolerances for defects shall be mentioned in the specifications for individual item of wood work.

Maximum slope of grain shall range between 1 in 10 and 1 in 20 as per I. S. 883-1966, clause 4.2.3.

A.16.11. *Rejected timber.*—Any timber rejected shall at once be removed from the site of works.

A.16.12. *Classification.*—Timber shall be classified as—

(*a*) Logs round, square or rectangular when the felled timber is not at all processed or when it is only partially hewn to a square or rectangular shape on the outside. Quantity is measured in cubic metres.

(*b*) **Pole or post-natural** felled timber without any processing, is classified according to the midgirth or middiameter or according to the girth or diameter at top and bottom excluding bark in each case. These are measured in metres in groups of each girth or diameter.

(*c*) *Planks.*—When the thickness of the sawn scantling is less than 5 cms. (about 2″) and width is more than 5 cm. (about 2″), they are classified as planks.

Quantity is measured in cubic metres or square metres with specified thickness.

(*d*) *Battens.*—When the thickness and width are each less than 5 cm. (about 2″) these are classified as battens and supply is measured in metres only and completed item in sq. metres.

(*e*) *Scantlings.*—Sawn scantlings of dimensions other than the above. These are measured in cubic metres.

## A.17. OIL PAINTS

*General.*—The specifications cover the requirements for oil paint to be used as a finishing material with respect to its composition, form, condition and tests to be carried out. Unless expressly permitted in the special provisions or directed by the Engineer, nothing but ready mixed (factory mixed) paints satisfying the I. S. specifications for the particular paint shall be used. But in cases when the Engineer permits use of stiff paints, the procedure for preparing paints shall be as described in the specifications given below in A.17.b.

All paints, thinners, etc., should preferably be kept in a separate store that is well ventilated and free from excessive heat, sparks, flame or direct rays of the sun.

## A.17.a. READY MIXED PAINTS

A.17.a.1. *Material.*—The paint shall be of the specified colour and shade and approved by the Engineer. The paint shall comply in all respects with relevant Indian Standard form:—

I. S. 105, 107, 111 to 116, 130 to 132, 134, 149 to 153, 159 and 163—1950.

I. S. 108, 135, 136—1952.

I. S. 102 to 104, 106, 118 to 129—1962.

I. S. 117—1964.

I. S. 133, 137, 148, 154 to 157—1965.

I. S. 109, 110, 158, 161, 162—1968.

the exact reference depending on choice of paint, the specified purpose to be served such as under-coating, finishing, exterior or interior painting and mode of application of paint like spraying and brushing. The detailed specifications for any item on painting shall mention the mode of application of paint. If mode is not mentioned application shall be with brushes.

Except as otherwise required in the cited specifications, all paints shall meet the following general requirements:—

(1) The paint shall not show excessive settling in a freshly opened full can and shall easily be redispersed with a paddle to a smooth, homogeneous state. The paint shall show no curdling, livering, caking or colour separation and shall be free from lumps and skins.

(2) The paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies when applied to smooth steel vertical surfaces at a rate of 10 sq. m. per litre (about 500 sq. ft. per gallon).

(3) The paint shall not skin within 48 hours in a three quarters filled closed container.

(4) The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other surface imperfections. The paint shall show no streaking or separation when flowed on clean glass.

(5) All vehicles shall be free from rosin and rosin derivatives. They may contain additional agents such as anti-skinning and wetting aids.

The paints shall be supplied in strong, substantial containers, clearly marked with the ready mixed weight and volume of paint content together with colour the name and address of the manufacturer. They shall not be opened until actually required for use. Paints from containers which have been opened shall be used first.

अनुक्रमणिका
Table of Contents



**A.17.b.4.**

A.17.a.2. *Use.*—Ready mixed paint shall be used exactly as received from the manufactures and generally according to their instructions and without any admixtures whatsoever except with the previous approval of the Engineer.

A.17.a.3. *Tests.*—In case of doubt regarding the quality, the paints supplied by the contractor shall be tested in an approved laboratory as described in I. S. 101-1964 if considered necessary by the Engineer. The cost will be borne by the Department if the paint satisfies the specifications and by the contractor if otherwise.

## A.17.b. OIL PAINTS PREPARED ON SITE

A.17.b.1. *Material.*—(1) *Oil paste.*—Oil pastes to be used to prepare oil paints shall comply in all respects with the relevant Indian Standards from I. S. 86 to I. S. 100 all of 1950—depending on the choice of colour and requirement in respect of chemical composition.

(2) *Linseed oil.*—Raw linseed oil shall comply with I. S. 75-1950. Boiled linseed oil shall comply with I. S. 17-1950 and pale boiled linseed oil shall comply with I. S. 77-1968.

(3) *Turpentine.*—Turpentine shall comply with I. S. 533-1954.

Oil paste, linseed oil and turpentine shall be supplied in strong and substantial containers clearly marked with the name, weight and volume of content of the material together with the name and address of the manufacturers.

A.17.b.2. *Preparation of Paint.*—The oil paste shall be mixed with a mixture of (pale boiled, boiled or raw) linseed oil and turpentine (mixed in proportion of about 3:1). Mixing shall be done thoroughly so as to produce a paint of uniform consistency suitable for application by brushing. If there are any undissolved particles or impurities, the paint should be screened through an approved strainer or canvas cloth to exclude them. The brushing consistency shall be such that when the paint is applied to a smooth and clean vertical steel surface, there shall be no running, streaking and sagging of the paint during the time required to dry. In case a flat finish is desired for the final coat, a little more turpentine shall be added to the paint.

A.17.b.3. *Tests.*—In case of doubt regarding the quality, the oil pastes shall be tested as described in I. S. 85-1950 and linseed oil and turpentine shall be tested as described in the respective I. S. mentioned above. The cost will be borne by the Department if the material satisfies the specifications and by the contractor if otherwise.

A.17.b.4. *Measurement.*—When required to be measured, measurement shall be by volume with litre as the unit for liquid and semi liquid paints and by weight with kg. as unit for stiff pastes.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# SECTION B

# STANDARD SPECIFICATIONS

# FOR

# GENERAL ITEMS.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## SECTION B

## General Items

CONTENTS


| | | Page No. |
|---|---|---|
| 1. | List of Indian Standard referred to .. .. .. .. .. .. | 23 |
| 2. | *Specification for General Items*— | |
| B.1. | Excavation .. .. .. .. .. .. .. .. | 24 |
| B.2. | Blasting .. .. .. .. .. .. .. .. | 27 |
| B.3. | (*a*) Lime mortar .. .. .. .. .. .. .. .. | 28 |
| | (*b*) Lime surkhi mortar .. .. .. .. .. .. .. | 29 |
| | (*c*) Lime mortar gauged with cement .. .. .. .. .. | 29 |
| B.4. | Lime concrete .. .. .. .. .. .. .. .. | 30 |
| B.5. | (*a*) Cement mortar .. .. .. .. .. .. .. | 31 |
| | (*b*) Cement surkhi mortar .. .. .. .. .. .. | 31 |
| B.6. | Ordinary cement concrete for plain and RCC work .. .. .. | 32 |
| B.7. | Controlled cement concrete .. .. .. .. .. .. | 37 |
| B.8. | (*a*) Burnt Brick masonry I class in lime/cement mortar .. .. | 39 |
| | (*b*) Burnt Brick masonry II class in lime/cement mortar .. .. | 41 |
| B.9. | Stone masonry (General) .. .. .. .. .. .. | 41 |
| | (*a*) Ashlar Fine tooled masonry .. .. .. .. .. .. | 44 |
| | (*b*) Ashlar Rough tooled masonry .. .. .. .. .. | 46 |
| | (*c*) Ashlar Rock faced masonry .. .. .. .. .. .. | 47 |
| | (*d*) Ashlar Chamfered masonry .. .. .. .. .. .. | 48 |
| | (*e*) Ashlar Block-in-course masonry .. .. .. .. .. | 48 |
| | (*f*) Random Rubble masonry 1st sort .. .. .. .. .. | 48 |
| | (*g*) Random Rubble masonry 2nd sort .. .. .. .. .. | 50 |
| | (*h*) Coursed Rubble masonry 1st sort .. .. .. .. .. | 50 |
| | (*i*) Coursed Rubble masonry 2nd sort .. .. .. .. .. | 52 |
| | (*j*) Coursed Rubble masonry 3rd sort .. .. .. .. .. | 53 |
| | (*k*) Uncoursed Rubble masonry .. .. .. .. .. .. | 54 |
| | (*l*) Laterite masonry .. .. .. .. .. .. .. | 56 |
| B.10. | Mild Steel bar Reinforcement for RCC work .. .. .. .. | 57 |
| B.11. | Cement plaster .. .. .. .. .. .. .. .. | 60 |
| B.12. | Lime plaster .. .. .. .. .. .. .. .. | 61 |
| B.13. | Cement pointing .. .. .. .. .. .. .. .. | 62 |
| B.14. | RCC cast-in-situ piles through driven shells .. .. .. .. | 62 |
| B.15. | RCC. cast-in-situ bored piles .. .. .. .. .. .. | 65 |
| B.16. | RCC precast piles .. .. .. .. .. .. .. | 67 |
| B.17. | Load tests of piles .. .. .. .. .. .. .. | 71 |
| B.18. | Welding .. .. .. .. .. .. .. .. .. | 72 |
| B.19. | Structural steel work .. .. .. .. .. .. .. | 75 |
| B.20. | Wood work .. .. .. .. .. .. .. .. | 76 |
| B.21. | Oil painting .. .. .. .. .. .. .. .. | 78 |


अनुक्रमणिका
Table of Contents

*List of Indian Standards referred to.*

1. I. S. 456-1964—with Amendment No. 1, 2, 3 and 4.
   Code of Practice for Plain and Reinforced Concrete for General Building Construction.
2. I. S. 800-1962—Amendment Nos. 1 and 2.
   Code of Practice for use of Structural Steel in General Building Construction.
3. I. S. 814-1967—Amendment No. 1.
   Covered Electrodes for Metal Arc Welding of Mild Steel.
4. I. S. 816-1956—
   Code of Practice for use of Metal Arc Welding for General Construction in Mild Steel.
5. I. S. 818-1968—
   Code of Practice for Safety and Health Requirements in Electric and Gas Welding and Cutting Operations.
6. I. S. 1148-1964—Amendment No. 1.
   Rivet Bars for Structural Purposes.
7. I. S. 1278-1967—
   Filler Rods and Wires for Gas Welding.
8. I. S. 1323-1966—
   Code of Practice for Oxy-Acetylene Welding for Structural Works in Mild Steel.
9. I. S. 1477-1959—Amendment No. 1.
   Finishing of Iron and Steel in Buildings, Painting and Allied Finishes: Part I Operations and Workmanship.
10. I. S. 1624-1963—Part II.
    Field Testing of Building Lime and Lime Mortar, Code of Practice for.
11. I. S. 851-1957—
    Synthetic Resin Adhesives for Construction Work in Wood.
12. I. S. 852-1957—Amendment No. 1.
    Animal Glue.

B.1.6.

## B.1. EXCAVATION.

*Excavation for foundation including shoring and strutting as necessary and disposing of excavated stuff as directed.*

*General.*—The excavation will generally refer to open excavation of foundation wet or dry.

B.1.1. *Clearing site.*—The site on which the structure is to be built shown on the plan and the area required for setting out and other operations should be cleared and all obstructions, loose stones, materials and rubbish of all kinds, stumps, brush wood and trees removed as directed, roots being entirely grubbed up. The materials obtained will be the property of Government and materials pronounced useful by the Engineer will be conveyed and properly stacked as directed within the specified lead. Useless materials will be burnt or otherwise disposed of as directed by the Engineer.

B.1.2. *Setting out.*—After clearing the site, the centre lines will be given by the Engineer and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc., and maintain them as long as required true to line, curve, level and slopes. The contractor will assume full responsibility for alignment, elevation and dimension of each and all parts of the work. Labour, materials, etc., required for setting out and establishing Bench Marks and other reference marks shall be arranged by the contractor at his own cost.

B.1.3. *Excavation.*—Foundation excavation shall include removal of all materials of whatever nature and whether wet or dry, necessary for the construction of foundation and substructure exactly in accordance with the lines, levels, grades and curves shown on the plans or as directed by the Engineer. It shall be taken to the exact width of the lowest step of the footing and the sides shall be left plumb where the nature of soil admits it. Unless there is a specific extra provision in the contract for shoring or for cutting side slopes, contractor shall at his own cost do the necessary shoring or cutting of slopes to a safe angle or both as approved by the Engineer when the strata need such treatment. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purposes of measurements before the ground is disturbed.

B.1.4. *Preparation of foundation for footing.*—The bottom of foundation shall be levelled both longitudinally and transversely or stepped as directed by the Engineer. Before footing is laid, final surface should be slightly watered and rammed. If any soft patches come to light on inspection or ramming, these shall be dug out and dealt with as ordered by the Engineer. No filling will be allowed to bring the foundation to level. If by contractor's mistake, excavation is made deeper than shown on the plans or ordered by the Engineer, the extra depth shall be made up with concrete or masonry of the foundation grade as directed by the Engineer and at the cost of the contractor. All rock or other hard foundation shall be cleaned of all soft and loose material and cut to a firm surface, either level, stepped or serrated as directed by the Engineer. The elevation of the bottom of foundation shown on the plan will be considered as approximate only and the Engineer may order such changes in the dimensions and elevation of foundation as may be deemed necessary to secure satisfactory foundation.

After each excavation is completed the contractor shall notify the Engineer to that effect and no footing will be allowed to be laid until the Engineer has approved the depth and dimensions of excavation and the nature of the foundation material and the levels and/or measurements are recorded.

B.1.5. *Shoring.*—Unless separately provided for in the contract, excavation of slopes to prevent falling in of sides or providing, fixing, maintaining and removing shoring, bracing, etc., shall not be paid for. The contractor would be responsible for the design of shoring for the excavation to be properly upheld. Shoring shall be of sufficient strength to resist side pressure and ensure safety from slips and blows and to prevent damage to work and property and injury to persons. It shall be removed as directed after all the items for which it is required are completed.

B.1.6. *Protection.*—Near towns and all frequented places foundation pits, well pits and similar excavation shall be strongly fenced and marked with red lights at night in charge of watchman to avoid accidents. Adequate protective measures shall be taken to see that the foundation excavation does not affect or damage adjoining structures. All measures required for the safety of the excavation, the people working in and near the foundation trenches, property and the people in the vicinity shall be taken by the contractor at his own cost, he being entirely responsible for any injury to life and damage to property caused by his negligence or accident due to his constructional operations.

अनुक्रमणिका
Table of Contents



B.1.7. *Disposal of excavated materials.*—No materials excavated from foundation trenches of whatever kind they may be, are to be placed even temporarily nearer than 1.5. m. (5' approximately) or greater distance prescribed by the Engineer from the outer edge of excavation. All materials excavated will remain the property of Government. Rate for excavation, includes sorting out of useful materials and stacking them separately as directed within the specified lead. Materials suitable and useful for backfilling or other use shall be stacked in convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or the elevation shown on the plans or as directed by the Engineer. For backfilling, the materials shall be placed in 15 cm. (6" approx.) to 20 cm. (8" approx.) layers, moistened and well compacted. Materials not useful in any way shall be wasted as directed by the Engineer. If useful excavated rubble is required by the contractor for use in other items, it shall be paid for at the rate fixed in the tender and if not so provided, at the rate in the Divisional schedule current at the time of tendering or at mutually agreed rate if there is no rate in the Divisional schedule. The site shall be left clean of all debris on completion.

B.1.8. *Dewatering.*—Unless specially provided for as a separate item in the contract, the excavation rate would include bailing or pumping out all water which may accumulate in the excavation during the progress of the work either from seepage, springs, rain or any other cause and diverting surface flow if any, by bunds or other means. The bunds shall be removed after their purpose is served.

Pumping out water from any foundation enclosure or trenches shall be generally in such a manner as to preclude the possibility of any damage to the foundation trenches, concrete or masonry or any adjacent structure. The excavation shall be kept free from water (1) during inspection and measurement, (2) when concrete and/or masonry are in progress and till they come above the natural water level, and (3) till the Engineer considers that the mortar is sufficiently set.

B.1.9. *Slips and blows.*—If there are any slips or blows in the excavation they shall be removed by the contractor without cost to the Department so as to provide the correct dimensions required for the foundation.

B.1.10. *Backfilling.*—All timber shoring and form-work shall be removed after their necessity ceases and trash of any sort shall be cleaned out from the excavation. All space between foundation masonry or concrete and the sides of excavation must be refilled to the original surface with approved materials, in layers of 15 cm. to 20 cm. (about 6" to 8") in thickness, watered and rammed.

The filling shall be done after concrete or masonry is fully set and done in such a way as not to cause undue thrust on any part of the structure. Where suitable excavated material is to be used for refilling it shall be brought from the place where it was temporarily deposited and used in refilling.

B.1.11. *Blasting.*—Blasting shall be carried out according to specification No. B.2.

B.1.12. *Classification.*—All the materials encountered in the excavation would be mainly classified in the following groups:—

(1) Soils of all sorts, sand, gravel, soft murum and other similar soft or loose materials.

(2) Hard murum.

(3) Hard murum and boulders.

(4) Soft rock.

(5) Hard rock (blasted).

(6) Hard rock (chiselled, wedged or line drilled).

(7) Laterite.

(1) *Soils of all sorts, sand, gravel, soft murum and other similar soft or loose materials.*—Soils of all sorts, sand, gravel, soft murum, softman, chopan yellow soil, etc., shall include all materials of earthy or sandy nature which can be easily ploughed or small shingle and gravel which can be easily removed. Removal of small boulders not exceeding 0.03 cu. m. or 30 litres (about one c. ft.) occurring in such strata will be included in the rate for this item.

(2) *Hard murum.*—This shall include all kinds of disintegrated rock or shale or indurated clay free from boulders larger than 0.03 cu. m. or 30 litres (about one cu. ft.) and can be removed with pick and shovel though not without some difficulty.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.1.14.**

(3) *Hard murum and boulders.*—This shall include all kinds of disintegrated rock or shale or indurated clay interspersed with boulders less than half a cubic metre (about half a cu. yd.) and larger than 0.03 cu. m. or 30 litres (approx. one c. ft.) which do not normally need blasting and can be removed with pick, bar, wedges, and hammer. Boulders bigger than ½ cu. m. will be paid for as soft or hard rock according as it is soft or hard rock.

(4) *Soft rock.*—This shall include all material which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock, old masonry and also soft rock, boulders bigger than ½ cubic metre and other varieties of rock which would normally be removed with pick, crow bars, wedges and hammer with some difficulty.

(5) *Hard rock (blasted).*—This shall include all rock occuring in masses or boulders bigger than half cubic metre each, which can best be removed by blasting and where, in the opinion of the Engineer, blasting is necessary. Manjrya rock shall be considered as hard rock.

(6) *Hard rock (chiselled, wedged or line drilled).*—This shall include all rock occuring in masses which can best be removed by blasting but which owing to the proximity of structures, possibility of shattering the rock below or for any other reason should be cut by means of cold chisels or wedges or line drilling.

(7) *Laterite.*—This shall include laterite rock soft and hard which can be removed with Dhokans or blasting. Lateritic murum which has not hardened into stone shall be classified as hard murum.

The classification of the excavation would be decided by the Engineer and his decision shall be final and binding on the contractor.

Merely the use of explosives in excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer.

Rock referred to above would include trap, granite, quartzite, gneiss, laterite and other types.

B.1.13. *Item to include.*—The rate for the item of excavation will include:—

(1) Clearing site.

(2) Setting out works, profiles, etc., according to sanctioned plan or as ordered and setting up Bench marks and other reference mark.

(3) Providing and subsequently removing shoring and strutting or cutting slopes except when, separately provided for in the tender.

(4) Bailing and pumping out water when separate provision does not exist for it in the tender.

(5) Excavation and removal of all materials of whatever nature wet or dry and necessary for the construction of foundation including materials like explosives, removal of blows and slipsand use of tools, plant and equipment necessary for satisfactory completion of the item and preparing bed for foundation.

(6) Sorting out of useful excavated materials, conveying them up to the specified lead clear beyond the structure and stacking them neatly for backfilling or reuse and wasting useless materials as directed by the Engineer.

(7) Backfilling the trenches alongside masonry or concrete with approved material up to the natural ground level.

(8) Necessary protection including labour, materials and equipment to ensure safety and protection against risk or accident.

(9) Supply of facilities for inspection and measurements at any time by the concerned Government officials.

(10) Compensation for injury to life and damage to property if any caused by the contractor's operations connected with this item.

(11) Small drill holes to explore the nature of substratum if necessary.

B.1.14. *Measurement and payment.*—The payment for respective class of excavation shall be made at the unit contract rate per cubic metre (about 35.3 c. feet) for the quantity acceptably excavated, limited to the dimensions shown in the sanctioned plans or as directed by the Engineer. Excavation to dimensions in excess of the above will not be measured nor paid for and if so ordered by the Engineer the contractor shall have to fill up the excess depth with cement concrete or U. C. R. masonry specified for foundation without extra payment.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Driving of sounding bars, or jumping small drill holes to explore the nature of substratum upto a total length of metre (about 3′) distributed in 2 or 3 places in each foundation if necessary, will be considered incidental work and will not be paid for separately.

Removal of slips and blows in the foundation trenches will not be measured nor paid for.

If it is necessary in the opinion of the Engineer to carry foundation below the levels shown on the plans, the excavation for the first 1.5 m. (about 5′) of additional depth will be included in the quantity for the particular classification at tendered rate. The excavation below this additional depth of 1.5 metres (5′ approx.) will be paid for as extra work at rate to be decided under the general conditions of contract unless the contractor is willing to accept payment at tendered rates. For all depths less than the designed depth plus 1.5 metres (about 5′) the excavation will be paid for at tendered rates.

Dimensions shall be measured correct to two places of decimals of a metre and individual quantity shall be calculated correct to two places of decimals of a cubic metre.

## B.2. BLASTING

B.2.1. *General.*—Blasting shall be carried out only with the written permission of the Engineer. All the laws, regulations, rules etc. pertaining to the acquisition, transport, storage, handling and use of explosives shall be rigidly followed. The magazine for the storage of explosives shall be built to the designs and specifications of the Explosives Department and located at the approved site. No unauthorised person shall be admitted into the magazine and when not in use shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The magazine shall have an effective lighting conductor. The following shall be hung in the lobby of the magazine:—

(*a*) A copy of rules both in English and in the language with which the workers concerned are familiar.

(*b*) A statement of up-to-date stock in the magazine.

(*c*) A certificate showing the last date of testing of the lighting conductor.

(*d*) A notice that smoking is strictly prohibited.

In addition to these, the contractor shall also observe the following instructions and any further addtional instructions which may be given by the Engineer and shall be responsible for damage to property and any accident which may occur to workmen or the public due to any and all operations connected with storing and handling or use of explosives and blasting. The Engineer shall frequently check the contractor's compliance with the precautions.

B.2.2. *Materials, tools and equipment.*—The black powder, explosives detonators, fuses, tamping materials, electrical firing equipment, if used, tools for drilling holes and tamping shall be subject to the approval of the Engineer. The Engineer may specify type of explosives to be allowed in special cases. The fuse to be used in wet locations shall be sufficiently water resistant as to be unaffected when immersed in water for 30 minutes. The rate of burning of the fuse shall be uniform and definitely known to permit such a safe length being cut as will permit sufficient time to the firer to reach safety before explosion takes place. Detonators shall be capable of giving effective blasting of the explosives. The blasting powder, explosives, detonators, fuses etc. shall be fresh and not damaged due to damp, moisture or any other cause. They shall be inspected before use and damaged articles shall be discarded totally and removed immediately.

B.2.3. *Personnel.*—The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the details of handling explosives and blasting operations.

B.2.4. *Blasting operation.*—The blasting shall be carried out during fixed hours of the day preferably during the midday luncheon hour or at the close of the work as ordered in writing by the Engineer. The hours shall be made known to the people in the vicinity. All the charges shall be prepared by the man in charge only.

Red danger flags shall be displayed prominently in all directions during the blasting operations. People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200 metres (656′ approx.) from the blasting site in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing, a warning whistle being sounded for the purpose.

The charge holes shall be drilled to required depths and in suitable places.

अनुक्रमणिका
Table of Contents

**B.3.(a).2.**

When blasting is done with powder, the fuse cut to the required length shall be inserted into the hole and the powder dropped in. The powder shall be gently tamped with copper rods with rounded ends. The explosive powder shall then be covered with tamping material which shall be tamped lightly but firmly.

When blasting is done with dynamite and other high explosives, dynamite cartridges are prepared by inserting the square cut end of a fuse into the detonator and finishing it with nippers at the open end, the detonator gently pushed into the primer leaving $\frac{1}{3}$rd of the copper tube exposed outside. The paper of the cartridge is then closed up and securely bound with wire or twine. The primer shall be housed into the explosive. Bore holes shall be of such size that the cartridge can easily pass down. The holes shall be cleared of all debris and explosive inserted. The space for about 20 cm. (8″) above the charge is then gently filled with dry clay, pressed home and the rest of the tamping is formed of any convenient material gently packed with a wooden rammer.

At a time, not more than 10 such charges will be prepared and fired. The man in charge shall blow a whistle in a recognised manner for cautioning the people. All the people shall then be required to move to safe distances. The charges shall be lighted by the man in charge only. The man in charge shall count the number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the work site.

B.2.5. *Misfire.*—In case of a misfire the following procedure shall be observed :—

Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charge.

If it is blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at about 45 cm. (about 18″) from the old hole and fired. This should blast the old charge. Should it not blast the old charge, the procedure shall be repeated till the old charge is blasted.

In case of charges of gelignite, dynamite etc. the man in charge shall gently remove the tamping and the primer with the detonator. A fresh detonator and primer shall then be used to blast the charge. Alternatively the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole. Another hole may then be drilled 15 cm. (about 6″) away and parallel to it. This hole shall then be charged and fired when the misfired hole should explode at the same time. The man in charge shall report to the office at once all cases of misfire, the cause of the same and what steps were taken in connection therewith.

If a misfire has been found to be due to defective detonator or dynamite, the whole quantity in the box from which defective article was taken must be sent to the authority directed by the Engineer for inspection to ascertain whether all the remaining materials in the box are also defective.

B.2.6. *Accidents.*—The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property, etc., due to the blasting without extra claims.

B.2.7. *Account.*—A careful and day-to-day account of the explosives shall be maintained by the contractor in an approved register and in an approved manner and shall be open to inspection of the Engineer at all times. Surprise visit may also be paid by the Engineer to the storage and in case of any unaccountable shortage or unsatisfactory accounting, the contractor shall be liable to be penalised by forfeiture of part or whole of his security deposit or by cancellation of tender in which case he shall not be entitled for any compensation.

## B.3. (*a*) LIME MORTAR

B.3.(*a*).1. *Materials*—(1) *Lime.*—Lime for structural purposes classified as class A and lime for masonary works as class B, both shall conform to Specification No. A.1.

(2) *Water.*—The water shall generally conform to the requirements laid down in specification No. A.5. for water.

(3) *Fine Aggregate.*—Fine aggregate to be used for lime mortar for structural purposes, masonary work and plaster shall conform to specification No. A.6. The grading of fine aggregate shall be suitable for the purpose of the item.

B.3.(*a*).2. *Proportion of mix for Mortar.*—Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and sand shall be measured by volume. If moist sand is used, necessary allowance shall be made for bulking. Lime mortars used for structural work shall not be weaker than 1 : 3.

B.3.(*a*).3. *Preparation of mortar.*—The lime mortar shall be prepared by wet process. Bullock driven Ghani or power driven mill may be used. The Bullock ghani shall be normally fitted with a Beale's Telltale.

The slaked lime is to be first placed in the mill in an even layer and ground for 180 revolutions with a sufficiency of water. Water shall be added as required during grinding. care being taken not to add more water than will bring the mixed materials to a consistency of stiff paste. Thoroughly wetted sand is then to be added evenly and the mixture ground for another 180 revolutions. When two stones are used, the number of revolutions for each stone shall be 90 for each part of the grinding. The mortar shall be stirred continuously during the grinding process, particularly in the angles of the ghani. The sides of ghani shall be maintained in good order.

Hydraulic lime mortar shall be ground a second time when used for plaster.

B.3.(*a*).4. *Storage.*—Mortar shall always be kept damp and protected from sun and rain till used up.

B.3.(*a*).5. *Use.*—All mortar shall be used as soon as possible after grinding. As a rule it should be used on the day on which it is prepared. But in no case should mortar made earlier than 36 hours be permitted to be used or remain at the site of the work.

B.3.(*a*).6. *Rejection of Mortar.*—Mortar more than 36 hours old or damaged mortar, or mortar which has once set or caked shall be condemned and removed from the site by the contractor at his own expense. No retempering of rejected mortar shall be permitted.

B.3.(*a*).7. *Tests.*—Field testing as per I. S. 1924-1960 shall be carried out for each class of limes when obtained from a new source.

## B.3.(*b*). LIME SURKHI MORTAR

*Materials*—(1) *Lime.*—Lime shall comply with specification No. A.1. in all relevant particulars.

(2) *Surkhi.*—Surkhi for lime mortar shall comply with specifications given in A.3.

(3) *Sand.*—Sand shall conform to specification No. A.6.

(4) *Water.*—Water shall comply with specification No. A.5.

*Proportion.*—Surkhi mortar shall consist of lime, surkhi and sand mixed in proportions by volume as mentioned in the wording of the item or in the special provisions.

*Mixing.*—The surkhi shall first be powdered in a ghani or mill to pass through I. S. sieve No. 100. The required quantity of lime shall then be added and ground in a ghani or mortar mill operated mechanically, water being gradually added. After lime and surkhi are ground well into a homogeneous mass total 180 revolutions (after adding lime) specified quantity of sand shall be added and the mixture thoroughly ground in the mill until such time as the ingredients are completely and uniformly mixed, care being taken not to add more water than is necessary to bring the mortar to the consistency of a thick paste.

During the process of grinding the mortar shall be continuously raked up particularly in the angles of the mill. The revolutions of the mill shall be 360 in all.

*Storing and use.*—As soon as ground, the mortar shall be protected from sun and rain and kept damp in shelters or shall be covered until used. The ground mortar shall be used within 24 hours after grinding.

*Rejection of Mortar.*—Any mortar which has not been used within this period or mortar which has set or hardened shall be considered unfit for use and removed from worksite. Retempering or remixing of partially hardened mortar shall not be permitted.

In all other respects specification No. B.3.(*a*) will apply.

## B.3.(*c*) LIME MORTAR GAUGED WITH CEMENT :

*Materials*—(1) *Lime.*—Lime shall comply with specification No. A.1.

(2) *Cement.*—Ordinary portland cement conforming to specification No. A.2 shall be used.

(3) *Sand.*—Sand shall conform to specification No. A.6.

(4) *Water.*—Water shall comply with specification No. A.5.

*Proportion.*—The proportion of the ingredients in the mortar shall be by volumes as specified in the item or special provisions.

**B.4.6.**

*Mixing.*—Lime and sand shall be ground into mortar as per specification No. B.3.(*a*). Immediately before use, the specified proportion of cement shall be added to a small quantity of the mortar and intimately mixed for obtaining uniform distributon of cement.

*Use.*—The lime mortar gauged with cement shall be used within half an hour of mixing cement.

In all other respects specification No. 3.(*a*) will apply.

## B.4. LIME CONCRETE

B.4.1. *Materials*—(1) *Lime Mortar.*—Lime mortar to be used shall be as per specification No. B.3.(*a*).

(2) *Coarse Aggregates.*—Coarse aggregates shall conform to specification No. A.7.

Normally maximum size of 50 mm. (about 2″) will be found suitable for most purposes.

B.4.2. *Proportion.*—Mortar shall consist of specified proportion of sand and slaked lime by volume as specified in the item or the special provisions. The proportion of mortar to aggregate shall be 1 : 2 unless otherwise specified in the special provisions.

B.4.3. *Mixing.*—Coarse aggregates shall be free from all impurities and if dirty or dusty should be thoroughly washed before being mixed with mortar. Concrete shall be mixed on a level and impervious platform, with tight and close joints. Dimensions of the platform shall be as directed by the Engineer. The coarse aggregate shall be spread on the platform in a heap of uniform depth. It shall be wetted before mixing. The required quantity of mortar shall then be spread over the whole surface of the coarse aggregate also to a uniform depth. The materials shall then be thoroughly incorporated by being turned over and over, backwards and forwards not less than 3 times, until every particle of the coarse aggregate is fully coated with mortar. Measuring boxes must be used for measuring both the aggregate and the mortar to ensure use of required proportion of mortar.

No more concrete shall be mixed than can be laid in place and rammed the same day. When it is necessary to give greater fluidity to concrete, this shall be effected by adding water to mortar and remixing mortar and not to the mixed concrete.

B.4.4. *Formwork.*—Formwork if necessary shall be as specified in B.6.5.(*b*). Formwork shall be removed only after the concrete is set.

B.4.5. *Laying.*—Before placing the concrete, the bed for the concrete shall be cleaned of all loose stuff, moistened and rammed if necessary. Formwork if used, should be got passed by the Engineer.

Concrete shall be used while fresh. It shall be laid (and not thrown) in layers not exceeding 15 cm. to 20 cm. (about 6″ to 8″) in thickness.

*Compaction.*—Concrete shall be well compacted by ramming with wooden or iron rammers (with area of hamming surface not exceeding 320 sq. cm. (about 50 sq. inches) and weighing not less than 4-50 kg. (about 10 lbs.) before the next layer is laid. The consolidation shall continue for each layer until mortar creams up to the surface. No water or mortar shall be added during laying or ramming. If after adequate ramming, the mortar does not fill the interstices of the aggregates and cream up to the surface, the top surface should be grouted with thin mortar. No ramming shall be done after the concrete has begun to set. Ramming shall be done by one or more lines of men, ranged across the width of the concrete with a lateral space of not more than 45 cm. (about 1½ ft.) per man. After consolidation the surface must be kept damp. If appreciable time passes between laying consecutive layers, the lower course should be made rough, cleaned and watered before the upper layer is laid.

After from work is removed, honey combed spots shall be finished with the lime mortar of the type used in the concrete.

B.5.(*a*).3.1.

B.4.6. *Curing.*—All lime concrete is to be kept continuously wet for at least 14 days after it has been deposited in position or until it is built over. The wetting shall be done initially on signs of dryness by spreading hessian or straw and watering very frequently from a watering can through a perforated rose in moderate quantity and later directly on concrete after the mortar has set. Should the cotractor fail to water the work continuously the Engineer may employ requisite labour, materials, equipment etc. to water the work properly and charge the cost to the contractor. All water used in mixing and curing of concrete shall be clean and free from any injurious materials.

No masonry shall be built up on concrete till the concrete is sufficiently set.

B.4.7. *Item to include.*—(1) Providing in place lime concrete of the specified proportion including formwork, compacting and curing.

(2) All labour, materials, tackle and use of tools and equipment necessary for satisfactory completion of the item as specified above.

B.4.8. *Mode of Measurement and Payment.*—The contract rate shall be per cubic metre (about 35.3 c.ft.). Concrete work shall be paid for the work laid and finished to the dimensions specified in the drawings or as directed by the Engineer. Extra concrete work done over and above this shall not be paid for.

Dimensions shall be measured correct up to two places of decimals of a metre and the quantity calculated correct up to two places of decimals of a cubic metre.

## B.5.(*a*) CEMENT MORTAR FOR MASONRY, PLASTER AND POINTING:

B.5.(*a*).1. *Materials*—(1) *Cement.*—Ordinary Portland cement shall conform to specification No. A. 2.

(2) *Water.*—Water shall conform to specification No. A.5.

(3) *Fine aggregate.*—Fine aggregate shall conform to specification No. A.6. with grading suitable for the purpose of the particular item.

B.5.(*a*).2. *Proportion.*—Cement and sand shall be mixed in specified proportions sand being measured in measuring boxes. The proportions will be by volume on the basis of 50 kg. bag of cement being equal to 35 litres (about 1.2 c. ft.). The mortar may be hand mixed or machine mixed.

B.5.(*a*).3.1.—*Preparation.*—In hand-mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Fresh and clean water as specified above shall be added gradually through a rose and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio may be as under or as directed by the Engineer.

*Nominal Mix.*

| Cement | Sand | Water cement ratio | Quantity of water per 50 kg. of cement (litres) |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 1 | 1 | 0·25 | 12·5 |
| 1 | 1½ | 0·28 | 14·0 |
| 1 | 2 | 0·30 | 15·0 |
| 1 | 2½ | 0·35 | 17·5 |
| 1 | 3 | 0·40 | 20·0 |
| 1 | 4 | 0·53 | 26·5 |
| 1 | 5 | 0·60 | 30·00 |
| 1 | 6 | 0·70 | 35·00 |
| 1 | 8 | 0·90 | 45·00 |

Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar nor the mixing water of the mortar shall flow out.

B.5.(*a*).3.2. Machine mixed mortar shall be prepared in an approved mixer. About 5 per cent. to 10 per cent. of mixing water shall be put into the mixer and sand and cement in the required proportions shall be then added. The remainder of water, quantity of which shall be predetermined by consideration of strength and consistency shall be added uniformly. Mixing will be continued until all particles of sand are uniformly coated with cement paste. Mixing for 1½ to 2 minutes will normally be sufficient. Water cement ratio shall be as per hand mixed mortar.

B.5.(*a*).4. The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes. The mortar remaining unused after that period or mortar which has partially hardened or is otherwise damaged shall not be retempered or remixed. It shall be destroyed or thrown away.

## B.5.(*b*). CEMENT SURKHI MORTAR:

*Materials*—(1) *Cement.*—Cement shall be Ordinary Portland cement conforming to specification No. A.2.

(2) *Surkhi.*—Surkhi for cement surkhi mortar shall comply with specifications given in A.3.

अनुक्रमणिका
Table of Contents



**B.6.3.**

(3) *Sand.*—Sand shall conform to specification No. A.6.

(4) *Water.*—As per A.5.

*Proportion.*—Cement surkhi mortar shall consist of cement, surkhi and sand mixed in proportions by volume as mentioned in the item or special provisions.

*Preparation.*—The preparation of the mortar shall generally conform to spcification No. B. 5(a) with addition of surkhi. Sand, surkhi and cement shall be fed into the mixer simultaneously.

In all other respects specification in B.5 (a) shall apply.

## B.6. ORDINARY CEMENT CONCRETE FOR PLAIN AND REINFORCED WORK:

B.6.1. *General.*—This specification covers the requirements of ordinary cement concrete of the specified proportions for use in various concrete items. Special requirements for a particular item will be laid down in the specifications for that item I. S. 456-1964 shall apply except for deviations laid down in this specification.

B.6.2. *Materials*—(1) *Cement.*—Cement shall conform to specification No. A.2. When type of cement is not specified, Ordinary Portland cement shall be used.

(2) *Water.*—Water shall conform to specification No. A.5.

(3) *Fine aggregate.*—Fine aggregate 0.15 mm. to 5 mm. (about .0059" to 3/16") I. S. sieve Nos. 15 to 480 shall conform to specification No. A.6.

(4) *Coarse aggregate.*—Coarse aggregate (5 mm. to 80 mm. 3/16" to 3") shall conform to specification No. A.7 and shall be within limits given in A.7.3.

*Size.*—The maximum size of coarse aggregate shall be as large as possible but normally not greater than $\frac{1}{4}$th of the minimum thickness of the concrete member provided that in the case of R. C. C., this size presents no difficulty to surround the reinforcement thoroughly and fill up the corners of the formwork fully and is less than the minimum cover by 6 mm. For plain concrete, maximum size of the coarse aggregate may be up to 80 mm. (about 3") subject to the above limitation and provided no limiting size is specified in the special provisions.

For heavily reinforced concrete members such as ribs of beams, etc., the maximum size of aggregate shall be restricted to 6 mm. (about $\frac{1}{4}$") less than the minimum clear lateral distance between the reinforcement bars or 6 mm. (about $\frac{1}{4}$") less than the cover whichever is smaller.

Generally a maximum size of 20 mm. (about $\frac{3}{4}$") should be found satisfactory for reinforced concrete work.

The grading between the maximum size and minimum size of 5 mm. (about 3/16") shall be such as to produce a dense concrete of the specified proportion and consistency that will work readily into position without segregation and without the use of excessive water content and shall be within limits given in A.7.3.

B.6.3. *Proportioning mix.*—In ordinary concrete, although proportion of cement to fine and coarse aggregate is specified by volume, the quantity of cement shall be determined by weight assuming one bag of cement weighing 50 kg. (about 110 lbs.) nett to be equivalent to 35 litres. (about 1.2 c.ft.). Fine and coarse aggregates shall be measured by dry volumes in suitable wooden boxes. Due allowance shall be made for bulking in the fine aggregate due to moisture if any, at the time of mixing.

Ingredients required for concrete containing one 50 kg. bag of cement for different proportions of mix will be as under:—

| Mix | Cement | Fine Aggregate | Coarse Aggregate | Water |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 1 : 1 : 2 .. | 50 kg bag (35 litres or 1·2 c . ft.). | 35 litres (about 1·2 c. ft). | 70 litres (about 2·4 c. ft.) .. | 23 to 27 litres (about 5 to 6 gallons). |
| 1 : 1½ : 3 .. | Do. | .. 52·5 litres (about 1·8 c. ft.) | 105 litres (about 3·6 c. ft.) | 23 to 30 litres (about 5 to 6·6 gallons). |
| 1 : 2 : 4 .. | Do. | .. 70 litres (about 2·4 c. ft.) | 140 litres (about 4·8 c. ft.) | 27 to 32 litres (about 6 to 7 gallons). |
| 1 : 3 : 6 .. | Do. | .. 105 litres (about 3·6 c.ft.) | 210 litres (about 7·2 c. ft.) | 37·5 to 45 litres (about 8·25 to 9·9 gallons). |
| 1 : 4 : 8 .. | Do. | .. 140 litres (about 4·8 c. ft.) | 280 litres (about 9·6 c.ft.) | 47·5 to 57 litres (about 10·4 to 12·5 gallons). |
| 1 : 5 : 10 .. | Do. | .. 175 litres (about 6 c. ft.) | 350 litres (about 12 c. ft.) | 56 to 68 litres (about 12·3 to 15 gallons). |

35.28 Cft = 1 Cum
0.02832 conversion from Cft to Cmt.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



The ratio of the volumes of the fine and coarse aggregates may be varied within limits of 1:1½ to 1:2½ as directed by the Engineer to suit the maximum size of coarse aggregate, the grading, density, workability and strength without extra cost. But the sum of the volumes of fine and coarse aggregates so adjusted shall however be equal to the sum of the volumes of fine and coarse aggregates given above for the particular mix.

The quantity of water shall be just sufficient, but not more than sufficient, to produce a dense concrete of required workability for its purpose. An accurate control shall be kept on the quantity of mixing water.

An allowance shall be made for surface moisture present in the aggregates when computing water content as indicated in I. S. 456-1964.

In the case of reinforced concrete work, the workability shall be such that the concrete will surround and properly grip all the reinforcement. Water cement ratio will be such as will give concrete just sufficiently wet to be placed and compacted without difficulty.

For vibrated concrete, water content may be reduced by 15 per cent. to 20 per cent. to give the required reduced slump.

B.6.4. *Mixing.*—For all important works concrete shall be mixed in a mechanical mixer at the site of work. Care shall be taken to see that the mixer and other accessories are in first class working condition and maintained so throughout the construction. Mixing shall be continued till there is a uniform distribution of the materials and a uniform colour is obtained and each individual particle of the coarse aggregate shall show a complete coating of mortar containing its proportionate amount of cement. In no case mixing shall be done for less than 1½ minutes. The water cement ratio shall range between 0.55 to 0.64 for 1.2.4 mix.

When hand mixing is permitted by the Engineer it shall be done on a smooth water tight platform large enough to allow efficient turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material shall get mixed with concrete nor the mixing water shall flow out.

The cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine aggregate required, also spread in a layer of uniform depth in the mixing platform. Dry sand and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually through a rose and the mass turned over till a mortar of required consistency is obtained. The measured quantity of coarse aggregate shall then be placed on the mixing platform and wetted and the mortar added and the entire mass turned and returned until all the particles of the coarse aggregate are fully covered with mortar and the mixture is of a uniform colour and required consistency. In hand mixing, quantity of cement shall be increased by 5 per cent. above that specified in para. B.6.3 without any extra cost.

Concrete shall have a consistency such that it will be workable in the required position and in the case of R. C. C., flow around reinforcing steel also.

For vibrated concrete, slump shall range between 2.5 cm. to 5 cm. (about 1″ to 2″). For hand tamped concrete, slump shall range between 8 cm. to 13 cm. (3″ to 5″) according to the type and nature of the concrete item. The slump shall be the least permitted by workability. The slump shall be determined as detailed in appendix G of I. S. 456-1964 and maintained throughout the concreting operation of a member.

The concrete shall be placed in its final position and rammed, vibrated and finished within 30 minutes of adding water to cement. Retempering or remixing of partially hardened concrete shall not be permitted.

B.6.5.(*a*). *Scaffolding.*—All scaffolding, hoisting arrangements and ladders, etc., required for the facility of concreting shall be provided by the contractor at his own expense and removed on the completion of work. The scaffolding, hoisting arrangements and ladders, etc., shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer. However the contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangements, ladders, work and workmen. The contractor shall pay all the necessary compensations arising out of the use of the scaffolding hoisting arrangements and ladders and for damages to work, property and injuries to persons.

The scaffolding, hoisting arrangements and ladders shall allow easy approach to the work spot and afford easy inspection.

B.6.5.(*b*).—*Forms.*—Forms shall generally comply with I. S. 456-1964, para. 7.2.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.6.5.(b).8.**

B.6.5.(*b*).1. *Design.*—The detailed designs of the formwork and falsework shall be prepared by the contractor and got approved by the Engineer well in time. Such an approval, however, will not relieve the contractor of his responsibility for the adequacy and strength of the formwork and falsework.

B.6.5.(*b*).2. *Materials.*—The forms and false work shall be made of wood or metal. The timber from which the forms are prepared should preferably be partially seasoned as too dry a timber will swell from absorption of moisture while green timber will dry and shrink. It shall be free from sap, shakes, loose knots, wormholes or other defects. The planks and scantlings shall be sawn straight and all edges and planes shall be straight and free from warps. Partially seasoned soft wood is generally preferable for formwork as it is difficult to drive nails in hard wood. The dimensions of scantlings should conform to the design. The strength of the wood shall not be less than that assumed in the design.

In metal forms, steel sheets of the designed gauge strengthened with framing of angle or other sections shall be used.

Wooden forms may also be lined with thin steel sheets or plywood to give the required surface or finish.

B.6.5.(*b*).3. *Fabrication.*—The timber planks and scantlings of the designed dimensions shall be used in the formwork with appropriate spacing of studs, yokes, joists, girders, etc., as provided in the designs. All timber in contact with concrete shall be wrought on one face and two edges, the unwrought face being on the outside. The joints should be made mortar tight. This may be done either by providing tongued and prooved or rebated joints or by caulking or nailing metal strips or applying adhesive tape on the joints. The forms shall be built with sufficient strength and rigidity and held in shape by bolts, clamps, ties, nails, wales or other contrivances to prevent distortion or collapse due to pressure of concrete and other loads incidental to the construction operations. The nuts and bolt heads inside the formwork adjoining the concrete should be countersunk. The formwork should allow finished concrete to have a smooth surface and conform to the shapes, lines and dimensions shown on the plans and true to line and grade. The effect of vibration shall be taken into account in the design and fabrication of forms and false work.

Forms shall be so designed and constructed as to be removeable in sections without damaging the surface of the concrete and with facilities of removal in the ascending order of removal time, without disturbing the remaining forms required to be removed later.

B.6.5.(*b*).4. *Treatment of the inside of forms.*—Before placing concrete, the inside of the forms which comes in contact with the concrete shall be coated with mineral oil or any other suitable material approved by the Engineer which witl prevent adhesion of concrete to the forms but will not discolour the concrete. When oil is used, it shall be applied before reinforcement is placed. Care shall be taken to see that reinforcement does not come in contact with the coating. All chippings, saw dust and other rubbish shall be removed from the interior of the forms before concreting.

B.6.5,(*b*).5. *Falsework.*—Falsework shall be built on foundation or base of sufficient strength to carry the loads without settlement. Falsework which cannot be founded on solid footing must be supported by piles or other similar devices. Falsework shall be designed to carry the full loads including that due to construction operations coming upon it.

B.6.5.(*b*).6. *Erection.*—The falsework and formwork shall be erected with an eye for absolute safety of the formwork and concrete work before, during and after pouring concrete. Watch should be kept to see that the behaviour of centering and formwork is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed later.

If there is failure of falsework and/or formwork the contractor shall be responsible for all the consequent damages to work, injury to life and damage to property.

B.6.5.(*b*).7. *Inspection.*—The forms and false work will be inspected, checked and approved by the Engineer before concreting is commenced. But this will not relieve the contractor of his responsibility for strength, adequacy and safety of the formwork and falsework.

B.6.5.(*b*).8. *Removal of forms.*—Formwork shall be removed carefully without damaging the concrete or giving sudden shocks. It should be ascertained from the exposed sides of concrete that it has gained adequate strength before the bottoms and supports of the formwork are removed.



अनुक्रमणिका
Table of Contents

Unless otherwise specified in the special provisions, forms of concrete work using ordinary Portland cement may be struck after expiry of the following periods in normal circumstances:—

| | |
|---|---|
| (i) Vertical sides of slabs, beams, columns ... ... ... | 48 hours. |
| (ii) Bottoms of slabs up to 4.5 m. span ... ... ... | 7 days. |
| (iii) Bottoms of slabs of more than 4.5 m. span, bottoms of beams and archribs up to 6 m. span ... ... ... | 14 days. |
| (iv) Bottoms of beams and archribs of more than 6 m. span ... ... | 21 days. |

In important structures, the sequence of striking formwork shall be approved by the Engineer.

B.6.5.(*b*).9. *Reuse.*—Before reuse, all forms shall be thoroughly scraped and cleaned, joints gone over and repaired and the insides retreated to prevent adhesion, all to the entire satisfaction of the Engineer. The shape, strength, rigidity, mortar tightness and surface smoothness of reused forms shall be maintained at all times.

B.6.6. *Transporting.*—The concrete shall be handled from the place of mixing to the final position as quickly as practicable by methods which will prevent segregation and loss of ingredients. In no case shall the operation take more than 15 minutes.

B.6.7. *Placing.*—The concrete shall be placed into its final position, compacted and finished within 30 minutes of mixing the water and before setting commences. The method of placing shall be such as to avoid segregation. Placing shall be done in a balanced manner to avoid eccentric loads on formwork.

As far as practicable the concrete for a particular portion shall be done in one continuous operation. The construction joints when required shall be made only where located on the plans or shown in the pouring schedule unless otherwise approved by the Engineer. The joint shall be regular and vertical and shall be made by placing a bulk head at the joint. Before commencing subsequent concreting, all loose particles, laitance, etc., shall be removed and the surface shall then be covered by thick cement slurry as part of placement. Care shall be taken during the placing not to disturb the forms or the reinforcement. Concrete compacted manually, shall preferably be laid in layers of 15 cm. to 20 cm. (about 6″ to 8″) the layers being decided by the time lapse between the successive layers. The time of laying one layer shall not exceed 30 minutes. The successive layers shall commence within 30 minutes.

When work is to be resumed on a surface which has hardened, such a surface shall be roughened and scrubbed with brushes to remove laitance, care being taken to avoid dislodgement of coarse aggregate, swept clean, thoroughly wetted and covered with 6 mm. (about $\frac{1}{4}$″) thick mortar layer composed of cement and sand in the same proportion as the cement and sand in the concrete, immediately before the commencement of concrete, for securing good bond.

The concrete shall be normally laid in the dry. If the area is under water, it shall be pumped dry and kept so while placing concrete and till it sets. Where it is necessary to deposit concrete under water, it shall be done as per I. S. 456-1964 para. 7.1.7. No extra payment will be made for the special arrangements, plant, etc., need for the purpose or for the additional 10 per cent. cement required to be added.

B.6.8. *Compacting.*—The concrete shall be thoroughly compacted during depositing to get a dense concrete and thoroughly worked into the edges and corners of the formwork as also along its faces and around reinforcement in the case of R. C. C., by means of suitable tools such as spades and rods to get a good cast finish without honey combing. Concrete shall not be disturbed once it is set.

For important or big works where stiffer mix with less slump is adopted, use of mechanical vibrators is essential. The vibrators shall have not less than 3,600 and preferably about 5,000 impulses per minute and shall be worked at an interval of about 60 cm. (about 2′). It shall be worked in one place for only such time as will allow formation of dense concrete without sinking and segregation of the coarse aggregate. Over vibration shall be avoided. Vibration shall be aided by spading and rodding.

B.6.9. *Curing.*—The concrete shall be initially protected from damage on account of impact, undue pressure, excessive heat of sun, rain, etc., and covered with wet sacking, hessian or similar absorbent material soon after the initial set. After the final set, the concrete shall be kept continuously wet preferably by pounding water for a period of not less than 14 days from the date of placement. On Sundays, holidays and days of cessation of work, arrangement shall be made to keep the concrete continuously watered.

**B.6.12.**

Should the contractor fail to water the concrete continuously, the Engineer may provide labour, materials and equipment required for watering and recover the cost from the contractor.

When atmospheric temperature exceeds 40°C (104°F) following precautions should be taken:—

(1) Stacking aggregates under shade and keeping them moist.

(2) Using cold water.

(3) Reduce the time between mixing and placing to the minimum.

(4) Cooling formwork by sprinkling water.

(5) Starting curing before concrete dries out.

(6) Restricting concreting to mornings and evenings.

B.6.10. *Finishing.*—Immediately after the removal of forms, any undulations, depressions, cavities, honeycombing, broken edges or corners, high spots and other defects shall be made good and finished with cement mortar 1:2. But the necessity of such finishing must be exceptional and the total surface requiring finishing shall not exceed 1 per cent. on an average. If the initial experience shows that this percentage is exceeded the method of working itself should be changed to get the required cast finish.

Where the concrete surface is to receive plaster, the surface shall be roughened immediately after removal of forms and within a day thereof to secure a hold for the plaster. The rate for concrete is inclusive of this roughening and finishing. Concrete after finishing shall be cured for the full period.

B.6.11. *Retempering.*—Concrete shall be mixed only in such quantities as are required for immediate use and any concrete which has developed initial set shall not be used. Concrete which is partially hardened shall not be retempered or re-mixed but shall be destroyed or thrown away.

B.6.12. *Sampling and Testing.*—Sampling of materials and concrete shall be done carefully by the contractor under the direct supervision of the Departmental staff as per I. S. 456-1964 at the cost of the contractor. All necessary labour, materials, equipment, etc., for sampling, preparing test cubes, curing, etc., shall be provided by the contractor. Testing of the materials and concrete will be arranged by the Department in an approved laboratory at the cost of the contractor. No plea will be entertained later on the ground that casting of the test specimen was faulty and that the result of the test specimen did not give a correct indication of the actual quality of concrete. Compressive strength of ordinary concrete shall not be less than those specified below:—

| No. | Mix | Works test on 15 cm. (about 6") cubes | |
|---|---|---|---|
| | | kg./sq. cm. at 7 days | Kg./sq. cm. at 28 days |
| 1 | 1 : 1 : 2 | 158 (about 2,250 lbs./sq. inch) | 242 (about 3,450 lbs./sq. inch). |
| 2 | 1 : 1½ : 3 | 131 (about 1,875 lbs./sq. inch) | 200 (about 2,850 lbs./sq. inch). |
| 3 | 1 : 2 : 4 | 105 (about 1,500 lbs./sq. inch) | 158 (about 2,250 lbs./sq. inch). |
| 4 | 1 : 3 : 6 | 66 (about 950 lbs./sq. inch) | 100 (about 1,425 lbs./sq. inch). |
| 5 | 1 : 4 : 8 | 49 (about 700 lbs./sq. inch | 73 (about 1,050 lbs./sq. inch). |

One set of six 15 cm. (about 6") cubes shall be prepared from the concrete to be used in the work for compression test on each of the first three days operation and thereafter for every 60 cu. m. (about 2120 c.ft.) of concrete or three days' work whichever is less, by the contractor in the presence of a responsible officer of the Department of a rank not less than that of an overseer. If the source of aggregate or grading is changed, one set of six test cubes shall be taken for each changed batch. Three cubes shall be used for test at 7 days' age and three at 28 days.

After the relation between strengths at 7 days and 28 days is reliably established for the particular set of materials from the same sources, subsequent tests may be carried out only on three cubes at 7 days. If the average strength of the cubes show ultimate compressive strength less than the above, the Engineer shall have a right to order a change in the mix or water content for the remaining concrete without extra cost. Defective concrete having strength below 80 per cent. of the required strength is liable to be rejected. Concrete of strength up to 80 per cent. of the required strength may be accepted as substandard work at a reduced rate provided such weak concrete is restricted to such members and in such quantities as will not endanger the safety of the structure.

B.6.13. *Keeping record.*—A day-to-day record authenticated by a responsible officer of the department and the representative of the contractor, in the *pro forma* approved by the Engineer shall be maintained by the contractor on the work site and kept open for inspection. This shall contain important information such as receipt of cement on the work site, daily use with details of use on various items, time of starting concreting and closure, number of batches through the mixer, source of water, water cement ratio of concrete, slump, dates of erection of formwork, passing of formwork by the competent authority, dates of striking of forms, periods, and method of curing and other events worthy of note. On completion of the work, the record shall be handed over to the Department.

B.6.14. *Item to include.*—(1) All labour, materials, use of equipment, tools and plant, installing and removal of scaffolding, false work and forms and bracing necessary for the satisfactory completion of the item except reinforcement steel.

(2) Providing cement concrete of specified proportion including transporting, placing and compacting, curing, finishing to the dimensions and shapes shown on the plans or as ordered by the Engineer.

(3) Necessary sampling and tests for materials and concrete.

(4) Compensation for injury to persons and damages to work or property.

B.6.15. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre of concrete. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on the plan or as ordered by the Engineer. No deduction shall be made for reinforcement in concrete in R. C. C. work. Individual dimension shall be measured correct to one cu. m. and quantities shall be worked out correct up to three places of decimals of a cubic metre.

## B.7. CONTROLLED CEMENT CONCRETE

Controlled concrete is that concrete in which proportions of aggregates, cement and water are determined by preliminary tests of the materials to be actually used to obtain the specified strength with the use of minimum quantity of cement. It shall generally comply with relevant provisions in I. S. 456-1964.

B.7.1. *Materials.*—Ordinary Portand cement, fine aggregates, coarse aggregate and water shall comply with specifications laid down for the respective items in specification No. B.6 for ordinary concrete.

B.7.2. *Proportioning mix.*—The mix of the fine and coarse aggregates, cement and water shall be designed by preliminary tests to give the densest concrete requiring the minimum quantity of cement paste for binding the materials to give the required strength. Water content shall be such as to suit the required consistency. Water content and the water cement ratio shall be determined from the results of preliminary tests of concrete to give the specified strength with the materials proposed for actual use in the work, carried out before the work is started, adopting the consistency suitable for the work and method of compaction that will be actually used on site.

B.7.3. *Tests.*—Tests shall conform to the specification laid down in I. S. 456-1964. These tests shall be got done in an approved laboratory at the cost of the contractor.

B.7.3.1. *Preliminary tests.*—In preliminary tests, three separate tests shall be carried out on samples collected from different stacks. Each test shall be carried out with six samples of 15 cm. (about 6") cubes and 3 of these shall be tested at 7 days and 3 at 28 days. In preliminary tests the average crushing strength attained shall be 33 per cent. higher than that required on work tests.

B.7.3.2. *Works tests.*—For each of the works tests, 6 samples shall be prepared from the concrete being used on the work 3 samples being tested at 7 days and the remaining 3 samples at 28 days. Works test shall be carried out on each of the first six days and subsequently once in three working days or for every 60 cu. m. (2,120 c. ft. approx.) of concrete whichever is less and also whenever the quality or grading of the materials is changed. When a relation between the strengths at 7 days and 28 days is established only 3 samples may be prepared and tested at 7 days only. This normal number of control specimen tests may be increased if the Engineer considers it necessary.

B.7.4. *Field mix.*—The actual proportions of the fine and coarse aggregates will be determined by preliminary tests. In the works tests, bulkage of sand due to moisture if any, should be allowed for different batches according to the moisture actually present at the time of mixing. This moisture will be taken into account in controlling the mixing water also. The

**B.7.13.**

proportions once fixed by preliminary tests shall not be changed so long as the materials are the same, subject only to the quantities of fine aggregate and water being adjusted to compensate for bulkage due to the moisture in sand and free water in fine aggregate at the time of use.

No change of materials shall be allowed unless fresh tests with new materials show satisfactory results.

Water and cement content per batch of concrete as determined by preliminary tests shall be maintained constant except for suitable allowances to be made for surface moisture of the aggregates at the time of actual use.

The minimum quantity of cement to be used in controlled concrete shall not be less than 220 kg. per cu. m. (about $12\frac{1}{2}$ bags per 100 c. ft.) of finished plain concrete and not less than 5.6 bags of 50 kg. per cu. m. (16 bags per 100 c. ft.) of finished reinforced cement concrete.

For any particular item, compressive strength required to be attained by the concrete at 28 days in the preliminary and works tests on 15 cm. (about 6") cubes, minimum cement content required to be used and approximate proportions of approved fine and coarse aggregates shall be specified in the special provisions. These particulars will be only for the guidance of the contractor for quoting rates.

Immediately upon the receipt of the award of the contract, the contractor shall inform the Engineer the exact location of the sources of the acceptable materials which he proposes to use and get the materials approved. The mix with the actual approved materials to be used shall be got designed in an approved laboratory by the contractor with minimum quantity and cement to give the specified strength in the preliminary tests and the proportions got approved by the Engineer in writing. These proportions shall be used so long as the materials continue to be of the same quality and from the same sources subject only to slight changes in the relative quantities of fine and coarse aggregates for the purpose of promoting workability provided the works tests also show the required strengths.

If such preliminary tests involve change in the theoretical cement factor originally set forth in the special provisions up to 2 per cent. on the higher or lower side, no adjustment in the cost of the item to be paid to the contractor shall be made. If such alterations change the theoretical cement factor by more than 2 per cent. on the higher or lower side, the source and quality of aggregate remaining the same, payment will be adjusted for or against the contractor in whatever amount the total cost of cement to the contractor has been increased or decreased by more than 2 per cent. The amount of such increase or decrease shall be calculated on the basis of quantity of cement determined and prescribed in the special provisions. In adjusting the cost, only the cost of cement shall be considered and not handling or other charges which shall be treated as incidental to the item.

If during the progress of the work, the contractor wishes to change the materials, the proportions shall be fixed on the basis of fresh preliminary tests to give the required strength after the Engineer is satisfied that the materials satisfy the specifications. No adjustment of cost shall be made for change of proportions of cement fixed in the original preliminary tests.

B.7.5. *Mixing.*—Mixing shall comply with specification No. B.6.4. Mixing shall be done only by mechanical mixers.

B.7.6. *Forms.*—Forms shall comply with specification No. B.6.5.(*b*).

B.7.7. *Transporting.*—Transport shall comply with specification No. B.6.6.

B.7.8. *Placing.*—Placing shall comply with specification No. B.6.7.

B.7.9. *Compacting.*—Compacting shall comply with specification No. B.6.8.

Compaction shall necessarily be done by mechanical vibrators. No hand compaction will be permitted except (i) to supplement vibration near the edges and faces of forms, to fill the corners completely and to prevent honeycombing or (ii) in members where vibration is not possible nor desirable in the opinion of the Engineer.

B.7.10. *Curing.*—Curing shall comply with specification No. B.6.9.

B.7.11. *Finishing.*—Finishing shall comply with specification No. B.6.10.

B.7.12. *Retempering.*—Specification No. B.6.11 shall be followed.

B.7.13. *Sampling and testing.*—Sampling and testing shall comply with B.7.3. above, special provision in the tender and relevant provision of B.6.12.

B.7.14. *Keeping records.*—Records shall be maintained and dealt as per specification No. B.6.13.

B.7.15. *Item to include.*—All the provisions prescribed in specification No. B.6.14 and also the preliminary laboratory tests to determine the exact proportions of the concrete mix to give the specified strength and control tests during the concreting operations.

B.7.16. *Mode of measurement and payment.*—Measurement and payment shall be as per specification No. B.6.15. Where adjustment of cost is necessary for use of more or less cement, only actual cost of cement shall be considered and not handling or other charges.

Cement content of the concrete shall be as specified in the special provisions. If the initial preliminary tests before starting work indicate variation of cement actually necessary to be within a range of $\pm$ 2 per cent. of the quantity specified in the special provisions, no adjustment shall be made in the cost for such variations. If the variation of the cement content is more than $\pm$ 2 per cent, the cost of concrete shall be adjusted for or against the contractor by whatever amount the total cost of cement to the contractor at work site is increased or decreased above or below 2 per cent. respectively per unit of finished concrete for which the rate is quoted in the tender.

## B.8.(*a*). BURNT BRICK MASONRY FIRST CLASS IN LIME/CEMENT MORTAR

*Burnt Brick masonry first class in lime/cement mortar of specified proportion including necessary scaffolding, watering masonry, etc., complete.*

B.8.(*a*).1. *Materials—Bricks.*—First Class Bricks shall be used for this item and shall comply with specification No. A.9.1. Sample shall be got approved by the Engineer who will keep it in his office for reference.

*Mortar.*—Mortar shall conform to specification No. B.3.(*a*) for lime mortar/B.5.a for cement mortar. The quantity of mortar to be used in one cu. metre of masonry shall vary from 0.24 cu. metre or 240 litre for thin masonry to 0.26 cu. metre or 260 litres for massive masonry of conventional bricks and 0.25 cu. m. or 250 litres for thin masonry and 0.27 cu. m. or 270 litres for thick masonry for I. S. I. bricks. The proportion of lime/cement mortar shall be as specified in the item and special provisions of the tender.

B.8.(*a*).2. *Construction Details*:—

B.8.(*a*).2.1. *Size.*—Bricks of different dimensions will not be allowed on the same work except when specially permitted by the Engineer.

B.8.(*a*).2.2. *Face work.*—Bricks of entirely uniform colour and of best shape and which have greater resistance to weathering and penetration by rain should be selected for the face work when it is not to be plastered.

B.8.(*a*).2.3. *Soaking.*—All bricks shall be immersed in water for two hours before being put into the work so that they will be saturated and will not absorb water from the mortar. Immersion will also assist in removing dirt and dust. The surfaces should be just moist but not too wet at the time of laying.

B.8.(*a*).2.4. *Bats.*—No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closers, in which case, full bricks shall be laid at corners, the bats being placed in the middle of the courses.

B.8.(*a*).2.5. *Laying.*—The bricks shall be laid in mortar to line, level and shapes shown on the plans, slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar so that they will be completely filled with mortar and no hollows left anywhere. Bricks shall be handled carefully so as not to damage their edges. They should not also be thrown from any height to the ground but should be put down gently. All courses shall be laid truly horizontal and all vertical made truly vertical. Vertical joints in one course and the next below shall not come over one another and shall not normally be nearer than quarter of a brick length. For battered faces bedding shall be at right angles to the face. Fixtures, plugs, frames, etc., if any, shall be built in at places shown in the plans while laying the course only and not later by removal of bricks already laid.

Care shall be taken during construction to see that edges of bricks at quoins, sills, heads, etc, are not damaged.

The verticality of the walls and horizontality of the courses shall be checked very often with plumb-bob and-spirit level respectively.

**B.8.(a).8.**

B.8.(*a*).2.6. *Bond.*—Bond used shall be English or such other as may be ordered and shall be carried throughout the work. At all corners, alternate courses of brick work shall be laid header and strecherwise as seen on the face so as to secure good bond. The arrangement of bond at quoins shall be symmetrical.

B.8.(*a*).2.7. *Joints.*—Joints shall not exceed 10 mm. (about 3/8″) in thickness and this thickness shall be uniform throughout. The joints shall be raked out not less than 10 mm. (about 3/8″) deep when the mortar is green where pointing is to be done. Otherwise joints shall be struck flush with the face at the time of laying.

B.8.(*a*).2.8. *Uniform raising.*—Brickwork shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60 cm. (about 2 ft.) lower than another. But where building at different levels is necessary, the breaks shall be stepped so as to give later a uniform level and effectual bond. Horizontal courses should be to line and level and even and face plumb or to batter as shown on the plan. The rate of laying masonry may be up to a height of 60 cm. (about 2′) per day if cement mortar is used and 45 cm. (about 18″) if lime mortar is issued. Greater heights may be built only if permitted by the Engineer in writing.

B.8.(*a*).3. *Scaffolding.*—Scaffolding will be double or single as is warranted for the particular work. The ends of poles if required to rest on the brick work shall be located at convenient places. Scaffolding shall be erected with bullies, steel sections, pipes or bamboos of adequate strength so as to be safe for all the dead, live and impact loads likely to come on them due to construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials, or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Put log holes shall be made good by bricks to match the face work when put logs are removed after ensuring that the holes behind are solidly filled in with 1 : 4 : 8 cement concrete.

B.8.(*a*).4. *Dewatering.*—Where water is met with, the work space shall be kept free of water by the contractor while the brick work is in progress and until the Engineer considers the mortar has sufficiently set. Dewatering shall also be done when required for taking measurements, etc. Dewatering shall be carried out in such a manner as not to injure masonry in any way. Dewatering will be included in the rate of brick work unless separately provided in the tender.

B.8.(*a*).5. *Watering.*—The Brick work shall continuously be kept well watered for 14 days after laying. Brick work when laid shall be initially protected against hot sun if necessary by wet sacking or straw or similar absorbent material. At no time during the curing period shall the mortar be allowed to dry. Initial watering should be done carefully through a rose so as not to disturb or wash out mortar. On Sundays and holidays or at the close of day's work or other periods of cessation of work, the masonry shall be kept well watered by employing sufficient number of labour. Should the contractor fail to water the work as specified, the Engineer may employ the requisite labour, materials and equipment to water the work properly and charge the cost to the contractor.

B.8.(*a*).6. *Final finish.*—If the brick work is not to be plastered, the face, after pointing is properly cured, shall be washed down and all stains and adhering mortar lumps removed. Put log holes, etc., shall be solidly filled in the interior with cement concrete 1 : 4 : 8 and the face with bricks to match adjoining work.

B.8.(*a*).7. *Bad work.*—Should the mortar perish, i.e., become dry or powdery through neglect of watering or masonry be hollow or the work not done according to plan and specifications, the work shall be pulled down and rebuilt at contractor's expense. If hollows or other defects are suspected a brick may be removed here and there for confirmation. If hollows or other defects are confirmed such portions shall be dismantled and rebuilt at the cost of the contractor.

B.8.(*a*).8. *Item to include.*—(1) All labour, materials, use of tools, equipment and other items incidental to the satisfactory completion of brick masonry.

(2) Erecting and removing of all scaffolding, ladders and plant required for the execution of the work to the height and depths and shapes as shown on the plan or as ordered by the Engineer.

(3) Dewatering required for completing this item and till the mortar of masonry, pointing, plastering is properly set, unless separately provided in the tender.

(4) Constructing bickwork to lines, levels, batters, curves, and to any position or shape, to the height and depth shown on the plans or as ordered by the Engineer including striking joints and raking out joints and housing frames, fixtures, etc., and rectifying defective work.

(5) Watering the masonry.

(6) Clearing the site round the brick work so as to restore the area to its original condition.

B.8.(*a*).9. *Measurement and payment.*—The contract rate shall be for a unit of one cubic metre of brick masonry fully completed. The quantity of brick work to be paid under this item shall be in number of cubic metres measured for the completed work and to the limiting dimensions not exceeding those shown on the plans or as ordered in writing by the Engineer. Battered, tapered and curved portions shall be measured net. Dimensions shall be measured and quantity of individual items worked out correct to two places of decimals of a metre and a cubic metre respectively.

No deduction shall be made for (1) ends of dissimilar materials like girders, beams, lintels, rafters, etc., upto 500 sq. cm. (about $\frac{1}{2}$ sq. ft.) in section and (2) opening upto 0.1 sq.m. (about 1 sq. ft.) in face area.

When the brick work is to be plastered, measurements will be exclusive of plaster.

Brick work shall normally be measured as under:—

Half brick wall shall be measured in sq. m. stating the thickness.

Brick walls upto and including three brick in thickness shall be measured in multiples of half bricks which shall be deemed to be inclusive of the mortar joints, as under:—

| | width for conventional bricks. | width or modular I.S.I. bricks. |
|---|---|---|
| One brick wall shall be measured as | 22.86 cm. (9″) | 20 cm. |
| One and half brick shall be measured as | 35.56 cm. (14″) | 30 cm. |
| Two brick shall be measured as | 47.00 cm. (18½″) | 40 cm. |
| Two and half brick shall be measured as | 59.70 cm. (23½″) | 50 cm. |
| Three brick shall be measured as | 71.12 cm. (28″) | 60 cm. |

Width of more than three bricks in walls will be measured actually and limited to the width specified.

Where fractions of half bricks occur due to architectural or other requirements the measurement shall be taken as actual.

## B.8. (*b*) BURNT BRICK MASONRY SECOND CLASS IN LIME/CEMENT MORTAR.

*Burnt brick masonry second class in lime/cement mortar of specified proportion including necessary scaffolding, watering masonry, etc., complete.*

B.8.(*b*).1. *Materials.*

B.8.(*b*).1.1. *Bricks.*—Bricks shall comply with specification No. A.9.2. for second class bricks.

B.8.(*b*).1.2. *Mortar.*—Mortar shall conform to specification No. B.3.(*a*) for lime mortar/ B.5(*a*) for cement mortar. Quantity of mortar to be used in one cu. m. of masonry shall vary from 0.30 cu.m.or 300 litres for thin masonry to 0.32 cu. m. or 320 litres for massive masonry of conventional bricks and from 0.31 cu. m. or 310 litres for thin masonry to 0.33 cu. m. or 330 litres for massive masonry of I. S. I. bricks.

B.8.(*b*).2. *Joints.*—Joints shall not exceed 12 mm. (about $\frac{1}{2}$″) in thickness and this thickness shall be uniform throughout.

All other specifications of first class B.B. masonry shall apply to this class of masonry also.

## B.9. STONE MASONRY (GENERAL)

B.9.1. *General.*—The following instructions are to be complied with for all classes of stone masonry.

B.9.2. *Materials.*

**B.9.4.**

B.9.2.1. *Building Stone.*—Building stone shall comply with the specifications detailed in A.8. Stones of the specified type and quality shall be obtained from the quarries defined in the special provisions or from other sources approved by the Engineer. The size of the stones shall be as specified for the item. The stone shall be kept free from dirt, dust, oil or any other injurious materials which may attack the stone or mortar or prevent adhesion of mortar. Stones with skins shall not be used.

Different categories of stones such as face stones headers, quoins, etc., shall be collected in advance to suffice at least for a week's requirement and shall be stacked separately categorywise.

B.9.2.2. *Mortar.*—The mortar to be used shall be of the type and proportion mentioned in the item or special provisions. Lime mortar if used, shall comply with specification No. B.3(*a*). Cement mortar if used, shall comply with specification No. B.5.(*a*). Water for curing shall comply with specification No. A.5.

B.9.3. *Dressing.*—Different types of dressing. The stones shall be dressed to one of the following types specified for the item or as detailed in the specifications for the particular item itself.

B.9.3.(*a*) *Rough tooled dressing.*—(*a*) Rough tooled surface shall have series of bands, 4 to 5 cm. wide, more or less parallel to tool marks all over the surface. These marks may be either horizontal, vertical or at an angle of 45° as required. The dressed stones may have depressions on the surface, the depth of gap between the surface and the straight edge held against it shall not exceed 3 mm. This is also called as " one line dressing ".

(*b*) *Chisel or punch dressing.*—A chisel dressed surface shall have series of parallel ridges. Chisel marks shall be left all over the surface. This dressing shall be more even than rough tooled dressing. The depth of the gap between the surface and a straight edge held against the surface shall not exceed 2 mm. This surface dressing is also called " two line dressing ".

(*c*) *Close punched or picked dressing.*—A close punched dressed surface shall be closer dressed further giving finer surface than the chisel or punch dressing. The depth of gap between the surface and the straight edge held against it shall not exceed 1 mm. This is also called as " three line dressing ".

(*d*) *Fine tooled dressing.*—A fine tooled dressing is the one which is finer than the close punched dressing such that all the unevenness is removed and a fairly smooth surface is obtained. The surface shall have 5 to 4 lines per centimetre width. Other types of dressing may also be specified in the special provisions.

(*e*) *Samples.*—Samples of each category of stones of the specified quality and dimensions dressed to the specified requirements shall be got approved by the Engineer who will keep them in his office for reference.

B.9.4. *Method of Laying Stone.*—The masonry shall be laid to lines levels, curves and shapes shown in the plans. Fixture, plugs, frames, etc., if any, shall be built in at places shown on the plan or directed by the Engineer while laying the masonry and not later by removing the stones already laid:—

(*a*) Stones in the hearting shall be laid on their broadest face which gives better opportunity to fill the space between stones.

(*b*) Stratified stones must be laid on their natural beds. All bed joints shall be normal to the pressure upon them.

(*c*) In battered walls, the beds of stone and the plane of courses should be at right angles to the batter.

(*d*) The courses of masonry shall ordinarily be pre-determined. They shall generally be of the same height. Where there is to be variation in height of courses, larger courses are to be placed at the lower levels, the height of courses decreasing gradually towards the top of the wall, unless plans specify otherwise due to architectural requirements.

(*e*) The stones shall be wetted before laying in mortar. Each mason shall be supplied by the contractor with a vessel full of water and a tumbler for wetting stones, care being taken not to spill any water on green masonry. The bed which is to receive the stone shall be cleaned, wetted and covered with a layer of fresh mortar. All stones shall be laid full in mortar both in bed and vertical joints and settled carefully in place with a wooden mallet immediately on placement and solidly bedded in mortar before it has set. Clean chips and spalls, carefully selected to fit in the spaces shall be wedged into the mortar joints and beds wherever necessary, to avoid thick beds or joints of mortar. When the foundation masonry is laid directly on rock, the face stones of the first course

shall be dressed to fit into the rock sungly when pressed down in the mortar bedding over the rock. No dry or hollow space shall be left any where in the masonry and each stone shall have all the embedded faces completely covered with mortar. If a portion of Masonry is dismantled, every stone must be found with mortar adhering fast to all its embedded surfaces and there shall be no hollows. This will be one of the tests in deciding if the masonry is good or bad if need arises. Where hollows or other defects are suspected a stone here or there may be removed for confirmation. If these are confirmed such portions shall be dismantled and rebuilt at the cost of the contractor.

(*f*) Face work and hearting shall be brought up evenly but the top of each course shall not be levelled up by use of flat chips.

(*g*) In case any stone already set in mortar is disturbed or the joint broken, the stone shall be taken out without disturbing the adjoining stones and joints, the mortar thoroughly cleaned from the joints and stone and the stone reset in fresh mortar. Attempts must never be made to slide one stone over another already laid.

(*h*) Shaping and dressing shall be done before the stone is laid in the work. No dressing and hammering which will loosen the masonry will be permitted after it is once placed.

(*i*) There shall be good collection of stones and spalls within easy reach of each mason to enable proper selection of stones for individual location while laying. The stones shall be continuously replenished.

(*j*) *Bond.*—(1) To give sufficient lateral bond a stone in any course shall break joint with the stone in the course below or above about half the height of the course and generally not less than 8 cm. (about 3″), i.e., joints parallel to the pressure in courses above and below shall not lie too closely near the same vertical line.

(2) To give sufficient transverse bond, the prescribed number of headers shall extend from front to back of thin walls up to a width of 60 cm. (about 2′) or prescribed number of lines of over-lapping headers from face to back of walls over 60 cm. (about 2′) thick. Overlaps shall be 15 cm. (about 6″) at each end. To ensure provision of full number of headers of the required size, they shall be kept at specified intervals in each course in advance of starting masonry and then embedded in mortar. Their position in each course shall be staggered, so that each will be near about the middle of the two in the courses below and above. Their faces shall be marked with a distinguishing sign to identify them.

(3) To bond work at all angle junctions of walls, the stones at each alternate course shall be so carried into each of the respective walls as to join the work thoroughly. Quoins shall be laid header and stretcherwise when seen on each side of the wall.

(4) When new work has to be started on the old or one completed a long while ago or in the previous working season, care shall be taken to roughen and clean old surface satisfactorily without disturbing the masonry before laying the new. It shall be wetted before laying the bedding mortar.

(5) Where practicable the whole of the masonry in any structure shall be carried up to a uniform level throughout. But where breaks are unavoidable in carrying up the work continuously in horizontal courses, sufficiently long step shall be left to join the courses to be laid later. All junctions of walls shall be formed at the time the walls are being built; cross-walls should be carefully bonded into the main walls.

(6) The practice of building two thin faces tied with occasional through-stones and filling up the middle with dry packing and putting mortar on top must be strictly guarded against. Putting dry chips in the joints of stones before filling them with mortar shall not be permitted.

(7) For ensuring good bond masonry shall be left uneven at the top of each course.

B.9.5. *Treatment of joints.*—When joints are to be pointed, they shall be raked to a depth not less than their width when the mortar is still green. When pointing is not to be done, the mortar in the joints shall be pressed and trowelled smooth while masonry is being laid. If this is not done, the joints shall be raked when the mortar is green as mentioned above, cleaned and wetted filled with 1 : 3 cement mortar, pressed and trowelled smooth. Joints shall be raked when plastering is to be done.

B.9.(a)-2-2.

B.9.6. *Watering.*—

All masonry built in lime or cement mortar shall be initially protected from sun, rain, etc., by wet hessian or straw till set and thereafter kept continuously wet for 14 days from the date of laying, unless other length of period is ordered in the special provisions. Watering shall be done carefully in the beginning through a rose so as not to wash the mortar out of the joints. On Sundays, holidays, at the close of day's work and other periods of cessation of work, the masonry is to be kept continuously wet for the specified period of curing and labourers are to be employed for the purpose. Should the contractor fail to water the work to the satisfaction of the Engineer, the latter may supply requisite men, materials and equipment to water the work properly and charge the cost to the contractor.

B.9.7. *Bad work.*—Should the mortar perish, i.e., become dry, white or powdery through neglect of watering or if the masonry shows hollow joints or non-adherence of mortar to the stones or if the work does not conform to plans and these specifications, the work must be pulled down and rebuilt at the contractor's expense.

9.8. *Final finish.*—All masonry shall be washed down on completion and all stains and adhering mortar removed from the face as the scaffolding is being lowered and removed.

B.9.9. *Iron, stone, concrete or other fixtures, buttresses, etc.*—All iron, stone, concrete or other fixtures, shall be built and bonded into the work in proper place as work proceeds not inserted or joggled on after the masonry is advanced.

B.9.10. *Wet Foundations.*—In wet foundations, or other situations where water is met with, the work space shall be kept free of water by the contractor while the masonry is in progress and until the Engineer considers the mortar has sufficiently set. Dewatering shall be carried out in such a way as not to injure the concrete or masonry in any way. Dewatering shall also be done when required for taking checking measurements, passing foundations, etc. Dewatering will be included in the rate of masonry unless separate provision is made in the tender.

B.9.11. *Scaffolding.*—Scaffolding required for facility of construction shall be provided by the contractor at his expense.

Scaffolding will be double or single as is warranted for the particular class of masonry. But the ends of poles should not be placed in the position of header stones. Scaffolding shall be erected with steel sections or pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed.

Put log holes shall be made good by stones to match the face work when scaffolding is being removed after ensuring that all holes behind are solidly filled in with 1 : 4 : 8 cement concrete.

Clauses of this General Specification shall be applicable in all pertinent points to the specifications for all classes of masonry.

## B.9.(*a*). ASHLAR FINE TOOLED MASONRY

*Ashlar Fine Tooled masonry in Cement mortar/Lime mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

B.9.(*a*).1. *General.*—Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. Ashlar Fine Tooled Masonry shall also comply with the following in addition.

B.9.(*a*).2. *Materials.*

B.9.(*a*).2.1. *Building Stones.*—According to B.9.2. Stones shall be obtained from the quarries defined in the contract or from other sources approved by the Engineer. It shall be blue basalt/yellow basalt/trap/granite/quartzite/gneiss, in that order available in the region and known for soundness and satisfying specification No. A.8 for stones unless special stones are specified. Stones shall be selected for their uniform colour and freedom from seams, cracks or other defects.

B.9.(*a*).2.2. *Mortar.*—Cement mortar/lime mortar shall be of proportion as mentioned in the wording of the item or the special provisions and shall comply with specification No. B.5(a)/B.3.(a).

B.9.(*a*).3. *Dressing and size.*—(1) Every stone shall be fine tooled on the beds, joints, and and faces, full, free and out of winding if the surfaces are plane or to uniform curves, twists and shapes required by the design. They shall be dressed accurately to the exact size and shape shown in the drawings, all visible edges must be entirely free from chippings. Dressings of stones shall be fine tooled as per specification No. B.9.3.(*d*) to conform to the detailed architectural designs.

(2) No stone shall be less than 30 cm. (about 12″) in height nor less in breadth than height or less in length than twice its height unless otherwise specified in the special provisions.

(3) In walls 75 cm. (about $2\frac{1}{2}'$) thick and under the header shall run right through the wall.

B.9.(*a*).4. *Scaffolding.*—Scaffolding shall necessarily be double and according to B.9.11.

B.9.(*a*).5. *Construction.*—(1) The stones dressed in accordance with the architectural details shown in the drawings shall be laid in regular courses not less than 30 cm. (about 12″) in height. All the courses shall be of the same height unless otherwise specified. No course shall be thicker than any course below in unless specially shown in the drawings.

(2) Each stone must first be fitted into its place dry in order that any inaccuracy of figure may be discovered and corrected before it is finally laid in mortar and settled in its bed. The stone shall be laid full in thin mortar, the bed and side joints being not more than 1.5 mm. (about 1/16″) in thickness. And all visible edges shall be quite free from chippings. Each stone shall be struck with a wooden mallet when laid in place in mortar to bring it to a solid bearing both as to bed and joint.

(3) The courses shall be horizontal and side joints vertical throughout unless otherwise indicated in the plans. Joints shall be struck.

(4) For bond, face stones shall be laid header and stretcher alternately unless otherwise ordered by the Engineer, the headers being arranged to come as nearly as possible in the middle of the stretchers below. The stones in the courses above and below shall break joint for about half the height of the course and the bond shall be carefully maintained throughout the wall.

B.9.(*a*).6. *Protection.*—The stone work fixed in place where liable to damage shall be protected from injury during construction by wooden casing, straw mats or padded gunny bags until construction is completed. The dressed stone faces shall be protected with mud or cowdung wash as protection against stains, etc. The rate is inclusive of cost of all protection and removing it after completion of work.

B.9.(*a*).7. *Item to include.*—Rate shall include—

(1) Erecting and removing scaffolding, ladders, and use of plant required for execution of the item including compensation for any injury, damage, etc.

(2) Constructing the Ashlar masonry as specified above to lines, levels, batters and shapes as per working drawings or as ordered after dressing the stones as specified and protecting and maintaining till completion.

(3) Striking joints.

(4) Watering the masonry for the specified period.

(5) All labour, materials, use of tools, equipment and tackle required to complete the item as specified.

(6) All chamfering, rebates, slots, holes, etc., required to be cut for fixtures, frames, dowels, railings, bars, anchors, etc.

(7) Dewatering where necessary for doing the work unless separately provided in the tender.

(8) Clearing the site round the masonry.

B.9.(*a*).8. *Mode of Measurement and payment.*—The contract rate shall be per cubic metre of the work finished as specified above. Any stone masonry constructed in excess of that stipulated on the drawings or as directed by the Engineer, will not be measured and paid. The linear dimensions shall be measured correct up to half a centimetre and total quantity worked out correct up to three places of decimals of a cubic metre. Where mouldings, rebates, recesses, holes and chamfers are provided the measurements thereof shall be taken square over all projections in the individual stones unless separately provided in the special provisions.

अनुक्रमणिका
Table of Contents



## B.9.(*b*). ASHLAR ROUGH TOOLED MASONRY.

*Ashlar Rough tooled masonry in Cement Mortar/Lime Mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

B.9.(*b*).1. *General.*—Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. "Ashlar Rough tooled" masonry shall also comply with the following in addition.

B.9.(*b*).2. *Materials.*

B.9.(*b*).2.1. *Building stones.*—According to B.9. stones shall be obtained from the quarries designated in the contract or from any other source approved by the Engineer. It shall be blue basalt/yellow basalt/trap/granite/gneiss/quartzite available in that order in the region and known for soundness and satisfving specification No. A.8 for stones unless special stones are specified. The stones shall be selected for their uniform colour and freedom from seams, cracks and other defects.

B.9.(*b*).2.2. *Mortar.*—Cement/lime mortar shall be of the proportion as mentioned in the wording of the item or the special provisions and shall comply with specification No. B.5.(*a*)/3.3.(*a*).

B.9.(*b*).3. *Dressing and size.*—(1) Beds, joints and faces of stones in this class of work shall be rough tooled (one line dressed) to the exact sizes and shapes shown on the plans. All visible edges shall be free from chippings. Faces exposed to view shall have fine dressed chisel draft of minimum 2.5 cm. (about 1″) width all round the edges. The dressing shall be done as per specification No. B.9.3(*a*).

(2) No stone shall be less than 30 cm. (about 12″) in height nor less in breadth than height or less in length than twice its height.

(3) In walls 75 cm. (about 2½′) thick and under, the header shall run right through the wall.

B.9.(*b*).4. *Scaffolding.*—Scaffolding shall conform to specification No. B.9.11. and shall be double.

B.9.(*b*).5. *Construction*:

(1) The stones dressed according to the architectural details shown in the drawings shall be laid in regular courses not less than 30 cm. (about 12″) in height. All the courses shall be of the same height unless otherwise specified. No course shall be thicker than any course below it, unless specially shown in the drawings. Each stone must first be fitted into its place dry in order that any inaccuracy of figure can be discovered and corrected before it is finally laid in mortar and settled in its bed.

(2) The stones shall be laid full in thin mortar, the bed and side joints being not more than 3 mm. (about ⅛″) in thickness. Each stone shall be struck with a wooden mallet when laid in place in mortar to bring it to a solid bearing both as to bed and joint.

(3) The courses shall be horizontal and side joints vertical throughout unless otherwise indicated in the plans. Joints shall be struck.

(4) For bond, face stones shall be laid header and stretcher alternately unless otherwise ordered by the Engineer, the headers being arranged to come as nearly as possible in the middle of the stretchers below. The stones in the courses above and below shall break joint on the face for about half the height of the course and the bond shall be carefully maintained throughout the wall.

B.9.(*b*).6. *Protection.*—The stone work fixed in place where liable to damage shall be protected from injury during construction by wooden casing straw mats or padded gunny bags until construction is completed. The dressed stone faces shall be protected with mud or cowdung wash as protection against stains, etc. The rate is inclusive of cost of all protection and removing after completion of work.

B.9.(*b*).7. *Item to include.*—(1) Erecting and removing seaffolding ladders, and use of plant required for execution of the item including compensation for any injury, damage, etc.

(2) Constructing the Ashlar Rough tooled masonry as specified above to lines, levels, batters and shapes as per working drawings or as directed by the Engineer after dressing the stones as specified and protection and maintaining till completion.

(3) Striking joints.

(4) Watering the masonry for the specified period.

अनुक्रमणिका
Table of Contents

**B.9.(f).3.1.**

B.9.(c).6. *Protection.*—The stone work fixed in place where liable to damage shall be protected from injury during construction by wooden casing, straw mats or padded gunny bags until construction is completed. The dressed stone faces shall be protected with mud or cowdung wash as protection against stains, etc. The rate is inclusive of cost of all protection and removing it on completion of work.

B.9.(c).7. *Item to include.*—Rate for the item shall include—

(1) Erecting and removing the scaffolding, ladders, and plant required for execution of the item including compensation for any injury, damage, etc.

(2) Constructing "Ashlar Rock, rustic or quarry faced masonry" as specified above to lines, levels, batters and shapes as per working drawings or as ordered by the Engineer after dressing the stones as specified and protecting and maintaining till completion.

(3) Striking joints.

(4) Watering the masonry for the specified period.

(5) All labour, materials, use of tools, equipment and tackle required to complete the item as specified.

(6) All chamfering, rebates, slots, holes, etc., required to be cut for fixtures, frames, dowels, railings, bars, anchors, etc.

(7) Dewatering where necessary for doing the work unless separately provided in the tender.

(8) Clearing site round the masonry.

B.9.(c).8. *Mode of measurement and Payment.*—The contract rate shall be per cubic metre of the work. Any masonry constructed in excess of that stipulated on the drawings or as directed by the Engineer shall not be measured and paid. The linear dimensions shall be measured correct up to half a centimetre and total quantity worked out correct up to three places of decimals of a cubic metre. The dimensions shall be measured from draft edge corners of quoins and bushing will not be taken into account. Where mouldings, rebates, recesses, holes and chamfer are provided, the measurements thereof shall be taken square overall projections in the individual stones unless separately provided in the special provisions.

B.9.(d). ASHLAR-CHAMFERED MASONRY:

*"Ashlar-Chamfered" masonry in cement mortar/lime mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

The specifications for this item will be exactly the same as for Ashlar Rock, rustic or quarry faced, except that it shall have all exposed edges of each stone bevelled off to 45° for about a depth of 2.5 cm. (about 1") or as shown in the plans at the joints starting from the edge of the chisel draft. The draft and the chamfer shall be chisel dressed.

B.9.(e). ASHLAR BLOCK IN COURSE MASONRY:

*Ashlar Block in course masonry in cement mortar/lime mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

The specifications for this will be the same as for Ashlar rough tooled except that the minimum heights of the courses specified in this case is smaller. The height of courses however shall not be less than 15 cm. (about 6" approx.)

B.9.(f). RANDOM RUBBLE MASONRY 1ST SORT.

*Random Rubble masonry 1st sort in cement/lime mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

B.9.(f).1. *General.*—Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. Random Rubble masonry shall also comply with the following in addition.

B.9.(f).2. *Materials.*—Materials shall conform to specification No. B.9.2.

B.9.(f).3. *Dressing and size.*

B.9.(f).3.1. *Face stones.*—Height shall not be greater than breadth of face and no stone shall have its length less than $1\frac{1}{2}$ times its height. All the sides of the stones on the face shall be dressed in straight lines and all the sides on the face shall be in one plane. The stone face shall be rough tooled (one line dressed) and the sides shall be rough tooled square up to and afford a bearing of at least 5 cm. (average) from face. Individual stones shall have generally

a face area of not less than 0.05 sq. m. (about ½ s.ft.). Face stones shall generally comply with specification No. A.8. The face stones shall be selected from the mass of quarry stones for their larger size, good beds, close grain and uniform colour. 50 per cent. of the stones shall be more than 0.010 cu. m. or 10 litres (about ⅓ c.ft.) in walls up to 50 cm. (about 20″) in thickness and 0.015 cu. m. or 15 litres (about ½ c.ft.) in thicker walls. They shall be as far as possible of equal size on the face and rough tooled.

B.9.(*f*).3.2. *Through stones.*—One through stone shall be provided per half square metre of facing evenly distributed in a staggered pattern. They shall be about 0.05 sq. m. (about ½ sq. ft.) in face area and shall have a tailing of the full width of the masonry when the width is 60 cm. (about 2′) or less. If the wall or masonry be over 60 cm. (2′) thick a line of headers overlapping each other by at least 15 cm. (about 6″) shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 44 cm. (about 18″) and their average cross sectional area shall not be less than 0.03 sq. m. (about ⅓ sq.ft.). Header shall be distinctly marked on its face.

B.9.(*f*).3.3. *Vertical headers.*—For massive work with a width of a metre (about 3.28″) and more, vertical headers 45 cm. (about 18″) long or depth of two courses whichever is more shall be provided at the rate of one for every sq. metre (10.76 sq. ft.) of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. The average sectional area of each should not be less than 0.03 sq. m. (about ⅓ sq.ft.).

B.9.(*f*)3.4. *Hearting and backing stones.*—These stones shall comply with specification No. A.8.3. These stones shall not be less than 15 cm. (about 6″) in any direction. In walls of 50 cm. (about 20″) and less about 30 per cent. of the stones shall not be less than 0.010 cu. m. or 10 litres (⅓ c.ft.) and for thicker walls about 30 per cent. of stones shall not be less than 0.015 cu. m. or 15 litres (about ½ c.ft.). Backing shall conform to U. C. R. masonry when it is to be plastered.

B.9.(*f*).3.5. *Quoins.*—Quoins shall be of selected stone and shall have rough/fine tooled dressing. They shall be cut to the required size and shall normally have a height of one course. If the plans show a height equal to two courses they shall be provided accordingly. The beds and tops shall be square to the face and rough tooled to 10 cm. (about 4″) from the face and vertical joints square and rough tooled to 4 cm. (about 1½″) from the face. The length of the quoins shall not be less than twice the height or 44 cm. (about 18″) whichever is more on the longer face nor less than the height on the shorter face. In the embedded portion the length of the side shall not be less than that of the side opposite by more than 8 cm. for the longer side and 5 cm. for the shorter side.

B.9.(*f*).4. *Scaffolding.*—Scaffolding shall comply with specification No. B.9.11.

B.9.(*f*).5. *Wet foundation.*—To comply with specification No. B.9.10.

B.9.(*f*).6. *Construction details.*

B.9.(*f*).6.1. *Laying.*—Specification in B.9. shall generally apply.

The face stones shall be laid absolutely without any pinnings on the exposed faces. In each course the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified laps where such laps are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

Quoins shall be laid stretcher and headerwise as seen on each face and shall correspond to the arrangement of quoins in the same course.

The quantity of mortar for one cubic metre of thin and massive masonry shall range from 0.25 cu. m. to 0.30 cu. m. and for water retaining masonry from 0.44 cu. m. to 0.46 cu. m.

B.9.(*f*).6.2. *Joints.*—No face joint shall exceed 6 mm. (about ¼″) in thickness. Stones shall be arranged to break joint as much as possible and long vertical lines of jointing shall be carefully avoided in the face work.

B.9.(*f*).6.3. *Striking Joints.*—The face joints should be properly struck while the mortar is fresh. Joints which cannot be so struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 6 mm. (about ¼″) when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted throughly and filled with good fresh cement mortar 1:3 and finished off by being trowelled smooth.

अनुक्रमणिका
Table of Contents



**B.9.(h).3.**

B.9.(*f*).6.4. *Rate of raising masonry.*—The rate of raising random rubble masonry brought up in uniform levels may be limited to a height of 60 cm. (about 2′) per day in case of cement mortar and 45 cm. (about 20″) in the case of lime mortar. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar:

B.9.(*f*).7. *Item to include.*—(1) Random rubble stone masonry first sort laid in cement/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer with headers, quoins, etc., including striking joints and curing. Cutting grooves holes, etc., for fixing frames, fixtures, etc., is also included.

(2) Erecting and removing all scaffolding, ladders and use of plant required for execution of the item, safety of the labour and inspection of the work including compensation for any injury, damage, etc.

(3) Dewatering to allow construction in the dry and proper setting of masonry unless separately provided in the tender.

(4) Clearing the site round the masonry and backfilling so as to restore it to the original condition.

(5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(*f*).8. *Mode of measurement and payment.*—The quantity of random rubble masonry to be paid under this item shall be in number of cubic metres of the completed work including quoins, etc., and with the limiting dimensions not exceeding those shown on the plans or as fixed by the Engineer. The contract rate shall be based on a unit of one cu. metre (about 35 cft.) of masonry. Dimensions shall be measured correct to a centimetre and individual quantities shall be calculated upto two places of decimals of a cubic metre.

## B.9.(*g*). RANDOM RUBBLE MASONRY 2ND SORT:

*—Random Rubble masonry 2nd sort in cement/lime mortar of specified proportion including striking joints, scaffolding, curing, etc., complete.*

The specification for this item shall be exactly same as standard specification B.9(*f*) for Random Rubble masonry 1st sort except for the following changes:—

(1) Faces shall be only hammer dressed as explained below. The bed and the joint faces shall afford a square bearing of 2.5 cm. (about 1″) average from face by hammer dressing or chiselling.

The sharp and irregular projections on the stone face shall be knocked off by the flat end of the scabbing or spalling hammer. The surface shall be further dressed by lifting the hammer and then allowing the pointed end to drop on the surface freely. This process shall be continued till a fairly uniform and even stone surface is obtained.

Chisel may be used to obtain straight edges for the sides and square surfaces for the beds and joints.

(2) The width of the joints shall not be more than 12 mm. (about $\frac{1}{2}$″).

If pointing or plastering is to be provided the joints shall be raked to not less than 12 mm. (about $\frac{1}{2}$″) when the mortar is green. Otherwise they shall be struck.

(3) The quantity of mortar for one cu. m. of masonry shall range from 0.30 cu. m. to 0.35 cu. m. for thin and massive masonry respectively and 0.46 cu. m. to 0.48 cu. m. for water retaining masonry.

## B.9.(*h*). COURSED RUBBLE MASONRY 1ST SORT:

*Coursed rubble masonry 1st sort in cement-mortar/lime-mortar of specifide proportion including scaffolding, curing, etc., complete.*

B.9.(*h*).1. *General.*—Specification No. B.9 for stone masonry (General) shall apply in all partinent particulars. C. R. masonry 1st sort shall also comply with the following in addition:—

B.9.(*h*).2. *Materials.*—Materials shall conform to specification No. B.9.2.

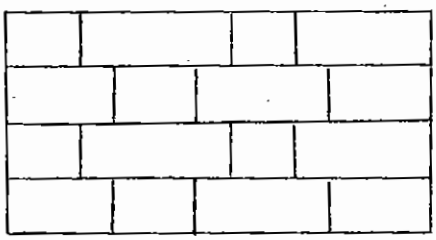
B.9.(*h*).3. *Dressing and size—(a) Face stones—(i) Khandki.*—The khandki stones received from quarry shall be dressed so as to have the vertical and horizontal sides perfectly straight, parallel and at right angles to adjacent sides. The four sides of the stone on the face shall



अनुक्रमणिका
Table of Contents

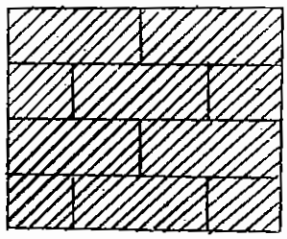
# ASHLAR FINE

FIG. I



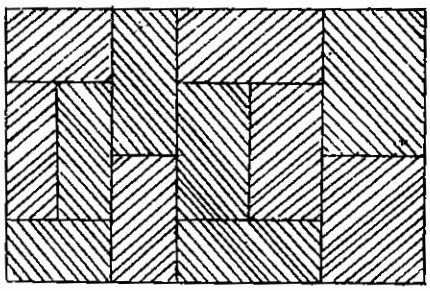
Elevation

FIG. II



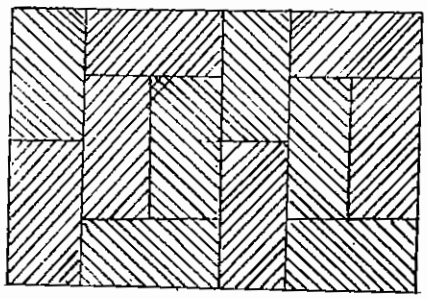
Section

FIG. III



Plan 1st Course

FIG. IV



Plan 2nd. Course

अनुक्रमणिका
Table of Contents

## Coursed Rubble 1st Sort

ELEVATION FIG. I

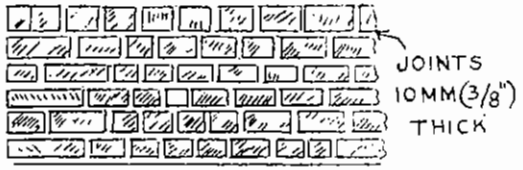



FIG. II
PLAN COURSE 1

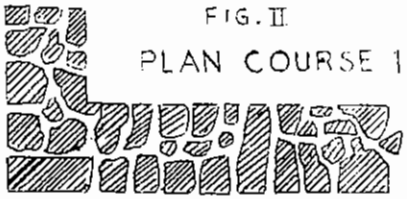
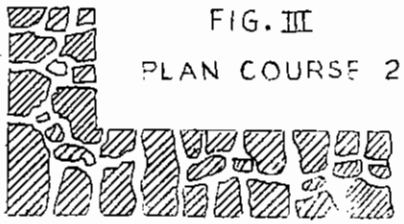


FIG. III
PLAN COURSE 2.



CROSS SECTION FIG IV



## Coursed Rubble 2nd Sort

ELEVATION FIG V

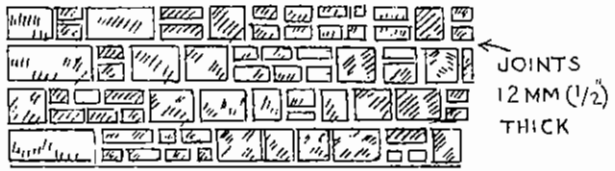



FIG. VI
PLAN COURSE 1

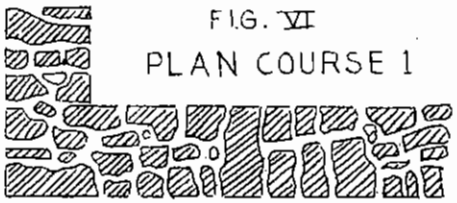
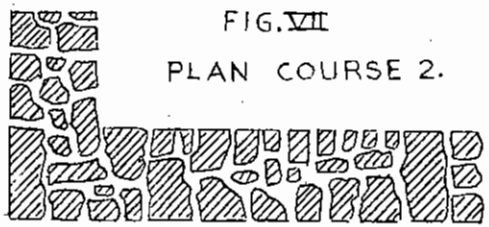


FIG. VII
PLAN COURSE 2.



CROSS SECTION FIG. VIII



## Coursed Rubble 3rd Sort

ELEVATION FIG. IX

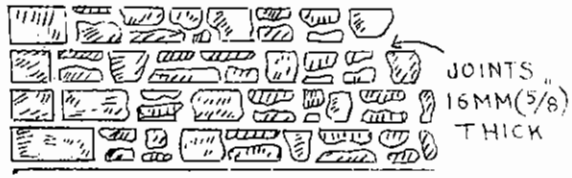



FIG. X
PLAN COURSE 1

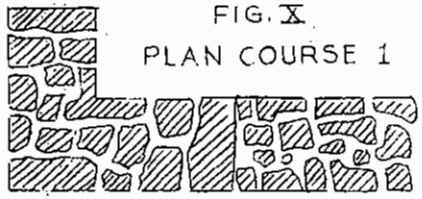
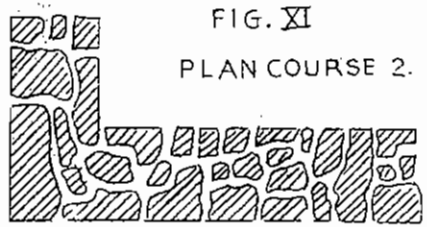


FIG. XI
PLAN COURSE 2.



CROSS SECTION FIG. XII



अनुक्रमणिका
Table of Contents

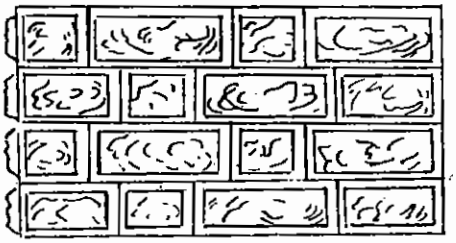
अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

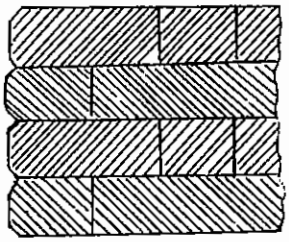
# Ashlar Rock Faced Masonry

FIG. I.



ELEVATION

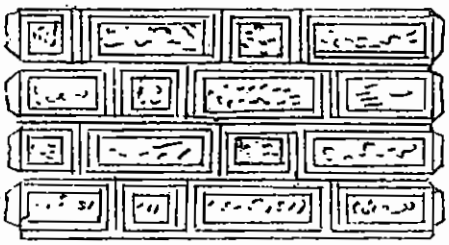
FIG. II



SECTION

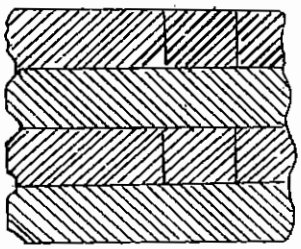
# ChamFered Ashlar

FIG. III



ELEVATION

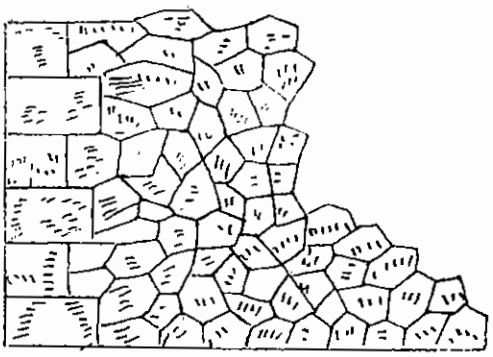
FIG. IV



SECTION

# Random Rubble
## First sort

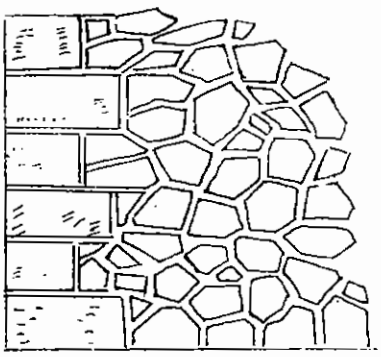
FIG. V



ELEVATION

# Random Rubble
## second sort

FIG. VI



ELVATIOIN

अनुक्रमणिका
Table of Contents

lie in one plane. Bushing on the face of the stones shall not project more than 4 cm. (about 1½″). The beds and tops shall be square to the face and rough tooled to at least 8 cm. (about 3″), from the face. The side vertical joint faces shall be square to the face and rough tooled to at least 4 c.m. (about 1½″) from the face. The face shall have no depression below the plane of the sides.

All the khandki stones shall be more in breadth than in height and shall run back into the masonry for not less than 1.5 times the height 30 per cent. of the khandkis shall have tailing of twice their height. 30 per cent, of these face stones shall not be less than 0.02 cu. metre or 20 litres (about ⅔ cu. ft.).

The height of the khandki shall not be less than 14 cm. (about 6″) or as specified for the particular item.

(ii) These khandkis shall be provided for the interior face also when it is to remain exposed or so specially provided.

(*b*) *Hearting and backing stones.*—When the interior face is to be plastered or otherwise permanently remaining covered, backing stones shall be as specified for U. C. R. masonry. Hearting and backing stones shall be as big as possible 30 per cent. of these stones shall not be less than 0.010 cu. m. or 10 litres (about ⅓ c.ft.) for walls 50 cm. (about 20″) or less in thickness and for walls thicker than 50 cm. (about 20″) 30 per cent. of them shall not be less than 0.015 cu. m. or 15 litres (about ½ c.ft.).

(*c*) *Quoins.*—The quoins shall be of selected stone and shall normally be of the same height as that of the course in which they are to be used. If the plans show a height of two courses they shall be provided accordingly. The faces of quoins shall be rough tooled or hammer dressed as directed by the Engineer. A chisel draft of about 40 mm. (about 1½″) shall be provided on each side of the exposed corners.

The beds and tops shall be dressed square to the face and rough tooled to 10 cm. (about 4″) from the face and vertical joints similarly dressed to 4 cm. (about 1.5″) from the face. The length of the quoins shall not be less than twice their height or 44 cm. (about 18″) whichever is more on the longer face nor less than their height on the shorter face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. (about 3″) for the longer side and 5 cm. (about 2″) for the shorter side.

(*d*) *Through stones.*—The height of through stones shall be the full height of the course and width shall not be less than the height. The face, beds and joints shall be dressed similar to khandkis.

They shall be about 0.05 sq. m. (about ½ sq. ft.) in face area and 0.03 sq. m. (about ⅓ sq. ft.) in average cross sectional area and shall have a tailing of the full width of the masonry when the width is 60 cm. (about 2′) or less. If the masonry be over 60 cm. (about 2′) in width, a line of headers overlapping each other by at least 15 cm. (about 6″) shall be laid right through the wall from the face to the back. The length of the interior headers shall not be less than 44 cm. (about 18″) and their average cross sectional area shall not be less than 0.03 sq.m. (about ⅓ s.ft.). Face header shall be distinctly marked on its face.

(*e*) *Vertical headers.*—For massive work with a width of a metre (about 3.28′) and more, vertical headrers 44 cm. (about 18″) long or depth of two courses whichever is more shall be provided. The average sectional area of each should not be less than 0.03 sq. m. (⅓ sq. ft.).

B.9.(*h*).4. *Construction.*—The stones shall be laid in horizontal course of not less than 14 cm. (about 6″) height. The stones in each course shall be of equal height and all courses shall be of the same height unless otherwise specified or directed by the Engineer. But no course shall be thicker than any course below it unless otherwise shown on the plans or directed. The heights of different courses shall be predetermined and shall match with the corresponding courses in other parts of the structure

Khandki stones shall be provided for faces, remaining exposed.

The through stones shall be placed 1.5 metres (about 5′) apart in the clear in every course before starting the construction of that course and finally embedded in the course.

Vertical headers shall be provided in the case of massive masonry where the thickness of the masonry is one metre or more at the rate of one for every sq. metre (about 10.76 sq. ft.) of area in plan. For every course, a new set of headers shall be introduced at this rate, in a staggered pattern.

**B.9.**(i).

The quoins shall be laid header and stretcherwise as seen on each face of the wall and shall correspond to the arrangement of quoins in the same course.

The faces of masonry to be plastered or remaining permanently unexposed shall conform to U. C. R. masonry unless otherwise directed.

The thickness of joint shall not exceed 10 mm. (about $\frac{3}{8}$"). Where pointing is to be done, the joints shall be raked to a depth of not less than 10 mm. (about $\frac{3}{8}$") when the mortar is green.

The quantity of mortar for one cubic metre of thin and massive masonry shall range from 0.25 cu. m. to 0.30 cu. m. and from 0.44 to 0.46 cu. m. for water retaining masonry.

B.9.(*h*).5. *Rate of raising masonry.*—The rate of raising masonry in cement mortar shall be limited to 60 cm. (about 2') and in lime mortar shall be limited to 45 cm. (about 18") per day. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(*h*).6. *Striking joints.*—The joints of the non-exposed face when pointing is not to be done shall be neatly struck when the mortar is green. Joints which cannot be so struck at the time of laying shall be prepared first by raking joints to a depth of not less than 10 mm. (about 3/8') when the mortar is fresh. These joints shall be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1 : 3 and finished off by trowelling smooth.

B.9.(*h*).7. *Cement pointing.*—When cement pointing is included in the item, it shall be done according to specification No. B.13.

B.9.(*h*).8. *Scaffolding.*—Scaffolding shall conform to specification No. B.9.11.

B.9.(*h*).9. *Wet foundations.*—To comply with specification No. B.9.10.

B.9.(*h*).10. *Item to include.*—(1) Coursed rubble masonry first sort laid in cement mortar/ lime mortar of specified proportion, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including striking joints, raking out joints and curing for the specified period. Chisel drafting, chamfering and dressing the stones to lines, shapes and curves shown on the working drawings, cutting grooves etc. for fixing frames, fixtures etc. headers and rough tooled quoins are also included.

(2) Erecting and removing all scaffolding, ladders and use of plant required for execution of the item satisfactorily including compensation for any injury, damage etc.

(3) Inspection facilities.

(4) Dewatering unless separately provided for in the tender.

(5) Cost of all labour, materials, use of tools and equipment and incidental items required for satisfactory completion of the item.

(6) Clearing site round the masonry.

B.9.(h).11. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cu. metre of masonry completed in all respects, in place and accepted. The quantity of coursed rubble masonry to be paid under this item shall be number of cu. metres of finished work and the limiting dimensions shall not exceed those shown on the plans or as ordered in writing by the Engineer.

Dimensions shall be measured and individual quantities calculated correct to 2 places of decimals of a metre and cubic metre respectively.

Battered, tapered or curved portions shall be measured net.

### B.9.(*i*). COURSED RUBBLE MASONRY 2ND SORT :

*Coursed rubble masonry 2nd sort in cement mortar/lime mortar of specified proportion including scaffolding, curing etc. complete.*

The specification for this item shall be exactly the same as standard specification B.9.(h) for the coursed rubble masonry 1st sort except for the following changes:—

(1) Two stones may be used for height in one course upto 50 per cent, of the face area.

(2) The thickness of joint shall not exceed 12 mm. (about $\frac{1}{2}$").

(3) Backing shall be of U. C. R. masonry, when unexposed or plastered.

अनुक्रमणिका
Table of Contents



(4) The quantity of mortar for one cu. m. of thin and massive masonry shall range from 0.28 cu. m. to 0.33 cu. m. respectively and 0.46 cu. m. to 0.48 cu. m. for water retaining masonry.

(5) The faces of quoins shall be rough tooled or provided the same type of dressing as Khandkies as directed by the Engineer. A chisel draft of about 40 mm. (about 1½″) shall be provided on each side of the exposed corner.

## B.9.(j). COURSED RUBBLE MASONRY 3RD SORT.

*Coursed rubble masonry 3rd sort in cement mortar/lime mortar of specified proportion including scaffolding etc. complete.*

B.9.(j).1. *General.*—Specification No. B.9. for stone masonry (General) shall apply in all pertinent particulars. C. R. masonry 3rd sort shall also comply with the following in addition.

B.9.(j).2. *Materials.*—Materials shall conform to specification No. B.9.2.

B.9.(j).3. *Dressing and Size.*—Stones to be set in the work shall be as received from the quarry after merely knocking off weak corners and edges with a mason's hammer. All the sides of the stones on the face shall be dressed in straight lines and all these sides shall be in one plane. The beds and joints shall afford a bearing of at least 2.5 cm. (about 1″) average. Individual stones shall have a width of not less 19 cm. (about 8″) in its thickest part and no stone shall be less in width than height and less in length than 1½ times its height. Each stone shall be about 0.015 cu. m. or 15 litres (about ½ cft..) or more.

B.9.(j).4. *Face stones.*—Face stones shall generally comply with specification No. A.8. The face stones shall be selected from the mass of quarry stones for their larger size, good beds, close grain and uniform colour. 50 per cent of the stones shall be more than 0.015 cu. m. or 15 litres (about ½ cft.) in walls up to 50 cm. (about 20″) in thickness and 0.02 cu. m. or 20 litres (about 2/3 cu. ft.) in thicker walls.

B.9.(j).5. *Through stones.*—Each through stone on the face shall have its width not less than the height and shall tail into the work at least 3 times its height.

One through stone shall be provided per half square metre of facing evenly distributed in a staggered manner. Through stones of successive courses should not be placed one above the other. They shall be about 0.05 sq. m. (about ½ sq. ft.) in face area and shall have a tailing of 60 cm. (about 2′) or the width of the wall whichever is less. If the wall of masonry be over 60 cm. (about 2′) thick, a line of headers overlapping each other by at least 15 cm. (about 6″) shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm. (about 18″) and their average cross sectional area shall not be less than 0.025 sq. m. (about 1/4 sq. ft.). Face header shall be distinctly marked on its face.

B.9.(j).6. *Vertical headers.*—For massive work with a width of a metre (about 3.28″) and more, vertical headers 45 cm. (about 18″) long shall be provided at the rate of one for every sq. metre (about 10.75 sq. ft.) of area in plan. For every course, a new set of headers shall be introduced at this rate in a staggered pattern. Their average sectional area shall not be less than 0.03 sq. m. (about ⅓ sq. ft.).

B.9.(j).7. *Hearting and backing stones.*—These stones shall comply with specification No. A.8.3. These stones shall not be less than 15 cm. (about 6″) in any direction. In walls of 50 cm. (about 20″) thickness and less, about 30 per cent. of the stones should not be less than 0.010 cu. m. or about 10 litres (⅓ cft.) and for thicker walls about 30 per cent. of the stones shall not be less than 0.015 cu. m. or 15 litres (about ½ cu. ft.)

B.9.(j).8. *Quoins.*—The quoins shall be selected stone and shall normally be 19 cm.× 24 cm.×39 cm. (about 8″×10″×16″) or as directed by the Engineer. The faces of quoins shall be rough tooled or provided the same type of dressing as that of the face stones as directed. Chisel draft of about 40 mm. (about 1½″) shall be provided on each side of the exposed corner.

The beds and tops shall be dressed square to the face and rough tooled to 10 cm. (about 4″) from the face and vertical joints similarly dressed to 4 cm. (about 1.5″) from the face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. (about 3″) for the longer side and 5 cm. (about 2″) for the shorter side. The sizes of quoins shall be uniform.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.9.(k).2.**

B.9.(*j*).10. *Wet foundations.*—To comply with specification No. B.9.10.

B.9.(*j*).11. *Construction details—Laying.*—Specification in B.9 for stone masonry (general) shall generally apply. The face stones shall be laid without any pinnings on the exposed faces. The edges of adjoining stones shall be parallel to allow joints of fairly uniform width. In each course, the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified laps where such laps are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

A horizontal joint shall be introduced at intervals specified on the drawings or as ordered by the Engineer throughout the masonry. The height of the course shall be a whole multiple of the height of the quoins.

Quoins shall be laid stretcher and headerwise as seen on each face and shall correspond to the arrangement of quoins in the same course.

Where the height of courses is less than 20 cm. (about 8″) 30 per cent. of face area shall be made up of stones of full height of the course. In the remaining area not more than 3 stones shall be used to make up the height.

Where the height of courses is between 20 cm. and 40 cm. (about 8″ and 16″) 30 per cent. of the face area shall be made up by stones each with a face area of not less than 0.03 sq. m. (about $\frac{1}{3}$ sq. ft.) and for the remaining area the stones shall have a face area of not less than 0.015 sq. m. (about 1/6 sq. ft.).

The quantity of mortar for one cu. m. of thin and massive masonry shall range from 0.30 to 0.35 cu. m. respectively and for water retaining masonry from 0.46 cu. m. to 0. 48 cu. m.

*Joints.*—The face joint width shall not exceed 16 mm. (about 5/8″).

*Striking joints.*—The face joints shall be properly struck while the mortar is fresh. Joints which cannot be struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 16 mm. (about 5/8″) when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1 : 3 and finished off by being trowelled smooth.

*Rate of raising masonry.*—The rate of raising coursed rubble third sort masonry per day shall be limited to a height of 60 cm. (about 2′) or the height of course whichever is less in case of cement mortar and 45 cm. (about 18″) in the case of lime mortar. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(*j*).12. *Item to include.*—(1) Coursed rubble third sort masonry laid in cement mortar/lime mortar of specified proportions, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including quoins, headers etc. and striking joints and curing.

(2) Erecting and removing all scaffolding, ladders and use of plant required for execution of the item satisfactorily, safety of the labour and inspection of the work including compensation for any injury, damage, etc.

(3) Dewatering unless separately provided in the tender.

(4) Clearing the site round the masonry.

(5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(*j*).13. *Mode of measurement and payment.*—The contract rate shall be for one cu. m. (about 35 cft.) of finished masonry including quoins, etc.

The dimensions shall be limited to the dimensions shown on the plan or as ordered by the Engineer.

Dimensions shall be measured correct upto a cm. and the cubic contents calculated correct upto two places of decimals of a cubic metre.

## B.9.(*k*). UNCOURSED RUBBLE MASONRY

*Uncoursed Rubble masonry in cement/lime mortar of specified proportion including striking joints, scaffolding, watering etc., complete.*

B.9.(*k*).1. *General.*—Specification No. B-9 for stone masonry (general) shall apply in all pertinent particulars. U. C. R. masonry shall also comply with the following in addition.

B.9.(*k*).2. *Materials.*—Materials shall conform to specification No. B.9.2.

अनुक्रमणिका
Table of Contents

B.9. (*k*).3. *Dressing and size.*—Stones to be set in the work shall be as received from the quarry after merely knocking off weak corners and edges with a mason's hammer. In the case of face stones all the sides of the stones shall be dressed in straight lines and all the sides shall be in one plane. Individual stones shall have thickness and width of not less than 15 cm. (about 6″) in its thickest part and no stones shall be less in length than 1½ times its height.

B.9.(*k*).4. *Face stones.*—Face stones shall generally comply with specification No. A.8. The face stones shall be selected from the mass of quarry stones for their greater size, good beds, close grain and uniform colour. 50 per cent. of the stones shall be more than 0.010 cu.m. or 10 litres (about ⅓ c.ft.) in walls up to 50 sm. (about 20″) in thickness and 0.015 cu.m. or 15 litres (about ½ c.ft.) in thicker walls. The beds and joints shall have an average bearing of not less than 2 cm. (about ¾″).

B.9.(*k*).5. *Through stones.*—One through stone shall be provided per half square metre of facing evenly distributed. They shall be about 0.03 sq. m. (about ⅓ sq. ft.) in face area and shall have a tailing of the full width of the masonry when the width is 60 cm. (about 2′) or less. If the wall or masonry be over 60 cm. (about 2′) in width line of headers overlapping each other by at least 15 cm. (about 6″) shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm. (about 18″) and their average cross sectional area shall not be less than 0.025 sq. m. (about ¼ sq. ft.). Face header shall be distinctly marked on its face.

B.9.(*k*).6. *Vertical headers.*—For massive work with a width of a metre (about 3.28′) and above, vertical headers 45 cm. (about 18″) long or depth of two courses whichever is more shall be provided at the rate of one for every sq. metre (about 10.76 sq. ft.) of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. Their average sectional area shall not be less than 0.03 sq. m. (⅓ sq. ft.).

B.9.(*k*).7. *Hearing and backing stones.*—These stones shall comply with specification No. A.8.3. In walls of 50 cm. (about 20″) and less about 30 per cent. of the stones shall not be less than 0.010 cu. m. or 10 litres (about ⅓ cft.) and for thicker walls about 30 per cent. of stones shall not be less than 0.015 cu. m. or 15 litres (about ½ cft.).

B.9.(*k*).8. *Quoins.*—The quoins shall be of selected stone and shall normally be 19 cm. × 24 cm. × 39 cm. (about 8″ × 10″ × 16″) or as directed by the Engineer. The faces of quoins shall be rough tooled or provided the same type of dressing as that of the face stones as directed. Chisel draft of about 40 mm. (about 1½″) shall be provided on each side of the exposed corner.

The beds and tops shall be dressed square to the face and rough tooled to 10 cm. (about 4″) from the face and vertical joints similarly dressed to 4 cm. (about 1.5″) from the face. In the embedded portion the length of the side shall not be less than that of the exposed side opposite by more than 8 cm. (about 3″) for the longer side and 5 cm. (about 2″) for the shorter side.

B.9.(*k*).9. *Scaffolding.*—Scaffolding shall comply with specification No. B.9.11.

B.9.(*k*).10. *Wet foundation.*—To comply with specification No. B.9.10.

B.9.(*k*).11. *Construction details—Laying.*—Specification in B.9 for stone masonry (general) shall generally apply.

The face stone shall be laid without any plannings on the exposed faces. In each course the headers or lines of headers as the case may be, shall be kept in position at specified intervals and with specified laps where such laps are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progresses.

Quoins shall be laid stretcher and headerwise as seen on each face and shall correspond to the arrangement of quoins in the same course.

The quantity of mortar for 1 cubic metre of thin and massive masonry shall range from 0.30 cu. m. to 0.35 cu. m. respectively and for water retaining masonry from 0.46 cu. m. to 0.48 cu. m.

*Joints.*—No face joints shall exceed 16 mm. (about ⅝″).

*Striking joints.*—The face joints should be properly struck while the mortar is fresh. Joints which cannot be so struck at the time of laying, shall be prepared for it by raking joints to a depth of not less than 16 mm. (about ⅝″) when the mortar is fresh. These joints should be properly cleaned of loose particles, wetted thoroughly and filled with good fresh cement mortar 1 : 3 and finished off by being trowelled smooth.

**B.9.(l).5.**

*Rate of raising masonry.*—The rate of raising uncoursed rubble masonry brought up in uniform levels may be limited to a height of 60 cm. (about 2′) per day in case of cement mortar and 45 cm. (about 18″) in the case of lime mortar. But no fresh course shall be laid over masonry previously laid within 4 hours of its laying for cement mortar and 8 hours for lime mortar.

B.9.(*k*).12. *Item to include.*—(1) Uncoursed rubble masonry laid in cement/lime mortar of specified proportion, built in any position to any height or depth and to lines, levels, curves and batters shown on the plans or as ordered by the Engineer including quoins, headers, etc. and striking joints and curing.

(2) Erecting and removing all scaffolding, ladders and use of plant required for execution of the item, safety of the labour and inspection of the work including compensation for any injury, damage, etc.

(3) Dewatering to allow construction in the dry and proper setting of masonry unless separately provided in the tender.

(4) Clearing the site round the masonry.

(5) All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

B.9.(*k*).13. *Mode of measurement and payment.*—The quantity of uncoursed rubble masonry to be paid under this item shall be in number of cubic metres of the finished work including quoins, etc., and with the limiting dimensions not exceeding those shown on the plans or as fixed by the Engineer. The contract rate shall be based on a unit of one cu. metre (about 35 cft.) of finished masonry. Dimensions shall be measured and individual quantities calculated correct upto two places of decimals of a metre and cubic metre respectively.

## B.9.(*l*). LATERITE MASONRY

*Providing and constructing laterite stone masonry in cement mortar/lime mortar of specified proportions, including scaffolding striking joints, raking out joints, curing, etc., complete.*

B.9.(*l*).1. *General.*—Specification No. B.9. for stone masonry (general) shall apply in all pertinent particulars. Laterite stone masonry shall also comply with the following in addition.

B.9.(*l*).2. *Material.*

B.9.(*l*).2.1. *Mortar.*—Cement mortar/lime mortar shall be of proportion as mentioned in the wording of the item or special provisions and shall comply with specification No. B.5.(*a*)/ B.3.(*a*).

B.9.(*l*).2.2. *Stones.*—The laterite stone shall comply with specification No. A.8 in all respects. Laterite of the specified quality shall be obtained from the quarries defined in the contract or from other sources approved by the Engineer. It shall be the best procurable in the region, known for soundness and satisfying the specification No. A.8 for laterite stone, laterite shall be dug from the approved quarry and allowed to harden as long as possible before being placed in the work.

B.9.(*l*).3. *Dressing and size.*—(1) The stone shall be quarried in blocks and dressed true and square to the sizes ordered. The least thickness of stones shall not be less than 14 cm. (about 6″) and the breadth shall not be less than the thickness and length not less than twice the thickness, unless other sizes are ordered.

(2) In walls 50 cm. (about 20″) thick and under, the header shall run right through the wall.

B.9.(*l*).4. *Scaffolding.*—Shall comply with specification No. B.9.11.

B.9.(*l*).5. *Construction.*—(1) The stones dressed according to the architectural details shown on the drawings or as directed by the Engineer shall be laid in regular courses not less than 15 cms. (about 6″) in height. All the courses shall be of the same height unless otherwise shown on the plan or specified. No course shall be thicker than any course below it, unless specially shown on the drawings. Each stone must be fitted into its place dry in order that any inaccuracy of figure may be discovered and corrected before it is finally laid in mortar and settled in its bed.

(2) The stones shall be laid in the work header and stretcher alternately to break joints at least 8 cms. (about 3″), the joints being in no case more than 12 mm. (about ½″) in thickness. Each stone shall be carefully laid in place in mortar to bring it to a solid bearing both as to bed and joint.

अनुक्रमणिका
Table of Contents



The quantity of mortar for one cu. m. of masonry shall be about 0.18 cu. m. to 0.20 cu. m.

(3) Courses shall be horizontal and side joints vertical throughout unless otherwise indicated on the drawings.

(4) The joints in the face shall be struck smooth while laying the masonry only. For face of masonry for which pointing or plastering has to be done later on, the joints shall be raked to a depth of not less than 12 mm. (about ½") when the mortar is green.

B.9.(*l*).6. *Item to include.*—(1) Erecting and removing scaffolding, ladders, and use of plant required for execution of the item.

(2) Constructing the Laterite masonry as specified above to lines, levels, batters and shapes as per working drawings or as directed by the Engineer.

(3) Striking and raking out joints.

(4) watering the masonry for the specified period.

(5) All labour, materials, use of tools, equipment, tackle, required to complete the item as specified.

(6) All chamfering, rebates, holes, etc., required to be dressed as per drawings or required to be cut for fixtures, frames, dowels, railing, bars, anchors, etc.

(7) Dewatering where necessary unless separately provided in the tender.

(8) Clearing the site round the masonry.

B.9.(*l*).7. *Mode of Measurement and Payment.*—The contract rate shall be per cubic metre of the work finished as specified above. Any stone masonry constructed in excess of the dimensions shown on the drawings or as directed by the Engineer will not be measured and paid. The linear dimensions shall be measured and total quantity worked out correct up to two places of decimals of a metre and cubic metre respectively.

## B.10. MILD STEEL BAR REINFORCEMENT FOR R. C. C. WORK:

B.10.1. *General.*—The item provides for the supply of mild steel bars, cutting, bending, binding with galvanised iron wire and erecting in position for reinforcement in the R. C. C.

B.10.2. *Materials.*—(1) Mild steel bars shall conform to the specification No. A.10.

(2) The binding wire shall conform to the specification No. A.15.

B.10.3. *Supply.*—When the supply is made by the Department, the contractor shall convey the mild steel bars from the place of delivery mentioned in schedule 'A' of the tender to the site of work. The contractor shall be solely responsible for any damage during the conveyance and till it is used.

When the contractor supplied mild steel reinforcement bars obtained from the market they shall be supplied to the site of work without damage.

B.10.4. *Fabrication.*—Reinforcing steel shall be thoroughly cleaned of all coatings of any character that would destroy or reduce the bond.

Bending Reinforcement shall conform accurately to the dimensions and shapes shown on the plans or as directed by the Engineer. Bars shall not be bent or straightened in a manner that will injure the material. Bars with kinks, bends or cracks shall not be used. Bars shall be bent cold to the shape and dimensions shown on the drawings or as directed by the Engineer in writing. Bar bender may be used to attain proper radii of bends and shapes. Bars which may be bent during transport or handling shall be properly straightened before being placed in the work without heating them. Bending bar by heating to cherry red heat not exceeding 815°C (about 1,500°F) may be allowed for bars larger than 25 mm. (about 1 inch) diameter except for bars which depend for their strength on cold working. Hot bars shall not be cooled by quenching.

B.10.4.1. Details of lengths, sizes, laps and bending diagrams shall be got approved by the Engineer. This is to secure additional precautions against errors.

B.10.5. *Splicing and lapping.*—All reinforcement shall be furnished in full lengths indicated on the plans as far as possible. Splicing bars except as shown on the plans will not be permitted without the written approval of the Engineer. When full lengths are not available, bars shall be spliced. Splices of tensile reinforcement at points of maximum stress and of adjacent bars at the same place shall be avoided. Splices shall be staggered as far as possible and located at suitable points. A welded or mechanical connection if adopted, shall develop



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.10.10.**

the full strength of the bars. Unless otherwise shown on the plans, bars shall be lapped as specified in I. S. 456-1964 with due regard to the grade of concrete. In lap-splices, bars shall be placed in contact and just wired together to keep in place.

B.10.6. *Coupling.*—Whenever plans and specifications call for the use of coupling-boxes or bottle nuts to join bars, they shall have sufficient cross section to transmit the full strength of the bars. The ends of the bars which are joined by coupling shall be upset for a sufficient length so that effective cross section after cutting the screw threads shall not be less than the normal cross section of the bars. Screw threads shall be standard Whitworth threads. Coupled joints will be paid for separately. Number of tensile tests shall be as indicated in specification No. B.10.7.

B.10.7. *Welding.*—Whenever plans and specifications call for welding of joints in reinforcement bars in lieu of lapping them, the bars shall be butt-welded so as to transmit their full strength. Welding shall generally conform to specification No. B-18 and I. S. 456-1964 except as modified below and when otherwise directed by the Engineer. Welded joints shall be so staggered that in any one section equal to the lap length of the bars, not more than 33 per cent. of the bars are welded. Electric arc welding or oxyacetylene process of welding, using a process which will exclude air from the molten metal and conforming to any special provisions for the welding as laid down by the Engineer in writing will be accepted. Suitable means shall be provided for holding the bars securely in position during the process of welding. The ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter and clean original metal exposed before welding. Only competent and experienced welders shall be employed on the work. Preliminary tests of the welds shall be carried out at the contractor's cost to see that the actual field welding method is satisfactory and gives the required strength. Two welds in 100 welds or a minimum of 2 welds shall be made on the site on test pieces under conditions exactly similar to the field welding of actual reinforcement bars and tested for their tensile strength. The strength of the welded joint shall not be less than that of the original bar. If the tests are not satisfactory, change of welding procedure and further tests may be ordered by the Engineer. Bars welded along with the welded samples, found unsatisfactory on test shall be cut and rewelded. Additional welds if required on this account shall not be paid for. All the tests shall be at the cost of the contractor.

When welded joints are required they will be paid for separately.

No part of the reinforcement embedded in concrete shall be used for conducting electric current.

B.10.8. *Substitution.*—Substitution of sizes of bars different from those specified will be permitted at the request of the contractor only if authorised by the Engineer. The steel substituted shall have an area not less than the designed area provided further that the safe bond stress is not exceeded. If such substituted steel has larger area than that originally specified, such excess weight due to larger area will not be paid for.

B.10.9. *Placing and fastening.*—All reinforcement shall be accurately placed in position with spacing and cover shown on the plan and firmly held so during the placing and setting of concrete. Bars shall be tied at all intersections. Binding wire of 1.63 mm. or 1.22 mm. diameter (about 16 or 18 gauge) shall be used. Alternatively the Engineer may permit spot welding instead of tying by wire. Spacing of bars shall be maintained by means of stays, blocks, ties, spacers, hangers or other approved supports at sufficiently close intervals so that bars will not sag between supports nor be displaced during placing, vibrating or compacting concrete or by any other operation. Metal supports which extend to the surface of the concrete except where shown in the plans and wooden supports shall not be allowed. Placing bars for reinforcement on a layer of fresh concrete as the work progress, will not be permitted. The use of pieces of broken stones or bricks or wooden blocks for maintaining spacing or cover shall not be permitted. Layers of bars shall be separated by precast cement mortar blocks, spacer bars or other approved devices. Special care shall be taken to prevent any disturbance of the reinforcement in concrete that has already been placed. Reinforcement after being placed in position shall be maintained in a clean condition till it is completely embedded in the concrete. All bars protruding from concrete to which other bars are to be spliced and which are likely to be exposed for an indefinite period shall be protected from rusting by a thin coat of cement wash.

B.10.10. *Inspection.*—Full details of the numbers, sizes, lengths, weights, laps, welds, spacing of the bars placed in position in different parts of the work shall be recorded, certified and signed by the Engineer to show that all reinforcement has been placed correctly as per the sanctioned drawing or as ordered by the Engineer in writing before placing concrete. No concrete shall be deposited until the Engineer has inspected and certified the correctness of



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



reinforcement, recorded the steel measurements and given permission to place the concrete in writing. After the approval of reinforcement by the Engineer it will be the contractor's responsibility to see that the reinforcement spacing and arrangements are not tampered with in any way before or during concreting.

B.10.11. *Tests.*—When the contractor supplies his own steel, he shall produce the test certificate. If there is any doubt about the quality, tensile and cold bend tests shall be carried out according to I. S. 432-1966 in an approved laboratory and the cost of the tests shall be borne by the contractor if the results are unsatisfactory and by the Department if the results are satisfactory.

B.10.12. *Item to include.*—(1) Cost of labour, material, use of tools, plant and tackle and other incidental items to complete the work included under the item satisfactorily.

(2) Supplying, conveying, cleaning, cutting, bending, binding with 1.63 mm. or 1.22 mm. diameter (16 or 18 guage) wire or spot-welding and placing reinforcement in position and maintaining it clean and in position till the concrete is laid.

(3) Cost of sampling and testing.

B.10.13. *Measurement and payment.*—The contract rate shall be on weight basis for 1 quintal of mild steel reinforcement. The weight of steel reinforcement incorporated in the concrete will be measured in quintals based on the total computed weights for the sizes and lengths of bars, as shown on the plan or as ordered by the Engineer. The lengths of the bars shall be measured correct to two places of decimals in metres and the weight payable would be worked out on the following basis correct to 0.10 of a kg.

| Diameter of bars in millimetres | Weight in Kg. per metre | Weight in lbs./ rft. | Diameter of corresponding bars in inches | Weight in lbs./rft. |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| 6 | 0·22 | 0·148 | $\frac{1}{4}''$ | 0·167 |
| 10 | 0·6 | 0·417 | $\frac{3}{8}''$ | 0·376 |
| 12 | 0·9 | 0·598 | $\frac{1}{2}''$ | 0·668 |
| 16 | 1·6 | 1·062 | $\frac{5}{8}''$ | 1·043 |
| 20 | 2·5 | 1·661 | $\frac{3}{4}''$ | 1·502 |
| 22 | 3·0 | 2·004 | $\frac{7}{8}''$ | 2·044 |
| 25 | 3·8 | 2·589 | $1''$ | 2·670 |
| 28 | 4·8 | 3·048 | $1\frac{1}{8}''$ | 3·380 |
| 32 | 6·3 | 4·243 | $1\frac{1}{4}''$ | 4·172 |
| 36 | 8·0 | 5·373 | $1\frac{3}{8}''$ | 5·049 |
| 40 | 9·9 | 6·630 | $1\frac{1}{2}''$ | 6·008 |

The steel will be issued to the contractor on actual weighment. However, while paying for the item of reinforcement, the weight of steel used on the work will be calculated on the basis of running length and standard weight per unit length. Claims on account of difference in actual weights and weights calculated on the basis of length will not be entertained.

The wire for tying and devices for supporting bars and maintaining various clearances will not be measured or paid.

No payment will be made for clips, binding wires, tack welding done in lieu of tying, separators, wire chairs and other materials used for fastening and supporting reinforcement in place. If the bars are substituted at the contractor's request and as a result more steel is used than specified, only the quantity specified shall be paid. Authorised lap lengths shall be paid for. If the lengths of bars contemplated in the designs are not available and the Engineer certifies the fact, steel involved in more number of laps will be paid for. When laps are made for splices other than those shown on the plans for the convenience of the contractor or lengths of laps more than indicated above, the extra steel will not be paid for. Any extra lengths of bars over the design if used (as shown on the plan) shall not be paid for.

When splicing of main tensile bars is required to be done by welding or by coupling boxes, such joints will be paid for separately in terms of numbers for the diameter of the bars jointed.

When steel is supplied by Government, the pieces of bars will not be taken back by the Department. Such wastages then shall be the property of the contractor and the contractor will be permitted to dispose off the same with the permission of the Iron and Steel Controller or in

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



B.11.9. Surplus steel (full length bars only) accordance with the prevailing orders of the Government. out of the steel issued to the contractor will be taken back at the rate at which it was issued to the contractor, the conveyance to the place of original issue for such steel being at the contractor's cost.

When steel is supplied free by Government, the rate will include all the items except supply of steel bars in available lengths at the place of delivery specified. If wastage of steel is more than the minimum possible, the cost of steel wasted in excess shall be recovered from the contractor at the Divisional issue rate plus a penal rate as decided by the Engineer.

## B.11. CEMENT PLASTER:

*Plastering concrete, stone, or brick masonry surface in cement mortar of specified proportion and specified thickness including, scaffolding, curing, etc., complete as directed.*

B.11.1. *Materials.*

*Cement Mortar.*—Cement mortar shall have the proportion of cement to sand as mentioned in the wording of the item or in the special provisions and shall comply with specification No. B.5.(*a*) for cement mortar for plaster.

B.11.2. *Scaffolding.*—Shall be as per B.9.11.

B.11.3. *Preparatory work.*—All joints in the face work that is to be plastered shall be raked out to a depth equal to not less than the width of the joints or as directed by the Engineer. The raking shall be done taking care not to allow any chipping of masonry. In new work the raking out shall be done when the mortar in the joints is still green. Smooth surfaces of concrete, old plaster, etc., must be suitably roughened to provide necessary bond for the plaster. All dirt, soot, oil, paint or any other material that might interfere with satisfactory bond shall be removed. In the case of stone masonry, bushing on the walls to receive the plaster shall not be more than 12 mm. (about $\frac{1}{2}$″). The surface to be plastered shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to plastering. It shall be kept damp during the progress of the work. The plastering shall not be commenced unless the preparatory work is passed in writing by the Engineer.

B.11.4. *Gauges.*—Patches of plaster 15 cm.×15 cm. (about 6″×6″) shall be put on about 3 m. (about 10′) apart as guages to ensure even plastering in one plane.

B.11.5. *Plastering.*—In all plaster work the mortar shall be firmly applied with somewhat more than the required thickness and well pressed into the joints and on the surface and rubbed and levelled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to ensure a perfectly plane and even surface. All corners must be finished to their true angles or rounded as directed by the Engineer. The surface shall be finished to plane or curved surfaces as shown on the plan or directed by the Engineer and shall present a neat appearance.

The mortar shall adhere to the masonry surface intimately when set and there should be no hollow sound when struck. Cement plastering should be done in squares or strips as directed. Plastering shall be done from top downward.

B.11.6. *Finishing.*—In any continuous face of a wall, finishing treatment of any type should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions.

B.11.7. *Moulding.*—All moulding shall be worked true to template and drawn neat, clean and level. All exposed angles and junctions with door frames, etc., shall be carefully finished; arrises shall be beaded if ordered.

B.11.8. *Watering and Curing.*—All plaster work shall be kept damp continuously for a period of 14 days. To prevent excessive evaporation on the sunny or windward side of the buildings in hot, dry weather, matting or gunny bags may be hung over on the outside of the plaster in the beginning and kept moist.

Should the contractor fail to water the work to the satisfaction of the Engineer, the latter may engage requisite labour, materials and equipment to water the work properly at the cost of the contractor.

B.11.9. *Bad work.*—Should the mortar of the plaster perish through neglect of watering or for any other default and if the work is not done as specified above, the plaster shall be removed and redone at the contractor's expense.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



B.11.10. *Item to include.*—(1) Erecting, dismantling and removing the scaffolding

(2) Preparing the surface to receive the plaster.

(3) Providing cement plaster of the specified average thickness with specified number of coats.

(4) Dewatering when necessary if not separately provided in the tender.

(5) All labour, materials, use of tools and equipment to complete the plastering as per specification.

(6) Curing for 14 days.

(7) Any moulding work if shown on the drawings or as specified unless separately provided in the tender.

B.11.11. *Mode of Measurement and Payment.*—The contract rate shall be per square metre of plastering of specified thickness. All work shall be measured net in square metres. Dimensions shall be measured and quantity worked out correct up to two places of decimals in metre and square metre respectively. If the average thickness of plaster provided by the contractor is more than what is specified on any account, no extra payment will be made.

B.11.(*a*). *Cement plaster in one coat.*—The above specifications in B.11 will apply in all pertinent particulars besides the following:—

In case of stone masonry the bushings on walls to receive the plaster shall be removed to within 12 mm. (about $\frac{1}{2}$″) before laying in masonry and the plaster shall cover all projections by at least 6 mm. (about $\frac{1}{4}$″).

The plaster shall then be laid on with somewhat more than the required thickness and pressed and levelled with a flat wooden rule or float to required thickness. The average finished thickness of plaster shall be as required in the wording of the item. The surface shall be rubbed smooth after floating it with a thick coat of pure portland cement slurry while the base coat is still fresh. If neeru finish is specified floating with neat cement will not be required.

B.11.(*b*). *Cement plaster in two coats.*—Specification No. B.11 will apply in all pertinent particulars.

When plaster is to be laid in two coats, the average thickness of first coat of plaster is generally 10 mm. (about $\frac{3}{8}$″) on Brick work and 20 mm. (about $\frac{3}{4}$″) on rubble masonry. The first coat is applied as per B.11.(*a*) but the surface is not floated or polished but roughened to give a key to the second coat of plaster. Before the first coat hardens, it shall be combed in wavy lines about 12 mm. (about $\frac{1}{2}$″) apart and 3 mm. (about $\frac{1}{8}$″) deep. The first coat shall be kept damp for at least 2 days immediately following its application. It shall then be allowed to become thoroughly dry. Before starting to apply the second coat the surface of the first coat shall be damped evenly. The finishing coat shall be of such thickness as to make the total average finished thickness equal to the required plaster thickness as per item. The finished surface shall be true and even and present a uniform texture throughout and all joining marks shall be eliminated.

## B.12. LIME PLASTER:

*Plastering concrete, brickwork or stone masonry surfaces in lime mortar of specified proportion and specified thickness, including scaffolding, curing, etc., complete as directed.*

B.12.1. *Materials.*—(1) *Lime mortar.*—Lime mortar of proportion as mentioned in the wording of the item or in the special provisions shall comply with specification No. B.3.(*a*).

B.12.2. *Scaffolding.*—Shall be as per B.9.11.

B.12.3. *Preparatory work.*—Shall be as per B.11.3.

B.12.4. *Gauges.*—Shall be as per B.11.4.

B.12.5. *Plastering.*—Shall be as per B.11.5. Lime mortar shall be used instead of cement mortar.

B.12.6. *Finishing.*—Shall be as per B.11.6. During the process of finishing, neeru as specified in specification No. A.4 of the consistency of thick cream should be applied and rubbed in to give a smooth and even surface when neeru finish is specified in the item or special provisions.

B.12.7. *Moulding.*—Shall be as per B.11.7.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



B.12.8. *Watering and curing.*—Shall be as per B.11.8.

B.12.9. *Bad work.*—Shall be dealt with as per B.11.9.

B.12.10. *Item to include.*—Shall be as per B.11.10, except that lime mortar shall be used instead of cement mortar.

B.12.11. *Mode of measurement and payment.*—Shall be as per B.11.11.

## B.13. CEMENT POINTING:

*Cement pointing with mortar of specified proportion to stone masonry or brickwork including raking out joints, watering, etc., complete.*

B.13.1. *Materials—Cement Mortar.*—Cement mortar for pointing shall be of the specified mix and be as per specification No. B.5.(*a*).

B.13.2. *Scaffolding.*—Scaffolding to be as per specification No. B.9.11.

B.13.3. *Construction details.*

B.13.3.1. Unless other types of pointing are specified in the item or the special provisions, pointing shall be of the grooved type. The joints in the masonry shall be raked out to a depth not less than the width of the joint or as directed in the special provisions or by the Engineer, when the mortar is green. The joints are to be brushed clean of dust and loose particles with a stiff brush. The area shall then be washed and the joints thoroughly wetted before pointing is commenced.

B.13.3.2. The raked out joints shall be filled with mortar of the specified mix and required consistency and well pressed and rubbed smooth.

B.13.3.3. A semicircular depression 3 mm. (about $\frac{1}{8}$") diameter shall be made in the joint by pressing a clean string with trowel keeping the string exactly horizontal and on the centre line of the joint. The vertical joints shall be similarly marked. These depressed lines will then be immediately rubbed with a nayla till they become uniformly 6 mm. (about $\frac{1}{4}$") deep and 6 mm. (about $\frac{1}{4}$") wide and assume fairly blackish colour. Intersection of the horizontal and vertical joints shall be finished neatly with the vertical line just touching the horizontal line but not crossing it. Where joints are not horizontal and vertical as in the case of uncoursed rubble masonry, the pointing shall be made along the centre line of actual joints and the junctions of pointing made neatly. The pointing mortar shall not spread over the adjoining stones. Mortar pointing shall be restricted to the width of the joints and all superfluous mortar shall be removed with a trowel.

B.13.4. *Watering.*—The pointed face shall be kept continuously wet for 14 days after initial set.

Should the contractor fail to water the work as specified, the Engineer, may if required in the interest of work and to keep the scheduled programme, supply labour, materials and equipment to water the work and charge the cost to the contractor.

B.13.5. *Bad work.*—Should the mortar perish or deteriorate through neglect of watering or any other default and if the work is not done neatly and as specified above, the pointing shall be removed and redone at the expense of the contractor.

B.13.6. *Item to include.*—Cement pointing shall include erecting and removal of scaffolding, all labour, materials and equipment incidental to complete the pointing, dewatering if necessary till the mortar is set unless separately provided for, raking out joints, cleaning, wetting, filling with mortar, trowelling, pointing with nayla and watering.

B.13.7. *Measurement and Payment.*—The contract rate shall be for a unit of one square metre of cement pointing. The dimensions of individual measurement shall be correct up to a centimetre and quantity calculated correct to two places of decimals of a square metre.

## B.14. RCC. CAST-IN-SITU PILES THROUGH DRIVEN SHELLS.

*Providing RCC. cast-in-situ piles of specified capacity placed through steel shells driven to the required depth in all strata except rock including driving the shell, concreting, compaction, cast-iron shoes and reinforcement and withdrawing the shell.*

B.14.1. *General.*—Cast-in-situ RCC piles shall be of the design shown on the plans or to the designs of the Patentee subject to the approval of the Engineer. They shall consist of concrete cast in steel shells driven to the required depth and/or set and filled with specified quality of concrete after laying the reinforcement cage. The concrete shall be compacted as the shell is withdrawn.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



B.14.2. *Equipment.*—Equipment will consist of heavy shells and steam or air hammer with all other necessary accessories and plant or as may be proposed by the Patentee subject to the approval of the Engineer.

B.14.2.1. *Steel shell.*—The shell shall be of substantial thickness and of sufficient strength and rigidity to permit their driving with heavy steam hammers and to prevent their distortion caused by soil pressures or the driving of adjacent piles until filled with concrete. The shells shall have their internal diameter equal to the specified diameter of the pile and shall be sufficiently watertight to exclude water during the placing of concrete. The shells shall be equipped with detachable heavy cast-iron shoes or driving points. A watertight gasket usually of hemp dipped in coaltar shall be provided between the shoe and the shell.

B.14.2.2. *Hammer.*—The steel shell shall be driven with steam or air hammer of sufficient weight. In no case shall the total energy developed by the hammer be less than 2,200 kg. metres (about 16,000 foot pounds) per blow.

B.14.2.3. *Leads.*—Pile driver leads shall be constructed in such a manner as to afford freedom of movement of the hammer and they shall be held in required position by guys and/or steel braces to ensure rigid lateral support to the shell during driving. Inclined leads shall be used in driving battered piles.

B.14.3. *Driving.*—The shell with the shoe shall be driven in the correct position with steam or air hammer to the required depth and/or set as shown on the plan or as directed by the Engineer, true and plumb or to the required batter and to give the designed set for the last ten blows. Accurate records of the number of blows required for the last 30 cm. whenever possible shall be kept in the required proforma for the guidance of the Engineer in determining allowable load on the pile. Where driving is interrupted before the final penetration is reached, the record for final penetration shall not be taken until at least 20 blows are given on resumption of driving. If the required penetration is not obtained, driving will be done more intensively with more blows per minute. As soon as the shell is found to be sufficiently deep in hard strata, start will be made for taking the set. The set shall be 12 mm. (about ½″) or less for the last 10 blows of the hammer. After the specified set is obtained, 10 more blows shall be given to the shell and the set recorded. If during these blows, the set in 10 blows is found to be more than 12 mm. (about ½″), the driving shall be continued further till the specified set is obtained. If during the process of driving piles, foundation masonry of old structure or boulder is met with, they shall be removed by the contractor by excavation for which no extra payment will be made. If any water pipe lines or drainages are encountered while driving pile shells, the necessary diversion of drainage or water pipe shall be carried out as per Municipal requirements and as directed by the Engineer, by the contractor at his expense. The item will cover driving the shell through all strata softer than rock.

The contractor will not be entitled to any compensation or extra rates if the depths to which the piles are required to be driven are increased or decreased, unless specially provided in the tender.

The contractor will be held responsible for any injury to persons and any damage that may be caused to the work or neighbouring structure or property due to the operation of driving piles.

B.14.4. *Tolerances.*—Utmost care shall be taken to see that the shell is driven true and plumb or to the required batter as far as possible. Unless remedial measures are necessary due to design requirements a shift up to 15 cm. (about 6″) in position and a cant up to 2 per cent. of the height will be permitted. If the cant is more than 2 per cent. and shift more than 15 cm. (about 6″) appropriate additional remedial construction as approved by the Engineer shall be provided at the contractor's expense.

B.14.5. *Reinforcement.*—Steel reinforcement shall conform to specification No. B.10. Longitudinal bars of the required size, shall be assembled into a cage with spirals or stirrups accurately tied according to the design or plan or according to the designs of Patentee approved by the Engineer. Splicing of the longitudinal bars may be by lap. The stirrups or spirals shall be tied to the longitudinal bars with 1.63 mm. diameter (16 guage) wire. The longitudinal bars shall extend 60 cm. (about 2′) over the top of the pile or as shown on the plans for being connected to the steel of the pile cap or foundation footing. The exposed length of reinforcement shall not be measured or paid. After driving the shell to the required depth, the cage of reinforcement bars shall be lowered into the shell and held in such a way that the cage remains truly in the direction of the axis of the shell with the designed cover of concrete all round during pouring of concrete. The reinforcement of the cage shall be got approved in writing by the Engineer before placing it in the shell.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.14.10.**

B.14.6. *Concrete.*—Concrete shall comply with specification No. B.6 for ordinary Portland cement concrete of 1:1½:3/1:2:4 proportion. The maximum size of aggregate shall be 20 mm. (about ¾"). The contractor shall be responsible to see that all the materials to be used including those supplied by the Department are of specified quality at the time of use and not damaged in storage. As the concrete is to be poured into the shell, water sufficient to allow flow of the concrete shall be provided. In case the surrounding area is dry, extra water will have to be added to enable water absorbed from the concrete by the ground, to be made up. The amount of extra water will be decided by the Engineer. The ground around the pile shall also be thoroughly wetted for six hours in advance of concreting and kept so for 3 days.

In waterlogged ground special care shall be taken to ensure that the soundness of concrete is not affected due to sub-soil water.

When the concrete is being poured, compaction shall be done by approved means either by vibrators or by vibration of the shell itself as it is being withdrawn. The bottom of the shell shall be maintained not less than 30 cm. (about 1') below the top of the concrete during withdrawal of shell and pouring operations, unless otherwise permitted by the Engineer. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the shell. In the later case, separate vibration of the concrete during pouring will not be required.

Concrete shall be placed in one continuous operation from the shoe to the correct pile cap elevation and shall be carried on in such a manner as to avoid segregation.

No shell may be driven nearer than 1.5 metres (about 5') or 4½ times the diameter of the pile whichever is greater, to a pile filled within 7 days unless it is substantially proved that no damage can take place to the pile due to vibrations.

All the piles shall be cast to a level previously fixed and any extra length of pile cast above that level shall not be paid for. This extra length of pile shall be cut carefully by chiselling in such a way that no damage results to the pile itself. The tops of piles shall be dressed to a plain surface. Both these operations when necessary will be carried out by the contractor at his own cost.

B.14.7. *Defective Piles.*—If the shoe has failed before the required depth is reached or the cant and shift are more than permissible, the concrete is of a poor quality the load test is unsatisfactory or there is any defect which in the opinion of the Engineer will affect the strength or life of the pile, the pile will be rejected or the following or other corrective methods approved by the Engineer, shall be adopted for the pile in question at the contractor's expense:—

(1) One or more additional piles shall be driven adjacent to the defective one to take the designed load.

(2) The pile cap shall be redesigned and extended to properly embed the piles to take the designed load.

All pile shells pushed up by the driving of adjacent piles or by any other cause, shall be driven down again.

B.14.8. *Test of concrete.*—One test of three 15 cm. (about 6") cubes shall be made for the concrete poured on the first day and thereafter one for every fifteen piles cast and not less than one test of three 15 cm. (about 6") cubes for each week's operation. The age of test shall be 28 days but 7 days' test may be used if the relation between strengths at 28 days and 7 days is established by a sufficient number of tests. These cubes shall be got tested in an approved laboratory. All the expenses for materials, moulds, labour, transport, test, etc., shall be borne by the contractor. If any test cube results show strength of concrete below the minimum specified, the piles represented by the sample shall be liable to be rejected.

B.14.9. *Load tests.*—Load tests shall be carried out on the piles indicated by the Engineer. The load tests shall be carried out according to specification No. B.17. If the tests are not satisfactory the piles may be rejected or if it is possible in the opinion of the Engineer to adopt corrective measures by driving additional piles and redesigning the pile cap such measures will be provided by the contractor without any extra cost to the Department. The load test will be paid for separately.

B.14.10. *Item to include.*—(1) All labour, materials and use of equipment including shoes, use of driving equipment and driving shell, concrete, reinforcement, compaction and withdrawal of the shell required for completing the pile in all respects.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(2) Compensation for any injury to persons and damage to property due to the operations of pile driving.

(3) Correction of defective piles.

Load tests will be paid for separately.

B.14.11. *Measurement and payment.*—The contract rate shall be for a unit of one running metre of pile of specified diameter and capacity driven and concreted to the full depth and accepted including reinforcement.

Quantity of *cast in situ* RCC, piles to be paid for, shall be the actual number of linear metres of piles cast and left in place in the completed and accepted work. The measurement shall be made from the point of the shoe of the pile to the bottom of the pile cap or bottom of footing as the case may be. Pile shoe will not be paid for separately. Quantity will be measured correct up to a centimetre.

The tendered unit rate shall apply even if the actual length is more or less than that shown on the plans or specified.

## B.15. R.C.C. *CAST IN SITU BOARD PILE*

*Providing RCC. cast* in situ *bored piles of specified capacity founded on suitable strata including reinforcement and compaction of concrete.*

B.15.1. *General.*—Cast *in citu* RCC. piles shall be of the design and layout shown on the plans or as proposed by the Patentee and approved by the Engineer. After the casing is sunk to the required depth in a suitable hard strata or to rock, the reinforcement cage shall be lowered into the casing. Cement concrete of the specified quality is then poured into the casing and compacted and the casing gradually withdrawn.

B.15.2. *Equipment.*—The equipment will consist of heavy steel casing sections with screwed ends for connection and various types of percussion or rotary boring tools for boring and lifting the bored materials and water if any, from the casing, worked mechanically with suitable machinery. Arrangement for driving the casing as boring proceeds within it shall also be provided. The casing shall be of suitable thickness, sufficient strength and rigidity to permit driving with heavy hammers and to prevent its distortion due to soil pressure until filled with concrete.

B.15.3. *Driving.*—The boring tool shall be centred at the exact pile location Boring and driving shall then proceed alternately till the appropriate strata is reached. When the casing is being driven in, care shall be taken to check that it is truly vertical. Sequence of boring and driving or *vice versa* will depend upon the strata passed through. The item will cover boring and driving the casing through all strata softer than rock. The contractor will not be entitled to any compensation or extra rate if the depths to which the piles are required to be driven are increased or decreased.

Contractor will be responsible for any compensation that may have to be paid due to injury to persons or damage to work and property caused by his pile driving operations.

When the boring is done to a satisfactory strata according to plan or as approved by the Engineer and the casing fully driven to the required depth, all loose material existing at the bottom of the hole after completing the boring operation shall be removed before pouring concrete.

Water may be used in the boring operations only to the extent absolutely necessary for facilitating boring. All necessary steps shall be taken to prevent surface water from entering the hole and all water which may have infiltrated into the hole shall be removed before pouring concrete. If necessary the inside of the shell shall be inspected by lowering a light and it should be seen that any material like earth, clay, etc., sticking to the casing is removed.

B.15.4. *Tolerances.*—Utmost care shall be taken to see that the shell is driven true and plumb as far as possible. Unless remedial measures are necessary due to design requirements a shift of 8 cm. (about 3″) in position and a cant of 2 per cent. of the height will be permitted. If the cant is more than 2 per cent. and shift more than 8 cm. (about 3″) appropriate remedial measures by way of redesigning the pile-caps and/or driving additional piles as may be approved by the Engineer shall be provided by the contractor without extra cost to the Department.

B.15.5. *Reinforcement.*—Steel reinforcement shall conform to specification No. B.10. Longitudinal bars of the required size shall be fabricated into a cage with spirals or stirrups accurately according to the design or plan or according to designs of the Patentee approved by the Engineer. Splicing of longitudinal bars may be by lap. The stirrups or spirals shall be tied to the longitudinal bars with 1.63 mm. diameter (16 gauge) wire. The longitudinal bars



अनुक्रमणिका
Table of Contents

**B.15.10.**

shall extend 60 cm. (about 2′) over the top of the pile or as shown on the plans for being connected to the steel of the pile-cap or foundation-footing. The exposed length of reinforcement shall not be measured or paid. After driving the casing to the required depth the cage of reinforcement bars shall be lowered into the shell and held in such a way that the cage remains truly in the direction of the axis of the shell with the designed cover of concrete all-round during pouring concrete. The reinforcement of the cage shall be got approved in writing by the Engineer before placing it in the casing.

B.15.6. *Concrete.*—Cement concrete shall comply with specification No. B.6. for Ordinary Portland cement concrete 1 : 1½ : 3 proportion. The maximum size of coarse aggregate shall be 20 cm. (about ¾″). The contractor will be responsible to see that all the materials to be used including those supplied by the Department are of specified quality and not damaged in storage. The inside of the casing shall be cleaned if necessary before concrete is poured. As the concrete is to be poured into the casing, water sufficient to allow flow of concrete shall be provided. In case the surrounding area is dry, extra water will have to be added to enable water absorbed from the concrete by the ground, to be made up. The amount of extra water will be decided by the Engineer. Surrounding area shall also be well watered for at least 6 hours before concreting and kept well watered for 3 days. In waterlogged ground care shall be taken to ensure that the soundness of concrete is not affected by sub-soil water. When the concrete is being poured, compaction shall be made by approved means. The bottom of the shell shall be maintained not less than 30 cm. (about 1′) below the top of the concrete during withdrawal of casing and pouring operations, unless otherwise permitted by the Engineer.

Concrete shall be placed in one continuous operation from the bottom of the bored hole to the bottom of the pile-cap and shall be carried out in such a manner as to avoid segregation.

If water is met with, it shall be removed. If it is impossible to remove it, concrete shall be laid by tremie.

All the piles shall be cast to levels previously fixed and any extra length of pile cast above that level shall not be paid for. This extra length of pile shall be cut carefully by chiselling in such a way that no damage results to the pile itself. The tops of piles shall be dressed to plain surface. Both these operations when necessary will be carried out by the contractor at his own cost.

B.15.7. *Defective piles.*—If the cant and shift are more than permissible, the concrete is of poor quality, the load test is unsatisfactory or there is any defect which, in the opinion of the Engineer, will affect strength or life of the pile, the pile will be rejected or the following or other corrective methods approved by the Engineer shall be adopted for the pile in question at the contractor's expense:—

(1) One or more additional piles shall be cast adjacent to the defective pile and so arranged as to take the designed load.

(2) The pile-cap or the footing shall be redesigned and extended to properly embed the pile to take the designed load.

B.15.8. *Tests of concrete.*—One test of three 15 cm. (about 6″) cubes shall be made for the concrete poured on the first day and thereafter one for every fifteen piles cast or one for each week's operation whichever is more. The age of test shall be 28 days; but 7 days' test may be used if the relation between the strengths at 28 days and 7 days is established by sufficient number of tests. These cubes shall be got tested from an approved laboratory. All the expenses for materials, moulds, labour, transport, test, etc., shall be borne by the contractor. If any test cube results show the strength of concrete below the minimum specified, the piles represented by the sample shall be liable to be rejected.

B.15.9. *Load tests.*—Load tests shall be carried out on the piles indicated by the Engineer. They shall generally be about 1 per cent. of the total number of piles. The load tests shall be carried out according to specification No. B.17.

If the tests are not satisfactory, the piles may be rejected or if it is possible to adopt corrective measures by driving additional piles and redesigning the pile-cap in the opinion of the Engineer such measures shall be provided by the contractor without any extra cost to the Department. The load tests shall be paid for separately.

B.15.10. *Item to include.*—(1) All labour, materials, use of equipment such as casing, boring and driving equipment, boring, providing concrete, compaction, reinforcement and withdrawal of casing including dewatering.

(2) Compensation for any injury to persons and damage to property due to the operations of pile driving.

अनुक्रमणिका
Table of Contents



(3) Tests of concrete.

(4) Correction of defects if any.

Load tests will be paid for separately.

B.15.11. *Measurement and payment.*--The contract rate shall be for a unit of one linear metre of pile finished and accepted including reinforcement. Quantity of RCC. cast *in situ* piles to be paid shall be actual number of linear metres of pile left in place in the completed and accepted work. The measurement shall be made from the bottom of the bored hole to the bottom of the pile-cap or bottom of footing as the case may be correct to one centimetre.

## B.16. RCC PRECAST PILES

*Providing and driving R. C. C. precast piles of specified dimensions and shape with M. S. reinforcement as per design and drawing for the specified capacity including use of necessary plant.*

B.16.1. *General.*—This item would refer to the manufacture and supply of precast R. C. C. piles of the size and shape with reinforcement, etc., as shown on plans and as specified below, including driving the pile to the required bearing, levels, lines, and in the locations shown in the drawings or as approved by the Engineer.

B.16.2. *Shape.*—The piles shall normally be square in section and of the specified size with corners chamfered at least 2.5 cm. (about 1"). Other shapes shall also be adopted if shown in the plans.

B.16.3. *Cement Concrete.*—Cement concrete for R. C. C. precast piles shall conform to specification No. B.7 for controlled concrete. The strength of concrete in preliminary tests at 28 days and the minimum cement content per cubic metre of concrete shall be as per special provisions.

B.16.4. *Reinforcement.*—Reinforcing steel shall comply with specification No. B.10 for reinforcement bars and specification No. A.15 for binding wire. The longitudinal bars shall as far as possible be in one length. If splicing is necessary, the bars shall be butt welded, with fish bars of the same diameter extending on both sides of the weld. Welding shall be done according to specification No. B.18. Reinforcement cages shall be assembled according to specification No. B.10 accurately according to design and plans.

While handling and transporting, the tackle should be attached at the designed pick-up points only. The cast-iron shoes shall be accurately fitted to the vertical bars so that the point is truly on the axis of the pile. Spacer forks of approved design should be inserted throughout. All crossings shall be securely bound with binding wire. All the longitudinal bars should end in the same plane and be kept back about 8 cm. (about 3") from the head of the pile. When the bars are drawn together at the end, they should not be bunched on one side as the pile may be damaged during driving. The cages shall be fixed straight and parallel to the moulds and held correctly to get the required cover by spacer blocks. Great care shall be taken to ensure correct and uniform cover throughout.

B.16.5. *Pile Shoes.*—Pile shoes shall be of grey cast-iron and of approved design. It shall have diamond points and mild steel straps cast in. Grey cast-iron shall conform to specification No. A.13. The shoe shall weigh not less than 20 kg.

B.16.6. *Casting Yard.*—The layout of the casting yard should be designed to maintain the scheduled programme. This should involve providing storage spaces for cement, aggregates, reinforcement, mixers, sufficient forms, vibrators, and floor space for storing piles so as to involve least handling. Casting floor should be firm to prevent warping or movement of green piles.

B.16.7. *Length of piles.*—When length of pile is not specified or cannot be determined satisfactorily test bore shall be taken or a test rod driven to ascertain the length of piles. If however these fail to indicate the length of piles required, test piles shall be driven. Such test piles must be of greater length than the length assumed in the design in order to provide for any variation in the sub-soil conditions. The contractor shall provide and drive test piles of the lengths and in locations ordered by the Engineer so that they may be incorporated in the permanent work.

The contractor shall not order for materials, or begin casting operations until the specific order is given by the Engineer in writing regarding lengths of piles based on the result of test bores, rods or test piles. If the contractor furnishes the concrete piling in lengths other than those specified in writing by the Engineer, the extra length of the piles so furnished shall not

अनुक्रमणिका
Table of Contents

**B.16.15.**

be measured for payment. The provision for casting extra length beyond that ordered shall be made by the contractor for allowing embedment in the pile-cap and for probable damage to the top of the pile during driving. These allowances shall be incidental to the item and covered by the rate for the lengths ordered. The contractor shall not plead misunderstanding as regards the lengths specified in writing, though they might differ from those shown on the plans.

B.16.8. *Forms.*—The forms may be of wood or metal and shall conform to the shape, lines and dimensions of the piles as shown on the drawings and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape and built in sections to give any length desired. The bottom of the form may be platform itself on which the piles are cast or sound planks or M. S. sheets strengthened with steel sections. The piles shall be cast horizontally on these platforms which shall be perfectly smooth and exactly level or in wooden or steel forms.

The contact surface of the forms shall be coated with a mineral oil or other suitable material approved by the Engineer to prevent adhesion of concrete to the forms. The oil or material shall be such as not to discolour the concrete. Chamfer shall be provided at top and the sides shown in the drawing.

B.16.9. *Placing reinforcement.*—Reinforcement cage accurately assembled shall be placed in the form in correct position, allowing designed cover. Care shall be taken to see that the position of the cage is not disturbed in any way during placing of concrete and compaction by vibrators.

B.16.10. *Placing Concrete.*—Only machine mixed concrete satisfying specification No. B.7 for controlled concrete of specified strength in preliminary tests shall be used. Placing shall be done in continuous operation until the pile is completed. Great care shall be taken to ensure that the heads of the piles are formed plane and square to the axis.

B.16.11. *Compaction.*—All concrete shall be thoroughly compacted by vibrating and spading and rodding during operation of placing, and shall be thoroughly worked round the reinforcement and into the corners of the forms. Each pile shall be stamped or marked with the date of its manufacture. Preferably hooks shall be inserted at lifting points indicated on the drawings or these points shall be clearly marked.

B.16.12. *Finishing.*—The side boards of the piles shall remain in position at least 24 hours after casting. Great care is to be taken when removing them so as not to damage concrete or disturb the pile in any way. Immediately after the forms are removed the surface of the pile shall be closely inspected and small irregularities shall be corrected and cavities filled up with 1 : $1\frac{1}{2}$ cement mortar. Piles not satisfactory for driving shall be rejected.

B.16.13. *Curing.*—Piles shall be protected from heat by covering with hessian or other absorbent material which shall be continuously kept wet at least for 14 days.

B.16.14. *Handling and Storage.*—Piles shall not be lifted before 80 per cent. of the specified strength at 28 days is attained. They shall be handled very carefully with sling or toggles only at the pick-up points and severe jarring while in a horizontal position or dropping shall be avoided. All piles shall be numbered serially and dated as cast and lift points marked. In addition to this scale showing length of the pile at every 25 cm. interval beginning from the shoe shall be marked. During storage, piles shall be firmly supported at suitable points and shall be separated from each other by at least 10 cm. (about 4″). When piles are stored in tiers, support shall be placed directly over the support for the lower piles. No tier shall contain more than 4 piles. Pile shall be handled so as to avoid surface abrasion and other injuries exposing interior concrete.

B.16.15. *Splice.*—If proper resistance to driving is not obtained at designed levels, the driving shall be continued and an additional length of pile required shall be poured in such a way as to develop the full strength of the section of the pile. Alternatively, the pile may be driven further to the full depth with the aid of a follower and then built up. When the piles are to be extended, the heads shall be stripped, the binders removed exposing main steel for one metre. The extension reinforcement shall then be added by welded butt joint. Concrete of the same proportion as for the original pile shall be poured to lengthen the pile as required by the Engineer and cured for 14 days. The pile shall not be redriven until the concrete has matured for 28 days. Just prior to placing extension concrete, the top of the pile shall be thoroughly cleaned and wetted and covered with thin coating of neat cement. The forms shall remain in position for not less than 7 days and shall then be carefully removed and the entire exposed surface of the pile finished as specified.

अनुक्रमणिका
Table of Contents



B.16.16. *Handling and Transporting.*—Handling and transporting of the precast piles from the storage yard to the actual place of driving shall be done by suitable lifting tackle supporting them at designed pick-up points and conveyed to the actual spot of driving.

B.16.17. *Driving caps.*—The heads of concrete piles (when the nature of the driving is such as to unduly injure them) shall be protected with approved cushions and helmet caps of approved design. They shall preferably have a rope or other suitable cushion next to the pile head and fit into the casting which in turn supports the timber shock block. When the area of the head of the pile is greater than that of the face of the hammer, a suitable cap shall be provided to distribute the blow of the hammer throughout the cross-section of the pile and thus avoid tendency to split or shatter the pile.

Special types of pile driving heads, mandrels, or other devices as may be necessary and approved by the Engineer, may be used to avoid injury to the police while driving.

B.16.18. *Hammer.*—Piles may be driven with gravity hammer, steam or air hammer or a combination of water jets and hammer, but steam hammer is prefarable. Precast concrete piles may preferably be driven by means of combination of hammer and jet in sandy material.

Unless otherwise stipulated, precast concrete piles shall be driven with a steam hammer which shall develop about 2200 kg. metres (about 16000 ft. lbs.) energy per blow at full stroke of the piston, not less than one kg. metre per 3.25 kg. of weight driven (about one foot pound per lb. of pile driven). In no case total energy developed by the hammer shall be less than 830 kg. metres (about 6,000 foot pounds) per blow. If gravity hammer is used it shall have a weight not less than that of driving head and pile and the maximum drop shall not exceed 2.5 metres.

B.16.19. *Leads.*—Piles shall be secured against lateral movement during driving by leads or other suitable means. They shall be constructed in such a manner as to afford freedow of movement to the hammer and shall be held in required position by guys and steel braces to ensure rigid lateral support to the piles during driving. Inclined leads shall be used in driving battered piles.

B.16.20. *Followers.*—Driving of piles with followers shall be made only when absolutely necessary and shall be done only under written permission of the Engineer.

B.16.21. *Driving.*—The pile shall be held in the correct position and driven with hammers preferably worked by steam or air power to the depths shown on the plan or as directed by the Engineer true and plumb or to the specified batter and to give the designed set for the last ten blows. Accurate records of number of blows for the last 30 cm. shall be kept in the required *pro forma* for the guidance of the Engineer in determining allowable load on the pile. Record shall also be kept for each pile to show the number of pile, diameter, length, location, penetration effected each day, shift and cant if any and the load test if carried out. These records shall be got countersigned by the Engineer or his representative every day.

Where driving is interrupted before the final penetration is reached, the record for final penetration shall not be taken until after at least 20 blows are given on resumption of driving provided no rock is encountered. If required penetration is not obtained, driving will be done with increased number of blows per minute without extra payment. As soon as the pile is found to be sufficiently deep in hard strata, start will be made for taking the set. After the specified set is obtained ten more blows shall be given to the pile and the set recorded. If during these blows the set in 10 blows is found to be more than 12 mm. (about $\frac{1}{2}$"), the driving shall be continued further till a set of 12 mm. (about $\frac{1}{2}$") or less is obtained for 10 blows. If during the process of driving piles, foundation masonry of old structure, or boulder is met with they are to be removed by the contractor by excavation for which no extra payment will be made. If any waterpipe line or drainages or other utilities are encountered while driving piles, the necessary diversion of drainage, water pipe or utilities shall be carried out as per Municipal or other regulations and as directed by the Engineer, at the contractor's expense. The contractor will be held responsible for any damage that may be caused to the neighbouring structures or property due to the operations of driving piles.

The item will cover driving the piles through all strata softer than rock.

B.16.22.—*Tolerances.*—The contractor shall locate the positions of piles as shown in the plan or as directed by Engineer on the actual plot of construction. Any deviation from such location shall not exceed 8 cm. (about 3") at the time when the driving is stared except as may be made necessary by the presence of large boulders, broken piling, or other unavoidable obstructions. Only when shown on the plans or with the permission of the Engineer, shall piles be driven closer together than 75 cm. (about 2'-6"). While being driven the piles shall be so

अनुक्रमणिका
Table of Contents

held with toggle, shores or cable as to prevent deviation as far as possible from the vertical or battered line shown on the plans. Unless remedial measures are necessary due to design requirements, a shift of 15 cm. (about 6″) in position and a cant of 2 per cent. of the height will be permitted. If these deviations are exceeded, proper remedial additional construction by way of additional piles or modified pile-cap shall be provided at the contractor's expense.

B.16.23. *Defective Piles.*—Procedure incidental to the driving of piles shall not subject them to excessive and undue stress resulting in crushing or spalling of concrete. Manipulation to force them into proper position causing excessive stress in the opinion of the Engineer will not be permitted. Any pile damaged due to internal defects or by inappropriate driving, or driven out of its proper location shall be corrected at the contractor's expense by adopting the following or other methods approved by the Engineer:—

(*a*) The pile shall be replaced by a new one and if necessary by additional piles. If approved by the Engineer, the injured part may be replaced by splicing or otherwise repaired to properly embed the piles.

(*b*) Additional piles shall be driven adjacent to the defective pile with the necessary modification in the construction of the pile-cap.

(*c*) The pile shall be spliced or rebuilt, or the footing or pile-cap extended and enlarged or to properly embed the piles.

(*d*) All piles pushed up by driving adjacent piles or by any other causes shall be driven down again.

B.16.24. *Cutting of piles.*—All piles driven and accepted shall be cut off to a horizontal plane at the levels indicated on the drawings from tops of piles or below any unsound portion of the piles as directed by the Engineer.

Piles driven or cut off after being driven below the levels indicated in the drawings for tops of piles may be rebuilt or extended with the approval of the Engineer. Splicing and extending of the pile shall be done as specified above in specification No. B.16.15.

B.16.25. *Loading tests.*—The loading test when required shall fully conform to the Specification No. B.17. It will be paid for separately.

B.16.26. *Jet Pipes.*—If the piles are to be driven through strata of sand, water jet may be used and its arrangements shall be made as follows:—

Pile shoe is to have two oblique holes, near the point, served by a short length of 20 mm. (about ¾″) diameter screwed black steel pipe for water jetting 32 mm. (about 1¼″) diameter screwed and socketted black steel pipe shall be placed and cast within the body of each pile with reducing socket for extending into the pile shoe and it has to be brought out near the head with screwed connection to receive hydraulic pressure pipe from the jetting pump. The contractor is at liberty to make alternative arrangements for water jetting subject however to the approval of the Engineer, either with the use of collapsible rubber tubes cast in the concrete or for using jet pipes from outside. All water jetting shall be contractor's responsibility and his rate for providing and driving piles shall be inclusive of pipes, jet pumps and of other arrangements for driving including water jetting piles successfully.

The number of jets and the volume and pressure of water at the jet nozzle shall be sufficient to freely erode material adjacent to the pile. The plant shall have sufficient capacity to deliver water at not less than 7 kg. per sq. cm. (about 100 p.s.i.) at two 20 mm. (about ¾″) jet nozzles. Before the desired penetration is reached, the jet shall be withdrawn and the pile shall be driven with hammer to secure final penetration.

B.16.27. *Item to include.*—(1) Preparing casting yard.

(2) Taking test bore, driving test rod or manufacture of test pile and driving it to secure all data. Only test piles if driven will be paid at the tendered rate. Taking test bore or driving test rod shall be considered as incidental to the item.

(3) All labour, materials and equipment (including hammer, which will have to be changed if necessary, according to circumstances) and incidental items for fabricating and assembling the reinforcement including welding where necessary, casting, curing, storing, handling, and driving the piles including the pile shoe.

(4) Taking tests of concrete.

(5) Extension of pile as required.

(6) Driving piles.

अनुक्रमणिका
Table of Contents



(7) Cutting piles.

(8) Finishing of piles.

(9) Providing and fixing jet pipes if necessary.

(10) Dealing with defective piles.

(11) Treatment of pile heads.

(12) Driving the piles including jet and other necessary work to obtain required penetration, set and bearing of the piles.

(13) Additional work required for remedial measures and lengths required to be cast for embedding into the pile-cap and to allow for damage of the pile top during driving.

(14) Compensation for damage to work or property and injuries to persons due to accidents connected with the pile driving operations.

B.16.28. *Mode of Measurement and Payment.*—The contract rate shall be for one running metre (about 3.28') of R. C. C. precast pile of approved size, shape, design and length ordered and driven to the required set. The length of precast pile driven shall be measured correctly up to 2 places of decimals of a metre for the full length ordered even if the final length driven is less. Payment for test piles shall be made for the actual length of the pile cast. The length of the pile shall be measured from the bottom of the shoe to the bottom of the pile cap. No payment shall be made for the remedial measures required to be taken in the case of piles driven beyond the tolerance limits. No payment shall be made for lengths of piles which shall be embedded in the pile cap and form part of the cap nor for the length cast to cover the damage at top while driving. No payment shall be made when damage to the pile is established to be due to faulty manufacture, handling and driving. As a check on the length of pile driven, complete record of driving piles shall be maintained on the work for each pile specifying the number of pile, length, location and penetration effected each day in a prescribed form. The penetration under the last 10 blows of the hammer and the result of any test shall also be recorded. All these records will have to be countersigned by the Engineer's representative on site daily.

Driving one test bore or one test rod for a group of 25 piles shall be considered as incidental work and shall not be paid for. When pipes are embedded in the piles or ducts left for water jetting purposes, no deduction will be made in the concrete nor payment made for the pipes or hollows.

## B.17. LOAD TESTS OF PILES

*Carrying out loading tests of pile or pile group including construction of test caps, accessories and instruments, dismantling the caps after test, etc., complete.*

B.17.1. *General.*—The load test shall be carried out on any particular pile or pile-group selected by the Engineer after a period of not less than 28 days after casting. The load test shall be carried out by applying a series of test loads as specified below on a test cap or suitable platform over the pile or group of piles unaided by any other support. Direct loading or application of pressure by hydraulic jacks with gauges or any other suitable method may be adopted as approved by the Engineer. Before any load test is made, the proposed apparatus and procedure shall be got approved by the Engineer. Readings shall have to be recorded with the help of deflectometers from two sides of the cap or platform, precision levels or any other suitable device approved by the Engineer. Reference points for measuring pile settlement shall be sufficiently removed from the test pile to preclude the possibility of disturbance. A complete record of all load tests shall be filed with the Department.

B.17.2. *Procedure of test.*—The pile or pile-group to be tested shall be loaded by a method which will maintain constant load under increasing settlement. The test load shall be 150 per cent. of the proposed safe working load on the pile or the pile-group. The load shall be applied in equal increments of 10 tonnes at intervals of half an hour till the full test load is reached. Full test load shall remain for a period of 48 hours. During the period of test, careful observations shall be made for settlement taking place before and after each increment of load.

The test load shall be removed in decrements not exceeding 10 tonnes with intervals of not less than fifteen minutes. The rebound will be recorded after each decrement. The final rebound shall be recorded 24 hours after entire test load has been removed. Reading of settlements and rebound shall be referred to a pucca Bench Mark. These shall also be recorded to 0.25 mm. for each increment or decrement of load by means of deflectometers.

अनुक्रमणिका
Table of Contents

**B.18.2.**

The contractor shall himself arrange to provide the necessary loads, R. S. joists, apparatus, test caps or platforms and all other materials and equipment, power and labour necessary for successfully carrying out the test to the satisfaction of the Engineer. The contractor shall be responsible for any injury to life and property, if any, caused during or due to the test. After the test load is removed, the head of the pile should be carefully examined for any damage. Damage, if any, shall be made good to the satisfaction of the Engineer.

B.17.3. *Acceptance of test.*—The test shall be accepted as satisfactory,

(i) if the total set under full test load after a period of 48 hours does not exceed 12 mm. (about half inch) and if the ultimate settlement after removal of test load does not exceed 6 mm. (about quarter of an inch), and

(ii) if the general behaviour of the pile or pile-group during the test period does not disclose any defects.

If the pile fails to comply with the requirements, due to defective pile or defective driving, the pile will be rejected unless it is possible to carry out effective remedial measures which will be done at the cost of the contractor. The cost of testing such defective piles shall be borne by the contractor.

In the case of precast piles, if the pile sinks under test load due to week strata, the pile shall be extended and driven to the required depth to obtain the specified loading capacity.

B.17.4. *Item to include.*—(1) Building up of test cap or platform or any other arrangement approved by the Engineer for satisfactorily loading of the pile or pile-group with the test load and removal,

(2) Necessary suitable material for loading in specified batches up to the total test load or necessary arrangement for applying the test load by hydraulic jacks with suitable yokes and tested pressure gauges,

(3) Suitable apparatus for accurately measuring the test load, the settlement or rebound of the pile under each increment or decrement of load,

(4) All labour, equipment, power, material incidental to making the loading test satisfactorily as directed by the Engineer,

(5) If the reinforcement bars projecting beyond the top of the pile are required to be cut for test purposes, the item will include chipping off the pile to the required length to uncover the reinforcing bars for securing sufficient lap length for the bars required to be added and rebuilding the pile to the required level, curing, etc.

(6) Clearing the site after the test.

B.17.5. *Measurement and payment.*—Test of one pile or pile-group shall be measured as one test and payment will be made at the rate quoted in the tender for one loading test.

## B.18. WELDING

B.18.1. *General.*—The specifications given hereunder shall apply to welding as applied to new and existing mild steel structures and mild steel reinforcement for R. C. C. work. Welding may be adopted in R. C. C. work in the following cases:—

(*a*) Fillet welding for placing the reinforcement in correct position or for providing cross bars in lieu of hooks.

(*b*) Butt welding of reinforcing bars. Welding shall be made by the metal arc process unless oxyacetylene gas welding is specially permitted by the Engineer in writing. The specifications for the former have been given in B.18.(*a*) and for the latter in B.18.(*b*).

B.18.2. *Welding Contract.*—(i) The welding work shall not be given to a contractor who does not produce satisfactory evidence of his ability to handle the work in a competent manner. The contractor shall also prove the ability of the operators employed by him to produce welding connection of the required strength.

(ii) The contractor shall employ a competent welding supervisor or charge-hand to ensure that the standard of workmanship is satisfactory.

(iii) The Engineer shall have free access to the work being carried out by the contractor at all reasonable times and facility shall be provided so that during the course of welding he may be able to inspect any layer of weld metal. He shall be at liberty to reject any work not conforming to the relevant specifications; defective welds shall be cut out and rewelded.

अनुक्रमणिका
Table of Contents



B.18.3. *Safety requirements and health provisions.*—The contractor shall make all safety and health provisions for his welders as are laid in I. S. 818-1968, *i.e.,* Code of practice of safety and health requirements in electric and gas welding and cutting operations.

## B.18.(*a*). METAL ARC WELDING

B.18.(*a*).I. *Metal arc welding in structural steel work—Material—Electrodes.*—Electrodes used for strengthwelds shall conform to I. S. 814-1967. They shall be of shape and size approved by the Engineer. They shall be preserved from oxidation and shall be kept in clean condition.

*Welding.*—The size of the weld and the position where the weld shall be placed shall be entirely as per the drawings supplied or as directed by the Engineer.

Design of welds, drawings, permissible stresses in welds, welding in compression and tension members, welding in plate girders lacing, battening, welding equipment, and electrodes shall be all as per I. S. 816-1956: Code of practice for the use of metal arc welding for general construction in mild steel.

Welded fabrication of structural steel shall be on the lines given in I. S. 800-1962.

The following instructions shall also be followed from point of view of workmanship:—

(i) Welders and work shall as far as possible be protected from wind and weather.

(ii) Welds should be made in the flat position wherever possible.

(iii) Adequate steps shall be taken to maintain the correct arc length, rate of travel, current and polarity for the type of electrode and nature of work.

(iv) Structural steel shall not be painted or oiled on any areas where welding is to be done and shall be well cleaned to remove any paint, scab, or rust and expose original clean metal surface immediately before welding.

(v) The member shall be securely held in position by means of tack welds, service bolts, clamps or jigs before commencing welding so as to prevent any relative movement due to distortion, wind or other causes. When wind or manual handling is liable to cause distortion, the work shall be securely held in approved frames or jigs.

(vi) Freedom of movement of one member of the joint shall be allowed wherever possible. No butt joint shall be welded without allowing one component freedom of movement of the order of 2 mm. (about 1/12″).

(vii) The sequence of welding shall be such that when possible, the members which offer greatest resistance to compression are welded first.

(viii) The welding of a joint shall be so arranged that resulting tensile and compressive stress produced by each portion of the weld tend to balance each other. The step back method shall be adopted for continuous runs.

(ix) Fusion faces may be cut to the required shape by shearing, chipping, machining or machine gas cutting. Hand cutting by gas may be substituted for machine gas cutting only if the latter is impracticable; the cutter shall be adequately guided so that the cut edge is clean and uniform. If the fusion face is rough it shall be dressed by chipping, filing or grinding in a satisfactory manner.

(x) Welds showing slag inclusions, porosity or lack of proper penetration shall be cut out and rewelded. Overlap of the toe of the weld and under cutting of the parent metal should be avoided and where present to a serious extent shall be rectified.

(xi) All slag shall be removed from each run before another run is superimposed and from the final run. When cold, the final run shall be protected with clean boiled linseed oil and shall not be painted until approved by the Engineer.

(xii) Grinding of finished weld is permitted provided the weld is not reduced below the prescribed section.

(xiii) All welds which have not been ground shall be scrubbed with a 10 per cent. solution of hydrochloric acid which shall be satisfactorily washed off with water before the paint is applied, unless alkali resisting paint is used.



अनुक्रमणिका
Table of Contents

B.18.(*a*)II. *Metal arc welding of M. S. bar reinforcement in R. C. C. works—Materials.*—Electrodes shall comply with I. S. 814-1967. They shall be of share and size as approved by the Engineer. They shall be preserved from oxidation and shall be in clean condition. Electrodes shall be of the heavily coated type. The electrodes shall satisfy the following mechanical properties:—

(*a*) Ultimate strength not less than 44 kg./sq. mm. (about 28 tons p. s. i.).

(*b*) Yield point not less than 31 kg./sq. mm. (about 20 hons p. s. i.).

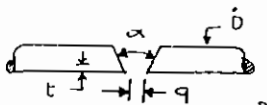
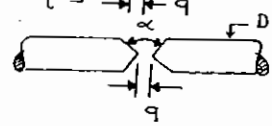
(*c*) Elongation of a length equal to 3.54 times the diameter of the rod, not greater than 20 per cent., and

(*d*) Izod impact test 4 kgm. (about 30 ft. lbs.).

The maximum size of electrodes shall be based on following table:—

| Diameters of bars in mm. | Diameter of bars in inches | Maximum size of Electrodes | | Amperage corresponding to Max. size of mm. Electrodes |
|---|---|---|---|---|
| (1) | (2) | (3) | | (4) |
| | | S. W. G. mm (in). | | |
| 12 to 25 | ½" to 1" | 10 | 3·25 mm (0·128) | As specified by the manufacturer of Electrodes. |
| 25 to 32 | 1" to 1¼" | 8 | 4·06 mm (0·160) | |
| | Double bevel | 10 | 3·25 mm (0·128) | |
| 32 to 50 | 1¼" to 2" | 10 | 3·25 mm (0·128) | |
| | Double bevel | 8 | 4·06 mm (0·160) | |
| 25 to 50 | 1" to 2" | 8 | 4·06 mm (0·160) | |
| | | 6 | 4·88 (0·192) | |

Forms of Butt welds.—Butt weld shall be made in one of the following form:—

| No. | Type | Diameter Range mm (D) | Min. Gap. mm (g) | Angle of V (*a*) | Root Face (E) | Details of welds |
|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| 1 | Single V Butt weld | 12 to 40 (½" to 1½"). | D/4 | 60° to 70° | None. |  |
| 2 | Double V Butt weld 28 and above | 3 to 6 (1/8" to ¼"). | | 60° to 70° | None. |  |

The form and dimensions of weld surface shall be such as will provide access for the electrode to be welded and enable the welder to see clearly the work in progress.

A butt weld shall be built up so that the effective throat diameter is greater than the diameter of the bars joined. Such increase in diameter shall be not less than 10 per cent. and not more than 25 per cent. of the diameter of the bars joined.

*Workmanship.*—(1) The surface to be welded and the surrounding material for a distance of at least 12 mm. (about ½") from the weld shall be freed from scale and cleaned so as to remove dirt, grease, paint, heavy rust or other surface deposit, wire brushing being used if necessary.

(2) Fusion faces may be cut to the required shape by shearing, chipping, machining or gas cutting.

(3) All the bars to be butt welded should be aligned and set in position with their axes in one straight line. This should be done either by wiring to the other reinforcement or by attachment in a jig or clamp or by use of standards and guides and chairs on a prepared

अनुक्रमणिका
Table of Contents



platform. One of the bars shall have freedom of movement in the direction of its axis to avoid residual stresses. Turning or rotating the bar till half the bar is welded should be avoided. Turning or rotating the bar shall be done without disturbing the alignment and without introducing any twist in the bar during the process of welding.

(4) The welding current shall conform with respect to voltage and amperage (and polarity if direct current is used) to the recommendations of the manufacturers of the electrodes being used. The arc length, voltage and amperage shall be suited to the diameter of the bar to be welded.

(i) A single layer of weldmetal whether deposited on one pass or made up of several parallel beads shall not exceed 3 mm. (about 1/8") in thickness.

(ii) The electrode manipulation during welding shall ensure that,—

(*a*) complete fusion between the base metal and the deposited weld metal is obtained,

(*b*) the melted base metal is replaced by weld metal so that no under cut remains along the edges of the finished weld,

(*c*) the melted weld metal makes all slag, oxide and gases float to the surface behind the advancing arc. All the slag should be removed from each run before another run is superimposed and from the final run by hammering lightly and wire brushing.

(*d*) full penetration into the root of the weld is obtained, and

(*e*) surface of the weld shows regular and even ripples and edges of the weld merge thoroughly with the base metal.

(5) Welder shall be provided with such staging and if necessary, with protection as will enable them to perform the welding operation properly.

(6) All welding equipment shall be in good condition and capable of enabling the welder to provide and maintain the correct arc at all times.

*Test.*—Two welds in 100 welds or a minimum of two welds shall be made on the site on test pieces under condition exactly similar to the field welding of actual reinforcement bars and tested for their strength. The strength of the welded joint shall not be less than that of the original bar i.e. failure shall be in the parent metal and not in the welded joint.

If the tests are not satisfactory change of welding procedure or personnel may be ordered by the Engineer. Bars welded along with the welded samples found unsatisfactory on test shall be cut and rewelded. The tests shall be got made at the cost of the contractor.

B.18 (b) Oxycetylene Welding.

B.18.(*b*).I. *Oxyacetylene welding in structural steel work—Material—Filler Rods.*—Filler rods shall conform to I. S. 1278-1967. They shall be preserved from oxidation and shall be in a clean condition.

The design, method of welding, workmanship in oxyacetylene welding shall be as per I. S. 1923-1959 ; Code of practice for oxyacetylene welding for structural work in mild steel. The instructions given in B.18(*a*) regarding workmanship shall also be adhered to in this type of welding.

B.18.(*b*).II. *Oxyacetylene welding for M. S. reinforcement bars in R. C. C. work—material—Filler Rods.*—Filler rods shall conform to I. S. 1278-1967. They shall be preserved from oxidation and shall be in a clean condition. They shall satisfy the same mechanical properties as mentioned for electrode in B.18.(*a*)II.

*Welding.*—Shapes of the ends of the bars at the weld shall be the same as laid down in B.18(*a*).II unless other shapes are permitted by the Engineer in writing.

*Workmanship.*—Same as for B.18.(*a*).II in all relevant particulars.

*Test.*—Same as for B.18.(*a*).II.

## B.19. STRUCTURAL STEEL WORK

B.19.1. *General.*—This specification covers the requirements of providing fabrication and erection of structural steel work including painting.

B.19.2. *Materials—Structural steel sections.*—This shall comply with specification No. A.11.

*Rivets.*—Shall conform to I. S. 1148-1964 and I. S. 800-1962.

*Bolts.*—These shall comply with S. 1148-1964 and I. S. 800-1962.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**B.20.2.**

B.19.3. *Fabrication and erection.*—Cutting, holding, assembly, riveting, bolting, machining, painting, marking and erection shall be carried out in accordance with approved plans and as directed by the Engineer from time to time and shall comply with I. S. 800-1962.

B.19.4. *Damaged members.*—Any material found damaged or defective shall be stacked separately and shall be marked in a distinctive colour. Such material is to be dealt with expeditiously under the orders of the Engineer.

B.19.5. *Reveting, welding and bolting.*—(1) Riveting or welding shall not be started until such time as the Engineer has personally satisfied himself that the alignment is correct, the vertical plumb, the camber correct with all camber jacks screwed tight, all joints and cover plates fixed tight with service bolts and field rivet holes coinciding. While assembling, holes in different components shall be made concentric with the use of drifts before service bolts are fixed.

2. Welding if required to be done, shall conform to specification No. B.18.

3. All permanent machine-fitted or other bolts must be perfectly tight and should be burred or otherwise checked, to prevent nuts from becoming loose. No unfilled rivet or bolt holes are to be left in any part of the structure.

4. Fitting and riveting (or welding) of connections of steel sections, in cases where pieces are short or of full length shall be done in such a manner that the metal is not unduly strained or cracks caused.

5. Care shall be taken to see that cracks are not filled with paint, putty, cinders, dirt, oil or fillings for the purpose of deception.

6. Particular care must be taken to ensure free expansion and contraction wherever provided for in drawings or as the Engineer directs.

7. Chipping of rivets, angle flanges, and edges of plates must be done without breaking out the metal. Chipped edges shall be finished off with a file and all concave corners shall be rounded off.

B.19.6. *Painting.*—Painting shall generally comply with I. S. 800-1962 and I. S. 1477 (Part I)-1959 subject to such additions or alterations as may be prescribed in the special provisions for any particular item. It shall also comply with relevant part of specification No. B.21. One priming coat of red lead shall be applied immediately after fabrication. Two coats of oil paint of approved shade shall be applied after complete erection.

Structural steel work to be encased in concrete shall not be painted.

B.19.7. *Inspection and Testings.*—These shall be carried out in conformity with I. S. 800-1962.

B.19.8. *Item to include.*—(1) The item shall include supply fabrication and erection in position at site of all structural steel sections of the required dimensions and labour, materials, and use of equipment required for all operations of fabrication, hoisting, erection and satisfactory completion of the item.

(2) Item shall also include labour, materials and use of equipment required for painting the structural steel work.

B.19.9. *Mode of measurement and Payment.*—The contract rate for the item shall be one quintal (about 220 lbs.) or one tonne (about 2,200 lbs.).

In the case of rolled sections lengths shall be measured correct to a cm. and weight calculated on the standard weight per metre tabulated in the I. S. I. Hand Book for structural steel sections limited to the length shown on the plans correct up to 0.10 of a kg. weight of steel plates of each thickness shall be calculated separately on the basis of actual shape provided without taking into account wastage or cut off. In case of bolted work, weight of bolts, nuts and washers shall be added in full and no deduction shall be made for bolt holes. In riveted work only the weight of rivet heads shall be added. No deductions shall be made for rivet holes. No increase in weight shall be allowed in welded work due to welding.

## B.20. GENERAL WOOD WORK

B.20.1. *General.*—The specifications refer to wood work in general, including carpentry and joinery work in roofs, floors, verandahs, staircases, door and window frames, bridges, coffer dams, shores, struts, large gates, etc.

B.20.2. *Materials.*—(1) Timber shall comply with specification No. A.16 in all respects.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(2) *Species of Timber.*—The species of timber to be used shall be mentioned in the items. Where no species is mentioned, good Indian teak (Tectona Grandis) alone shall be used. In case a particular jungle wood species has to be changed the Engineer's decision about the alternative shall be final.

Engineer may inspect all logs and scantlings previous to use and reject any which he considers defective in the requirement of specification.

(3) *Glue.*—Glues are of two types (*i*) organic type which glue shall be from skin or bone material, and (*b*) synthetic type. It shall be of such a material that it may be used without causing harm and odour. A freshly prepared hot solution shall be of a clear amber colour, translucent, free from black or cloudy spots and shall swell considerably when immersed in cold water without dissolving.

Organic type shall comply with specification No. I. S. 852-1957 and synthetic shall comply with I. S. 851-1957 in all respects.

(4) *Nails, Screws, etc.*—Nails, screws, ties, straps, bolts, etc., shall be of the material, make and pattern specified in the item or the special provisions and approved by the Engineer.

B.20.3. *Precautions against decaying.*

B.20.3. (1) The contractor must in all cases obtain orders from the Engineer regarding time at which he shall do painting or oiling to woodwork and obtain permission of the Engineer before he paints, oils or otherwise treats woodwork.

B.20.3. (2) All parts of woodwork resting on or set in masonry shall be well painted with 2 coats of hot boiled tar approved by the Engineer. The tar shall be so applied as not to appear on the exposed timber. No extra payment shall be made for such tarring. Timber buried in the ground shall be well coated with tar.

When the end of a beam or joist is embedded in masonry and air space of 6 mm. (about ¼") shall be left at the end and sides wherever practicable and necessary in the opinion of the Engineer.

B.20.4. *Workmanship.*—All woodwork shall be neatly and truly finished to the exact dimensions required. Unless otherwise required in the special provisions, woodwork which will remain exposed to view when the work is completed shall be accurately planed to the required dimensions perfectly smooth and to lines, planes or curves as required. Unless otherwise specified all joints shall be simple tenon and mortise joints with the end of the tenon exposed to view. All mortise, tenon and other joints shall fit truly and fully without wedging or filling, in a workmanlike manner. Only where specially required, the end of the tenon shall not show. All joints shall be of the types shown on the drawings or specified for the item and as directed by the Engineer. Where no specific instructions are given to the contractor, he shall observe the following principles in forming joints:—

(1) To cut the joints and arrange fastenings so as to weaken as little as possible the pieces of timber they connect.

(2) To place each abutting surface in a joint as nearly as possible perpendicular to the pressure it has to transmit.

(3) To form and fit accurately every pair of surfaces that come in contact.

All framed joinery, for external work shall be put together with white lead and joints pinned with hardwood or bamboo pins. For internal work where joints are not likely to be affected by moisture, the joints may be glued and similarly pinned. Where ordered, the butt joints shall be cross tongued and the tongues cut at right angles or diagonally to the grain of the wood. All moldings shall be clean and accurately finished and all mitres, etc., shall be properly met. Where turning is required it shall be done to the exact shapes shown in the drawings.

B.20.5. *Framing.*—Framed woodwork includes all sawing, cutting, planing, jointing, framing, supply and use of all straps, bolts, hold fasts, nails, trenails, spikes, screws, etc., necessary for framing and fixing.

Framing and trussing are to be done in the best possible manner and all necessary ties, straps, bolts, screws, etc., fitted as shown on the drawings or as directed by the Engineer.

Holes of correct size shall be drilled before inserting screws. Driving in or starting the screws with hammer is prohibited. All screws shall be dipped in oil before being inserted in the wood. The kind of nails and screws shall be subject to the approval of the Engineer. The heads of nails or screws shall be sunk or dealt with as the Engineer may direct.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents





B.20.6. *Scaffolding.*—The contractor shall provide all labour, scaffolding ladders and tackle necessary for hoisting and fixing woodwork in position and afford facilities for its inspection during construction. He is also responsible to see that the tackle and scaffolding, etc., are of the requisite strength and that the work is secured in a proper manner during inspection. The contractor shall be responsible for the safety of the work, workmen and for any action or compensation that may arise in this connection.

B.207. *Iron work.*—All iron-work connected with woodwork and going to be embedded in masonry shall before erection, receive 2 coats of hot coaltar. If it is to be painted, it shall be given the first 2 coats on the ground before being fixed in position and the third coat afterwards.

B.20.8. *Precautions against fire.*—No woodwork of any kind shall be laid within 60 cm. (about 2′) of a fire place or fuel. During the progress of work all shavings, cuttings and other rubbish shall be cleared away as the work progresses, and all precautions shall be taken against fire. No rubbish shall be left under floor boards or in other concealed positions on the job.

B.20.9. *Inspection.*—All woodwork shall be inspected and passed by the Engineer before being put into the work. The Engineer shall not be barred from rejecting any wrought timber on account of defective quality by reason of his having previously passed the same before it had been worked upon. In no case the woodwork shall be painted or otherwise treated before it is inspected and approved by the Engineer.

All woodwork in a building shall after it has been passed by the Engineer, have the primary coat of paint put on or otherwise treated before being fitted in position. The subsequent coats of paint or other finish shall be applied after the woodwork is fixed in position.

B.20.10. *Defective-work.*—If within three months after the work is completed any undue shrinkage or bad workmanship is discovered the contractor shall forthwith replace or refix the same to the satisfaction of the Engineer without extra charge.

B.20.11. *Item to include.*—(1) Supply of specified species of timber sawn to requisite sizes without any defect, wrought, framed and fixed in position with the required standard of workmanship including supply and fixing of fixtures, straps, bolts, holdfasts, spikes, nails, screws, etc., applying contractors glue or other jointing materials, coal-tarring embedded parts and painting joints.

(2) All material, labour, scaffolding, use of equipment, etc., for framing and fixing and completing the item as specified.

3. Applying two coats of double boiled linseed oil to internal woodwork unless other types of finishing is specified in the special provisions.

B.20.12. *Mode of Measurement and Payment.*—This will depend upon the item in the tender for which woodwork is executed . All woodwork when put up shall be of the dimensions shown on the drawings or as directed by the Engineer. Woodwork will be paid by net measurements and no allowance will be made for wastage or for dimensions supplied beyond those specified. But the length of each piece shall be measured overall so as to include projections for tenons or scarfs. For curved pieces cut out of the solid, the minimum overall dimensions of the required original rectangular section of scantling will be allowed in the measurements. The dimensions of sectional measurement shall be taken correct up to 2 mm. (about 1/12″) and the length will be measured correct up to two places of decimals of a metre. The quantity shall be calculated correct to three places of decimal of a cubic metre. When the schedule calls for supply of wrought timber, the rate shall as in all other cases include carriage to and delivery at the site of work.

## B.21. OIL PAINTING

B.21.1. *Materials and accessories.*

B.21.1.1. *Oil paints.*—Oil paints shall conform to specification No. A.17. All paints shall be thoroughly stirred with a clean stick before use. While being used the paint shall be stirred often to keep the pigment in uniform suspension. Ready mixed (factory mixed) paints only shall be used unless other types are specifically mentioned. Sample colour boards shall be prepared by the contractor and got approved by the Engineer before painting is started.

B.21.1.2. *Brushes.*—Unless other methods of application like spraying are specified paint shall be applied with brushes. On no account shall rags be used in the application of paints. The size of brushes to be used for painting of various works shall be got approved by the Engineer. All brushes shall be either round or oval shaped. Flat brushes when specifically authorised by the Engineer in writing shall not be over 8 cm. (about 3″) wide.

अनुक्रमणिका
Table of Contents

B.21.1.3. *Containers.*—The paint while being applied shall be kept in shallow pans and not in deep cans and must be kept well stirred. All paint cans must be cleaned out at the end of each day's work.

B.21.2. *Scaffolding.*—Scaffolding if necessary shall be as per B.9.11.

B.21.3. *Precautions in using lead paints.*—(1) White lead, sulphate of lead and all products containing those pigments (but not white pigments containing not more than 2 per cent. of lead) shall not be used in internal painting of building except for priming coat and artistic painting or fine lining work. They shall be as far as possible used in painting operations in the form of paste or ready mixed paint and measures shall be taken wherever practicable, to prevent danger arising from the application of the paint in the form of spray or by dust caused by rubbing down and scraping.

(2) Paint workers must be warned to avoid getting smeared with the above paints.

B.21.4. *Cleaning.*—Cleaning operations shall precede painting so that paint may be applied to clean surfaces. The work shall be carried out in such a manner that dirt and matter removed by cleaning will not come in contact with freshly applied paint. The method to be applied for cleaning and preparing surfaces for painting shall be mentioned in the specifications for each type of surface. When not so mentioned, any suitable method approved by the engineer for exposing the original surface without damage shall be adopted.

B.21.5. *Application.*—The primer coat of paint shall be applied as soon as possible after the surface has been cleaned before deterioration of the surface by rust (in case of steel surfaces) and contamination of the surface by dust, dirt or any other foreign material for all surfaces. Preferabaly painting should be done immediately after cleaning on the same day. If rusting occurs after the surface is prepared or there is contamination of cleaned surface with salts, acids, alkali or other harmful materials before the priming coat is applied and between the application of the remaining coats of paint, the surfaces shall be cleaned again.

Paints shall not be applied when the air is misty or atmospheric conditions are such as to promote condensation or in the opinion of the Engineer, the conditions are otherwise unsatisfactory for the work. Painting shall normally be done only in dry weather. It shall not be applied upon damp and moist surfaces.

Paint may be applied by spraying or brushing. Unless otherwise specified paint shall be applied with brushes. Paint shall be worked into all crevices and corners where possible and surfaces not accessible to brushes shall be painted by sheepskin or spray or any other method approved by the Engineer. All runs or sags shall be brushed out. Painting shall be done in a neat and workmanlike manner. Paint shall be applied so as to produce a uniform even coating over the entire surface, free from streaks, pitting, wrinkles or other irregularities.

The number of priming and finishing coats shall be as specified for the particular item.

Sufficient time shall be allowed for one coat of paint to dry before the next is applied.

B.21.6. *Protection.*—Painted surface shall be protected from sun, rain, condensation, contamination or surface damage until it is dry to the fullest extent. Boards indicating "Wet Paint" shall be put up where necessary.

B.21.(*a*). *Painting Iron and Steel work.*—In addition to specifications for oil painting "General" the following shall also apply for painting Iron and Steel Work:—

B.21.(*a*)1. Operation and workmanship for painting Iron and Steel work shall be as per I. S. 1477 (Part I)—1959, code of practice for finishing of Iron and Steel in Buildings, painting and allied finishes; subject to the following:—

(1) The method of preparation of the surface for painting shall be as specified in the special provisions for each item and as in B.21.4. Where Iron and Steel works need repainting (as maintenance), instructions detailed in clause 8 of I. S. 1477 (Part I)—1959 shall be followed.

(2) Red lead paint shall be used for primer coat unless other paints are specified. The number of primer coats shall be given in detailed specifications for each item. When not given it shall be one coat.

(3) Intermediate protective treatments (pre-treatments) shall be omitted unless specified in the special provisions.

(4) The finishing coats shall be of the paint as specified for each item by the Engineer. The number of finishing coats of the required shade of colour shall also be specified for each item separately. They shall be two when the number is not specified.

(5) Actual date of painting girders, steel tanks and other steel structures shall be neatly marked by the contractor on the structure according to the instructions of the Engineer.

B.21.(*b*). *Painting New Wood work.*—In addition to specifications for 'Oil painting General', the following specifications shall also apply for painting new woodwork:—

B.21.(*b*).1. Paint shall not be applied to a woodwork which is not well seasoned. The surface to be painted must be thoroughly dry, clean and smooth Woodwork must be passed by the Engineer before any paint is applied.

B.21.(*b*).T....*Preparation of Surface.*—Before any paint is applied the woodwork shall be finished smooth with the plane. The surface shall then be rubbed smooth with sand paper first with coarse grade about 2½ and then finished with a medium grade paper say 1½. Sand papering must be finished with the grain. When finished, no scratches from the coarse paper should show.

Before priming coat is applied, the knotting shall be done by one of the following methods as directed by the Engineer:—

(1) *Ordinary or size knotting.*—This shall be applied in two coats. The first to be made by grinding red lead in water and mixing it with strong glue size, used hot. The second coat shall be of red lead ground in linseed oil and thinned with boiled linseed oil and turpentine.

(2) *Lime knotting.*—Cover the knot with hot lime and leave on for 24 hours; then scrape off and coat the surface with size knotting as above.

(3) *Patent knotting.*—This consists of 2 coats of a varnish made by dissolving shellac in methylated spirits of wine.

B.21.(*b*).3. *Priming coat.*—After preparing the surface of woodwork as above, priming coat shall be applied.

Priming coat shall be as follows:—

(*a*) *On inside woodwork.*—It shall consist of 0.25 kg. (about ½ lb.) of red lead + 4 kg. (about 8 lbs.) of white lead+1.14 litres (about 2 pints) of boiled linseed oil+0.57 litre (about 1 pint) raw linseed oil+40 gm. (about 1½ oz.) of litharge or patent driers and shall be applied before the woodwork is fixed in place.

(*b*) *On outside woodwork.*—It shall consist of 4.5 kg. (about 10 lbs.) of white lead + 2.28 litres (about 4 pints) of raw linseed oil+27 gm. (about 1 oz.) of red lead+54 gm. (about 2 oz.) of litharge or patent driers and shall be applied before the woodwork is fixed in place.

B.21.(*b*).4. *Stopping.*—After priming, all small holes, cracks, open joints and similar minor defects of every kind if already allowed by the Engineer to remain, shall be stopped with putty made from pure whiting mixed to the proper consistency with raw linseed oil, a little white lead being worked in after mixing to help the hardening of the putty. On no account putty is to be used before the priming coat is put on.

B.21.(*b*).5. *Additional coats.*—After applying priming coats, the work shall be lightly rubbed down smooth with sand paper and the subsequent coats of paint of the specified shade approved by the Engineer, shall be applied. The paint shall be applied with brushes. It shall be spread as smoothly as possible with the brush by means of crossing (at right angles to the grain) and then laying of with the brush in the direction of the grain over the crossing. The final coat shall be very carefully crossed and laid off so that the brush marks are not visible. Each coat of paint shall be allowed to dry thoroughly and shall be lightly rubbed down before the next is laid. Every coat shall be passed by the Engineer before the next is laid on it. The finished surface shall not show any hair marks, ridges, or dry patches of paints, and no puddles shall be left in the corners of panels, and angle of moulding.

For new wood work exposed to the weather unless the number of coats of paint is mentioned in the special provisions three coats of paint shall be applied exclusive of the priming coat. In the interior of the buildings 2 coats shall suffice.

B.21.(*b*).6. *Embedded timber.*—The outside of the chowkats of the doors and windows as also other timber embedded in masonry shall be given two coats of hot coal-tar before erection. This is incidental to the item and shall not be paid separately.

अनुक्रमणिका
Table of Contents



B.21.(*c*). *Repainting old wood work.*—In addition to specifications for "oil painting General" the following specifications shall also apply for repainting old wood work:—

B.21.(*c*).1. *Cleaning the surface.*—All the paint shall be removed either by scraping, burning or by a paint remover as ordered by the Engineer. Following precautions shall be taken:—

(1) While removing paint by burning by using a blow lamp, particular care shall be taken to avoid burning wood work. If any wood work is found to be charred it will be replaced at the cost of the contractor.

(2) In the event of a paint remover containing alkali being used, the surface, shall subsequently be washed down with a weak acid such as dilute vinegar, so as to neutralise the alkali.

(3) While removing paint by scraping, care shall be taken not to damage the underlying surface of wood.

The surface shall then be rubbed down smooth with sand paper.

B.21.(*c*).2. *Priming Coat.*—The priming coat shall then be applied as specified for painting in B.21.(*b*).

B.21.(*c*).3. *Stopping.*—After priming, the defects shall be stopped with putty. The putty for stopping wood work shall be prepared from pure whiting mixed to the proper consistency with raw linseed oil, a little white lead being worked in after mixing to help the hardening of the putty. On no account shall putty be used before the priming coat is put on.

B.21.(*c*).4. *Finishing.*—The surface shall again be lightly rubbed smooth with sand paper and specified number of coats of required shade of paint shall then be applied as specified above or ordered by the Engineer.

B.21.(*d*). *Painting plastered surface.*—In addition to the specifications for "Oil painting General", the following specifications shall also apply for painting plastered surfaces:—

B.21.(*d*).1. New plaster shall not be primed or painted till it is completely dry and hard.

B.21.(*d*).2. *Preparation of the surface.*—The surface shall be carefully rubbed smooth and thoroughly cleaned with clean fresh water. Supplementary specifications if any, will be laid down in the special provisions for the item according as the particular nature of the surface to be painted, requires. The surface shall be dry, smooth, clean and free from dirt.

B.21.(*d*).3. *Priming Coat.*—This shall consist of equal parts of white and red lead mixed in boiled linseed oil to the required consistency applied uniformly over the surface. When this coat is dry, all cracks, holes and other such defects shall be filled with a mixture of one part white lead and three parts ordinary putty. The surface shall then be rubbed down with sand paper and dusted clean.

B.21.(*d*).4. *Finishing Coats.*—It may be necessary to give four coats of paints over the priming coat. The first coat shall be thin so that plaster may be thoroughly saturated. The second coat shall be thicker and shall contain a small quantity of turpentine with some of the required colouring pigment. The third coat also shall be thicker having equal parts of linseed oil and turpentine. The last coat shall be as specified for each item of painting. Walls and ceilings shall be given a flat finish as glossy finishing coat shows up the irregularities in the plaster.

The paint shall be applied with brushes. It shall be spread as smoothly as possible.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



# SECTION BR

# STANDARD SPECIFICATION

FOR

# BRIDGE WORK

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



# SECTION BR—BRIDGE WORK.

## CONTENTS


| Sr. No. (1) | Item (2) | Pages (3) |
|---|---|---|
| 1. | List of Indian Standards Referred to ... ... ... | 91 |
| BR.1. | Constructing and maintaining temporary road diversion including the barricading the existing road, maintaining night watchmen, red lights, etc., as directed till the completion of the work. | 93 |
| BR.2. | Dismantling the existing structure including sorting out useful materials and stacking them within the specified lead neatly as directed and disposing off the unsuitable materials. | 94 |
| BR.3. | Excavation for foundation including shoring and strutting as necessary and disposing of excavated stuff as directed in—<br>(*a*) earth, soils of all types, sand, gravel, soft murum, etc.,<br>(*b*) hard murum,<br>(*c*) hard murum and boulders,<br>(*d*) soft rock,<br>(*e*) hard rock (blasted),<br>(*f*) hard rock (chiselled and wedged or line drilled),<br>(*g*) laterite. | 96 |
| BR 4. | Dewatering including diversion of stream, providing cofferdams, bunds, etc., as may be necessary for foundation and other parts of the work and bailing out and pumping out water during and after excavation as required. | 97 |
| BR.5. | Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal in foundations including necessary form work, compacting and curing. | 99 |
| BR.5.(*a*) | Providing and laying in situ 1:3:6 cement concrete of metal and plums of trap/granite/quartzite/gneiss stones in foundations including form work, compacting and curing. | 100 |
| BR.6. | Providing uncoursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for foundations of piers, abutments, wings, etc., including dewatering, striking joints and watering complete. | 100 |
| BR.7. | Providing islands for laying steel curb or cutting edge of wells. | 101 |
| BR.8. | Providing, fabricating, launching, floating and grounding in position steel curbs for wells with necessary steel bracings and steel cutting edges as shown on the detailed drawings. | 102 |
| BR.9. | Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal in the hollow of the steel curbs including compaction by vibrating and curing complete. | 103 |
| BR.10 | Providing, fabricating and setting out mild steel cutting edges for R. C. R. well curbs as shown on the detailed drawings. | 103 |
| BR.11. | Providing, cutting, bending, hooking, laying in position and tying mild steel reinforcement bars in position for well curbs and steining complete as per detailed drawings. | 105 |
| BR.12. | Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. well curbs including necessary shuttering, compacting by vibrating, finishing and curing complete (excluding mild steel reinforement). | 105 |


अनुक्रमणिका
Table of Contents

| Sr. No. (1) | Item (2) | Pages (3) |
|---|---|---|
| BR.13. | Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal in well steining including shuttering, compaction by vibrating and rodding, finishing and curing complete (excluding mild steel reinforcement). | 106 |
| BR.14. | Sinking the wells for foundations through all strata except rock by approved methods including removal of obstacle and use of necessary plant, machinery, divers, etc., and proper seating of the well. | 107 |
| BR.15. | Carrying out a plate bearing test on the strata at the bottom of the well including supply of necessary bearing plate and stanchion assemblies and platform for loading and use of cranes, loads, hydraulic jacks and other relevant equipment, etc., complete. | 110 |
| BR.15(*a*). | Carrying out a plate bearing test on the strata at the bottom of the well with the bearing plate assembly, stanchion, casing and the platform for loading supplied by the Department and using contractor's own crane, loads, hydraulic jacks and other relevant equipment, etc., complete. | 112 |
| BR.15(*b*). | Carrying out loading test on a well including use of loading platform, loads, gauges and other equipment. | 112 |
| BR.16. | Providing steel anchor dowels at the base of the well including drilling holes, placing the dowels in position and effectively grouting the holes. | 113 |
| BR.17. | Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal for the bottom plugs of wells in the dry or under water including compaction and curing where necessary. | 114 |
| BR.18. | Providing and filling in wells with sand/rubble and sand/shingle and sand including compaction between the top and bottom plugs. | 115 |
| BR.19. | Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal for top plug of wells including impaction by vibration and curing. | 116 |
| BR.20. | Providing cast in situ R. C. C. piles of 1:1.5:3 mix. with trap/granite/quartzite/gneiss metal for a capacity of ..... tonnes placed through steel shells driven to the required depth through all strata except rock including reinforcement. | 116 |
| BR.21. | Providing cast in situ R. C. C. bored piles of 1:1.5:3 mix with trap/granite/quartzite/gneiss metal for a capacity of ..... tonnes placed through steel shells sunk to the required depth through all strata except rock including compaction of concrete and provision of reinforcement. | 117 |
| BR.22. | Carrying out loading test of pile or pilegroup including construction of test caps, accessories and dismantling them after test. | 117 |
| BR.23. | Providing, cutting, bending, hooking, laying in position and tying mild steel bars for reinforcement for R. C. C. well/pile caps as detailed in the drawings including shear pins. | 117 |
| BR.24. | Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. well/pile caps including necessary centering, formwork, compaction by vibrating, finishing and curing complete (excluding mild steel reinforcement). | 117 |

| Sr. No. (1) | Item (2) | Pages (3) |
|---|---|---|
| BR.25. | Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for abutments, returns, wings, etc., with khandki facing and pointing with cement mortar 1:3 for khandki faces and rubble facing with struck joints for rubble backing including scaffolding and watering masonry complete. | 118 |
| BR.26. | Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for piers with khandki facing and pointing with cement mortar 1:3 on all sides including cut and ease waters, necessary scaffolding and watering masonry complete. | 119 |
| BR.27. | Providing and laying 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal for cast-in-situ piers, abutments, returns, wings, etc., including provision of v shaped false joints to form suitable panels on the faces to approved design with necessary centering, shuttering, scaffolding, compacting by vibrating, finishing and curing complete. | 120 |
| BR.27(*a*). | Providing and laying 1:3:6 cement concrete of metal and plums of trap/granite/quartzite/gneiss stones for cast-in-situ piers, abutments, returns, wings, etc., including provision of V shaped false joints to form suitable panels on the faces to approved design with necessary centering, shuttering, scaffolding, compacting by vibrating, finishing and curing complete. | 121 |
| BR.28. | Providing cutting, bending, hooking, laying in position and tying mild steel bars for reinforcement for pier and abutment caps and for concrete piers and abutments when provided, as detailed on the drawings. | 121 |
| BR.29. | Providing and laying in situ 1:2:4 ordinary cement concrete/controlled cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. caps over piers and abutments including necessary scaffolding, centering, formwork, compacting by vibrating, finishing and curing complete (excluding mild steel reinforcement). | 122 |
| BR.30. | Providing and laying in situ controlled cement concrete of trap/granite/quartzite/gneiss metal for the R. C. C. concrete block below the bearing including formwork, scaffolding, compaction by vibrating, finishing and curing complete (excluding steel reinforcement). | 123 |
| BR.31. | Providing and fixing cast steel roller-rocker bearing of ..... tonnes capacity as per detailed drawings. | 123 |
| BR.32. | Providing and fixing mild steel fixed plate bearings of..... tonnes capacity as per detailed drawings. | 125 |
| BR.33. | Providing and fixing cast steel rocker bearings of ..... tonnes capacity as per detailed drawings. | 126 |
| BR.34. | Providing and fixing mild steel sliding plate bearings of ..... tonnes capacity as per detailed drawings. | 126 |
| BR.35. | Providing, cutting, bending, hooking, laying in position and tying mild steel bars for reinforcement as per detailed drawings for—<br>(*a*) solid/deck slab,<br>(*b*) main girders/arch ribs,<br>(*c*) cross girders,<br>(*d*) arches. | 126 |

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| BR.36. | Providing welded joints for mild steel reinforcement bars of—<br>(*a*) 25 mm. diameter and under,<br>(*b*) 28 mm. diameter,<br>(*c*) 32 mm. diameter,<br>(*d*) 36 mm. diameter,<br>(*e*) 40 mm. diameter. | 127 |
| BR.37. | Providing bottle-nut joints for the mild steel reinforcement round bars of 25 mm. diameter and above. | 127 |
| BR.38. | Providing and laying in situ 1: 2: 4 ordinary cement concrete/ controlled cement concrete of 'trap/granite/ quartzite/ gneiss metal for R. C. C. work including centering, form-work, scaffolding, ramming, vibrating, finishing and curing complete in—<br>(*a*) solid/deck slab,<br>(*b*) main girders/arch ribs,<br>(*c*) cross girders,<br>(*d*) arches (excluding mild steel reinforcement). | 128 |
| BR.39. | Providing and fixing cast-steel roller bearings of ..... tonnes capacity at the articulation as per detailed drawings. | 129 |
| BR.40. | Providing and fixing mild steel sliding plate bearings of ..... tonnes capacity at the articulation as per detailed drawings. | 130 |
| BR.41. | Providing and fixing cast-steel rocker bearings of ..... tonnes capacity at the articulation as per detailed drawings. | 130 |
| BR.42. | Providing and fixing mild steel fixed plate bearings of ..... tonnes capacity at the articulation as per detailed drawings. | 130 |
| BR.43. | Providing expansion, joints as per detailed drawings. ... | 130 |
| BR.44. | Providing coursed rubble/trap/granite/quartzite/gneiss stone masonry in cement mortar 1 :—for head walls with khandki facing and cement pointing 1:3 for khandki faces and rubble facing with struck joints for rubble backing including scaffolding and watering mosonry complete. | 131 |
| BR.45. | Providing and laying in situ 1: 4: 8 cement concrete of trap/ granite/quartzite/gneiss metal for haunch filling including campacting, curing and scaffolding complete. | 131 |
| BR.46. | Providing trap/granite/quartzite/gneiss rubble filling over haunches and arches including hand packing. | 132 |
| BR.47. | Providing and laying in situ 1: 2: 4 cement concrete of trap/ granite/quartzite/gneiss metal including compacting, finishing, curing, and filling in joints with bitumen complete for—<br>(*a*) wearing course 8 cm. (about 3″) thick,<br>(b) approach slab (excluding mild steel reinforcement). | 132 |
| BR.48. | Providing vent holes in the slab and wearing course with iron grill at the top and galvanised iron pipe at bottom as per drawing. | 134 |
| BR.49. | Providing, cutting, bending, hooking, laying, in position and tying mild steel reinforcement bars as per detailed drawings for ballast walls, kerbs, returns, approach slabs etc. | 135 |

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGES |
|---|---|---|
| BR.50. | Providing and laying in situ 1: 2: 4 cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. work of ballast walls, kerbs, box returns etc. including scaffolding, centering formwork, compaction, finishing and curing complete (excluding mild stel reinforcement. | 135 |
| BR.51 (*a*). | Providing R. C. C. parapet with 1: 2: 4 cement concrete of trap/granite/quartzite/gneiss metal with cast-in-situ/precast panels as per the detailed drawings including reinforcement, scaffilding, centering, formwork, compacting, finishing and curing complete. | 136 |
| BR.51(*b*). | Providing railing of mild steel angle/I/tee posts and galvanised iron pipes as per the detailed drawings including scaffolding and painting. | 137 |
| BR.51(*c*). | Providing railing of cast in situ R. C. C. posts with 1: 2: 4 cement concrete of trap/granite/quartzite/gneiss metal and chains as per the detailed drawings including reinforcement scaffolding, centering, formwork, compaction, finishing and curing complete. | 137 |
| BR.51(*d*). | Providing collapsible railing with mild steel channel posts and removable galvanised iron pipes as per the detailed drawings including scaffolding and painting. | 138 |
| BR.51(*e*). | Providing railing of cast in situ R. C. C. posts with 1: 2: 4 cement concrete of trap/granite/quartzite/gneiss metal and galvanised iron pipes as per detailed drawings including reinforcement scaffolding, centering, formwork, compaction, finishing, and curing complete. | 138 |
| BR.51(*f*). | Providing collapsible railing with channel posts, flats and angles as per the detailed drawings, including scaffolding and painting. | 139 |
| BR.52. | Providing fine tooled trap/granite/quartzite/gneiss stone work for cornice, string course, corbels and copings in cement mortar 1 :—as per drawings including scaffolding and curing complete. | 140 |
| BR.53. | Providing coursed rubble trap/granite/quartzite/gneiss stone mosanry in cement mortar 1:—for parapet with khandki facing and pointing with cement mortar 1:3 on all khandki faces including scaffolding and watering masonry. | 141 |
| BR.54. | Extra over C. R. masonry for providing face stones with—<br>(*a*) Rough tooled dressing,<br>(*b*) Chisel dressing,<br>(*c*) Close punched dressing,<br>(*d*) Fine tooled dressing. | 141 |
| BR.55. | Providing galvanised iron 150 mm. (about 6") diameter water spouts as per drawings. | 141 |
| BR.56. | Providing and fixing marble tablet of size and description as per detailed drawings including moulded marble/1: 2 cement mortar border. | 142 |
| BR.57. | Providing trap/granite/quartzite/gneiss rubble filling behind the abutments, returns or wings. | 142 |
| BR.58 | Carrying out load test of bridge. ... | 143 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



*List of Indian Standards referred to*

1. I.S. 73—1961—
   Paving Bitumen.
2. I. S . 1834—1961—
   Hot sealing compounds for joints in concrete.
3. I. S. 1838—1961—
   Preformed fillers for expansion joints in concrete non-extruding and resilient type.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



BR.1. *Constructing and maintaining temporary road diversion including barricading the existing road, maintaining night watchmen, red-lights, etc., as directed till the completion of the work.*

BR.1.1.—*General.*—The item provides for constructing temporary diversion road, temporary stream crossings, closing the existing road, providing barricades, signs, signals, watchmen and red lights, maintaining the diversion and crossings in a condition satisfactory for the use of traffic till the completion and opening of the work to traffic and restoring the land to the original condition on completion of the work.

BR.1.2. *Alignment.*—If the alignment of the diversion is specified on the drawing, the same shall be adopted without any deviations unless found necessary and permitted by the Engineer. In the absence of such specified alignment, the contractor shall align the diversion suitably and obtain approval of the Engineer before constructing the same.

BR.1.3. *Lands.*—The contractor shall be allowed if possible and convenient to the Department, to make use of the Departmental land free of royalties, rents, etc. In case the diversion is required to be routed over other than the Departmental land, the contractor shall be responsible for obtaining the consent of the owners and payment of royalties, rents, compensations, etc., arising out of the use of such lands and shall not be entitled for extra claims. The Department shall remain indemnified in these matters.

BR.1.4. *Construction.*—The diversion shall be constructed to the satisfaction of the Engineer on the approved alignment with an eye to the safety and convenience of the traffic at all times and shall—

(i) not have a gradient steeper than 1 in 10,

(ii) have a width not less than 6 metres (about 20′) in case of two-way traffic and 3.75 metres (about 12.30′) in case of one-way traffic,

(iii) not have radius of curves less than 30 metres (about 100′),

(iv) have vertical curves allowing a vision of over 50 metres (about 164′),

(v) have banks not more than 1.5 metres (about 5′) high where higher banks are avoidable, and

(vi) have sides in cuts and banks to stable slopes.

The Engineer may permit in writing deviations in the above if circumstances justify.

The land for the road width shall be cleared of all debris, bushes, stumps of wood, logs, boulders and all other obstructions.

The bank shall be formed in layers of 15 cm. to 20 cm. (about 6″ to 8″) and where necessary shall be so consilidated as to enable traffic to negotiate without risk at a speed not exceeding 15 km./hour. The road in cutting shall have an even road surface. The 6 metres (about 20′) width for two-way and 3.75 metres (about 12.3′) width for one-way traffic shall be provided with top dressing of murum or other suitable material approved by the Engineer to give a reasonably even and hard surface satisfactory for the use of traffic at all times if it is not naturally firm and well compacted. Diversion shall include stream crossings also. At stream crossings, the diversion shall be provided with temporary crossings or hard bed as and when necessary where the depth of water exceeds 30 cm. or the nature of stream bed does not allow the traffic to pass without inconvenience. The crossing shall be designed for one-way traffic and for loading corresponding to the vehicle loading permitted on the road. Waterway to be allowed and the details of crossings shall be subject to the approval of the Engineer. Protective measures such as railing shall be provided where necessary as directed by the Engineer.

BR.1.5. *Arrangement for traffic.*—The existing road should be closed only after the diversion is completed and ready to take the traffic and then also only after getting prior approval of the Engineer. The traffic shall be guided properly over the diversion which shall be clearly marked by white-washed stones or other such means. In case of one-way traffic the flow of vehicles shall if necessary, be regulated alternately from each end by watchmen and signallers. Caution and "GO-SLOW" signs approved by the Engineer, shall be erected as directed by the Engineer. The old or existing road shall be adequately barricaded and properly closed at both ends. Red lights shall be displayed during the night time to indicate the diversion. Warning signals shall be erected on the existing road at about 70 m. (about 225′) from both the ends of the diversion. All diversion signs shall be clearly visible by night and day. The contractor's men or materials shall not cause any impediment to the traffic on the diversions. If speed limit is necessary it should be enforced after obtaining sanction from the competent authority.

अनुक्रमणिका
Table of Contents

BR.1.6. *Maintenance.*—The contractor shall maintain the diversion in a reasonably good condition till the work is over. The traffic should be able to pass over the diversion without inconvenience at a speed not exceeding 15 km./hour. He shall also be responsible to reconstruct it or parts of it if damaged due to the monsoon or any other cause without extra claims for the same. The wearing surface shall also be maintained by carrying out repairs to it as and when necessary. During the monsoon, road side gutters shall be provided wherever necessary to drain off the surface water if it is likely to damage the diversion road.

If the contractor fails to repair the diversion and the crossings in a satisfactory manner, even after being required by the Engineer to do so within a specified period in writing, the Engineer will be free thereafter to repair and keep the diversions including the crossings in satisfactory condition at the cost of the contractor.

BR.1.7. *Closing.*—After the traffic is allowed to pass over the newly constructed or repaired road surface, bridge or culvert, the diversion road shall be closed for traffic and all the barricades, signs, signals, etc., removed. The land over which the diversion is taken out shall be restored to its original condition. The crossings shall be dismantled.

BR.1.8. *Special Points.*—The contractor shall be responsible thus for–

(1) aligning the diversion suitably when no route is specified,

(2) obtaining valid written consent of land owners and payment of compensation to them and indemnifying Government in this connection,

(3) construction of the temporary diversion road including temporary stream crossings where necessary for safe and satisfactory passage of traffic,

(4) providing adequate and necessary barricades, sign boards, signallers, signals and red lights,

(5) control of traffic over the diversion,

(6) maintenance of the diversion in good condition,

(7) accidents over or due to the diversion if caused by its bad condition and compensation if any in that connection,

(8) reconstruction of the diversion when damaged,

(9) restoring the land to the original condition on abandoning the diversion,

(10) making good any damage to the existing road due to the diversion.

BR.1.9. *Item to include.*—(i) All labour, materials, use of equipment, tools and plant necessary for aligning, constructing, operating, maintaining and closing the diversion satisfactorily.

(ii) All sorts of compensations and responsibilities arising out of the diversion.

BR.1.10. *Mode of measurement and payment.*—The contract rate shall be for the job. The payment shall be for the entire job including maintenance till the road, bridge or C. D. work under construction is opened to traffic. Part payment may be made through the running account bills at the discretion of the Engineer.

BR.2. *Dismantling the existing structure including sorting out useful materials and stacking them within the specified lead neatly as directed and disposing off the unsuitable materials.*

BR.2.1. *General.*—The item provides for the complete removal of the existing structure except such portions as may be required or permitted to be left in place as shown on the drawing or as directed by the Engineer, clearing the site, sorting out useful materials and stacking them nearly within a lead of 100 m. (about 328′) or on the bank indicated by the Engineer whichever is more and wasting the non-useful materials.

BR.2.2. *Preliminaries.*—If necessary and directed by the Engineer the contractor shall have to erect screens of canvas or other suitable materials and/or to water the structure and area to avoid the nuisance of dust before and during dismantling. Care shall be taken to see that dismantling is done in such sequence and manner as to prevent all avoidable damage to usable materials and any damage to nearby property or injury to life.

In case of structures which are to be removed for re-erection, all members shall be properly match-marked with paint. The pins, nuts, plates, structural steel members, timber, etc., shall be similarly marked for identification of their position in the entire assembly. All machined surfaces, pin holes, pins, etc., shall be coated with grease.

अनुक्रमणिका
Table of Contents



An inventory of all possible serviceable materials shall be kept on record and signature of the contractor obtained in token of his acceptance. Any doubt or non-aggreement with the same shall be reported by the contractor before starting the removal.

Portions required to be kept intact shall be clearly marked before starting dismantling.

If no separate provision exists in the tender for necessary diversion, the contractor shall nevertheless invariably be responsibile for the construction and maintenance of adequate barriers, watchmen and/or lights at the ends of portions of the road closed by construction, to the satisfaction of the Engineer at his (contractor's) cost, diversion itself being treated as extra work.

A register shall be opened by the contractor on the work site to show a day-to-day account of the turn out, salvaged materials and whether properly stacked or wasted. It shall be signed by the representative of the contractor and a responsible member of the Departmental supervising staff every day.

BR.2.3. *Dismantling and removal.*—The structure shall be dismantled carefully and the materials removed without causing damage to the serviceable materials to be salvaged, the part of the structure to be retained and any properties or structures nearby. Any avoidable damage to articles to be salvaged and part of the structure to be retained and any damage to nearby property or structure shall be made good by the contractor without extra claims. The contractor shall be responsible for any injury to the workers or the public.

Unless otherwise specified the structure shall be removed upto 45 cm. (about 18") below the ground level and the portion which interferes in any way with the new construction shall be removed entirely. Removal of overlying or adjacent materials if required for the dismantling of the structure, shall be included in the item.

Where existing bridge is to be extended or otherwise incorporated in the new work, only such part or parts of the existing structure shall be removed as are necessary to provide a proper connection to the new work. The connecting edges shall be cut, chipped and trimmed to the required lines and grades without weakening or damaging the part of the structure to be retained.

Blasting if required, may be resorted to with the written permission of the Engineer. In such a case blasting shall be carried out as specified in B.2. All blasting operations shall be finished before the new construction is commenced.

Equipment or methods which might damage members, portions of the structure to be preserved or adjacent construction or structure shall not be used.

If sewers or drains are removed or disturbed, the contractor shall at once remove the foul matter. If sewers or drains have to be temporarily removed the contractor shall provide temporary passage for the flow and redo the sewer or drain without extra claims. If existing sewers or drains are required to be removed permanently and rebuilt to altogether new alignments, they shall be paid for separately as extra work if there is no provision in the tender for such work.

BR.2.4. *Disposal.*—All the materials obtained from the removal of the structure shall be the property of Government. Useful materials shall be stacked neatly in such a manner as to avoid deterioration and in places directed by the Engineer within a lead of 100 m. (about 328') or on the bank indicated by the Engineer whichever is more. Different categories of materials shall be stacked separately.

Unless otherwise provided, excavated materials shall be used in backfilling excavation made in removing the structure, in constructing embankment or otherwise disposed off as directed within 100 m. free of cost.

Useful materials will be issued to the contractor for use in the new work or elsewhere at the rates provided in the tender or when not so provided at the rates agreed upon by the Engineer and the contractor.

Non-useful materials shall be wasted by the contractor without causing any damage or inconvenience.

BR.2.5. *Final clearance.*—All rubbish shall be cleared off the site and the ground left clean and clear. Any damage caused during the operation shall be made good.

अनुक्रमणिका
Table of Contents

BR.2.6. *Responsibilities.*—The contractor shall be responsible for—

(i) maintaining a register of the salvaged materials,

(ii) keeping intact the portion not to be removed,

(iii) avoidable damage to serviceable articles to be salvaged during dismantling, conveyance and stacking,

(iv) blasting operations when necessary,

(v) stacking neatly and safe custody of the salvaged materials till handing over to the Department,

(vi) disposing off unserviceable materials and its consequences,

(vii) damages to nearby property and injury to workers and the public due to his operations.

BR.2.7. *Item to include.*—(1) All labour, materials, use of equipment, tools and plant required for completing the job satisfactorily.

(2) Erecting and removing screens and watering when necessary and directed.

(3) Marking the structure suitably.

(4) Opening register of salvaged materials.

(5) Providing adequate barricades, signs, lights, etc.

(6) Removal of the structures.

(7) Diverting the existing drains, road, etc., temporarily and redoing the same, if not separately provided.

(8) Stacking serviceable materials.

(9) Wasting unserviceable materials.

(10) Clearing site on completion.

(11) Compensation for damaged properties or injuries to persons.

BR.2.8. *Mode of measurement and payment.*—The contract rate shall be a lump sum for the complete job. Proportionate payment may be made through running account bills. Full payment shall be made on completion of the job in all respects.

BR.3. *Excavation for foundation including shoring and strutting as necessary and disposing of excavated stuff as directed in—*

(*a*) *earth, soils of all types, sand, gravel, soft murum, etc.,*

(*b*) *hard murum,*

(*c*) *hard murum and boulders,*

(*d*) *soft rock,*

(*e*) *hard rock (blasted),*

(*f*) *hard rock (chiselled and wedged or line drilled),*

(*g*) *laterite.*

BR.3.1. *General.*—The excavation shall conform to specification No. B.1. in all respects subject to the following:—

If excavation in rock is done by blasting, the lowest 15 cm. (about 6″) of blasting shall be done by light charges so as not to shatter or weaken the underlying rock on which the foundation will be actually laid.

If excavation in rock is done in excess of the dimensions shown on the plans or as directed by the Engineer, not only no payment will be made for such over break but the contractor shall at his own cost fill such extra excavation with concrete or U. C. R. masonry of the foundation grade and cure it properly. If any offsets are left over the footings, the contractor is not liable to fill the portion above these offsets with concrete or U. C. R. masonry free of cost although he is bound to do so free of cost in the space between a vertical line from lowest footing and the rock overbreak if so ordered. This shall be done when it is intended to fill the gap between the permanent structure and the side of the trenches in rock with concrete or masonry.

All seams and crevices in rock shall be cleaned out and washed.

अनुक्रमणिका
Table of Contents



Useless materials obtained from clearing site and excavation shall be wasted as directed by the Engineer. Useful materials obtained from clearing site shall be stacked as directed by the Engineer within a lead of 100 metres (about 328′) or on the bank whichever is more as directed by the Engineer. Materials useful for backfilling may be stacked at a convenient place within a lead of 50 metres (about 164′) for reuse free of cost. Backfilling shall be done after the concrete or masonry is fully set and shall be done simultaneously on both sides in such a manner as not to cause any undue or unbalanced thrust on any part of the structure. Special care shall be taken for compacting the fill behind the abutments. Rolling or mechanical tamping shall not be done so near the abutment as to cause undue thrust. Where backfilling is necessary, on both sides, it shall be done simultaneously to the same level on both sides in layers not exceeding 20 cm. (about 8″), moistened and manually well compacted. Materials useful for approach banks shall be used for banks complying with its pertinent specification for consolidating, etc., if the lead is within 100 m. (about 328′) and will not be separately paid for. Useful stones from rock excavation shall be stacked neatly and will be allowed to be used by the contractor on payment at rates laid down in the contract or if not so laid down, at scheduled rates of the Division current at the time of tendering.

The excavated materials will not be deposited in such a way as to obstruct the stream or spoil its regime or in any way adversely affect the structure during or after construction. The materials from foundation or other excavation if temporarily deposited in the stream, shall be removed or disposed of as directed and the stream freed from the obstruction.

Satisfactory and safe arrangement shall be provided for the use of the supervising staff and labour for giving access to the sites of excavation from the banks.

BR.3.2. *Dewatering.*—Dewatering shall be done according to specification No. BR.4. Unless separate provision for dewatering is made in the tender the item of excavation will include dewatering needed to be done for the satisfactory execution of excavations as specified in specification No. BR.4 without extra cost to the Department.

BR.3.3. *Item to include.*—In addition to items detailed in specification No. B.1.13, excavation in rock will include filling concrete or masonry of the foundation grade in the trenches excavated to dimensions in excess of those shown on the plans, i.e., overbreak portions at contractor's cost as directed by the Engineer instead of filling with excavated materials subject to the conditions in BR.3.1 above.

All blows, slips, etc., occurring in the excavation shall be removed by the contractor without any extra cost to the Department. All surplus materials from the excavation shall be removed and the site left clean on completion of the work.

BR.3.4. *Mode of measurement and payment.*—It shall be as per specification No. B.1.14. With regards to backfilling of foundation trenches if concrete or masonry is to be filled between the concrete or masonry of the structure and the vertical plane of excavation in rock shown in the drawings it shall be paid for; but no payment shall be made for the concrete or masonry laid in the overbreak portion.

*BR.4. Dewatering including diversion of stream, providing cofferdams, bunds, etc., as may be necessary for foundation and other parts of the work and bailing out and pumping out water during and after excavation as required.*

BR.4.1. *General.*—The foundation trenches shall be kept dry by resort to pumping alone or pumping in combination with diversion channels, cofferdams, bunds, diversion weirs, drainage channels, well points or any other satisfactory method to suit local conditions at the choice of the contractor. The contractor shall supply details of his proposals for approval of the Engineer, but such approval shall in no way release the contractor from the responsibility for the adequacy of diversion and dewatering arrangements and for the quality and safety of the work, for all of which the contractor shall be solely responsible.

BR.4.2. *Method.*—The method to be adopted shall be entirely left to the choice of the contractor provided adequate dewatering is carried out and the scheduled programme is adhered to. The contractor shall plan, construct and maintain satisfactorily necessary diversion channels and temporary diversion and protective works so as to safely pass the stream flow and also satisfactorily deal with any sudden rise of flow without damaging the foundation excavation or works. Where practicable, all substructures shall be constructed in open excavation and where necessary the excavation shall be shored and braced or protected by cofferdams. The cofferdam should be carried to adequate depths and heights, safely designed and constructed with suitable dimensions and protection and shall be made as water-tight as practicable for facility of construction of the work to be done inside them. The interior dimensions of the



अनुक्रमणिका
Table of Contents

cofferdams shall be such as to give sufficient clearance for the construction and inspection and to permit installation of pumping machinery etc., inside the enclosed area. The cofferdams shall be of sufficient heights to prevent ingress of water into the foundation pits and to protect green concrete or masonry against damage from tides or sudden rising of the stream and to prevent damage of the foundation by erosion.

Unless otherwise permitted, no excavation shall be made outside the enclosed area and the natural stream bed adjacent to the foundation shall not be disturbed without permission from the Engineer.

Cement grouting or other approved methods may be used at the discretion of the contractor to prevent or reduce seepage and to protect the area to be excavated if the soil is porous.

BR.4.3. *Pumping.*—Adequate pumping arrangements shall be made for dewatering foundation trenches and other areas of construction where dewatering is essential and keeping them dry while masonry or concrete or other construction is in progress and till the concrete or mortar of masonry has sufficiently set and construction can be proceeded without pumping. Pumps of adequate capacity and in required numbers shall be provided to ensure the above. Pumping from the foundation trenches or from the interior of the cofferdam or other areas of construction shall be done in such a manner as to preclude the possibility of the movement of water through any fresh concrete or masonry and washing away parts of concrete or mortar. No pumping will be allowed during placing of concrete or for a period of at least 24 hours thereafter unless it is done from suitable sump separated from concrete or masonry by effective means.

The contractor should make his own arrangement for necessary labour, materials, and equipment for confferdams, pumps, engines and other machinery and devices required for successful execution of the item of dewatering.

BR.4.4. *Desilting.*—If any foundation pits are filled due to floods or flow or blows or slips during the progress of the work or during the rainy season or due to any other cause, all pumping required to dewater the pits and to do desilting shall be done without making extra claims.

BR.4.5. *Removal.*—The cofferdams and other works constructed, for facility or diversion and/or dewatering shall not cause any damage to property and work and shall be removed after they have served their purpose in a manner and to the extent directed by the Engineer. If any excavation is made outside the enclosed area for facility of construction, the contractor shall refill the same with proper ramming after the foundation work is completed so as to bring the river bed to its original condition if and as directed by the Engineer. Similarly any material deposited within the stream area from the filling of the cofferdam or from any excavation shall be removed and the stream area made free from obstruction caused thereby as directed by the Engineer.

BR.4.6. *Item to include.*—(1) Diversion of surface flow, construction of cofferdams, cribs, shoring, strutting, bunds, dams, service path during construction and removing the same after completion to bring the river bed to its original condition.

(2) All labour, materials, use of equipment and other arrangement necessary for dewatering during excavation and construction of other items requiring dewatering.

(3) Dewatering foundation trenches, excavation and other areas to be built upon to enable the masonry, concrete, or other construction work to be done in the dry and till the Engineer considers that the mortar or concrete has sufficiently set.

(4) Dewatering till all the items requiring dewatering are fully completed. This shall also include time required for passing foundations and taking measurements of all the items requiring dewatering.

(5) Removing liquid stuff of any sort which might find access into the trenches by blowings, slip or any other cause whatsoever from the sides or bottom of the foundation or excavation or from elsewhere during or after dewatering.

BR.4.7. *Mode of measurement and payment.*—The payment for dewatering done by any suitable acceptable method of dewatering approved by the Engineer and for the depths shown on the drawings and up to 1.5 m. (about five feet) below such depth shall be the lump sum for the complete job or for each sub-item as agreed in the tender.

अनुक्रमणिका
Table of Contents



Dewatering required for excavation and other items below this additional depth of 1.5 m. (about 5′) will be paid for as extra work, rate for which will be fixed according to the general terms of the contract:—

(1) 70 per cent. of the lump sum cost will be paid when masonry or concrete and other appur-tenant works come up above the natural water level or bed level whichever is higher.

(2) The balance will be paid when all the work is completed.

BR.5.—*Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/ gneiss metal in foundations including necessary formwork, compacting, curing and scaffolding complete.*

BR.5.1. *Preparation of foundation for laying concrete.*

BR.5.1.1. *Passing foundation.*—The foundation shall have been prepared according to specification No. B.1.4 and passed in writing by the Engineer before concreting is started. Just before starting concrete, the bed of the foundation trenches shall be cleaned of all loose materials and slightly moistened if dry, to prevent absorption of water from the concrete. In the case of rock foundation, the bed shall be washed clean and excess water if any, removed.

BR.5.1.2. *Wet foundation.*—If the area on which the concrete is to be placed is under water, it shall be pumped dry and kept so throughout the period of laying concrete and 2 hours afted completing concrete, without causing damage to concrete. Concrete with changed water content may be placed in wet foundations if so directed by the Engineer. Dewatering shall be done according to specification No. BR.4. Unless dewatering is separately provided for in the tender the rate for concrete shall also include the cost of dewatering required. If unusual or unforeseen conditions are met with and it is not possible nor desirable to dewater, the Engineer may permit the placing of concrete under water as specified in specification No. B.6.7.

BR.5.2. *Cement Concrete.*—The cement concrete shall comply with specification No. B.6 for ordinary cement concrete subject to the following:—

BR.5.2.1. *Proportion.*—The proportion of materials shall be one 50 kg. bag of cement: 105 litres (about 3.6 c. ft.) of sand: 210 litres (about 7.2 c. ft.) of coarse aggregate.

BR.5.2.2. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound stones of the specified types available in the region and approved by the Engineer.

The maximum sixe of coarse aggregate shall be 50 mm. (about 2″) when the depth of the concrete footing is 20 cm. (about 8″) or more. For less depths, the maximum size shall not exceed ¼th the depth. The aggregate shall be well graded between the maximum size and 5 mm. (about 3/16″) as indicated in specification No. A.7.

BR.5.2.3. *Mixing.*—The cement concrete shall be normally machine mixed. But the Engineer may permit hand mixing when all due precautions including additional cement laid down in specification No. B.6.4 shall be observed and uniformly well mixed concrete obtained. Water content may be within the range mentioned in specification No. B.6.3. or as may be approved by the Engineer to give the required consistency.

BR.5.2.4. *Slump.*—Slump for manually compacted concrete may not exceed 12 cm. (about 5″) and for vibrated concrete 5 cm. (about 2″).

BR.5.2.5. *Placing.*—Before placing concrete, seams, hollows and crevices if any, shall be treated with 1:2 cement mortar grout, or filled with 1:3:6 cement concrete if they are large enough. Grouting will be considered as an incidental item but concrete will be paid for.

BR.5.2.6. *Compaction.*—Compaction shall be started during placing. The concrete will be normally compacted by immersion vibrators and rodding but the Engineer may permit manual compaction provided it is effectively done to get a dense concrete.

BR.5.2.7. *Forms.*—If the trenches are dug exactly to the dimensions of the footings, no forms will be necessary. But the sides and bottom of the trench shall be moistened to the extent necessary to prevent absorption of water from the concrete. If however, footing in strata softer than soft rock are dug to dimensions larger than those shown on the drawings or as directed by the Engineer, forms complying with specification No. B.6.5 shall be used. The side forms may be removed 24 hours after placement of concrete.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**BR.6.2.**

BR.5.2.8. *Backfilling.*—After the concrete is set, the space between the concrete and the excavation sides shall be filled with approved materials in 15 cm. (about 6″) layers, moistened and consolidated satisfactorily. In the case of extra excavation in rock, the additional space shall be filled with 1:3:6 cement concrete up to the top level of concrete footing or top of rock whichever is lower at the cost of the contractor. Relevant provisions of BR.3 shall also apply.

BR.5.2.9. *Tests.*—If there is any doubt regarding the quality of concrete, the Engineer may arrange to get the concrete tested as specified in B.6.12 for the concrete prepared on the first day and thereafter once for every 60 cu. m. (about 2,120 c. ft.).

BR.5.3. *Vertical headers.*—In order to allow sufficient bond with masonry above, vertical headers with an average sectional area of not less than 0.03 sq. m. (about 0.3 sq. ft.) and not less than 44 cm. (about 18″) in length shall be embedded to half their length in concrete, the other half projecting above the concrete at the rate of one per square metre within the area to be covered by masonry. No payment will be made for these vertical headers nor any deduction made in the quantity of concrete for the embedded part of the vertical headers.

BR.5.4. *Interval for starting masonry.*—Masonry will be allowed to be started on the concrete 48 hours after completion of concrete. Side filling will also be allowed after 48 hours after completion of concrete. But the material adjoining the concrete shall be kept wet for the duration of the curing period.

BR.5.5. *Item to include.*—In addition to the items mentioned in the general specification No. B.6.14, item will include the following:—

(1) Dewatering if necessary, if not provided as a separate item in the tender.

(2) Treating joints, seams and crevices in rock with 1:2 cement mortar grout.

(3) If excavation in rock is done in excess of the dimensions shown on the plan or as ordered, the extra excavation shall be filled with foundation grade concrete and/or masonry up to top of rock.

BR.5.6. *Mode of measurement and payment.*—This shall be as in specification No. B.6.15. Embedded parts of vertical headers will not be deducted from the concrete nor the vertical headers will be paid in separately. Concrete in the extra excavation in rock referred to in BR.5.2.8 shall not be paid for.

*BR.5.(a) Providing and laying in situ 1:3:6 cement concrete of metal and plums of trap/granite/quartzite/gneiss stones in foundations including formwork compacting, curing, and scaffolding complete.*

The item shall comply in all respects with specification No. BR.5 except that the plums shall be used as specified hereinafter.

BR.5.(*a*).1. *Plums.*—The stones to be used as plums shall conform to B.9.2.1 and shall be roughly cubical or rounded and shall be about 0.010 cu. m. (about ⅓ c. ft.) in volume. They may not have sharp edges and angles. The stones shall be more or less rounded and without concave surfaces.

BR.5.(*a*).2. *Use.*—The total volume of solid plums (after deducting 40 per cent. from the stack volume) shall not be more than 15 per cent. of the volume of the concrete alone.

At least 60 cm. (about 2′) of concrete layer shall first be laid before the plums are used. The plums shall be placed on the concrete surface immediately the concrete starts stiffening. While placing plums care shall be taken to see that the clear distance between two plums is at least 20 cm. The plums shall be pressed into the concrete such that they are partly visible on on the surface of the particular layer. Care shall also be taken to see that the clear distance between the face of the concrete and plums is not less than 40 cm.

Successive layers of concrete may be about 45 cm. (about 1½′). At the top surface of the concrete the plums shall be entirely embedded in the concrete with a minium cover of 15 cm. (about 6″) of concrete.

BR.6. *Providing uncoursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for foundations of piers, abutments, wings, etc., including dewatering, striking joints and watering complete.*

BR.6.1. *General.*—The masonry shall comply with specification No. B.9..(*k*) for uncoursed rubble stone masonry in cement mortar of specified proportion including dewatering, scaffolding, striking joints, curing etc. complete in all respects subject to the following:—

BR.6.2. *Cement mortar.*—The proportion of cement mortar shall be given in the wording of the item.

अनुक्रमणिका
Table of Contents

BR.6.3. *Stones.*—The stones shall be of the specified type and the best available in the region and got approved by the Engineer before collecting them. Samples of different categories of stones of specified sizes and dressing shall be got approved by the Engineer and deposited in the Engineer's office by the contractor for reference.

BR.6.4. *Weepholes.*—If provision of weepholes is shown on the drawings or ordered by the Engineer, they shall be made as provided in specification No. BR.25 with inverted filters behind. No deduction will be made in the quantity of masonry for the weepholes. No payment will be made for the weepholes and the inverted filters.

BR.6.5. *Dewatering.*—Dewatering if necessary shall be done according to specification No. BR.4 and shall be covered by the rate of the item unless separately provided in the tender.

BR.7. *Providing islands for laying steel curbs or cutting edge of wells.*

BR.7.1. *General.*—Where it is necessary to sink the well in water, island of sand or earth or other suitable material shall be formed.

BR.7.2. *Materials.*—Earth or sand or other approved material for forming the island shall contain no lumps, clods, stones or other hard material which will obstruct the sinking of the well or deviate the well from the true line of sink.

Materials such as rubble, sand bags, bamboos, bullie, stakes, etc., required for protection of the edges and slopes of the island from erosion as also railing materials for the safety of workmen shall be provided at the cost of the contractor.

BR.7.3. *Construction.*—The island shall be formed by depositing approved material in uniform layers and shall have a diameter of not lass than 3 m. (about 10′) more than the outside diameter of the well to allow free working space necessary to operate tools and plant and for movement of labour, etc. The island shall be brought at least 30 cm. (about 12″) above the water level or above such level in case of tidal rivers as will give sufficient time for work as directed. The area on which the well curb is to be laid shall be levelled properly and compacted.

The island shall be constructed out of earth or sand or other suitable stuff. Where the depth of water is shallow, simple island may be prepared by laying rings of sand bags all round and filling earth or sand within. Side slopes may be provided in place of ring of sand bags if they are likely to remain stable. Side slopes may be protected from erosion with pitching or sand bags where necessary.

In greater depths of water where side slopes may not be suitable, two rings of bamboos, stakes or bullies may be driven as far as they can be hammered in the river bed. Each of these rings may be lashed round with old steel wire rope or tied round with bullies or bamboos. Closely knit split bamboos may be placed inside the two rings and earth filled in between. Sand bags may be laid outside these rings for further stability if necessary. The inside space may be filled with earth or sand to form the island for placing the cutting edge of curb.

Where the curb is to be floated to the side of sinking, the top of the island shall be kept at such level as to facilitate the seating of the curb.

The island shall be maintained throughout the sinking operation and also further if its use is required for other items of the bridge. If the sinking of a well extends through and beyond the monsoon, the contractor shall not be entitled for compensation due to any damage, etc., to the island due to floods or any other cause.

If so required, the contractor shall have to remove the island entirely or to the extent necessary on completion of the sinking of the well or completion of the work as directed by the Engineer.

BR.7.4. *Safety.*—The contractor shall provide suitable railing if it is essential in the opinion of the Engineer for the safety of the workers. He shall also take such other measures as are necessary for the safety of the work and work-people and shall be responsible for any damage, injury or accident and compensation connected therewith.

BR.7.5. *Item to include.*—(1) Constructing, maintaining and protecting the island and if so required, full or partial removal after completion of the work.

(2) All labour, materials, use of equipment, tools and plant necessary for the satisfactory completion of the work.

(3) Safety measures including compensation for any injury to persons or damage to work.

**BR.8.9.**

BR.7.6. *Mode of measurement and payment.*—The contract rate shall be for one island constructed and maintained including removal to the extent necessary on completion of the work as directed. Payment shall be made for number of such islands. Payment for the island shall be made on final completion of the pier. If however, the island is required to be retained for any other item of the work, only part payment may be made on completion of the pier and full payment on completion of the work.

BR.8. *Providing, fabricating, launching, floating and grounding in position steel curbs for wells with necessary steel bracings and steel cutting edges as shown in the detailed drawings.*

BR.8.1. *Materials.*—Structural steel shall comply with specification No. A.11.

BR.8.2. *Manufacturing details.*—Cutting edge shall be fabricated as shown in the detailed drawing. Cutting, bending, drilling or punching holes, etc. shall conform accurately to the dimensions, shapes and locations shown on the working drawing or as directed by the Engineer in writing and shall be done by methods approved by the Engineer.

Fabrication and election shall conform to the relevant provisions of specification No. B.19.

BR.8.3. *Special points.*—'V' cuts may be taken in the horizontal leg of the angle at regular intervals throughout the length to facilite bending. The angle shall be cold bent and pressed to correct shape and the 'V' cuts welded together. The lengths of the structural sections shall be jointed together with rivets or bolts or welds with the necessary coverplates to ensure appropriate strength of the original sections.

Holes shall be drilled at points designated on the plans in the horizontal leg of the steel member at the top of the curb for bolting the tie rods for the steining with checknuts.

BR.8.4. *Welding.*—Welding may be resorted to for structurals in place of the rivets or the bolts and also for ties if so permitted by the Engineer in writing. Welding shall be carried out by fillet welding with single cover or by any other method approved by the Engineer, employing suitable qualified and experienced welders. Welding may be done by the Metal Arc or Oxy-Acetylene process preferably the former.

Care shall be taken while carrying out welding to see that the axes of different members cut at points indicated on the working drawings. The surfaces to be welded shall be cleaned throughly exposing the original metal immediately before welding. The welded joint shall develop the full strength of the particular member.

Welding shall be done as per specification No. B.18.

BR.8.5. *Layout.*—Necessary reference points to site the well shall be fixed in a stable manner in their exact position away from the zone of blows or possible disturbances resulting from dredging and other operations. These points shall be connected to permanent theodolite stations on the base line on the banks. The centre of the individual curbs shall be peg marked with reference to these stations.

BR.8.6. *Preparing the bed.*—Unless otherwise shown on the drawing, if the river bed is dry, open excavation as per specification No. BR. 3 for the item of excavation shall be carried down to about 30 cm. (about 12″) above the sub-soil water level before the well curb is laid.

BR.8.7. *Island.*—Where it is necessary to sink the well in water, an island may be formed as laid down in specification No. BR.7 and the steel curb shall be towed by barges or carried by any other suitable means to the site and mounted and sited accurately in the correct position on the island or bed. The contractor shall be responsible for any loss or damage to the curb during towing conveyance, grounding, floods, etc.

BR.8.8. *Pitching of the curb.*—The area on which the curb is to laid shall be levelled properly and compacted. The curb shall be placed in exact location with reference to the centre peg on closely spaced timber plank grillage of the required width for distributing the load while concrete is being poured. The curb shall be laid 30 cm. (about 12″) above the water level obtaining at the time of its laying or such level in tidal rivers as may be convenient and approved by the Engineer. This level of the prepared bed or top of the island will form the datum for the purpose of measurements for sinking the well. All the vertical rods connected to the cutting edge shall be temporarily fastened together so as not to disturb the setting of the curb.

BR. 8.9. *Safety.*—Measures shall be taken by the contractor to provide full safety to the workmen and he will be held responsible for any accidents and compensation in connection with the item.

BR.8.10. *Item to include.*—(1) Fixing the correct location of the well.

(2) Open execution or providing island if and where necessary as ordered unless separately provided in the tender.

(3) Providing, fabricating and erecting, floating, launching and grounding the curb correctly on site.

(4) All labour, materials, and use of equipment, tools and plant necessary for carrying out the item satisfactorily.

(5) Safety measures and compensation in case of damage and injury.

BR.8.11. *Mode of measurement and payment.*—The contract rate shall be for one quintal of structural steel, provided, fabricated completed, and set at the correct position on site as per sanctioned plan or as approved by the Engineer. The lengths of steel sections provided shall be recorded correct upto two places of decimals of a metre. The weight shall be worked out according to the standard weights per unit length laid down by the Indian Standards Institution correct upto 0.10 of a kg.

No separate payment shall be made for rivets, bolts and nuts or for welding. No deduction shall be made for the holes punched or 'V' cuts taken as explained above.

BR.9. *Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/ gneiss metal in the hollow of the steel curbs including compaction by vibrating and curing complete.*

BR.9.1. *General.*—The item shall be carried out generally as per specification No. B.6. subject to the following:—

BR.9.2. *Proportion.*—The proportion for cement concrete shall be one 50 kg. bag of cement: 105 litres (about 3.6 c. ft.) of sand: 210 litres (about 7.2 c. ft.) of coarse aggregate.

BR.9.3. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 20 mm. (about ¾") and properly graded from 20 mm. to 5 mm. (about ¾" to 3/16") as indicated in specification No. A.7 to give a dense concrete. Samples of fine and coarse aggregates approved by the Engineer shall be deposited, by the contractor in the Engineer's office for reference.

BR.9.4. *Mixing.*—Mixing shall be done in a mechanical mixer. Water content may be within the range specified in specification No. B.6.3 or as may be approved by the Engineer to give the required consistency.

BR.9.5. *Slump.*—Slump may be 5 cm. to 8 cm. (about 2" to 3").

BR.9.6. *Placing.*—Before placing concrete in the hollow steel curb, the reinforcement or ties and the connections will be checked by the Engineer and the curb shall be entirely cleared of all loose stuff and the contact surface of concrete shall be properly cleaned. Concrete will be placed thereafter.

BR.9.7. *Compaction.*—Compaction shall be done with vibrators and rods to get a dense concrete with reinforcement or ties properly embedded and the concrete filled well in the angles and edges of the steel curb.

BR.9.8. *Item to include.*—As per specification No. B.6.14.

BR.9.9. *Mode of measurement and payment.*—As in specification No. B.6.15. The measurements shall be taken net for the inside dimensions of the steel curb. No deduction shall be made for reinforcement, ties, bolts, nuts, rivet heads and bracing.

BR.10. *Providing, fabricating and setting out mild steel cutting edges for R. C. C. well curbs as shown on the detailed drawings.*

BR.10.1. *Materials.*—The structural steel shall comply with specification No. A.11.

BR.10.2. *Manufacturing details.*—The cutting edge shall be fabricated as shown on the detailed drawings. Cutting, bending, drilling, or punching holes, etc., shall conform accurately to the dimensions, shapes and locations shown on the working drawings or as directed by the Engineer in writing and shall be done by the methods approved by the Engineer.

Fabrication and erection shall conform to the relevant provisions of specification No. B.19.

**BR.10.11.**

BR.10.3. *Special points.*—'V' cuts may be taken in the horizontal leg on the angle at regular intervals throughout the length to facilitate bending. The angle shall then be cold bent and pressed to correct shape and the 'V' cuts welded together. The lengths of the structural sections shall be joined together with rivets or bolts with the necessary cover-plates to ensure appropriate strength of the original section.

Holes shall be drilled at points designated on the plans in the horizontal leg of the steel member of the cutting edge for bolting the tie rods for the steining with check-nuts.

BR.10.4. *Welding.*—Welding may be resorted to for structurals in place of the rivets or the bolts and also for ties if so permitted by the Engineer in writing. Welding shall be carried out by the fillet welding with single cover or by other methods approved by the Engineer, employing suitable, qualified and experienced welders. Welding may be done by Metal Arc or Oxy-Acetylene process perferably by the former.

Care shall be taken while carrying out welding to see that the axes of different members cut at points indicated on the working drawings. The surfaces to be welded shall be cleaned thoroughly exposing the original metal immediately before welding. The welded joint shall develop the full strength in the particular member. Welding shall be done generally as per specification No. B.18.

BR.10.5. *Layout.*—Necessary reference points to site the well shall be fixed in a stable manner in their exact position away from the zone of blows or possible disturbances resulting from the dredging and other operations. These points shall be connected to the permanent theodolite stations on the baseline on the banks. The centre of the individual cutting edge shall be peg marked with reference to these stations.

BR.10.6. *Preparing the bed.*—Unless otherwise shown on the drawings, if the river bed is dry, open excavation as per specification No. BR.3 for the item of excavation shall be carried down to about 30 cm. (about 12″) above the sub-soil water before the cutting edge of the well is laid.

BR.10.7. *Island.*—Where it is necessary to sink the well in water, an island shall be formed as laid down in specification No. BR.7 and the cutting edge shall be towed on barges or carried by any other suitable means to the site and mounted on the island and sited accurately in the correct position. The contractor shall be responsible for any loss or damage to the cutting edge during towing, conveying, grounding, floods, etc.

BR.10.8. *Pitching of the cutting edge.*—The area on which the cutting edge is to be laid shall be levelled properly and compacted. The cutting edge shall be placed in exact location with reference to the centre peg on closely spaced timber plank grillage if necessary for distributing the load while concrete is being poured. The cutting edge shall be laid 30 cm. (about 12″) above the water level obtaining at the time of its laying or such levels in tidal rivers as may be convenient and approved by the Engineer. This level of the prepared bed or top of the island will form the datum for the purpose of measurements for sinking the well.

BR.10.9. *Safety.*—Measures shall be taken by the contractor to provide full safety to the workmen and he shall be responsible for any accident and compensation connected with the item.

BR.10.10. *Item to include.*—(1) Fixing the correct location of the well.

(2) Open excavation or island if and where necessary or as ordered unless separately provided in the tender.

(3) Providing, fabricating and erecting, floating, launching and grounding the cutting edge correctly on site.

(4) All labour, materials use of equipment, tools and plant necessary for carrying out the item satisfactorily.

(5) Safety measures and compensation in case of damage and injury.

BR.10.11. *Mode of measurement and payment.*—The contract rate shall be for one quintal of structural steel provided, fabricated, completed and set at the correct position on site as per the sanctioned plan or as approved by the Engineer. The lengths of steel sections provided shall be recorded correct upto 2 places of decimals of a metre. The weight shall be worked out according to the standard weight per unit length laid down by the Indian Standards Institution correct upto 0.10 of a kg.

No separate payment shall be made for the rivets, bolts and nuts or for welding. No deduction shall be made for the holes punched or the 'V' cuts taken as explained above.

BR.11. *Providing, cutting, bending, hooking, laying in position and tying mild steel reinforcement bars for well curbs and steining complete as per detailed drawings.*

BR.11.1. *General.*—The item shall include providing the reinforcement bars, fabricating them as per sanctioned design or as ordered by the Engineer and placing them in position ready for concreting as laid down in specification No. B.10.

BR.11.2. *Materials.*—Mild steel bars and binding wire shall comply with specification No. A-10 and A-15 respectively.

BR.11.3. *Fabrication and placement.*—Fabrication shall generally comply with specification No. B.10. The steel reinforcement of the appropriate size and shape shall be properly assembled and accurately placed in exact position as shown on the drawings or as ordered by the Engineer including reinforcement to be embedded in the steining of the well for obtaining proper bond between the curb and the well steining. The tie rods shall be fixed securely to the horizontal member of the cutting edge/steel curb with check nuts on both sides. Alternatively the tie rods may be welded to the cutting edge with the approval of the Engineer. The threaded portion of the bars is to be hammered flat after fixing of the nuts into position.

BR.11.4. *Splicing.*—Where splices are necessary, they shall be staggered as far as possible. They shall be lapped 45 diametres excluding hooks. Authorised lap length of bars will be paid for.

All bars protruding from the concrete, to which other bars are to be spliced and which are likely to be exposed for a considerable period shall be protected from rusting by a thin neat cement wash.

BR.11.5. *Item to include.*—The item shall include in addition to others mentioned in the general specification No. B.10, threading of the bars and double checknuts where necessary, flattening the ends of bars below the nuts and neat cement wash to bars likely to be exposed for appreciable period.

Welded joints if approved, in place of laps will be paid in terms of length of bars required for overlapping. Welding of the steining reinforcement bars to the cutting edge if permitted in lieu of fixing with bolts, shall be included in the rate and no separate payment will be made for the same.

BR.11.6. *Mode of measurement and payment.*—As per specification No. B.10.

Threading of the bars, providing nuts and checknuts for attaching the reinforcements bars to the cutting edge or welding in lieu shall not be paid for separately.

BR.12. *Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/ gneiss metal for R. C. C. well curbs including necessary shuttering, laying, compaction by vibrating, finishing and curing, complete (excluding mild steel reinforcement).*

BR.12.1. *General.*—The specification for the cement concrete required for the R. C. C. curbs for the well shall comply with specification No. B.6 subject to the following:—

BR.12.2. *Forms.*—Forms shall be of mild steel sheets bent to the required shape and stiffened suitably with mild steel angles. Other types of forms shall be permitted only with the prior approval of the Engineer in special cases. The forms shall be fabricated in segments to facilitate easy handling. The formwork shall be completely leakproof. The outer forms may be removed 48 hours after laying concrete.

The inside froms carrying the weight of the curb shall be removed only after seven days after laying concrete.

BR.12.3. *Proportions.*—The proportion for cement concrete for the well curb shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate. Water content may be within the range laid down in specification No. B.6.3 or as may be approved by the Engineer to give the required consistency.

BR.12.4. *Coarse aggregate.*—Coarse aggregate shall be crushed from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 6 mm. (about $\frac{1}{4}$") less than the cover or 40 mm. (about $1\frac{1}{2}$") whichever is smaller. The aggregate shall be properly graded from the maximum size to 5 mm. (about 3/16") as indicated in specification No. A.7. The contractor shall get the samples of sand and coarse aggregates approved by the Engineer who will keep them in his office for reference.

BR.12.5. *Mixing.*—The cement concrete shall be mixed in a mechanical mixer. Slump may be 5 cm. (about 2").

**BR.13.7.**

BR.12.6. *Placing concrete.*—The concrete for the curb shall be laid continuously from start to finish without break. No junctions or joints shall be allowed while laying concrete. It shall be laid in the dry. Dewatering if necessary, shall be included in the item unless separately provided in the tender.

BR.12.7. *Compaction.*—Compaction shall be done by mechanical vibrators and also by rods so that all reinforcement is properly embeded, all corners are properly filled, honeycombing is avoided and dense concrete is obtained.

BR.13. *Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal in well steining including shuttering, laying, compaction by vibrating and roodding finishing and curing complete (excluding mild steel reinforcement).*

BR.13.1. *General.*—The concrete for the steining of the well shall comply with specification No. B.6 subject to the following :—

BR.13.2. *Forms.*—The design of the forms shall be such as to build the steining to make up the lift not exceeding 2 m. (about 6.5′) in height in convenient number of courses. Forms shall preferably be of mild steel sheets bent to conform accurately to the required shape and stiffened suitably with mild steel angles or other sections and shall have no gaps at joints. The forms shall be fabricated in segments to facilitate easy handlings. If timber forms are used they shall be lined with plain galvanised iron sheets. The formwork shall be completely leak proof.

The side forms shall be removed 48 hours after the concreting and the surface finished where necessary immediately thereafter, and kept well watered for the curing period.

BR.13.3. *Proportion.*—The proportion of cement concrete for the well steining shall be one 50 kg. bag of cement: 105 litres (about 3.6 c. ft.) of sand: 210 litres (about 7.2 c. ft.) of coarse aggregate.

BR.13.4. *Coarse aggregate.*—Coarse aggregate shall be crushed from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 50 mm. (about 2″) or 6 mm. (about $\frac{1}{4}$″) less than the cover, whichever is smaller. The aggregate shall be well graded from the maximum size to 5 mm. (about 3/16″) as indicated in specification No. A.7.

BR.13.5. *Mixing.*—The cement concrete shall be mixed in a mechanical mixer. Water content may be within the range mentioned in specification No. B.6.3 or as may be approved by the Engineer to give the required consistency.

BR.13.6. *Placing concrete.*—Before building up the steining the planks below the curb if any should be removed in such a manner as to maintain reasonably equal pressure of the curb on its bed without any tilt. After the forms are set up and approved, reinforcement verified and checked, the concrete shall be placed in such a way as not to cause segregation. The concrete shall be laid continuously all round from start to finish of each course. The building up of the steining shall be proceeded with in convenient lifts as directed by the Engineer, as the well is sunk by excavating the inside. The first height shall not exceed 2 metres (about 6$\frac{1}{2}$′) and the second 2.5 m. (about 8′). Subsequently height shall be built upto convenient heights not exceeding the diameter of the well. At any stage, the well above the top of the island or bed (if there is no island), shall not project more than 2 m. (about 6$\frac{1}{2}$′) or half the depth of the well sunk below the top of island or bed, whichever is more. The concrete shall be poured in the best-manner possible without segregation of metal and the steining shall be built up to equal heights around its whole circumference. The height of the steining from the bottom of the cutting edge shall be marked continuously by paint and thin incisions at intervals of 25 cm. (about 10″) on the inside and outside of steining so as to facilitate inspection.

BR.13.6. *Compaction.*—The compaction shall be done by immersion type vibrators and rods so that all reinforcement will be properly embedded, all spaces properly filled to give a dense concrete and honeycombing is avoided.

BR.13.7. *Joints.*—The top of the well steining at various lifts shall be left rough so as to develop a good bond between two lifts. The joints between successive stages of concreting shall be watertight. Before adding a lift, the old concrete surface left rough shall be brushed with wire brushes to remove laitance and all loose particles and washed clean. A uniform thin coat of 1:3 cement mortar shall be applied to the cleaned surface and concrete of the upper lift shall be placed immediately thereafter. The upper lift shall be placed after a minimum interval of 3 days after laying the lower lift. Kentledge shall not be laid before the concrete develops sufficient strength to bear it.

BR.13.8. *Curing.*—Curing shall be done as in specification No. B.6.

BR.13.9. *Sampling and testing.*—Sampling and testing shall be done as in specification No. B.6, only if the Engineer doubts the quality of concrete.

BR.13.10. *Cutting steinings.*—If the steining is built to heights greater than those indicated on the drawings or as instructed by the Engineer, the contractor shall cut the extra heights neatly to a uniform plane without damage to the concrete below at his own cost and no payment will be made for the extra height or for cutting it to the required level.

BR.13.11. *Item to include.*—As per B.6.14.

It shall also include marking heights of steining from the cutting edge upto the top on the inside and outside of the well and cutting steining, etc., if any as above.

BR.13.12. *Mode of measurement and payment.*—As per B.6.15. Reinforcement will be paid for separately under item No. BR.11.

BR.14. *Sinking the wells for foundations through all strata except rock by approved methods including removal of obstacles and use of necessary plant, machinery, divers, etc., and proper seating of the well.*

BR.14.1. *General.*—The specification pertains to the well sinking operation proper. Cutting edge, curb reinforcement and concrete, steining reinforcement and concrete shall be included and paid for under separate items. Preliminary open excavation or dressing required for laying the cutting edge and curbs and providing island shall be included in the item unless separately provided in the tender.

BR.14.2. *Sinking of well.*—The item provides for sinking of the well through all strata except rock to the R. L. as shown on the drawing or ordered by the Engineer until desired foundation stratum is met with.

Programme should be arranged as far as possible in such a way that, every well started during any working season is completed, plugged and sealed at the top and pier or abutment constructed to a safe level in that season only, so as to be safe during floods. If not, suitable protective measures shall be taken by the contractor at his own cost.

The contractor may at his own cost, bore holes to ascertain the exact depths to which the particular wells may have to be sunk. If bore results are indicated by the Department, they shall be taken only as a general guide. Government do not bind themselves for the accuracy of the same. The contractor shall not be entitled to any compensation on account of variation in strata during actual sinking.

If the river bed is dry, open excavation shall be carried out to about 30 cm. (about 12″) above the subsoil water level before the cutting edge is laid.

Where it is necessary to sink the well in water, an island shall be formed as laid under specification No. BR.7 for laying the cutting edge. The cutting edge and the curb shall be constructed as detailed under specification Nos. BR.8, BR.9, BR.10, BR.11 and BR.12. The steining shall be built up as detailed in the specification Nos. BR.11 and BR.13.

The cutting edge or the curb shall be laid in the exact position on blocking timber. The blocking timber shall be removed individually in such a manner as to maintain equality of pressure without any tilt of the cutting edge. The blocking timber shall be pulled out after loosening the sand underneath. Material within the curb shall be excavated methodically and evenly over the whole internal area excavating first in the centre and then working towards the circumference uniformly till the curb sinks to about 15 cm. (about 6″) above the bed. Sand or soil excavated shall then be back filled to keep the pitched curb in place and stable. The formwork of steining shall then be set up and the first lift poured.

The well may be adjusted and guided in regard to its direction of sink by temporary frame-work or staging. The staging may be used as platform for handling materials and fixing the dredging equipment thereon. The design and the layout of the staging shall require prior approval of the Engineer although the contractor will not be thereby relieved of his responsibility for its safety and suitability.

Sinking must not be started till the concrete steining to be sunk has set properly and until the steining has been passed by the Engineer and commencement of sinking approved.

The well shall be sunk by excavating the material from the interior methodically and evenly and removing the material and building up additional sections of steining as the well sinks. The excavated materials shall be stacked within a lead of 50 m. (about 164′) or wasted.

**BR.14.4.**

It is essential to see that the curb and the first two lengths of the steining are kept perfectly vertical and that they do not go out of place or plumb materially. The subsequent sinking to plumb is easier. Any neglect in the initial stages will make it more difficult to correct errors.

The contractor shall adopt his own arrangement and method of sinking consistent with the magnitude of the work, its nature, site conditions, speed required, etc., and failing the required progress, the sinking shall be done as ordered by the Engineer. Normally one of the following methods or combination of two or more of them will be found to work satisfactorily according to the site conditions:—

(1) Manual excavation.

(2) Excavation by divers.

(3) Excavation by winch and grab, heavy chisels, etc.

(4) Excavation by dredgers.

(5) Sinking by applying kentledge.

(6) Using light blast with the approval of the Engineer.

(7) Dewatering.

(8) Jetting.

Manual excavation aided by tools to suit the strata may be conveniently resorted to where there is not much of water or where the water can be easily pumped out.

In deep water, the excavation will have to be done by the aid of winch and grab or a dredger. Harder strata shall have to be loosened by heavy chisels.

In case of manual excavation under water or removal of obstructions such as boulders, logs, etc., divers may have to be employed to successfully excavate or remove the obstacles.

When the well does not sink, even after dredging or excavation, kentledge shall be applied judiciously to effect the sink.

Great care shall be taken from the commencement of sinking operations to ensure that the well is continuously kept in exact position and perfectly vertical, checking frequently with the plumb bobs hanging on the inside faces of the steining. Daily records of tilts and shifts shall be kept on site in the requisite proforma. If there are sand blows in the wells they shall be removed after establishing stable conditions and no claim shall be entertained regarding removal of the material or difficulties connected therewith.

The tendency of the well to lean to one side over dipping hard strata or in soft soils shall be countered by providing suitable supports, etc. The levels of the excavation in the well shall be constantly checked so as to keep the bottom as nearly level as practicable.

Dewatering to the extent necessary shall be done as and when required. Balancing the water level inside and outside the well shall also be arranged whenever necessary. Jetting on outside may be resorted to when advisable with the approval of the Engineer. All these and any other measures required to sink the well are included in the item.

In sinking groups of wells joined together, the excavation in all the wells in one cluster should be carried out simultaneously and equally to facilitate even sinking.

Where two separate wells are to be sunk close to each other or the distance between them is not greater than the diameter of the well, they should be sunk alternately each being sunk not more than ½ the diameter in advance.

BR.14.3. *Obstacles.*—When obstacles such as large boulders, logs, hard clay, compacted material, etc., are met with they shall have to be removed by grabs, dredgers, etc., after breaking, cutting, jetting, etc., by sending divers if necessary. If this is not successful small charges of explosives may have to be used with the permission of the Engineer to break the boulders by sending divers. In no case blasting of any sort shall be done without the permission of the Engineer in writing and before the concrete in steining has hardened sufficiently and is more than 7 days old. The contractor shall include in his tendered rate, the eventuality of the cost of the services of divers and all other costs ancillary for removing boulders, dislodging obstructions below cutting edge and such other operations as may be required for sinking the well. The method of removal of the obstacles shall be got approved by the Engineer.

BR.14.4. *Kentledge.*—Kentledge may be used with advantage in sinking the well to overcome skin friction and bouyancy but shall not be excessive so as to damage the cutting edge or steining or arranged in such a way as to interfere with the internal excavation.

BR.14.5. *Explosives.*—When other measures are not successful sinking of wells held up by skin friction, etc., is sometimes aided by tremor and vibration caused by exploding a small charge of 28 grams or 56 grams (about one or two ozs.) of dynamite in the centre of the well. But such explosives shall not be used without the specific approval of the Engineer. Any damage to the well or adjoining structures due to the blasting shall be made good by the Contractor at his own cost.

BR.14.6. *Righting.*—If the well tilts during sinking it may be righted by—

(1) Putting an eccentric loading on the high side of the wells.

(2) One side excavation at bottom of wells which is on the higher side.

(3) Jetting on the higher side to reduce skin friction.

(4) Pulling or pushing the well by approved methods.

(5) Any other suitable method.

Methods adopted for righting a well shall require the approval of the Engineer. This shall however, not relieve the contractor of his responsibility for obtaining satisfactory results.

BR.14.7. *Last sink.*—When the well is approaching its final depth and before the last length of the steining is poured in, the exact length required should be decided and the steining should be built up preferably just less than this length with a view to build it up to the correct level after the well has been sunk to its final depth.

BR.14.8. *Bedding of well.*—When the well has reached the required level and strata, it shall be properly seated by levelling the area under the cutting edge. Where uneven or sloping rock is met with, rock cutting shall be done either after dewatering or by sending divers to ensure that the periphery of the well rests evenly on rock for more than half the circumference. Where the difference in levels at extreme ends is not more than 30 cm. (about 1') efforts shall be made to seat the entire well evenly on rock. Otherwise in the portions where the well does not rest on rock overburden on the rock shall be removed and the space filled with concrete while laying bottom plug. Cutting rock to seat the well properly is included in the rate for sinking. In cases other than rock bed the well bottom should be embedded into the strata well below the scour depth to obtain the required stability as shown in the plans or as ordered by the Engineer.

BR.14.9. *Cracks in wells.*— Vertical and horizontal cracks of a minor nature developed during sinking for various reasons shall be grouted and finished with neat cement. If the cracks are appreciable, the well or portion of the well from the bottom plug to a section covering the cracks shall have to be filled with 1:4:8 concrete as directed by the Engineer at the cost of the contractor.

BR.14.10. *Tolerances.*—The completed wells shall not have a tilt of more than 1 in 60 of the depth in any direction and shift of more than 5 per cent. of the external diameter, unless these affect the stability of foundations. When the Engineer allows tilts or shifts the dimensions of the concerned well cap shall be increased so as to cover completely the well tops and the cap shall be symmetrical with respect to the axis of the piers, abutment and the axis of the bridge provided that the stresses at the foundation of the well are within permissible limits. No payment for increase in dimensions of the cap or reinforcement shall be made by Government. If even with the adjusted location and increased dimensions of the well cap, the stresses at the foundation level due to tilt and shift do not fall within permissible limits, the contractor shall have to provide all the additional remedial measures at his own cost. If due to tilts and shifts and the remedial measures, the span arrangement is required to be changed, it shall be so done at the cost of the Contractor.

BR.14.11. *Tests.*—In case of wells which are not founded on soft or hard rock, load test of well and bearing capacity of the foundation stratum shall be carried out by the contractor on any one well as ordered by the Engineer. Loading tests of well and bearing capacity of the foundation stratum of the well shall be carried out according to specification No. BR.15(*b*), BR.15 and BR.15(*a*) and will be paid for separately.

The choice of the well to be tested rests with the Engineer. Additional number of wells may be tested if so ordered by the Engineer. If the results are found to be unsatisfactory due to bad concrete or defective sinking, the cost of test shall be borne by the contractor. All defective wells shall have to be rectified by the contractor at his own cost.

The contractor shall collect undisturbed and other samples of soil of the foundation stratum as directed by the Engineer and supply them to the Engineer intact for testing. Cost of collection of samples will be incidental to sinking and is included in the rate of sinking. Cost of testing soil samples will be borne by the Department.

BR.14.12. *Cleaning.*—After the well is finally and properly seated the bottom shall be cleaned and all loose materials removed if necessary, by sending divers before laying concrete for the bottom plug is permitted. This will be the time to check and verify the levels and record the depth.

BR.14.13. *Safety.*—The contractor shall be responsible to take all measures for the safety of the work and workmen and also for any compensation due to injury to persons or damage to work and property. Well sinking shall be done in such a way as not to cause any damage to adjoining structures. The contractor shall be responsible for any such damage.

BR.14.14. *Item to include.*—(i) Open excavation to 30 cm. (about 12″) above subsoil water level when no provision for open excavation is made in the tender.

(ii) Sinking of well through all strata except rock by excavation, dredging, loading, etc., and, disposing the excavated stuff.

(iii) Dewatering, balancing water levels.

(iv) Righting.

(v) Trial bores for deciding the actual depth if required by the contractor.

(vi) Removing blows, obstacles, etc.

(vii) Clearing the bottom.

(viii) Redredging if the work is not completed before monsoon.

(ix) Preparing seat by levelling uneven or sloping rock if necessary, for proper seating of the well.

(x) Use of divers, if needed.

(xi) Collecting samples of material of the foundation strata.

(xii) All labour, materials, staging, use of equipment, tools and plant and other incidental items necessary for the satisfactory completion of sinking the well.

(xiii) Safety measures and compensation for injury to persons and damages to work and property.

BR.14.15. *Mode of measurement and payment.*—The contract rate shall be for one metre of well sunk through all strata except rock. The depth shall be measured correct up to five mm. The depth of sink shall be measured from the initial level at which the cutting edge was laid to the bottom of the cutting edge as finally bedded.

If the well is sunk up to 1.5 m. (about 5′) below the level specified on the drawings or even less than shown on the drawings, the actual depth will be paid for at the tendered rate. There will be no compensation for sinking of wells to less depth than that estimated or shown on the drawings.

For sinking of well beyond 1.5 m. (about 5′) below the designed level the contractor shall be paid compensation commensurate with the extra cost involved.

Variation in strata shall not entitle the contractor for extra claims.

BR.15. *Carrying out a plate bearing test on the strata at the bottom of the well including supply of necessary bearing plate and stanchion assemblies and, platform for loading and use of cranes, loads, hydraulic jacks and other relevant equipment, etc., complete.*

BR.15.1. *General.*—The item provides for carrying out a plate bearing test on the stratum at the well bottom including the supply of bearing plate assembly, stanchion and loading platform assembly, use of hoisting equipment, loads and hydraulic jacks as mentioned later and of other relevant equipment.

BR.15.2. *Bearing plate.*—The bearing plate shall be of mild steel 60 cm. (about 2′) diameter and 2.5 cm. (about 1″) thick rigidly welded into a box unit with mild steel plate 45 cm. (about 18″) square with ribbed plates 10 cm. to 15 cm. (about 4″ to 6″) high and 12 mm. (about $\frac{1}{2}$″) thick. The upper plate shall be welded to a spacer unit and a threaded rod to facilitate connection of the bearing plate assembly with the base of the stanchion. All the mild steel sections shall comply with specification No. A.11 and fabrication done according to specification No. B.19.

BR.15.3. *Stanchion.*—The stanchion shall be made of suitable structural sections and designed as a column for the height over which the loading platform has to be supported. It shall have mild steel plates 12 mm. (about $\frac{1}{2}$″) thick fixed both at the top and the bottom.

अनुक्रमणिका
Table of Contents



The bottom plate assembly of the stanchion shall be built up to engage the spacer unit of the bearing plate assembly and the threaded rod for fixing it to the bottom of the stanchion with a nut.

The full height of the stanchion may be made up in convenient number of sections for ease of handling. They shall be rigidly connected to each other so as to have the same vertical axis for the full height; all the mild steel sections shall comply with specification No. A-11 and fabrication done according to specification No. B.19. Other types of stanchions may be used if approved by the Engineer.

BR.15.4. *Platform and deflection measuring.*—(1) The platform shall be of structural steel sections suitably connected to afford easy erection over the stanchion and easy axial fixing and shall be designed to take the full test load safely.

(2) The deflection measuring device shall consist of a knife edge rigidly attached to the sides of the uppermost part of the stanchion. A lever arrangement shall work with the knife edge to magnify the deflection and measure it correct up to 0.125 mm. (about 0.005″).

BR.15.5. *Procedure of Test.*—The plate and stanchion design and details shall be worked out by the contractor and got approved by the Engineer. The approval of the Engineer shall in no way relieve the contractor of his responsibility for the design, safety of the stanchion, sunk wells and workmen.

The surface to receive the bearing plate shall be cleaned and made level to secure full bearing. Divers shall be sent down for this if there is standing water in the well and if dewatering cannot be done.

The bearing plate shall be fixed to the bottom section of the stanchion by means of the bolt and nut. The lowest section of the stanchion shall then be lifted by lifting devices such as crane, brought over the well vertically and lowered. Before the stanchion section is completely lowered R. S. J. of suitable size shall be inserted within the column just below the top of the stanchion section and the R. S. J. made to rest on the well steining. The second section shall then be brought and made to rest over the top of the first and fixed rigidly to it. The stanchion shall be lowered again and the top of the second section held over the R. S. J. Requisite numbers of sections shall thus be connected after lowering the column.

The R. S. joists fixed on the top of the stanchion to serve as loading platform shall be supported on hydraulic jacks seated on brick pillars with mild steel plate 12 mm. (about ½″) thick fixed on the top of the pillar when it finally supports the top of the stanchion from underneath.

The stanchion shall be held vertically by means of ropes.

The well shall be filled with sand up to 3 m. (about 10′) or specified depth of surcharge as directed by the Engineer. A casing of mild steel sheets shall be provided round the stanchion to separate it from the surcharge if so directed by the Engineer.

The pointer of the gauge shall be adjusted to zero before the loading is put on.

Load shall then be placed symmetrically on the platform. The jacks shall support the whole loading and no deflection shall be observed on the scale.

The jacks shall be slowly released to apply the load gradually on the stanchion.

Reading of settlement shall be taken immediately after the load is applied and settlement shall be observed every half an hour until no settlement takes place in 2 hours.

The jacks shall again be operated so that further settlement is arrested. The second loading shall then be placed and the jacks released. Reading of settlement shall be observed every half an hour till there is no further settlement in 2 hours. Load settlement curve shall be plotted which should show a uniform curve.

Number of loadings and each loading shall be as directed by the Engineer.

The safe bearing strength per unit area of the strata shall not be less than 1.5 times the intensity of total load.

The loading shall be removed after the test is over.

All the readings of settlement shall be observed by a responsible Government officer and recorded in a tabular form.

The sand filling and all the equipment shall be removed after the load testing is over.

BR.15.6. *Handing over of equipment.*—On completing the load test the contractor shall hand over the bearing plate assembly, complete stanchion, loading platform, casing and the supporting R. S. Joists to the Department in good order.

अनुक्रमणिका
Table of Contents

BR.15.7. *Accidents and compensation.*—The contractor shall be entirely responsible for all the operations in load testing and shall pay necessary compensation for damage to property and injuries to persons if any.

BR.15.8. *Item to include.*—(1) Levelling the bed.

(2) Providing and fabricating bearing plate assembly, stanchion, loading platform, casing and R. S. J.

(3) Deflection measuring equipment.

(4) Erecting the stanchion and casing in place and filling sand in well.

(5) All labour, necessary materials, use of equipment and tools and plant for completing the test satisfactorily.

(6) Removing sand and equipment.

(7) Handing over the bearing plate assembly, stanchion, loading platform, casing and R. S. J. to the Department.

(8) Compensation to be paid for damage to property or injury to persons if any.

BR.15.9. *Mode of measurement and payment.*—The contract rate shall be for carrying out one complete load test. The test as described above shall be counted as one test.

The rate includes the cost of the bearing plate, stanchion and loading platform assemblies, and casing to be supplied by the contractor and retained by the Department.

BR.15.(*a*). *Carrying out a plate bearing test on the strata at the bottom of the well with the bearing plate assembly, stanchion, casing and the platform for loading supplied by the department and using his own crane, loads, hydraulic jacks and other relevant equipment, etc., complete.*

BR.15.(*a*).1. *General.*—The specifications for the item shall be the same as BR.15 except that the bearing plate assembly, stanchion, casing, R. S. Js. and loading platform will be supplied by the Department. All other materials, equipment, etc., required for carrying out the test shall be brought by the contractor at his own expense.

BR.15.(*a*).2. *Deflection measuring device.*—The deflection measuring device shall conform to BR.15.4(2).

BR.15.(*a*).3. *Procedure of test.*—The procedure of test shall conform to BR.15.5.

BR.15.(*a*).4. *Handing over the equipment.*—This shall conform to BR.15.6. Any damage to equipment during its use shall be made good before return of the equipment to the Department.

BR.15.(*a*).5. *Accidents and Compensation.*—This shall conform to BR.15.7.

BR.15.(*a*).6. *Item to include.*—This shall conform to BR.15.8. except that the materials mentioned in BR.15.8.2. will be lent by the Department free of rent.

BR.15.(*a*).7. *Mode of measurement and payment.*—This shall be as per BR.15.9. But the contractor shall use bearing plate, stanchion and loading platform assemblies and casing supplied by the Department and shall return them to the Department in good order.

BR.15.(*b*). *Carrying out loading test on a well including use of loading platform, loads, gauges and other equipment.*

BR.15.(*b*).1. *General.*—The item refers to the loading test of well resting on strata other than rock.

BR.15.(*b*).2. *Preliminaries.*—The well to be tested shall first be relieved of all kentledge and other superimposed loads if any.

A Platform of R. S. Joists shall be laid over the steining for placing the test load. It shall be so arranged as not to cause any damage to the steining. The steining shall have been fully cured before taking up the load test.

Four marks for taking levels shall then be established on the well at down-stream and up-stream and in the direction of the axis of the bridge.

BR.15.(*b*).3. *Method of test.*—The loading may be by sand bags, rails, pig iron or other suitable material laid a uniform and balanced manner on the platform. The test load shall be as required in each case. This load shall not be less than the kentledge applied any time during the process of sinking. The test load shall be applied without causing impact or eccentricity in suitable uniform increments, each not exceeding 25 per cent. of the test load at

अनुक्रमणिका
Table of Contents



uniform intervals of 6 hours or a period when there is no further settlement whichever is longer as directed by the Engineer. Levels shall be taken at each of the four points marked on the well before commencement and after completion of placing each increment of load. The full test load shall be maintained for 24 hours.

The total settlement in 24 hours shall not be more than 8 cm. (about 3").

The decrement of load shall be at the same rate as the increment and at the same intervals. Levels shall be observed at the four points before starting and after completion of each decrement. All observations shall be made by the Deputy Engineer.

The load settlement curve shall be plotted for loading and unloading. The rate of settlement shall be uniform.

BR.15.(*b*).4. *Item to include.*—(1) Filling sand in the well.

(2) Putting up suitable platform and loading with test load in suitable increments and unloading it and observing settlements.

(3) Removing the platform, sand filling, etc., and clearing site.

BR.15.(*b*).5. *Mode of measurement and payment.*—The contract rate shall be a lump amount for carrying out one complete load test. The test described above shall be counted as one test.

BR.16. *Providing steel, anchor dowels at the base of the well including drilling holes, placing the dowels in position and effectively grouting the holes.*

BR.16.1. *General.*—The specification pertains to the provision of dowels to anchor the well to the foundation rock.

BR.16.1.1. *Materials.*—Mild steel dowels shall comply with specification No. A.11 and shall be of the size and shape shown on the drawings or as ordered by the Engineer. If the drawings show the dowels to have split bottoms and wedges, they shall be prepared accordingly.

BR.16.1.2. Sand shall comply with Specification No. A.6.

BR.16.1.3. Water shall comply with specifications No. A.5.

BR.16.1.4. Cement shall comply with specification No. A.2.

BR.16.1.5. Cement sand grout shall be of 1:1 proportion and of as thick a consistency as possible to suit the operation and poured in small quantities and rodded all round to ensure complete embedment of the dowel leaving no hollow in the bore hole.

BR.16.2. *Constrauctional details.*—Where the well bottom is sufficiently dry or can be pumped dry, holes shall be drilled in the foundation rock stratum at the locations shown in the drawings or as directed. The diameter and the depth of the bores shall be as shown on the plan or as ordered. The bore holes shall be cleaned and dewatered and kept clean till the dowels are driven and grouted.

Mild steel sections with split bottom and wedges when so shown on the drawing, properly cleaned of rust, paint, etc., shall be inserted and driven in the bores and grouted with 1:1 cement mortar slurry and allowed to set. The dowels shall be embedded in the bottom plug.

Where the well bottom cannot be dewatered, the bottom plug shall be laid first and then holes drilled through the concrete of the bottom plug into the rock stratum on which the well is founded. Rest of the process shall be similar to the one explained above, the portion of the bore hole in the plug also being grouted. If any part of the dowel is projecting above the plug, that portion shall be bent flat before insertion and embedded in 1:2:4 cement concrete so as to have a cover of 15 cm. (about 6") all round, concrete shall be properly cured.

BR.16.3. *Item to include.*—(1) Dewatering.

(2) Drilling holes in the foundation rock and also through bottom plug when necessary as shown on the plans or as directed by the Engineer.

(3) Furnishing mild steel sections with wedges prepared to shapes shown on the drawings or as ordered by the Engineer and placing and/or driving in position.

(4) Grouting the dowels and embedding them in concrete above the plug where necessary.

(5) All labour, materials, use of equipment, tools and plant, and other incidental items necessary for the satisfactory completion of the work.



अनुक्रमणिका
Table of Contents

**BR.17.3.**

BR.16.4. *Mode of measurement and payment.*—The contract rate shall be for a unit of one dowel fixed. The dowel shall be of specified section, length and shape, placed along with the wedge in the hole of required diameter and depth, driven in and grouted and embedded, in concrete where necessary.

BR.17. *Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite: gneiss metal for the bottom plugs of wells in the dry or under water including compaction and curing where necessary.*

BR.17.1. *Cement concrete.*—Cement concrete shall comply with specification No. B.6 for ordinary cement concrete subject to following:—

BR.17.1.1. *Proportion.*—The proportion of cement concrete for the bottom plugs shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate when the concrete is to be laid in the dry. When it is to be placed under water 10 per cent. more cement shall be added and the rate shall be inclusive of its cost as laid down in specification No. B.6.

BR.17.1.2. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound stone of the specified type available in the region and approved by the Engineer. The maximum size of the coarse aggregate shall be 50 mm. (about 2″) and well graded from 50 mm. to 5 mm. (about 2″ to 3/16″) as indicated in specification No. A.7.

BR.17.1.3. *Mixing.*—Mixing shall be done in a mechanical mixer. When the concrete is to be laid under water, water content shall be such as to give a slump of not less than 10 cm. (about 4″) and not more than 18 cm. (about 7″).

BR.17.1.4. *Placing.*—When the concrete is to be laid under water it shall be done by tremine or any other method as per I. S. 456-1964 para. 7.1.7 as may be approved by the Engineer. When the concrete is laid in the dry, water content shall be within the range specified in specification, No. B.6 and approved by the Engineer. When placement is in the dry, compaction shall be done with vibrators and curing done as in specification No. B.6.

BR.17.2. *Details of construction.*—When the well has reached the foundation rock bed and is properly seated and the inside of the well has been thoroughly cleaned of all rubbish or loose and soft materials over-lying rock bed concreting will be permitted by the Engineer. In the case of other softer strata when the well reaches the suitable strata and level to be founded upon as approved by the Engineer, all loose materials from inside the well shall be completely removed before placing concrete. If water cannot be pumped out, divers should be sent down to clean the bottom by removing all loose and soft materials before placing concrete. The depth of the well shall be carefully measured at this stage, verified and recorded.

If the well can be kept dry without pumping during placing of concrete and during the time required for its setting, concrete may be laid in the dry and compacted by vibrators.

When the concrete is to be placed under water, the water level in the well should be brought up to its normal steady condition or in level with the water outside the well before concreting is started. No dewatering is to be done in the well in question nor in any adjacent well at the time of concreting or till it is set. When concrete has to be laid under water, it shall be deposited in still water by specially designed water tight collapsible or emptying buckets approved by the Engineer or by tremie. The placing operations shall be continued without break till the full thickness of the plug is formed to avoid laminations and to effectively seal the bottom. The mouth of the tremie shall at all times remain submerged in the concrete. The consistency of the concrete shall be such as to suit the operation and as directed by the Engineer. After depositing, the concrete shall be allowed to set for 14 days during which period it should not be disturbed in any way. The water shall not be pumped or disturbed during the period. The concrete will be premeasured before placement on the basis of bag mixes if it will not be possible to measure the quantity due to the concrete spreading beyond the cutting edge. In any case, a check on the quantity should be kept by premeasuring the mixes.

BR.17.3. *Testing.*—After the concrete has fully set, water shall be pumped out of the well completely. The plug shall be consideded satisfactory if there is no appreciable leakage of water in the well through or by the side of the plug. If necessary, kentledge shall be applied to overcome the buoyancy of the well during testing.

अनुक्रमणिका
Table of Contents



If the depth of the well is great and complete dewatering is likely to damage the plug by upthrust, the test shall be limited to depressing the water level to safe hydrostatic head that the thickness of plug and buoyancy will permit. The rate of recuperation shall be observed. If appreciable leakage occurs, the contractor shall be required to remedy the defect by depositing more concrete to effectively seal the leakage or cement grouting.

These remedial measures shall be entirely at the cost of the contractor.

BR.17.4. *Safety.*—All measures for the safety of work and workmen shall be taken by the contractor who will be entirely responsible for any injury to life or damage to work or property during the execution of the item.

BR.17.5. *Item to include.*—(1) Carefully sounding the well bottom including dewatering where possible.

(2) Cleaning the inside and bottom of the well thoroughly if necessary, by using divers.

(3) Pumping out water from the well to the extent possible and necessary when concrete can be placed in the dry.

(4) Bringing the water level in the well to the normal steady condition when concrete has to be placed under water.

(5) Providing and laying the cement concrete as detailed above under water if it cannot be laid in the dry.

(6) Testing the bottom concrete plug for leakage including dewatering and apply kentledge if and as required to counteract hydrostatic pressure.

(7) Placing additional concrete or cement grouting till satisfactory results are obtained, cost of the remedial measures being borne by the contractor.

(8) Payment of compensation for injuries to persons or damage to property due to testing operations, etc.

BR.17.6. *Mode of measurement and payment.*—The rate to be paid for this item shall be for a unit of one cubic metre of plug concrete actually laid. The cubic quantity of concrete shall be calculated on the basis of average foundation level and the actual top level of plug. The dimensions shall be measured correct to two places of decimals in metres and the quantities shall be worked out correct to three places of decimals in cubic metres. The volume shall be worked out by the prismoidal formula.

If it is likely to be difficult to ascertain the dimensions of the plug laid, the quantity to be paid shall be pre-measured based on the number of 50 kg. cement bag mixes used including the concrete required to be laid below and beyond the cutting edge if necessary, to ensure stability of the well. Bulkage of concrete over the quantity of cross aggregate shall be assumed at an average rate of 10 per cent.

No deduction shall be made for the steel reinforcement or dowels if used.

BR.18. *Providing and filling in wells with sand/rubble and sand/shingle and sand including compaction between the top and bottom plugs.*

BR.18.1. *Material.*—Sand required for filling the well shall be clean, coarse free from clay, clods, grass roots, etc., and generally obtained from the local sources unless found to be unsuitable. It should not contain more than 5 per cent. of clay. Rubble should be of trap or granite or quartzite or gneiss, in that order available in the region, free from weathered, soft or crumbling portions. Shingle shall be dense, hard and free from weathered, soft or crumbling portion.

BR.18.2. *Construction details.*—After the bottom plug is laid and tested by pumping, the well shall be filled up with clean coarse sand or rubble well packed with sand or shingle and sand as mentioned in the item, in layers of 15 cm. to 20 cm. (about 6″ to 8″) and each layer compacted to maximum density up to bottom of the top plug. To get this compaction, sand shall be laid under fully saturated (flooded) condition so that it occupies the minimum volume while being placed. Rubble or shingle when used, shall be laid in layers and each layer packed with sand.

BR.18.3. *Item to include.*—Providing, filling in layers, watering and compacting the sand or rubble and sand or shingle and sand as detailed above and all incidental labour, material and use of tools, scaffolding, etc., required for the satisfactory completion of the item shall be included in the item.

अनुक्रमणिका
Table of Contents

**BR.20.3.**

BR.18.4. *Mode of measurement and payment.*—Before filling in, the depth of the top of bottom plug shall be measured for verifying the fill and recorded. The contract rate shall be for a unit of one cubic metre of compacted sand filling. The dimensions shall be measured correct up to two places of decimal of a metre and the quantity worked out correct up to two places of decimal of a cubic metre.

BR.19. *Providing and laying in situ 1:3:6 cement concrete of trap/granite/quartzite/ gneiss metal for top plug of wells including compaction by vibration and curing.*

BR.19.1. *General.*—The concrete shall conform to specification No. B.6. for ordinary cement concrete subject to the following.

BR.19.2. *Proportion.*—Proportion of concrete shall be one 50 kg. bag of cement ; 105 litres (about 3.6 c. ft.) of sand ; 210 litres (about 7.2 c. ft.) of coarse aggregate.

BR.19.3. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of the coarse agregate may be up to 50 mm. (about 2") and well graded from the maximum size to 5 mm. (about 3/16") as indicated in specification No. A.7.

BR.19.4. *Mixing.*—Mixing shall be done in mechanical mixers. Water content may be within the range specified in B.6. as approved by the Engineer.

BR.19.5. *Dewatering.*—If there is water in the space to be concreted it shall be removed and kept free of water by adopting suitable measures and devices at the cost of the contractor. Dewatering shall be done according to specification No. BR.4 when necessary.

BR.19.6. *Placing concrete.*—After filling sand, etc., is completed, approved and its level checked by the Engineer, the concrete of the top plug shall be placed. It shall be laid to the correct level shown on the drawings or as directed by the Engineer.—Sand shall be kept wet so as to occupy minimum volume when concreting is started but the surface shall be just moist without any surplus water. Concrete shall make thorough bond with the steining.

BR.19.7. *Compaction.*—Compaction shall be done by mechanical vibrators and rods so as to get dense concrete and intimate contact with the steining.

BR.19.8. *Item to include.*—(1) As in specification No. B.6.

(2) Keeping the top of sand filling moist but well drained.

(3) Dewatering if necessary, when not separately provided in the tender.

BR.19.9 *Mode of mesurement and payment.*—All dimensions shall be recorded correct to two places of decimals of a metre and the quantity worked out correct to three places of decimals of a cubic metre.

The contract rate for the top plug concrete shall be for a unit of one cubic metre of concrete.

BR.20. *Providing cast-in-situ R. C. C. piles of 1:1.5:3 mix with trap/granite/quartzite/ gneiss metal for a capacity of ..... tonnes placed through steel shells driven to the required depth through all strata except rock including reinforcement.*

BR.20.1. *General.*—The item shall comply with specification No. B.14 in all respects subject to the following.

The R. C. C. pile shall have the specified capacity. It shall be circular in shape and have designed diameter. Reinforcement cage shall be formed of designed diamater and numbers of mild steel bars placed symmetrically along the circumference leaving the designed cover. The stirrups will be separate links or helical spirals of the designed diamater mild steel bars as shown in the plans or as directed by the Engineer and tied with 1.63 mm. (16 gauge) or 1.22 mm. (18 gauge mild steel wire. Cement concrete shall have a proportion of 1 : 1.5 : 3. Cover shall be as designed. Pile shoes shall be detachable and prepared of grey cast iron (vide specification No. A.13) with pointed tip and made to fit the shell with a watertight gasket of hemp dipped in coal tar or of any other suitable material approved by the Engineer. The joint shall be watertight. The weight of the shoe shall be not less than 20 kg. (about 44 lbs.)

BR.20.2. *Defective Piles.*—If the remedial measures needed to rectify cant, shift or other defects involve adjustment of span arrangements, it shall also be done and all the cost involved shall be borne by the contractor.

BR.20.3. *Item to include.*—In addition to those mentioned in specification No. B.14.10, cost of adjustment of spans if any vide BR.20.2 shall be borne by the contractor.

अनुक्रमणिका
Table of Contents



BR.21. *Providing cast in situ R. C. C. bored piles of 1:1.5:3 mix with trap/granite/quartzite/gneiss metal for a capacity of ..... tonnes placed through steel shells, sunk to the required depth through all strata except rock including compaction of concrete and provision of reinforcement.*

BR.21.1. *General.*—The item shall comply with specification No. B.15 subject to the following :—

The R. C. C. pile shall have the specified capacity. It shall be circular in shape and have the designed diamater. Reinforcement cage shall be formed of designed diamater and Nos. of mild steel bars placed symmetrically along the circumference leaving the designed cover. The stirrups shall be separate links or helical spirals of the designed diamater bars as shown on the plans or as directed by the Engineer and tied with 1.63 mm. (16 gauge) or 1.22 mm. (18 gauge) mild steel wire. Cement concrete shall have a proportion of 1:1.5:3. Cover shall be as designed.

BR.21.2. *Defective piles.*—If the remedial measures needed to rectify cant, shift or other defects involve adjustment of span arrangements, it shall also be done by the contractor at his own cost.

BR.21.3. *Item to include.*—In addition to those mentioned in specification No. B.15.10 cost of adjustment of spans if any, vide BR.21.2 shall also be borne by the contractor.

BR.22. *Carrying out loading test of pile or pilegroup including construction of test caps, accessories and dismantling them after test.*

The item shall comply with specification No. B.17 in all respects.

BR.23. *Providing, cutting, bending, hooking, laying in position and tying mild steel bars for reinforcement for R. C. C. well/pile caps as detailed in the drawings including shear pins.*

BR.23.1. *General.*—The item shall comply with specification No. B.10 subject to the following.

False work and form work required for R. C. C. work shall have been erected according to specification No. B.6 to the satisfaction of the Engineer before starting laying of reinforcement. Splicing of the main longitudinal bars shall be by lap only. In the case of caps over piles, the main longitudinal reinforcement bars of the piles shall be tied to the reinforcement of the pile caps as shown in the plans or as directed by the Engineer. No separate payment will be made for the protruding bars of piles or for splicing them the bars of the pile caps.

In the case of wells, reinforcement bars from the steining shall be anchored into the well cap as shown in the drawings or as directed by the Engineer. Such protruding bars for the well steining will be paid for.

Shear pins of 25 mm. (about 1″) diamater and 45 cm. (about 18″) long shall be embedded in the top of the well or pile cap for a length of 23 cm. (about 9″) leaving the remaining length projecting above the top of the cap concrete. These shall be fixed at the rate of one per sq. metre of area to be covered by concrete or masonry of the piers and abutments. These pins shall be measured along with the reinforecement for payment.

The projecting pins shall be encased monolithically with the well or pile caps in 1 : 2 : 4 cement concrete with a 15 cm. × 15 cm. area at top and 20 cm. × 20 cm. at top level of cap. 44 cm. (about 18″) stone headers may be used as pin headers instead of steel pins encased in concrete. No deduction shall be made for pinheaders or shear pins from the masonry or concrete of piers and abutments nor separate payments shall be made for headers or concrete casing of shear pins.

BR.24. *Providing and laying in situ, 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. well/pile, caps, including necessary centering, formwork, compaction by vibrating, finishing and curing complete (excluding mild steel reinforcement).*

BR24.1. *General.*—The item shall comply with specification No. B.6 for ordinary cement concrete subject to the following :—

BR.24.2. *Proporation of concrete.*—The proporation of concrete shall be one 50 kg. bag of cement : 70 litres (about 2.4 c. ft.) of sand : 140 litres (about 4.8 c. ft.) of coarse aggregate. Water content shall be within the range specified in B.6.3 as may be approved by the Engineer. The slump shall not exceed 8 cm. (about 3″).

अनुक्रमणिका
Table of Contents

**BR.25.2.1.**

BR.24.3. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound and best stones of the specified type available in the region and approved by the Engineer. The maximum size of the aggregate shall be 40 mm. (about 1½") or 6 mm. (about ¼") less than the cover whichever is smaller and well graded from the maximum size to 5 mm. (about 3/16") according to specification No. A.7.

BR.24.4. *Forms.*—Wooden or metal forms may be used. Their rigidity and shape shall be maintained by suitable ties, struts, framework and lateral supports. They shall be supported by unyielding centering. They shall be so built as to give the concrete the exact dimensions and shape shown on the drawings or as directed by the Engineer. Stripping of forms shall be done as laid down in specification No. B.6.5.

BR.24.5. *Reinforcement.*—The reinforcement of the shapes and dimensions shown in the drawings shall be placed in the form work with the required spacing and cover and shall be inspected, passed and measured by the Engineer before concreting is allowed to be started. Cap reinforcement shall be tied with the reinforcement coming out of the well steining or piles before concreting. The reinforcement out of the piles and well coming into the cap will be dealt with as in specification No. BR.23 as regards payment.

Mild steel bars of 25 mm. (about 1") diameter and 45 cm. (about 18") long shall be embedded for 23 cm. (about 9") in the concrete with the remaining length protruding above the top level of the cap concrete to serve as shear pins. These shall be fixed at the rate of one for every sq. metre of the area to be covered by masonry or concrete of piers and abutments over the pile or well cap. These will be paid for along with the reinforcement. The projecting pins shall be encased in 1:2:4 cement concrete cast monothically with the cap with top of 15 cm. square and bottom of 20 cm. sqare.

BR.24.6. *Scaffolding.*—All scaffolding required for facility of construction shall be provided by the contractor at his own expense as also all measures to ensure the safety to the work and work-people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for injuries to persons or damages to work and property reasulting from ill-erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to the work spot.

BR.24.7. *Mixing.*—Mixing shall be done in mechanical mixers.

BR.24.8. *Placing.*—Placing shall be done in one continuous operation without break.

BR.24.9. *Compacting.*—Compacting shall be done by vibrators supplemented by rods to get—

(1) thorough and full embedment of reinforcement bars.

(2) dense concrete.

(3) corners and angles of the forms thoroughly filled with concrete, and

(4) good cast surface on the faces without honeycombing.

BR.24.10. *Dewatering.*—Cost of dewatering if necessary, shall be included in the rate unless it is separately provided in the tender and it shall be done as per specifications No. BR.4.

BR.24.11. *Mode of measurement and payment.*—According to specification B.6.15 Tops of piles embedded in the cap shall be treated as per part of cap, piles being paid upto the bottom of the pile-caps. BR.23.1 shall apply regarding pin hearders and casing concrete pins.

BR.25. *Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for abutments, returns, wings, etc. with khandki facing and pointing with cement mortar 1:3 for all khandki faces and rubble facing with struck joints for rubble backing including dewatering, scaffolding and watering measonry complete.*

BR.25.1. *General.*—The item shall comply with specification No. B.9.(i) for coursed rubble masonary 2nd sort in cement mortar etc. in all respects except that all stones in each course shall be of the full height of the course and shall be subject to the following.

BR.25.2. *Materials:—*

BR.25.2.1. *Cement mortar.*—The proporation of cement mortar shall be as specified in the wording of the item for masonry and one part of cement to three parts of sand for pointing. Water cement ratio shall be such as to give a fairly stiff plastic mortar.

अनुक्रमणिका
Table of Contents



BR.25.2.2. *Stones.*—All stones shall be of the specified type and best available in the region and got approved by the Engineer before collecting them. The contractor shall get dressed samples of all categories of stones required for the work and answering to the specifications approved by the Engineer and keep them in charge of the Engineer for reference.

BR.25.3. *Height of courses.*—The height of courses shall not be less than 20 cm. (about 8") unless specially permitted by the Engineer in writing. The adjustment of the total height shall usually be made by providing courses of greater height in the lowest portions. The heights of courses shall be predetermined so that counting downwards from the top, the corresponding courses in all piers, abutments, hauches, wings, etc. will be at the same level.

BR.25.4. *Face stones.*—Khandki face stones shall be selected as far as possible for their longer length on the face. Khandki facing shall be provided for the portion shown in the drawings or up to 30 cm. (about 12") below the probable depth of exposures of masonry due to scour or any other cause or as may be decided by the Engineer. At least 30 per cent. of these stone shall tail into the work to twice their height. On the backing, the face shall comply with specification No. B.9 (k) for uncoursed rubble masonry and the positions of headers shall correspond with those in the facing.

BR.25.5. *Dressing.*—In odrer to check the batter of abutments, returns or wings, 5 cm. (about 2") wide chisel draft shall be provided at the ends of abutments and returns or wings.

BR.25.6. *Pointing.*—Pointing of 1:3 cement mortar shall be done to all the khandki work and shall comply with specification No. B.13. Cement pointing is included in the rate of masonry.

BR.25.7. *Weepholes.*—Weepholes shall be kept in the abutments and returns or wings to drain the moisture from the earth fill behind the masonry. They shall be 8 cm. (about 3") wide and of the full height of the course in which they are provided and extend through the full width of the masonry, with a slope of 1 in 20 or so towards the outside draining face. The sides and bottom of the weepholes in the interior shall be made up with stones having fairly plain surface to avoid any obstruction to easy flow and the weephole channel will be slabbed over with stones not less than 15 cm. (about 6") thick and having a bearing of not less than 10 cm. (about 4") on each side. The weepholes may be spaced about 2 m. apart horizontally and about one m. vertically in regular staggered positions commencing at about 15 cm. (about 6") above the low water level or ground level whichever is higher or as directed by the Engineer.

Inverted filter shall be provided behind each weephole extending about 30 cm. (about 12") on all sides of the hole and shall consist of core of 15 cm. (about 6") layer of 15 cm. (about 6") rubble next to the weaphole. Then 8 cm. (about 3") layer of 20 mm. (about $\frac{3}{4}$") metal or gravel covering the rubble layer on all sides and lastly 8 cm. (about 3"), layer of sand covering the metal or gravel layer on all sides next to earth filling.

No deduction will be made for weepholes in masonry. Nothing extra will be paid for providing the weepholes or inverted filters behind the weepholes.

BR.25.8. *Dewatering.*—Dewatering if required shall be done according to BR.4.

BR.25.9. *Item to include.*—(1) As in specification No. B.9 (i) as modified above and in addition :

(2) Providing chisel drafts.

(3) Pointing all khandki work with 1:3 cement mortar.

(4) If so directed excess excavation in rock shall be filled with concrete or U. C. R. masonry of the foundation grade in the space outside prescribed dimensions of the footing in the overbreak portion.

(5) Weepholes with inverted filters.

(6) Occasional removal of a few stones to see if the masonry is hollow.

(7) Dismantiling of defective masonry and rebuilding it properly.

(8) Dewatering if required and not separately provided in the tender.

BR.25.10. *Mode of measurement and payment.*—As in specification No. B.9.(*h*).

No deduction will be made for weepholes and no separate payment will be made for them and their filters.

BR.25. *Providing coursed rubble trap/granite/quartzite/gneiss stone masonary in cement mortar 1: for piers with khandki facing and pointing with cement mortar 1:3 on all sides including cut and ease waters, dewatering, necessary scaffolding and watering masonry complete.*

अनुक्रमणिका
Table of Contents

**BR.27.6.**

BR.26.1. *General.*—The specifications for this item shall be the same as BR.25 subject to the following:—

BR.26.2. *Face stones.*—Khandki facing shall be provided all round the piers. It shall be provided for the depths shown in the drawings or up to 30 cm. (about 1') below the probable depth of exposure of masonry due to scour or any other cause or as may be decided by the Engineer. At least 30 per cent. of the khandkies shall tail twice their height into the masonry. 5 cm. (about 2") chisel draft shall be provided at the end of the straight portions of the piers near cut and ease waters for checking the batters which shall be uniform without a break.

BR.26.3. *Cut and ease waters.*—Cut and ease water shall be provided exactly to the shapes shown in the plans and their face work shall correspond to that of the straight portion of the piers. 5 cm. (about 2") chisel drafts shall be provided on both sides of the noses of the cut and ease waters to check that the batters are uniform. Nose stones shall be laid header and strecherwise.

BR.26.4. *Weepholes.*—If there are land piers and weepholes are to be provided in them they shall be provided as in specification No. BR.25.7.

BR.26.5. *Item to include.*—(1) As per specification No. BR.25.9 as modified above and in addition.

(2) Providing cut and ease water and khandki facing on all sides.

(3) Providing chisel drafts.

BR.26.6. *Mode of measurement and payment.*—To be as per specification No. BR.25.10. No deduction shall be made for weepholes if provided, and no payment shall be made for the weepholes and their filters. The tendered rate shall cover the cut and ease water portions also which shall be measured nett.

BR.27. Providing and laying 1:3:6 cement concrete of trap/granite/quartzite/gneiss metal for cast-in-situ piers, abuments, returns, wings, etc. including provision of V shaped false joints to form suitable panels on the faces to approved design with necessary centering, shuttering, scaffolding, laying, compacting by vibrating, finishing and curing complete.

BR.27.1. *General.*—The item shall comply with specification No. B.6. for ordinary cement concrete subject to the following:—

BR.27.2. *Proportion.*—The proportion for cement concrete shall be one 50 kg. bag of cement : 105 litres (about 3.6 c. ft.) of sand : 210 litres (about 7.2 c. ft.) of coarse aggregate. Water content shall be within the range specified in specification No. B.6.3 or as directed by the Engineer.

BR.27.3. *Aggregate.*—Coarse aggregate shall be crushed or broken from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of the coarse aggregate shall be 50 mm. (about 2") or 6 mm. (about ¼") less then the cover (in case reinforcement is provided) whichever is smaller. The aggregate shall be properly graded from the maximum size to 5 mm. (about 3/16") as indicated in specification No. A.7 to give a dense concrete. Samples of fine and coarse aggregates approved by the Engineer shall be deposited in the Engineer's office for reference.

BR.27.4. *Slump.*—Slump as required for the suitable consistency shall be decided by the Engineer and the same shall be maintained throughout.

BR.27.5. *Mixing.*—Mixing shall be done in a mechanical mixer.

BR.27.6. *Forms.*—The forms shall be either of timber lined with plain galvanised iron sheets or steel plates strengthened with suitable mild steel sections as may be found convenient by the contractor and shall be erected to the exact shape, dimensions, and RLs indicated on the plans or as ordered by the Engineer. The forms shall be prepared in pannels or boards with V fillets as may be found convenient to obtain easily the false V. notch joints on the surface of piers, abutments etc. The pattern of joints in abutments, piers, wings etc. shall be the same and from the top downwards the corresponding joints shall be at the same level unless directed otherwise by the Engineer. The design of forms and pattern and dimensions of V fillets for false joints shall be furnished in advance by the contractor for the approval of the Engineer. Any addition or replacement of different members if found necessary and suggested by the Engineer, shall be provided by the contractor. However, the entire responsibility regarding erection and removal of form work and scaffolding, safety of work and work-people shall rest on the contractor. The forms may be stripped after 48 hours after concreting.

अनुक्रमणिका
Table of Contents



If reinforcement is provided, it shall be inspected, passed and measured before concreting is allowed.

BR.27.7. *Dewatering.*—If the area of the placement is under water, cofferdams and other necessary devices shall be provided and the water pumped out and the area kept dry throughout the process of laying concrete and till such time as is required for setting of concrete in the opinion of the Engineer. Pumping shall be carried out in such a manner as to avoid damage by movement of water through green or freshly laid concrete.

If concrete is required to be laid under water it shall be done as laid down in specification No. B.6. Water content of concrete should be adjusted in such case if necessary.

Cost of dewatering shall be included in the rate of concrete unless separate provision is made in the tender.

BR.27.8. *Scaffolding.*—Necessary ladders, scaffolding, etc., shall be built up to convey the concrete to the site of placement. This shall comply with specification No. B.6.5 (*a*). Service bunds, paths, hoists etc. as may be necessary for carrying out the item shall be provided by the contractor at his own cost.

BR.27.9. *Placing.*—The concrete shall be placed in one continuous operation without break for each lift of concrete. The top of each lift be kept a little uneven to allow bond with the concrete of the upper lift. The height of the layer shall be such as to allow compacting with immersion type vibrators conveniently. The height of lift to be concreted in one operation in the case of abutments, wing walls or returns and piers shall be got approved in advance. Successive heights shall be laid after three days when the concrete has attained adequate strength or as approved by the Engineer.

No operation shall be carried out causing vibration in the concrete already laid and partially set.

BR.27.10. *Compaction.*—The concrete shall be compacted with mechanical vibrators of the immersion type and also with steel rods worked along the mechanical vibrators to give a dense concrete. The concrete shall be rodded in all corners, edges, and angles of the forms and along the form faces while it is being vibrated to get a good surface finish without honeycombing. Overvibration shall be avoided. Sufficient number of vibrators shall be provided to compact the concrete sufficiently. The vibrators shall be applied immediately after placing of concrete. The forms shall not be touched by the vibrators.

BR.27.11. *Finishing.*—Immediately after the removel of the forms any undulations, depressions, cavities, honeycombing, broken edges or corners, high spots and other defects shall be made good and finished with cement mortar 1:2. Such finishing is however looked upon only as an exception and the total surface requiring finishing shall not exceed one per cent. on an average. If initial experience shows that this percentage is exceeded, the entire method of working shall be changed as ordered by the Engineer to get the cast finish.

V grooves as indicated on the drawings or as ordered by the Engineer shall be neatly finished to give the appearance of panels on the piers, abutments, returns, wingwalls, etc.

BR.27.12. *Item to include.*—(1) As in specification No. B.6.14.
(2) Providing V. joints.
(3) Dewatering if necessary, when not separately provided in the tender.
(4) Scaffolding, hoists, service bunds and paths.

BR.27.13. *Mode of measurement and payment.*—As per scpecification No. B.6.15.

No deduction shall be made in the volume of concrete nor any extra payment made for V grooves or other ornament work on piers, abutments, wings or returns.

BR.27.(*a*). *Providing and laying 1:3:6 cement concrete of metal and plums of trap/granite/quartzite/gneiss stones for cast-in-situ piers, abutments, returns, wings, etc., including provision of V shaped false joints to form suitable panels on the faces to approved design with necessary centering, shuttering, scaffolding, compacting by vibrating, finishing and curing complete.*

The item shall comply in all respects with specification No. BR.27 except that the plums shall be used as specified in BR.5.(*a*).

BR.28. Providing, cutting, bending, hooking laying in position and tying mild steel bars for reinforcement for pier and abutment caps and for concrete piers and abutments when provided as detailed on the drawings.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**BR.29.10.**

*General.*—The item shall be carried out according to specification No. B.10 for providing reinforcement in pier and abutment caps as also in concrete piers and abutments as shown on the drawings or as ordered by the Engineer. Safe scaffolding as specified in specification No. B.6.5.(*a*) and approved by the Engineer shall be erected where necessary.

If anchor bolts, etc., are to be fixed while concrete is being placed, they shall be placed in the correct location and level and secured properly so that they will not be displaced in any way while placing concrete or vibrating. Fixing anchor bolts and other accessories of bearings shall be covered under the item of bearings.

BR.29. Providing and laying in situ 1:2:4 ordinary cement concrete/controlled cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. caps over piers and abutments including necessary scaffolding, centering, form-work, compacting by vibrating, finishing, and curing complete (excluding mild steel reinforcement).

BR.29.1. *General.*—The following specifications from BR.29.2 to BR.29.10 shall be common to both the ordinary and controlled cement concrete with due reference to specification No. B.6 for ordinary concrete and B.7 for controlled cement concrete.

BR.29.2. *Coarse aggregate.*—The maximum size of coarse aggregate shall be 40 mm. (about 1½″) or 6 mm. (about ¼″) less than the cover whichever is smaller, Coarse aggregate shall be broken or crushed from sound stones of the specified type available in the region and approved by the Engineer and well graded from the maximum size to 6 mm. (about 3/16″) according to specification No. B.7.

BR.29.3. *Forms.*—Wooden or metal forms may be used. Their rigidity and shape shall be maintained by suitable ties, struts, frame-work and lateral and bottom supports. They shall be so built as to give to the concrete the exact dimensions and shape shown on the plans or as directed by the Engineer. If richer concrete blocks are to be provided below the bearings, such block spaces shall be isolated by suitable form-work approved by the Engineer to provide exact dimensions required for the blocks. The forms may be stripped after 24 hours after concrete is completed.

BR.29.4. *Reinforcement.*—The reinforcement of the shapes and dimensions shown in the drawings shall be placed in the form-work with required spacing and cover and shall be inspected, passed and measured by the Engineer before concreting is allowed to be started. Special reinforcement if any, under the bearings shall also be placed in correct position. Reinforcement shall be paid separately.

BR.29.5. *Scaffolding.*—All scaffolding required for facility of construction shall be provided by the contractor at his own expense as also all measures to ensure the safety of the work and work-people. Any instructions of the Engineer in this respect shall also be complied with. The contractor shall be entirely responsible for injuries to persons or damage to work and property resulting from ill-erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to work spot.

BR.29.6. *Mixing.*—Mixing shall be done in mechanical mixers.

BR.29.7. *Placing.*—Placing shall be done in one continuous operation without break.

B.R.29.8. *Compacting.*—Compacting shall be done by vibrators supplements by rods to get—

(1) through and full embedment of reinforcement bars.,

(2) dense concrete,

(3) corners and angles of the forms thoroughly filled with concrete, and

(4) good cast surface on the faces without honeycombing.

BR.29.9. *Bearings.*—Bearings and anchor bolts of bearings to be fixed in the abutment or pier caps shall be placed correctly with regard to their location and elevation before concrete is laid. They shall not be disturbed in any way during concreting. Anchor bolts and their fixing shall be included in the item of providing bearings. Under special circumstances, the Engineer may permit holes of the required size and depth to be left in the cap for fixing the anchor bolts of the bearings at a later date and grouting them.

BR.29.10. *Dewatering.*—Cost of dewatering if necessary, shall be included in the rate unless it is separately provided in the tender.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



BR.29.11. *Ordinary cement concrete: Proportioning mix.*—Proportioning of the ingredients for 1:2:4 ordinary cement concrete shall be done as laid down in specification No. B.6.3. Water content shall be regulated to give the required consistency with a slump of not more than 5 cm. (about 2″) or as directed by the Engineer.

BR.29.12. *Controlled Cement Concrete: Proportioning mix.*—Before the work is started, proportions of fine and coarse aggregates and their grading and the minimum quantity of cement and water required to give a compressive strength of 267 kg./sq. cm. (about 3,800 lbs/sq. inch) at 28 days on 15 cm. (about 6″) cubes shall be determined by trial mixes in the preliminary tests. Works tests with the same proportions shall show a compressive strength of 200 kg./sq. cm. (about 2,850 lbs./sq. in) at the same age corresponding to a working compressive strength of 66.8 kg./sq. cm. (about 950 lbs./sq. in) in bending. For purposes of quoting rates the cement content shall be taken as 6.3 bags of 50 kg. per cubic metre of concrete and the approximate nominal proportion may be taken as 1:2:4.

BR.29.13. All the other relevant provisions in specification No. B.6 for ordinary cement concrete and B.7 for controlled cement concrete shall apply to the respective concrete used in this item.

BR.30. Providing and laying in situ controlled cement concrete of trap/granite/quartzite/gneiss metal for the R. C. C. concrete block below the bearing including formwork, scaffolding, compaction by vibrating and curing complete (excluding mild steel reinforcement).

BR.30.1. *Cement concrete.*—The controlled cement concrete shall comply with specification No. B.7. subject to the following:—

BR.30.2. *Proportioning mix.*—Before the work is started proportion of fine and coarse aggregates and their grading and the minimum quantity of cement and water required to give a compressive strength of 360 kg./sq. cm. (about 5,120 lbs./sq. in) at 28 days on 15 cm. (about 6″) cubes shall be determined by trial mixes in the preliminary tests. Works tests with the same proportions shall show a compressive strength of 270 kg./sq. cm. (about 3,850 lbs./sq. in) at the same age corresponding to a working compressive strength of 70 kg./sq. cm. (about 1,000 lbs./sq. in) in direct compression. For purposes of quoting rates the cement content shall be taken as 11.5 bags of 50 kg. per cubic metre and the approximate nominal proportion be taken as 1:1:2. If with approved aggregates and water cement ratio, minimum cement required is more or less than specified above for attaining the above strength in the preliminary tests, the cost shall be adjusted as indicated in specification No. B.7. No adjustment of cost shall be permissible for change of proportions of aggregates or their grading. The proportions once decided on the basis of preliminary tests shall be continued until there is a change in the materials. No adjustment of cost for the contractor shall be made if the subsequent change of materials requires greater cement content to obtain the specified strength.

BR.30.3. *Form work.*—The open sides of the recesses in the abutment or pier cap concrete shall be covered by wooden planks or metal sheets suitably strengthened and fixed to serve as forms for casting of concrete without distortion.

BR.30.4. *Mixing.*—The concrete shall be mixed in a mechanical mixer.

BR.30.5. *Placing.*—The surface of the pier or abutment cap concrete to receive the cast-in-situ concrete block shall be thoroughly cleaned and wetted before placing concrete. Anchor bolts if not already fixed in the cap, shall be placed in exact positions before the concrete is deposited and held so till the concrete is laid.

BR.30.6. *Compaction.*—Compaction shall be done by vibrator and rods as the concrete is being poured. The concrete shall be sufficiently rodded to cover the faces of the joints in cap concrete completely. Care shall be taken to see that the anchor bolts are not disturbed by rodding or by vibrators.

Bearing seats shall be fixed at the exact location and correct level and shall have full bearing.

BR.30.7. *Item to include.*—As in specification No. B.7.15.

Bearing seats, anchors, etc., shall be fixed at the correct level and location.

BR.30.8. *Mode of measurement and payment.*—As in specification No. B.7.16. No deduction shall be made for anchor bolts or reinforcement.

BR.31. *Providing and fixing cast-steel roller-rocker bearing of ..... tonnes capacity as per detailed drawings.*

अनुक्रमणिका
Table of Contents

BR.31.6.

BR.31.1. *General.*—The item covers the supply and fixing of cast-steel roller rocker bearing with all their accessories such as anchor bolts, nuts, etc., in position including carrying out necessary tests.

BR.31.2. *Materials.*—The cast steel of the bearing shall comply with all the requirements laid down in Specification No. A.12. Sulphur and Phosphorus contents shall not each exceed 0.06 per cent. The minimum ultimate tensile stress shall not be less than 5,512 kg/sq. cm. (about 36 tons/sq. in.); minimum elongation shall not be less than 15 per cent. The yield point stress of cast-steel shall not be less than 4,218 kg./sq. cm. (about 60,000 lbs. per square inch). Working stress in structural steel shall be 1,265 kg./sq. cm. (about 18,000 lbs. per square inch). The steel for the casting shall be made by basic electric process or basic open hearth process. Brinell hardness shall range between 180 to 200. Anchors and bolts shall conform to I. S. No. 226-1969 and 1148-1964.

BR.31.3. *Moulding and Finishing.*—The bearings shall be cast to conform accurately to the shapes and dimensions on the drawings with necessary identification marks ordered by the Engineer and shall be free from pouring falts, sponginess, cracks, blowholes and other defects affecting their strength and usefulness. The edges of all ribs shall be parallel throughout the length. The bearing surfaces shall be machined and finished very accurately and the limits of tolerances specified below shall not be exceeded. Machining of bearing surfaces shall be done in the direction of movement. Bearings not conforming to the required shapes and dimension shall be rejected.

BR.31.4. *Tolerances.*—Following tolerances shall be allowed:—

| | | |
|---|---|---|
| (1) Roller Diameter | ... ... | 0.07 mm. (about 0.003″). |
| (2) Between the diameter of pin and the diameter of knuckle or bearing. | ... ... | 0.5 mm. (about 0.02″). |
| (3) Height of component | ... ... | 0.5 mm. (about 0.02″). |
| (4) Thickness of casting | ... ... | No minus tolerances. |

BR.31.5. *Tests.*—Two test pieces for testing the properties of the bearing from each melt shall be cast attached to the bearing and shall be tested for the properties indicated in specification Nos. A.12 and B.31.2. Officials of the Directorate of Inspection of the Ministry of Works, Production and Supply shall be given facilities of inspection during manufacture and testing and their certificates for the results of tests shall be produced. The contractor shall also produce certified cast analysis of the sample to the Department and to the Directorate of Inspection of the Ministry of Works, Production and Supply to verify that it conforms to the requirements laid down in specification No. A.12 and BR.31.2.

Each cast steel roller bearing exceeding 20 cm. (about 8″) in height and each cast steel rocker part exceeding 15 cm. (about 6″) depth shall be subjected to X ray or Gammagraphic test. Only such castings as are certified to be internally flawless in respect of tapped air bubbles and other defects shall be accepted. All the expenses concerning these tests and all other tests for the properties of the material referred to in BR.31.2 and A.12. shall be borne by the contractor. [Portable equipment for testing bearings grammagraphically is available with the X-Ray Engineering Company (India) Private Ltd. Kamani Chambers, Nical Road, Bombay-1 and with Government Test House 11/1 Judge's Court Road, Alipore, Calcutta-27.] If the test results do not satisfy the requirements, the bearings from the melt represented by the test sample shall be rejected.

BR.31.6. *Fixing.*—The bearing seats shall be checked for their trueness, level and location. If necessary, the seat shall be finished with 1:1 cement mortar for obtaining even bearing and true level. Anchor bolts may be tied to the reinforcement if necessary and embedded in the correct positions and levels in the concrete cap using templates during the casting of the caps. They may, with the approval of the Engineer, be alternatively fixed in holes left or drilled in concrete for the purpose and grouted with cement mortar 1:1 and allowed to set before fixing the bearing. The anchor bolts shall in the latter case be fixed thus:—

Anchor bolts shall first be put into the dry hole and taken out to ensure proper fitting. The hole shall then be filled with 1:1 cement mortar up to slightly below the top and the bolt inserted fully correctly to template by uniform pressure in the hole until the mortar rises to top. The excess mortar shall be removed and the top levelled and cleaned.

The bearing pedestals shall then be fixed over the bolts at the correct level using 1:1 cement mortar for the bedding to have a full and uniform bearing over the whole area. The upper half of the bearing shall be fixed over the pedestal by the fixing plates to be fixed only

अनुक्रमणिका
Table of Contents



during the casting of the deck system. The upper half shall be made to fit to the form work of the main girder with the anchor bolts projecting inside of the form work for being embedded into with the girder concrete. For span of 30 m. and over, effect of temperature stresses at the time of fixing shall be taken into account in positioning the top bearing plates of Roller/ Rocker bearings. The surfaces of contact shall be thoroughly greased to obtain unrestricted movement. On completion and on obtaining permission from the Engineer, the contractor shall remove temporary fixing plates and nuts and bolts.

Grease box of suitable size and design as approved by the Engineer to enclose the whole bearing assembly shall be provided for each bearing. The box shall be made of 1.63 mm. (16 gauge) thick galvanised steel sheets strengthened if necessary, with detachable sides fixed by bolts and nuts and shall be fully stuffed with neutral grease. The dimensions of the box shall be such as to allow free movement of the bearing while preventing intrusion of dust and other foreign matter.

BR.31.7. *Painting.*—All the exposed parts of the bearing and their accessories except the contact surfaces shall be thoroughly cleaned of all loose and foreign matter and painted with a base coat of red lead and an anticorrosive oil paint of approved shade in two coats. The exposed surfaces of grease boxes shall also be similarly painted. Painting shall be done according to specification No. B.13.(*a*). The machined contact surfaces shall not be painted but only greased. The bearings shall be protected and maintained by the contractor till completion of the work.

BR.31.8. *Item to include.*—(1) Supply of bearings, accessories, test-pieces and test certificates.

(2) Fixing in cement mortar,

(3) Painting and greasing,

(4) Carrying out tests,

(5) Providing grease boxes and stuffing them with neutral grease.

(6) All labour, materials, use of equipment, tools and plant and scaffolding necessary for completing the item satisfactorily and maintaining the bearings till completion of work.

BR.31.9. *Mode of measurement and payment.*—The contract rate shall be for providing and fixing one set of bearings with all its accessories at the correct level and location in concrete. One set of bearings shall include the bottom and top assembly including all accessories, such as anchor bolts, grease box for that assembly and all items mentioned in BR.31.8.

The measurement shall be for the number of sets of the bearings fixed.

No deduction shall be made in the concrete for the anchor bolts or any other fixtures of bearings embedded in the concrete.

BR.32. *Providing and fixing mild steel fixed plate bearings of ..... tonnes capacity as per detailed drawings.*

BR.32.1. *General.*—The item covers the supply of the mild steel fixed plate bearings with all their accessories such as anchoring arrangements and fixing them in the concrete caps on piers and abutments and in girders as detailed in the drawings.

BR.32.2. *Materials.*—Mild steel plates of the designed dimensions shall comply with specification No. A.11. Mild steel bars of 32 mm. (about 1¼″) diameter and 60 cm. (about 2′) long shall comply with specification No. A.10. Cement mortar shall comply with specification No. B.5(*a*). The proportion of cement and sand shall be 1 : 1.

BR.32.3. *Tolerances.*—No minus tolerance shall be permitted in the thickness of the plates. A tolerance of ± 1 mm. may be permitted in the length and breadth of the plates.

BR.32.4. *Fabrication.*—Fabrication shall generally comply with specification No. B.19. The mild steel plates shall be cut with smooth edges to the exact size and shape shown on the drawings with a smooth hole of 35 mm. for inserting the anchor bar.

BR.32.5. *Fixing.*—As detailed in the drawings, mild steel bar of 32 mm. (about 1¼″) diameter shall be fixed 30 cm. (about 12″) in the pier cap at the exact location and level. The bar shall be thoroughly greased before placing in the concrete so as to prevent bond with the pier cap. The mild steel plates shall then be placed over a layer of 12 mm. (about ½″) thick 1 : 1 cement cortar bedding as shown in the drawing and the bars projecting outside of the pier cap and passing through the mild steel bearing plate shall finally be embedded in the concrete of the main girder.

अनुक्रमणिका
Table of Contents

**BR.35.**

Exposed surfaces of the bearings shall be cleaned thoroughly and painted with one coat of red lead oil paint and two coats of oil paint of approved shade.

BR.32.6. *Item to include.*—(1) Supply of bearings and their accessories.

(2) Sampling and testing.

(3) Fixing bearings on 12 mm. thick cement mortar bed and into the concrete, of the pier cap and the girder including painting and greasing.

(4) All labour, materials and use of equipment and scaffolding required for the satisfactory completion of the item.

BR.32.7. *Mode of measurement and payment.*—The contract rate shall be for supply and fixing of one set of fixed plate bearings with all the necessary accessories and the cement mortar bedding. The measurement shall be for the number of sets of bearings provided and fixed.

BR.33. *Providing and fixing cast steel rocker bearing of ..... tonnes capacity as per detailed drawings.*

The bearings shall conform accurately to the drawings and comply with specification No. BR.31.

BR.34. *Providing and fixing mild steel sliding plate bearings of ..... tonnes capacity as per detailed drawings.*

BR.34.1. *General.*—The item covers the supply and fixing of mild steel sliding plate bearings with all their accessories such as anchors to be fixed in pier and abutment caps and in the girders detailed in the drawings.

BR.34.2. *Materials.*—Mild steel plates and flats of the designed thickness and size shall comply with specification No. A.11.

BR.34.3. *Tolerances.*—No minus tolerance will be permitted in the thickness of the plates. A tolerance of $\pm 1$ mm. may be permitted in the length and breadth of the plates.

BR.34.4. *Fabrication.*—Mild steel plates shall be cut to the exact size and shape shown on the drawings and the metal contact-surfaces machined true and square to give complete bearing. Machining shall be done in the direction of movement of the bearing. The mild steel flats shall be bent and welded to the two mild steel plates as shown in the drawings. The welding shall be done according to specification No. B.18. The edges of plates shall be smooth.

BR.34.5. *Fixing.*—The plate with 'U' type of flat welded to it shall rest on the cap with full and even bearing in the correct location and level with the flats embedded inside of the concrete of the cap while the concrete is being laid. The other mild steel plate shall remain projecting outside of the bottom of the main girder and the bent mild steel flat embedded in the main girder. The top plate shall fit exactly over the bottom plate and shall be prevented from disturbance during the concreting by suitable devices. The two faces of the mild steel plates coming in bearing contact shall be thoroughly greased before one is laid over the other. Non contact exposed surfaces of bearings shall be painted as specified in specification No. BR.31.

BR.34.6. *Item to include.*—(1) Supply of bearings and their accessories.

(2) Sampling and testing, if necessary.

(3) Fixing including greasing and painting.

(4) All labour, material and use of equipment and scaffolding necessary for the satisfactory completion of the item.

BR.34.7. *Mode of measurement and payment.*—The contract rate shall be for one set of the sliding plate bearing fixed. The measurement shall be for the number of sets of bearings fixed.

BR.35. *Providing, cutting, bending, hooking, laying in position, and tying mild steel bars for reinforcement as per detailed drawings for—*

(*a*) Solid/deck slab.

(*b*) Main girders/arch ribs.

(*c*) Cross girders.

(*d*) Arches.

*General.*—The item shall be carried out according to specification No. B.10 in all respects.

अनुक्रमणिका
Table of Contents



Where thicker bars of the required full length are not available and where they are crowded as in heavy beams, the bars shall be welded or joined with screwed coupling or bottle nut as shown on the plans or ordered by the Engineer. In both cases, tests shall be conducted as specified in specification No. B. 10 to see that with the couplings/welders available and the method of welding proposed to be adopted on the site, the strength of the coupled/welded joints is not less than the strength of the bar. Payments for such welded and coupled joints shall be made separately.

Bars necessary for splicing the reinforcement of the R. C. C. parapets, kerbs, etc., shall be left protruding from the slabs. Where projecting bars form part of an item like parapet for which the rate is inclusive of reinforcement, the projecting bars will not be paid separately.

BR.36. *Providing welded joints for mild steel reinforcement round bars of—*

*(a) 25 mm. diameter and under,*

*(b) 28 mm. diameter.*

*(c) 32 mm. diameter,*

*(d) 36 mm. diameter.*

*(e) 40 mm. diameter.*

BR.36.1. *General.*—The item provides for welding joints in mild steel round bars 25 mm. (about 1″) diameter and under and other large diameter bars used for reinforcement in R. C. C. work and includes necessary welding materials, use of specified process and equipment and tests.

The item shall comply with specification No. B.10.7 in all respects.

BR.36.2. *Item to include.*—(1) Cost of all labour, materials like electrodes or filler rods, use of equipment, tools and plant, etc., necessary for the satisfactory conpletion of the item.

(2) Testing welded joints. If the welding test is unsatisfactory and the bar is cut and rewelded with an additional joint, such additional joint shall not be paid.

BR.36.3. *Mode of measurement and payment.*—The contract rate shall be per number. The measurement shall be for the number of joints made, limiting them to the specified number or as ordered by the Engineer.

BR.37. *Providing bottle-nut joints for the mild steel reinforcement round bars of 25 mm. diameter and above.*

BR.37.1. *General.*—The item provides for the bottle-nuts joints in mild steel round bars of 25 mm. diameter and above used for reinforcement in R. C. C. work and include necessary bottle-nuts, labour, use of equipment and tests.

BR.37.2. *Joints.*—Whenever plans and specifications call for bottle-nut joints, they shall be made in lieu of the laps and shall develop full strength of bars.

These joints shall be staggered in such a way that in any one section equal to the lap length of bars not more than 33 per cent of the bars shall be with bottle-nut joints. Further, care shall be taken to see that the nuts do not prevent concrete from surrounding the bars completely and affording full cover.

The ends of the bars which are to be joined with bottle-nuts shall be upset for a sufficient length before cutting threads so that the effective diameter after the cutting of threads shall not be less than original diameter of the bar.

The ends of the bars shall have threads cut on them as shown in the drawings and shall be cleaned of all loose scales, grease, paint and other foreign matter before fixing the bottle-nuts.

Tensile tests on test specimen with bottle-nut joint shall be made at the contractor's cost. Two joints per 100 joints or a minimum of two joints shall be made on test pieces under conditions exactly similar to the joints obtained in the field and tested for their strength. The tensile strength of the joints shall not be less than that of the original bar. If the test results are unsatisfactory, modifications in the procedure may be done as ordered by the Engineer. The joints on the reinforcement bars prepared along with the test joints found unsatisfactory shall be cut and redone. Additional bottle-nuts if required in such cases shall not be paid for. All the tests shall be at the cost of the contractor.

BR.37.3. *Item to include.*—(1) Cost of all labour, materials including bottle-nuts, use of equipment, tools and plant, etc., necessary for the satisfactory completion of the item.

(2) Testing joints.

अनुक्रमणिका
Table of Contents

**BR.38.2.** BR.37.4. *Mode of measurement and payment.*—The contract rate shall be per number. The measurement shall be for the number of joints made limiting them to the specified number or as ordered by the Engineer.

BR.38. Providing and laying in situ 1:2:4 ordinary cement concrete/controlled cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. work including centering, formwork, scaffolding, ramming, vibrating, finishing and curing complete in—

(*a*) Solid/deck slab,

(*b*) main girders/arch ribs,

(*c*) cross-girders,

(*d*) arches (excluding mild steel reinforcement).

BR.38.1. *Ordinary cement concrete.*

BR.38.1.1. *General.*—This item shall be carried out according to specification No. B-6 subject to the following:—

BR.38.1.2. *Proportion.*—The proportion of 1:2:4 ordinary cement concrete shall be as laid down in specification No. B.6.3. Water content shall be regulated to give the required consistency for the particular member within the range specified in specification No. B.6.3 or as ordered by the Engineer.

BR.38.1.3. *Coarse Aggregate.*—Coarse aggregate shall be broken or crushed from sound and best stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 20 mm. (about $\frac{3}{4}$″) and well graded from 20 mm. to 5 mm. (about $\frac{3}{4}$″ to 3/16″) as specified in specification No. A.7.

BR.38.1.4. *Formwork and centering.*—Formwork and centering shall comply with specification No. B.6,5,(*b*). The contractor shall prepare the designs of the centering and formwork well in time and get them generally approved by the Engineer. Great care shall be taken to see that the props are adequately strong and capable of safely bearing the loads assumed in the designs and actually likely to occur and are placed on bases which are unyielding and safe. If the ground is yielding, its bearing strength shall be increased by suitable means or piles shall be driven to a safe depth and bearing to support the props. The props shall be adequately braced horizontally and vertically and shall be spaced at intervals indicated in the designs. The props and formwork shall be designed to safely stand the dead, live and impact load likely to come on them during the construction operations. No extraneous loads shall be placed on the completed concrete before it becomes set in excess of the loads for which the centerings are designed. Although the design of centering and formworn will be generally approved by the Engineer, the contractor shall remain fully responsible for the strength and adequacy of the centering and formwork and safety of the work and work-people and satisfactory finish of the concrete surfaces. Stripping of the forms shall be done as laid down in specification No. B.6.5.(*b*).8.

BR.38.1.5. *Mixing.*—The cement concrete shall be mixed in mechanical mixers. A spare mixer shall be provided whenever considered necessary to guard against the contingency of failure of any working machine.

BR.38.1.6. *Slump.*—Slump shall not exceed 8 cm. (about 3″) but in thin sections and in the portions where reinforcement bars are crowded, slump up to 12 cm. (about 5″) may be allowed.

BR.38.1.7. *Placing.*—The schedule of pouring and location of construction joints if any, shall be got approved by the Engineer and adequate labour and machinery shall be provided to keep up the programme. Anchor bolts necessary for fixing bearings and angles or posts of the railing shall be fixed correctly in the concrete.

BR.38.1.8. *Compaction.*—Compaction shall be done by vibrators and robs as the concrete is being poured to give a dense concrete. Adequate rodding shall be done to fill the concrete round the reinforcement bars and in the corners and edges of formwork and also along the form faces to give a plain cast finished surface without honeycombing. It should be seen that the vibrator needle does not touch the reinforcement and disturb concrete already set. Where it is not possible to use the vibrator, rodding shall be resorted to and concrete with greater slump may be used.

BR.38.2. *Controlled cement concrete.*—When controlled concrete is specified it shall comply with specification No. B.7. subject to the following:—

अनुक्रमणिका
Table of Contents



BR.38.2. *Proportion.*—Before the work is started, proportions of fine and coarse aggregates and their grading and the minimum quantities of cement and water required to give a compressive strength of 267 kg./sq. cm. (about 3,800 lbs./sq. in.) at 28 days on 15 cm. (about 6") cubes shall be determined by trial mixes in the preliminary tests. Works tests with the same proportions shall show a compressive strength of 200 kg./sq. cm. (about 2,850 lbs./sq. in.) at the same age corresponding to a working compressive strength of 66.8 kg./sq. cm. (about 950 lbs./sq. in.) in bending. For purposes of quoting rates, the cement content shall be taken as 6.3 bags of 50 kg. per cubic metre of concrete and the approximate nominal proportion as 1:2:4. If with approved aggregates and water cement ratio, minimum cement required is more or less than that specified above for attaining the above strength in the preliminary tests, cost shall be adjusted as indicated in specification No. B.7. No adjustment of cost shall be permissible for change of proportions of aggregate or their grading or for handling more or less cement. The proportions thus arrived at shall be continued until there is a charge in the materials. If subsequent change of materials invoives use of additional cement, no further adjustment of cost shall be made for the additional cement.

BR.38.2.2. Formwork, placing and compaction shall also comply with specification No. BR.38.1.4, BR.38.1.7 and BR.38.1.8.

BR.38.3. *Item to include.*—(1) Providing, laying, compacting, finishing and curing ordinary cement concrete/controlled cement concrete to the dimensions and shapes shown in the drawings.

(2) All labour, materials, use of equipment, tools and plant, centering, forms and scaffolding necessary for the satisfactory completion of the item.

(3) Sampling and testing materials and concrete.

(4) Preliminary and works tests in the case of controlled concrete in addition.

BR.38.4. *Mode of measurement and payment.*

*Solid slabs/Deck slabs.*—Solid slabs shall be measured net for their full length, width and thickness. For beam and slab and box girder type construction, the top deck slab shall be measured overall for the full width. Tapered and cantilevered portions of the slab shall be measured net as slabs only. Fillets between slab and beam shall not be measured as part of the slab. The length and the width shall be measured correct up to one cm. while the depth shall be measured correct up to $\frac{1}{2}$ cm.

*Main girders/Arch ribs.*—The main girders/arch ribs shall be the beams/ribs supporting the slab/barel slab and shall be measured for the dimensions below the sollit of the slab/barrel slab. The average length of the arch rib shall be measured midway between extrados and intrados. The length shall be measured correct up to one cm. The depth and width shall be measured correct up to $\frac{1}{2}$ cm. The fillets between slabs and beams/ribs shall be measured as parts of beams.

In box type girder structures, all the structural elements including webs, bottom members and connected fillets at bottom and top shall be measured as beams. The top slab shall be measured as slab.

In case of the bulb type girders, the sectional dimensions shall be measured net correct up to $\frac{1}{2}$ cm.

*Cross girders.*—These shall be measured for their length, width and depth between the faces of main girders. The length shall be measured correct up to one cm. The depth and width shall be measured correct up to $\frac{1}{2}$ cm.

*General.*—All the dimensions described above shall be restricted to the dimensions shown on the drawings or as ordered by the Engineer in writing. In all cases no deductions shall be made for vent pipes or other openings each of 500 sq. cm. or less in section or for chamfers of less than 50 mm. (about 2"). Deduction shall be made for bigger chamfers. All quantities shall be calculated correct to three places of decimals of a cub. m.

The contract rate shall be for a unit of one cubic metre as agreed in the contract.

BR.39. *Providing and fixing cast-steel roller bearings of ——— tonnes capacity at the articulation as per detailed drawings.*

The item shall conform to the drawings and comply with specification No. BR.31 except that the bottom assembly shall be fixed in the supporting girder while concreting it at the articulation.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**BR.43.3.**

BR.40. *Providing and fixing mild steel sliding plate bearings of ——— tonnes capacity at the articulation as per detailed drawings.*

The item shall conform to the drawings and comply with specification No. BR.34 except that the bottom assembly shall be fixed in the supporting girder while concreting it at the articulation.

BR.41. *Providing and fixing cast-steel rocker bearings of ——— tonnes capacity at the articulation as per detailed drawings.*

The item shall conform to the drawings and comply with specification No. BR.31 except that the bottom assembly shall be fixed in the supporting girder while concreting it at the articulation.

BR. 42. *Providing and fixing mild steel fixed plate bearing of ——— tonnes capacity at the articulation as per detailed drawings.*

The item shall conform to the drawings and comply with specification No. BR.32 except that the bottom assembly shall be fixed in the supporting girder while concreting it at the articulation.

Bd.43. *Providing expansion joints as per detailed drawings.*

BR.43.1. *General.*—The item provides for the expansion joints in the cement concrete of wearing course.

BR.43.2. *Material.*—The joints requires a copper plate and the bituminous filling material.

The width of joint shall correspond to the space between the ends of the slabs.

For the expansion joint the copper plate shall be of 1.63 mm. (16 gauge) thickness with a width of 30 cm. (about 12″).

The bituminous filler shall be as under:—

(1) *Poured joint filler.*—The poured joint filler shall be composed of the following ingredients:—

| | | | |
|---|---|---|---|
| Clean fine sand | ... | ... | 55 per cent. |
| Bitumen S. 35 grade of I. S. 73-1961 | ... | | 40 per cent. |
| Asbestos Fibre | ... | ... | 5 per cent. |

The sand and the bitumen shall be heated separately to a temperature of 163°C (about 325°F). Both sand and bitumen shall be mixed intimately after heating. To this shall be added asbestos fibre and the whole mixed thoroughly. While hot, the mixture shall be poured into the clean dry joint and allowed to thicken. The mixture shall be laid slightly poured and if found to be very high, the surplus shall be removed by heated knife or trowel.

When proprietory product from the market is to be used, it shall conform to I. S. 1834-1961.

(2) *Pre-moulded joint filler.*—The joint filler shall be composed of the following ingredients:—

| | | | |
|---|---|---|---|
| Clean fine sand | ... | ... | 60 per cent. |
| Bitumen ... S. 35 grade of I. S. 72-1961 | | | 30 per cent. |
| Cement | ... | ... | 8 per cent. |
| Chopped Hemp | ... | ... | 2 per cent. |

The sand shall be heated in a flat pan to a temperature of 177°C (about 350°F). The bitumen shall be separately heated to a temperature of 163°C (about 325°F). The requisite quantity of bitumen shall be added to the heated sand and stirred well. The required quantity of cement and chopped hemp shall be added and the whole mixed intimately. All the materials shall be measured by weight. The mixture shall be then poured into moulds and allowed to cool. Width of the moulds shall be such as to fill the U of the copper plate and remain about 25 mm. below the top of the slab. When proprietory product from the market is to be used it shall conform to I. S. 1838-1961.

BR.43.3. *Construction.*—The copper plate shall be bent as shown on the drawings and shall be laid over the R. C. C. deck-slab with its U in the gap in between adjacent dack-slabs. The wearing coat concrete shall then be laid leaving requisite width of the joint in between



अनुक्रमणिका
Table of Contents

the two wearing coat-slabs. If full width of bridge is not obtained in one piece of the copper plate, pieces of copper plates shall be brazed together to obtain the requisite width, i.e., the width of the bridge. When the slabs are cured and are to be opened to traffic, all the dirt, mud, etc., accumulated in the joints during the process of curing of the slabs shall be raked out, cleaned and washed before filling in the bituminous filler. The joint between the two wearing course slabs and the U of the copper plate shall then be filled with the bituminous filler.

In case it is so ordered by the Engineer, the joints shall be formed of premoulded joint fillers and in such a case, this pre-moulded joint filler shall be placed in the joint immediately before taking up the concreting of the adjoining slab of the wearing coarse. These pre-moulded joint fillers shall fit the U of the copper plates also and remain about 25 mm. below the top of the slab. This gap shall be filled with poured joint filler.

BR.43.4. *Rate to include.*—(1) Copper plate, its bending, soldering, fixing in position and filling joint with the bituminous filler, premoulded and or poured.

(2) All labour, materials, use of equipment required for satisfactory completion of the item.

BR.43.5. *Mode of measurement and payment.*—The contract rate shall be either for one number of such a joint or for one running metre of the joint as may be provided in the tender. The lineal measurement of the joint shall be recorded correct up to 2 places of decimals of a metre.

**BR.44.** ***Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1 :—for head walls with khandki facing and cement pointing 1 : 3 for khandki faces and rubble facing with struck joints for rubble backing including scaffolding and watering masonry complete.***

BR.44.1. *General.*—The item shall comply with specification No. BR.25 in all respects subject to the following :—

BR.44.2. *Heights of courses.*—The heights of courses which shall be pre-determined shall not normally be less than 20 cm. (about 8″) but height up to 15 cm. (about 6″) may be allowed by the Engineer if necessary to improve appearance etc. Height of upper courses shall not be less than that of the lower ones unless specially shown on the plan or directed by the Engineer. Heights of courses in haunches in the case of an arched bridge shall match with the corresponding courses in other haunches and also with the corresponding courses in other haunches and also with the corresponding courses in the abutments, returns or wings.

BR.44.3. *Drainage pipes.*—One 80 mm. (about 3″) diameter galvanised iron drainage pipe shall be laid in each haunch at the specified level for the full width of the head wall at that level with a gentle slope towards outside face and protruding 15 cm. (about 6″) beyond the face of the head wall. No deduction shall be made in the masonry for the pipes nor separate payment made for these pipes.

**BR.45.** ***Providing and laying in situ 1 : 4 : 8 cement concrete of trap/granite/quartzite/gneiss metal for haunch filling including compacting, curing and scaffolding complete.***

BR.45.1. *General.*—This item shall be carried out according to specification No. B.6. for ordinary concrete subject to the following :—

BR.45.2. *Proportion.*—The proportion of concrete shall be one 50 kg. bag of cement : 140 litres (about 4.8 c. ft.) of sand : 280 litres (about 9.6 c. ft.) of coarse aggregate. Water content shall be within the range specified in specification No. B.6.3. or as directed by the Engineer to obtain the required consistency.

BR.45.3. *Coarse aggregate.*—Coarse aggregate shall be crushed or broken from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 40 mm. (about 1½″) and the aggregate shall be well graded from 40 mm. to 5 mm. (about 1½″ to 3/16″) as indicated in specification No A.7 to give a dense concrete.

BR.45.4. *Slump.*—Slump of 5 cm. to 8 cm. (about 2″ to 3″) as required for the suitable consistency shall be decided by the Engineer and the same shall be maintained throughout.

BR.45.5. *Mixing.*—Mixing shall be done in a mechanical mixer.

BR.45.6. *Forms.*—Ordinarily no forms will be necessary for haunch filling. If, however, they are found to be necessary, they shall comply with requirements laid down in specification No. B.6.

**BR.47.(a).2.**

BR.45.7. *Placing.*—The concrete shall be conveyed to the place of deposition without causing segregation or loss of materials and shall be laid in horizontal layers 38 cm. to 45 cm. (about 15″ to 18″) when vibrator is used and 15 cm. to 20 cm. (about 6″ to 8″) for manual compaction. The concrete shall be placed as far as possible in one continuous operation in the entire haunch filling. The top of the masonry or the concrete of the arches shall be thoroughly cleaned and wetted before laying concrete. No operation shall be carried out causing vibration in the concrete or masonry already set.

In a single span arch, haunch filling shall be carried out simultaneously on both sides of the arch and filling shall be continued in horizontal layers to conform to the required levels and shape. In multi span bridges, concreting of the haunches shall be undertaken so as to not to cause unequal stresses in the arches.

BR.45.8. *Compaction.*—In the thicker sections, compacting may be done by vibrators and rods but in the thinner and feather edge sections, compaction may be done by ramming and rodding.

BR.45.9. *Finishing.*—Any unevenness, depressions, undulations, cavities, etc., shall be made good immediately after laying with 1:3 cement mortar. All loose aggregate particles, etc., shall be swept clean before finishing.

BR.45.10. *Item to include.*—As per specification No. B.6.14.

BR.45.11. *Mode of measurement and payment.*—As per specification No. B.6.15.

BR.46. *Providing trap/granite/quartzite/gneiss rubble filling over haunches and arches including handpacking.*

BR.46.1. *General.*—The specifications for this item shall be the same as per BR.57 except for the following:—

The rubble shall be laid carefully by hand over the arches and haunches close to each other in layers of 15 cm. to 23 cm. (about 6″ to 9″) with spalls wedged in the interstices for close packing. The rubble shall not be dumped over the arch or the haunch concrete to avoid injuring the arch or the concrete. The stones shall be laid gently.

Rubble and spalls shall be arranged at the top 15 cm. (about 6″) in the manner of a reverse filter to drain away the seepage water through the drainage pipes in the head walls.

No earth or murum shall be allowed to get mixed which will impair the filtering action of the rubble filling.

BR.46.2. *Item to include.*—(1) Supply of rubble and spalls, laying in layers and hand-packing and providing reverse filter at top.

(2) All labour, materials, use of tools, scaffolding, etc., necessary for the completion of the item satisfactorily.

BR.46.3. *Mode of measurement and payment.*—The rubble filling shall be measured net in cubic metres limiting the dimensions to those specified in the plans or as ordered by the Engineer.

The dimensions shall be measured correct up to two places of decimals of a metre and the quantity worked out correct up to two places of decimals of a cubic metre. The contract rate shall be for one cubic metre of rubble laid, hand packed and finished. No deduction shall be made for the voids.

BR.47. *Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal including compacting, finishing, curing and filling in joints with bitumen complete for:—*

(*a*) Wearing course 8 cm. (about 3″) thick.

(*b*) Approach slab (excluding mild steel reinforcement).

BR.47.(*a*).1. *General.*—This specification covers the requirements of concrete and incidental work for providing cement concrete wearing course over the decking of the bridge.

BR.47.(*a*).2. *Concrete.*—The concrete hall conform to specification No. B.6 subject to the following:—

*Coarse aggregate.*—Coarse aggregate shall be broken or crushed from sound stones of the specified type available in the region and approved by the Engineer. The stone shall be selected as far as possible to stand abrasion satisfactorily. The aggregate crushing value, *vide*

अनुक्रमणिका
Table of Contents



para. 4.4 of I. S. No. 383-1963 shall not generally exceed 30 per cent. Maximum size of the coarse aggregate shall be 40 mm. (about 1½"). The grading of the aggregate shall be such as shall give dense concrete with the maximum possible proportion of the bigger size. Generally the following shall be found to work satisfactorily:—

| | | | |
|---|---|---|---|
| Metal size | ... | 25 mm. to 40 mm. (about 1" to 1½") | 60 to 66 ⅔ per cent. |
| Metal size | ... | 5 mm. to 25 mm. (about 3/16" to 1") | 40 to 33 ⅓ per cent. |

BR.47.(*a*).3. *Proportion.*—The proportion of the concrete shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate.

Water cement ratio shall not exceed 0.55 and slump shall not exceed 5 cm. (about 2").

The proportioning of the mix shall be done as specified in No. B.6.3.

BR.47.(*a*).4. *Mixing.*—Mixing shall conform to the relevant provisions in specification No. B.6.4.; concrete shall be mixed in mechanical mixers.

BR.47.(*a*).5. *Forms.*—The side forms shall be of steel or timber preferably of steel. Their depth shall be equal to the thickness of the slab. Timber form when permitted shall be free from warps and shall have sufficient thickness to secure rigidity; their top edge shall be true to level. Steel form shall be of approved section preferably channels. They shall be true to line with their tops at the required level. All the forms shall be rigidly held in their correct position and their continuity of line and level maintained with suitable devices. The forms shall be coated on the inside with oil or approved material to prevent sticking of concrete. The side forms shall be struck after 24 hours. They shall be removed in a manner not to injure the concrete or to break the edges. They shall be cleaned and oiled again before reuse.

BR.47.(*a*).6. *Transporting.*—Transporting shall conform to the relevent portion of specification No. B.6.6.

BR.47.(*a*).7. *Placing.*—Placing shall conform to specification No. B.6.7. in general. The surface to receive the concrete shall be thoroughly swept clean of all dirt, loose particles and laitance. It shall then be wetted immediately before placing of concrete with just sufficient water to moisten the surface. The concreting may be done either by the alternate bay or the continuous method. Care shall be taken to see that the required thickness of the slab is obtained all over the area. Expansion joints as separately detailed for that item elsewhere, shall be fixed during the concreting to coincide with the expansion joints in the decking in width and location. Contraction joint shall be provided at 6 m. (about 20') or at other regular intervals as directed by the Engineer and shall be formed by making groove 6 mm. (about ¼") wide with a depth of not less than ¼th of the depth of pavement at the thinnest part of the section with a suitable tool. Longitudinal joints shall be plain butt joints.

BR.47.(*a*).8. *Compacting.*—Compacting shall conform to the relevent portion of specification No. B.6.7. Secreed board vibrator shall be used for compacting. The tamper shall weigh not less than 10.5 kg./metre (about 7 lbs./rft.) of its length. The bottom shall not be less than 8 cm. (about 3") wide. The bottom shall be shaped to give the required camber to the wearing course. It shall be sufficiently strong to withstand working impacts and pressures. It shall rest on the side forms and shall be moved ahead with a sawing motion. At transverse joints it shall not be drawn closer than one metre (about 3') towards the joint. In such a case it shall be worked from the joint in the reverse direction and the surplus concrete removed.

BR.47.(*a*).9. *Surface finishing.*—Immediately after compacting, the surface shall be inspected for its trueness and rectified where necessary and floated with a wooden hand float of 1.2m. × 10 cm. (about 4'-0" × 0'-4"). The float shall be worked in the transverse direction to the centreline of the bridge to obtain uniform surface. The surface shall then again be inspected for its trueness with a straight edges about 3 m. (about 10') long and rectified where necessary. The surface for a width of at least 15 cm. (about 6") on each side of the joints shall be floated simultaneously with a float to produce a level surface across the joints immediately after initial floating. The surface shall then be finished by a bass fibre broom pulled gently over the surface in the transverse direction to the centreline of the bridge.

The edges of the slabs and of all transverse and longitudinal joints shall be rounded to a radius of 10 mm. (about 3/8") with an edging tool.

The operation of finishing, brooming etc. shall be done from a bridge spanning across the width of the concrete to avoid spoiling the surface.

अनुक्रमणिका
Table of Contents

**BR.48.2.**

B.R.47.(*a*).10. *Curing.*—Curing shall conform to specification No. B.6.9 sufficient care shall be taken to protect the edges. Immediately after the initial set the wearing coat shall be covered with wet empty cement bags. The bags shall be kept wet by sprinkling water till the final set of the concrete. Soon after the final set of the concrete, bunds or ridges of earth shall be laid as instructed by the Engineer over the edges and across the surface to form suitable ponds. These ponds shall be filled with water and kept so far 14 days. The concrete surface shall be protected from any damage till it is completely cured. After the curing is over, the surface and all the joints shall be completely cleaned and the expansion joints filled as detailed in specification No. BR.43. The contraction joints shall be filled with hot liquid bituminous sealing compound. The traffic may be allowed after 2 days after laying concrete.

BR.47.(*a*).11. *Sampling and testing.*—This shall conform to specification No. B.6.12.

BR.47.(*a*).12. *Keeping Records.*—This shall conform to specification No. B.6.13.

BR.47.(*a*).13. *Item to include.*—This shall be as per specification No. B.6.14. Compaction shall be done by screed board vibration. Filling joints with bitumen is also included in the item. Where copper strip expansion joint is not provided in the tender, filling expansion joints with bitumen, sand and asbestos fibre shall be included in the rate for pavement concrete.

BR.47.(*a*).14. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of the concrete pavement completed and finished. The concrete shall be measured for its length and breadth, limiting dimensions to those specified on the plan or as ordered by the Engineer. Dimensions shall be recorded correct to two places of decimals of a metre and the area worked out correct to two places of decimals of a sq. metre. No extra payment will be made if the thickness of the pavement is made more than that specified. If the thickness provided is less than that specified, the concrete may be rejected or a reduced rate may be paid as decided by the Engineer. No deduction shall be made for ventholes.

BR.47(*b*). *Approach slab.*

BR.47.(*b*).1. *Preliminary.*—The earth work under the approach slab shall have been laid in layers of 15 cm. to 20 cm. (about 6″ to 8″) watered and each layer thoroughly consolidated before the upper is laid. Water bound macadam with at least 15 cm. (about 6″) rubble soling duly hand packed shall have been also laid and well consolidated. These items will be paid separately.

The water bound macadam surface shall be cleaned of all loose materials, blindage, etc. and brushed clean with fibre brushes. Dust etc. shall be blown off by compressed air or by waving with gunny cloth.

BR.47.(*b*).2. *Reinforcement.*—Reinforcement as shown in the drawings or directed by the Engineer shall be placed as specified in specification No. B.10. Reinforcement will be paid separately under item No. BR.49.

BR.47.(*b*).3. *Approach slab concrete.*—Specification for approach slab concrete shall be the same as that for 1:2:4 cement concrete wearing course [BR.47.(*a*)]. After the reinforcement is placed, the area to be concreted shall be cleaned of dust and wetted. There shall be no pools of water. Concrete shall then be laid to the specified depth and camber and compacted with screed board vibrator and finished and cured and joints treated as in the case of wearing course.

BR.47.(*b*).4. *Item to include.*—This shall be as per specification No. BR.47(*a*).12.

BR.47.(*b*).5. *Mode of measurement and payment.*—This shall be as per specification No. B.6.15.

BR.48. *Providing vent holes in the slab and wearing course with iron grill at the top and galvanised iron pipe at bottom as per drawing.*

BR.48.1. *General.*—The item shall be carried out according to the detailed drawings. The holes shall be located as shown on the drawings or as ordered by the Engineer.

BR.48.2. *Materials.*—(1) Galvanised iron pipe 100 mm. (about 4″) diameter of required lengths.

(2) Grill of mild steel plates 6 mm. (about ¼″) thick, cut and welded as indicated on the drawings. It shall be welded to the pipe.

Both combined shall be of such length as to be just flush with the top of road slab and bottom of deck slab.

BR.48.3. *Construction.*—The 100 mm. (about 4″) diameter galvanised iron pipe shall be placed during the concreting of the deck slab and allowed to project for the required length over the deck slab so that the top of the grill shall be level with the finished wearing surface.

The edges of the exposed surface of the grill plates shall be neatly ground or filed flush with the wearing surface so that the wheels of vehicles shall not be injured.

BR.48.4. *Item to include.*—(1) Galvanised iron pipes.

(2) Grills of mild steel flats or plates welded to the pipes.

(3) Fixing of Galvanised Iron pipes and grill.

(4) All labour, materials, use of equipment, tools, etc., necessary for the satisfactory completion of the item.

BR.48.5. *Mode of measurement and payment.*—The contract rate shall be for one vent hole provided. Measurement shall be for the number of such vent holes fixed on to the bridge.

BR.49. *Providing, cutting bending, hooking, laying in position and tying mild steel reinforcement bars as per detailed drawings for ballast-walls, kerbs, returns, approach, slabs, etc.*

This item shall be carried out according to specification No. B.10 in all respects.

BR.50. *Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal for R. C. C. work of ballast walls, kerbs, box returns, etc., including scaffolding, centering, formwork, compaction, finishing and curing complete (excluding mild steel reinforcement).*

BR.50.1. *General.*—The item shall be carried out according to specification No. B.6. subject to the following:—

BR.50.2. *Proportion.*—The proportion of cement concrete shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate. Water content shall be regulated to give the required consistency for the particular member within the range specified in specification No. B.6.3. or as ordered by the Engineer.

BR.50.3. *Coarse aggregate.*—Coarse aggregate shall be broken or crushed from sound stones of the specified type available in the region and approved by the Engineer. The maximum size of coarse aggregate shall be 20 mm. (about ¾″) and the aggregate shall be well graded from 20 mm. to 5 mm. (about ¾″ to 3/16″) as indicated in A.7. to give a dense concrete.

BR.50.4. *Formwork.*—Formwork shall comply with specification No. B.6.5.

BR.50.5. *Mixing.*—Mixing shall normally be done in a mechanical mixer. But manual mixing with all the precautions necessary to get a uniformly mixed concrete and additional cement as per specification No. B.6 may be permitted by the Engineer.

BR.50.6. *Slump.*—Slump shall not exceed 10 cm. (about 4″).

BR.50.7. *Compaction.*—Compaction shall be done properly by vibration wherever possible and by rodding to give a dense concrete, full embedment of reinforcement and a good cast surface without honeycombing.

BR.50.8. *Finishing.*—Finishing shall be done as required in specification No. B.6.10. Kerbs and exposed areas of returns shall immediately on stripping of forms and within one day of such stripping, be finished with 6 mm. (about ¼″) thick 1:3 mix smooth or sand faced cement plaster as directed by the Engineer after roughening the original surface. Finishing shall be done neatly to lines, levels and curves shown on the plans and shall present a workmanlike appearance. Curing shall be done for 14 days thereafter.

BR.50.9. *R. C. C. Box returns.*—In the case of R. C. C. box returns, excavation shall be carried out as indicated on the plans for laying the footing of the R. C. C. returns and paid for separately under relevant item of excavation. The excavated surface shall be watered and compacted and lean concrete of the specified thickness laid to the required level for laying of the R. C. C. return footing. This lean concrete shall be paid for separately under relevant item. Before casting the concrete of the returns, suitable arrangements shall be made to leave 100 mm. (about 4″) diameter vents at the designated places in the R. C. C. return to act as weepholes. These holes shall be slightly sloping towards the outside.

Inverted filters as specified in BR.25.7. shall be provided behind these vents.

No deductions shall be made for the vents nor separate payment made for the inverted filters behind the vents.

अनुक्रमणिका
Table of Contents



**BR.51.(a).4.**

BR.50.10. *Item to include.*—(1) As per specification No. B.6.14.

(2) Providing cement plaster finish to kerbs and exposed areas.

(3) Weepwholes in the R. C. C. box returns and inverted filters behind them.

BR.50.11. *Mode of measurement and payment.*—As per specification No. B.6.15. The concrete shall be measured for its length, breadth and depth excluding plaster finish (where provided) limiting dimensions to those specified on the plans or ordered by the Engineer. Curved sections shall be measured net. No deduction sholl be made for embedded pipes or other openings less than 500 sq. cm. (about $\frac{1}{2}$ sq. ft.) in sectional area. No payment shall be made for the pipes if provided and inverted filters provided behind the weepholes in the R. C. C. box returns.

BR.51.(*a*). Providing R. C. C. parapet with *1:2:4 cement concrete of trap/granite/quartzite/gneiss metal with cast-in-situ/precast panels, as per the detailed drawings including reinforcement, scaffolding, centering, formwork, compacting, finishing and curing complete.*

BR.51.(*a*).1. *General.*—The item refers to the provision of R. C. C. parapet with precast or cast-in-situ panels as per the item as detailed in the working drawings.

BR.51.(*a*).2. *Materials.*—Mild steel bar reinforcement and wire shall comply with specification Nos. A.10 and A.15 respectively. The diameter of the bars shall be as shown in the working drawings.

*Cement concrete* for R. C. C. shall comply with specification No. B.6. Proportion of concrete shall be one 50 kg. bag of cement 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate. Maximum size of coarse aggregate for R. C. C. panels and railing shall be 6 mm. (about $\frac{1}{4}$″) and 20 mm. (about $\frac{3}{4}$″) for the posts. Water content shall be regulated to give the required consistency for the item within the range specified in specification No. B.6.3. or as ordered by the Engineer. Mixing and compacting may be mechanical or manual as per specification No. B.6.4. at the choice of the contractor subject to the production of concrete of uniform consistency with all coarse aggregates entirely covered with cement mortar and a dense concrete with good cast finish to the surfaces.

BR.51.(*a*).3. *Construction.*—The R. C. C. parapet shall be constructed as per the detailed drawings after the centering of decking is removed.

The R. C. C. parapet of the type mentioned in the item shall be built in between cast-in-situ R. C. C. posts to correct shape, dimensions and spacings specified on the drawings. The mild steel bar reinforcement of the posts shall be provided as specified under specification No. B.10 and shown in the drawings and spliced to the bars protruding from the slab or the kerb.

The concrete shall be cast as per specification No. B.6. to the shapes, sizes and spacings shown on drawings. The forms shall be such as to give the exact shape to the concrete members shown in the drawings or ordered by the Engineer. Cast-in-situ posts, panels and rails shall be plastered neatly with cement mortar of 1:3 mix to 5 mm. (about $\frac{1}{4}$″) thickness and finished to smooth or sand face as ordered by the Engineer. Plastering shall be done immediately after and within one day of stripping the forms after roughening the concrete suitably. The plaster and concrete shall be well cured for 14 days.

Precast panels shall be cast to the required design with specified reinforcement and tamped and cured for 14 days. They shall originally present smooth surfaces and shall be filled into the grooves left into the kerb properly supported and grouted. Thereafter the R. C. C. post and rail will be cast. Precast top rails may also be used along with precast panels in which case only posts will be cast in situ. The cast-in-situ members shall be plastered with 1:3 cement mortar 6 mm. (about $\frac{1}{4}$″) thick to smooth or sand face finish, immediately after and within one day of stripping the forms after roughening and cured for 14 days.

BR.51.(*a*).4. *Item to include.*—(1) Providing R. C. C. cast-in-situ posts cast-in-situ/precast concrete panels and cast-in-situ/precast rails as shown in the drawing including formwork and 6 mm. (about $\frac{1}{4}$″) thick plaster of cement mortar of 1:3 mix for cast-in-situ members.

(2) Reinforcement for precast and cast-in-situ members.

(3) All labour, materials, use of equipment, tools, plant, scaffolding, etc., necessary for the completion of the item satisfactorily. No separate payment shall be made for concrete and reinforcement of R. C. C. members, the rate per metre being inclusive of all the necessary materials like those mentioned above.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



BR.51.(*a*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the parapet completed to the shape and dimension shown on the drawings. The parapet shall be measured between the inside of the end pillasters over the abutments. Where there are only end posts, the parapet shall be measured from outside to outside of end posts. The length shall be measured correct up to two places of decimals of a metre.

BR.51.(*b*).—*Providing railing of mild steel angle/I/tee posts and galvanised iron pipes as per the detailed drawings including scaffolding and painting.*

BR.51.(*b*).1. *General.*—The item refers to the provision of mild steel angle, I or tee section posts and galvanised iron pipe gailings as shown on the working drawings.

BR.51.(*b*).2. *Materials.*—(1) Mild steel angles, I or tees as per the item, shall be of sizes shown on the plans and shall comply with specification No. A.11.

(2) Anchor bolts, nuts and check nuts to be as per I. S. No. 1148-1964 and of the shape and size shown in the drawing or ordered by the Engineer.

(3) Galvanised iron pipes of the diameter as shown in the drawings with couplings shall be of the standard type. The diameter shall be the inside bore diameter.

BR.51(*b*).3. *Construction.*—The railing shall be constructed as per the detailed drawings. There shall be three rows of pipes on each side.

The angle iron, I or tee sections shall be fixed to the projecting anchor bolts which shall be placed in accurate positions at the time of concreting of the slab and/or the kerb and fastened securely by means of nuts and check nuts. Three rows of galvanised iron pipes with couplings shall then be fixed on each side to lines, levels and curves as directed by the Engineer and passing through the holes cut in the angles, I or tees. It should not possible to remove the pipes easily. All ragged edges of posts shall be smoothened by filing. The pipes and posts shall then be painted with one coat of red lead and two coats of approved shade good oil paint. Oil painting shall be done according to specification No. B.13.

BR.51.(*b*).4. *Item to include.*—(1) Providing or fixing angles, I or tees, as mentioned in the item, bolts, nuts, galvanised iron pipes with coupling including painting as shown in the drawings.

(2) All labour, materials, accessories, use of equipment, tools, plant, scaffolding, etc., necessary for the completion of the item satisfactorilly.

BR.51.(*b*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the railing completed. The railing shall be measured between the inside of the end pillasters over the abutments. Where there are only the end posts the railing shall be measured from out-side to out side of end posts. The length shall be measured correct to two places of decimals of a metre.

BR.51.(*c*). *Providing railing of cast in situ R. C. C. posts with 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal and chains as per the detailed drawings including reinforcement scaffolding, centering, formwork, compaction, finishing and curing complete.*

BR.51.(*c*).1. *General.*—The item refers to the provision of R. C. C. post and chain type railing as shown on the working drawings.

BR.51.(*c*).2. *Materials.*—Mild steel reinforcement and wire shall comply with specification No. A.10 and A.15, respectively.

Cement concrete for R. C. C. posts shall comply with specification No. B 6. The maximum size of coarse aggregate shall be 20 mm. (about ¾"). Proportion of concrete shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate. Water content shall be regulated to give the required consistency for the member within the range specified in specification No. B.6.3. as ordered by the Engineer. Mixing and compacting may be mechanical or manual as per suecification No. B.6.4 at the choice of the contractor subject to the production of concrete of uniform consistency with all coarse aggregate entirely covered with cement mortor and dense concrete with good cast finish to the surfaces.

Chains, eyes and hooks to be fixed in the R. C. C. posts shall be of mild steel or wrought iron as detailed in the drawing or ordered by the Engineer.

BR.51.(*c*).3. *Construction.*—The railing shall be constructed as per the detailed drawings. There shall be two rows of chains on each side.

The R. C. C. posts shall be cast as detailed on the drawings in cement concrete of 1:2:4 mix after reinforcement is fabricated and spliced to the bars protruding from the slab or the kerb according to specification No. B.10. The forms shall be such as to give the exact shape and size to the concrete members shown in the drawings or ordered by the Engineer. The posts shall be correct to line and levels.



अनुक्रमणिका
Table of Contents

**BR.51.(e).1.**

The cast in situ concrete posts shall be finished with plaster of 1:3 cement mortar 6 mm. (about ¼") thick after roughening the surface immediately after and within one day of stripping the forms. The plaster and concrete shall be cured for 14 days.

The chain of the shape and dimensions shown on the drawings shall be fixed to the eyes embedded in concrete of the posts as indicated on the drawing either with both ends or one end fixed. The chain and steel exposed parts shall be painted with one coat of red lead and two coats of good oil paint of approved shade. Oil painting shall be done according to specification No. B.13.

BR.51.(*c*).4. *Item to include.*—(1) Providing R.C.C. cast-in-situ posts with eyes embedded in them and providing and fixing chains as shown on the drawings with painting for chains and other exposed steel parts.

(2) All labour, materials, use of equipment, tools, plant, scaffolding, etc., necessary for the completing the item satisfactorily.

No separate payment shall be made for concrete and reinforcement of R. C. C. members, chains, etc. The rate per metre being inclusive of all the necessary materials, accessories, labour, etc.

BR.51.(*c*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the railing completed. The railing shall be measured between the inside of the end pillasters over the abutments. Where there are only end posts, the railing shall be measured from the outside to outside of the end posts. The length shall be measured correct up to two places of decimals of a metre.

BR.51.(*d*). *Providing collapsible railing with mild steel channel posts and removable galvanised iron pipes as per the detailed drawings including scaffolding and painting.*

BR.51.(*d*).1. *General.*—The item refers to the provision of collapsible type of railing as shown on the drawings.

BR.51.(*d*).2. *Materials.*—(1) Channel sections for the posts and cleats shall be of the size and dimensions shown on the drawings and shall comply with specification No. A.11.

(2) Galvanised iron pipes of the diameter shown in the drawings with couplings shall be of the standard type. The diameter shall be the inside bore diameter.

(3) Anchor bolts, nuts, bolts and rivets shall conform to I. S. 1148-1964 and shall be of the shape and size shown on the drawings.

BR.51.(*d*).3. *Construction.*—The railing shall be constructed as per the detailed drawings. The channel cleats shall be fixed over the projecting anchor bolts by means of nuts. The posts shall be fixed into the cleats as detailed on the drawings by means of nuts and bolts. Three rows of galvanised iron pipes shall be fixed to the posts on each side through the holes punched for the purpose. The galvanised iron pipes shall be removeable, the posts, cleats and the galvanised iron pipes shall be painted with one coat of red lead and two coats of paint of approved shade. Painting shall be done according to specification No. B.13.

BR.51.(*d*).4. *Item to include.*—(1) Providing and fixing collapsible channel posts, cleats, bolts, nuts and galvanised iron pipes with couplings including anchor bolts, nuts, rivets as per drawings and painting pipes and steel parts.

(2) All labour, materials, accessories, use of equipment, tools, plant, scaffolding, etc., necessary for completing the item satisfactorily.

BR.51.(*d*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the railing completed. The railing shall be measured between the inside of the end pillasters over the abutments. Where there are only end posts, the railing shall be measured from outside to outside of the end posts. The length shall be measured correct up to two places of decimals of a metre.

BR.51.(*e*). *Providing railing of cast-in-situ R. C. C. posts with 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal and galvanised iron pipes as per the detailed drawing including, reinforcement scaffolding, centering, formwork, compaction, finishing and curing complete.*

BR.51.(*e*).1. *General.*—The item refers to the provision of R. C. C. posts and galvanised iron pipe railing as shown on the working drawings.

BR.51.(*e*).2. *Materials.*—(i) Cement concrete shall comply with specification No. B.6. The proportion shall be one 50 kg. bag of cement: 70 litres (about 2.4 c. ft.) of sand: 140 litres (about 4.8 c. ft.) of coarse aggregate. The maximum size of coarse aggregate shall not exceed 20 mm. (about ¾") and shall be well-graded to the minimum size of 5 mm. (about 3/16").

अनुक्रमणिका
Table of Contents



Water content shall be regulated to give the required consistency for the member within the range specified in specification No. B.6.3. or as ordered by the Engineer. Mixing and compacting may be mechanical or manual as per specification No. B.6.4. at the choice of the contractor subject to the production of concrete of uniform consistency with all course aggregates entirely covered with cement mortar and dense concrete with good cast finish to the surface.

(ii) Reinforcement bars and binding wire shall comply with specification Nos. A-10 and A.15, respectively.

(iii) Standard galvanised iron pipes of the diameter shown in the plans with coupling. Diameter shall be of the inside bore.

BR.51.(*e*).3. *Construction.*—The railing shall be constructed as per the detailed drawings. There shall be three rows of pipes on each side.

The R. C. C. posts shall be cast to size, shape and spacing as indicated on the drawings after the reinforcement is put up and spliced according to specification No. B.10. The forms shall be such as to give exact shape and size to the concrete members shown in the drawing or ordered by the Engineer. Reinforcement shall conform to specification No. A.10 and shall be spliced to the bars projecting from the slab or kerb as detailed on the drawings. Galvanised iron pipes shall be fixed to the posts through the holes left into the posts for the purpose and shall not be easily removeable. Immediately after the form is stripped and within one day of stripping, the concrete surfaces of the posts shall be roughened and be finished with plaster of 1:3 cement mortar 6 mm. (about ¼") thick and duly cured for 14 days. The galvanised iron pipes shall be painted with one coat red lead and two coats of good oil paint of approved shade. Oil paintings shall be done according to specification No. B.13. The railing and posts shall be in line and level.

BR.51.(*e*).4. *Item to include.*—(1) Providing R. C. C. cast-in-situ posts and galvanised iron pipes with couplings as per drawings with painting for galvanised iron pipes.

(2) All labour, materials, accessories, use of equipment, tools, plant scaffolding, etc., necessary for the completion of the item satisfactorily. No separate payment shall be made for the concrete and reinforcement of R. C. C. members, pipes, etc., the rate per metre being inclusive of all the necessary materials, accessories labour etc.

BR.51.(*e*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the railing completed. The railing shall be measured between the inside of the end pillasters over the abutments. Where there are only end posts the railing shall be measured from outside to outside of end posts. The length shall be measured correct up to two places of decimals of a metre.

BR.51.(*f*). *Providing collapsible railing with channel posts, flats, and angles as per the detailed drawings including scaffolding and painting.*

BR.51.(*f*).1. *General.*—The item refers to the provision of collapsible type of railing as shown on the drawings.

BR.51.(*f*).2. *Materials.*—(1) Channel sections of specified sizes and lengths for the posts and the bottom channel shown in the drawings shall conform to specification No. A.11.

(2) Flats of sizes and lengths shown on the plans for the anchorage of the bottom channels and braces shall conform to specification No. A.11.

(3) Angles of sizes and lengths for the top rail shown on the plan shall conform to specification No. A.11.

(4) Chain, pin and rivets as shown on the working drawings shall be of mild steel or wrought iron.

BR.51.(*f*).3. *Construction.*—The railing shall be constructed as per the detailed drawings. The bottom rail shall be fixed to the flats embedded in the kerb at the time of concreting of the kerb or fixed later. The channel posts shall be fixed at designated points by loose rivets. Slots shall be cut into the bottom channel and the top angle as indicated on the drawings. The top angle shall be fixed to the channel posts by the pin with chain fixed to the posts. The flat braces shall have a loose rivet at the centre. In the collapsed position, the flat braces, the top angles and the channel posts shall be housed into the bottom channel as indicated on the drawings. The steel members shall be painted with one coat of red lead and two coats of oil paint of approved shade. Oil painting shall be done according to specification No. B.13.

BR.51.(*f*).4. *Item to include.*—(1) Providing and fixing the collapsible channel posts, bottom rail, top rail, flat braces and top angle with necessary accessories and painting.

अनुक्रमणिका
Table of Contents

**BR.52.6.**

(2) All labour, materials, accessories and use of equipment, tools, plant scaffolding, etc., necessary for the completion of the item satisfactorily.

BR.51.(*f*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre length of the railing completed. The railing shall be measured between the inside of piliasters over the abutments. Where there are only end posts, the railing shall be measured from outside to outside of the end posts. The length shall be measured correct upto two places of decimals of a metre.

BR.52. Providing fine tooled trap/granite/quartzite/gneiss stone-work for cornice, string course, corbels and copings in cement mortar/1: ..... as per drawngs ncluding scaffolding and curing complete.

BR.52.1. *General.*—Item provides for fine tooled stone-work for string course, cornice, corbel and copings for the bridge. It shall generally comply with specification No. B.9.

BR.52.2. *Materials*:—

BR.52.2.1. *Stones.*—Stones shall comply with specification No. A.8. The stones shall be as square and even bedded as possible and in as large pieces as quarrying and handling permit. They shall be as long as possible on the face and generally not less than 2 times the height. They shall tail into the work not less than 1.5 times the projection or 1.5 times the height whichever is more with a minimum of 23 cm. (about 9″). Stones shall be of the specified type and the best available in the region and got approved by the Engineer before collecting them.

BR.5.2.2. *Mortar.*—Mortar shall comply with specification No. B.5(*a*). The proportion of cement and sand shall be as given in the item.

BR.52.3. *Dressing.*—All the stones shall be dressed on all beds and joints to a minimum of 15 cm. (about 6″) in the embedded portion. They shall be fine-tooled, dressed square, curved or to any special shape, mouldings or chamfer on the exposed faces as shown on the drawings or ordered by the Engineer. The rear face of cornice, string course and corbels going into the masonry may not be dressed. Fine tooled dressing shall comply with specification No. B.9.3.(*d*). A sample of the dressed stone of each category shall be got approved by the Engineer and kept in his office for reference.

BR.52.4. *Construction.*—The stones shall be laid true to line, levels and curves shown on the drawings. Joints shall not exceed 1.5 mm. (about 1/16″). The visible edges shall be free from unsightly chippings. Each stone must first be fitted into its place dry in order that any inaccuracy of figure may be discovered and corrected before it is finally laid in mortar. All stones shall be set fully in mortar in all beds and joints and struck with a wooden mallet to bring them to a solid bearing both in beds and joints. The joint shall be neatly stuck leaving no mortar spread on the face. All the stones shall be of equal height and matching with each other. Stones in the cornice, string course, and coping shall break joint with those in the adjoining masonry at least for half their height.

The stones in positions liable to stains and injury shall be protected as laid down in specification No. B.9.(*a*).6 if directed by the Engineer.

Scaffolding and curing shall comply with the provisions of specification Nos. B.9.11 and B.9.6, respectively.

BR.52.5. *Item to include.*—(1) Providing and laying cornice, string course, corbel and coping including striking, curing and protection.

(2) All labour, materials, erection and removal of scaffolding, use of equipment, tools and plant required for satisfactory completion of the item.

BR.52.6. *Mode of measurement and payment.*—The cornice, string course and corbel completed to the dimensions and shapes shown on the drawings laid and finished shall be measured in metres along the centreline of the projecting portion. No deduction shall be made in the masonry for embedded parts of cornice, corbel and string course. Copings shall be measured on its centreline. The contract rate shall be for one metre and shall be measured correct to two places of decimals of a metre.

When the tendered unit for coping is a cubic metre and the rate is on a cubic metre basis the net square dimensions from tip to tip shall be measured without making any deduction for chamfers, mouldings, throatings etc. The diamensions shall be measured and the cubic contents calculated to two places of decimals of a metre and a cubic metre respectively.

BR.53. *Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for parapet with khandki facing and pointing with cement mortar 1 : 3 on all khandki faces including scaffolding and watering masonry complete.*

The item shall comply with specification No. BR.26. Double faced headers of the full width of the parapet shall be used when the width is 60 cm. (about 2′) or less but they should not be dumbel shaped. Drainage holes shall be left in the parapets for which no separate payment will be made. They shall be of the full height of the course and dressed stones of the full width shall be provided for the sides of the holes. They shall be provided at intervals of about 6 m. (about 20′) or as directed by the Engineer.

When water spouts are provided in the tender, they will be paid for separately.

When the faces of stones are to be dressed further according to specification No. BR.54, the joints shall be reduced from 10 mm. (about $\frac{3}{8}$″) to 1.5 mm. (about 1/16″) for fine tooled dressing and 3 mm. (about 1/8″) for rough tooled, chisel dressed and close punched dressing.

No deduction shall be made in the masonry for drainage holes or water spouts.

BR.54. *Extra over C. R. masonry for providing face stones with—*

(*a*) *Rough tooled dressing.*

(*b*) *Chisel dressing.*

(*c*) *Close punched dressing.*

(*d*) *Fine tooled dressing.*

BR.54.1. *General.*—The item refers to the provision of rough tooled, chisel dressed, close punched or fine tooled face stones to the C. R. stone masonry as per the item.

BR.54.2. *Dressing.*—The stones in the face of the C. R. masonry shall be further dressed to rough tooled, chisel dressed, close punched or fine tooled standard as mentioned in the item and shall comply with the respective relevant specifications as given in B.9.3.(*a*), B.9.3.(*b*), B.9.3.(*c*) or B.9.3.(*d*). The dressing shall be done before the stones are laid in the masonry. When the dressing is done as tbove the bed and vertical side joints of the masonry shall be dressed to allow 1.5 mm. (about 1/16″) joint for fine tooled masonry 3 mm. (about $\frac{1}{8}$″) for other types.

BR.54.3. *Joints.*—The width of the joints shall be 1.5 mm. (about 1/16″) for fine tooled dressing and 3 mm. (about 1/8″) for other three types of dressing.

BR.54.4. *Item to include.*—(1) Dressing of the face stones of the C. R. masonry as specified above.

(2) All labour, use of tools etc. required for carrying out the work satisfactory.

BR.54.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre. The dimensions for the area shall be the same as the corresponding dimensions of the face of the C. .R masonry which has dressed surface as above. The dimenisions shall be measured correct up to two places of decimals of a metre and the area calculated correct up to two places of decimals of a sq. metre. No area shall be deducted for the weepholes or the pipes or water spouts etc.

BR.55. *Providing galvanised iron 150 mm. (about 6″) diamater spouts as per drawings.*

BR.55.1. *General.*—The item refers to the provision of 150 mm. (about 6″) diameter galvanised iron pipe water spouts as detailed on the drawings for the draining of water from over the bridge without fouling the masonry or concrete.

BR.55.2. *Materials.*—150 mm. (about 6″) diamater galvanised iron pipe of required length as indicated on the drawings.

BR.55.3. *Construction.*—The galvanised iron 150 mm. (about 6″) diameter pipe shall be cut to the length and shape indicated on the drawings and shall be suitably fixed in the masonry or form-work of concrete symmetrically at 6 m. (about 20′) centre to centre or at other intervals or places as directed by the Engineer while the masonry is being laid or concreting of the slab is taken up. These pipes should be placed symmetrically to the span, i.e., at half point or at 1/3 points or at 1/4 points. The pipe shall be suitably embedded in the masonry or concrete while masonry or concrets is being laid and not after laying. The inside end of the pipe shall be neatly shaped and finished to fit in the surface of masonry or concrete without any projection so as to provide smooth and unobstructed passage for the water to enter.

BR.55.4. *Item to include.*—(1) The cost of pipes, other materials, fastenings, labour, use of tools, etc., and operations required to complete the item satisfactorily.

BR.55.5. *Mode of measurement and payment.*—The contract rate for the water spouts shall be for one number of the water spout. The water spouts shall be measured for their numbers provided on the bridge.

BR.56. *Providing and fixing marble tablet of size and description as per detailed drawings including moulded marble/1 : 2 cement mortar border.*

BR.56.1. *General.*—The item provides for the supply of marble slab of the required size, engraving the emblem, figures and letters as ordered by the Engineer and fixing the same in position on the bridge as indicated on the drawings or as ordered by the Engineer.

BR.56.2. *Materials.*—(1) The marble slab shall be 25 mm. (about 1") thick and shall be of good quality milky white shade, free from veins and unsightly spots, etc. It shall have a uniform shade all over the surface. The surface shall be even, smooth, and in one plane with edges true and square. The size of the slab shall be as indicated on the drawings or as ordered by the Engineer. Marble border if provided in the drawing, shall be of the size, shape and colour shown therein.

(2) Cement mortar 1 : 2 shall comply with the specification No. B.5.(*a*).

(3) Black lead filling.

BR.56.3. *Engraving.*—The border, emblem, figures and letters shall be engraved as indicated on the drawings. The engraving shall be in 'V' cut grooves and shall be filled with black lead tacked in the grooves and flush with the face of the tablet.

BR.56.4. *Fixing.*—The marble tablet shall be fixed securely in position indicated on the drawings or as ordered by the Engineer in cement mortar 1 : 2 with marble or mortar moulding all round according to drawings ; mouldings shall be rubbed smooth. Recess may be left in the concrete or the masonry or may be cut subsequently for the purpose. No deduction shall be made for the recess left or cut in the masonry or the concrete.

BR.56.5. *Item to include.*—(1) Supply of marble tablet, engraving and fixing including lead filling and finishing with moulded border of marble or cement mortar.

(2) Cutting recess in masonry or concrete if necessary.

(3) All labour, materials, use of equipment, tools and plant for completion of the item satisfactorily.

BR.56.6. *Mode of measurement and payment.*—The contract rate shall be for one square meter of the marble tablet overall including moulded marble border if provided. Overlaps of border and tablet shall not be measured. Cement mortar border if provided, shall be considered as incidental to fixing and shall not be measured. The length and width shall be measured correct up to two place of decimals of a meter and area calculated correct to three places of a square meter.

BR.57. *Providing trap/granite/quartzite/gneiss rubble filling behind the abutments, returns or wings.*

BR.57.1. *Materials.*—The stones to be used shall be broken rubble with fairly regular shape and not weathered or decayed stones. Stones shall be selected for their larger size. The stones shall be about 0.015 cub. m. or 15 litres (about $\frac{1}{2}$ c. ft.) in size unless otherwise ordered by the Engineer, having regard to the nature of the stone being quarried. The stones to be used for wedging in the joints between stones shall be chips of such size as to *snugly* fill up the interstices in most cases. All suitable rubble obtained from foundation excavation shall be made use of first. The rate to be charged for this rubble to the contractior shall be that which is entered in the schedule A and if not so entered, the Divisional schedule rate crrrent at the time of tender.

BR.57.2. *Details of contruction.*—Dewatering if necessary shall be done according to specification No. BR.4. The bed on which rubble filling is to be laid shall be cleared of all loose materials levelled and consolidated and got approved by the Engineer before starting rubble filling. Rubble filling behind abutments, returns or wings shall be laid in regular horizontal layers of not more than 30 cm. (about 12") in thickness closely packed and compacted and firmly set with their broadest face downwards. The interestices between adjacent stones shall be wedged in with spalls of the proper size, well driven in with hammers or wooden mallets to ensure tightly packed layers. Such wedging shall be carried on simultaneously with the placing in position of the largest stones in each layer and shall in no case be permitted to fall behind. Each layer shall be packed and completed before the upper layer is started.

Backfilling required to be done if any, on the river-side of the abutment, wings or returns shall be done simultaneously with the filling on the landside. Special precautions should also be taken to prevent wedging action against masonry. The masonry shall have been fully cured before rubble filling.

BR.57.3. *Item to include.*—(1) Supplying broken rubble and spalls of approved quality and size.

(2) All labour, materials and use of equipment and tools for properly laying hand packing and compacting the rubble.

(3) Any other incidental charges to complete the work as per sanctioned plan including dewatering unless separately provided in the tender.

BR.57.4. *Mode of measurement and payment.*—Rubble filling shall be measured in cubic metres limiting the dimensions to those shown in the plan or as directed by the Engineer. The dimensions shall be measured to two places of decimals in metres and quantities worked out to two places of decimals of a cubic metre.

No deduction shall be made for voids.

The contract rate shall be for a unit of one cubic metre.

BR.58. *Carrying out load test of bridge.*

BR.58.1. *General.*—The item provides for carrying out load test of the bridge including necessary erection and removal of scaffolding, platform, use of suitable loads, equipments for application of loads and instruments for measuring deflections, all labour, materials, etc., necessary for carrying out the test. Load testing shall not be done before 28 days after concreting. The test shall be on one span or self-contained group of spans connected to one another in such a way that the loading of one part affects another in the same group.

BR.58.2. *Preliminaries.*—Inspection platform shall be erected for observing deflections cracks and behaviour of the superstructure under the loading in the selected and designated spans or units. The platforms shall be so erected as to give easy accessibility close to the bottom and sides of the deck system, safety and facility of easy movement on them and shall be totally independent of the structure. During the test, struts strong enough to take the whole load shall be placed in position leaving a small gap under the members.

Suitable arrangements such as the deflectometer or tested dial gauges shall be provided to measure the deflections of the designated structural members at designated positions. These arrangements shall be entirely independent of the inspection platform.

BR.58.3. *Test Loading.*—Test load shall be 125 per cent. of the live load including impact. The test load shall be converted into a uniformly distributed dead load spread over a suitable length and width so as to produce the bending moment and shear equivalent to those produced by the test live load. Distributed test load prducing the design bending moment and shear force, shall be applied evenly in the form of sand bags or such other suitable loads over a predetermined section of the span. Except for this loading, the entire units shall be cleared of all loads at the time of test.

BR.58.4. *Test procedure.*—The test load shall be applied in increments of 20 per cent. or other suitable increments as directed by the Engineer at an interval of one hour. The behaviour of the deck system shall be observed continuously throughout the test. Deflections shall be observed before and after the application of each increment of load. On reaching the maximum load the same shall be maintained for 24 hours and then the loading shall be decreased at the same rate and at the same intervals as those of increments of loads and the deflections shall be observed just before and after the removal of each decrement of load. The behaviour of the deck system shall be observed during this process also.

During the entire test, the behaviour of the bearings such as shift and tilt shall be observed and recorded.

BR.58.5. *Recording.*—The observations of the test shall be recorded in tabular pro-forma specified herein and the behaviour of the structural members recorded in the column of remarks by an officer of the Department ranking not lower than a Deputy Engineer and signed by the contractor also:—

(1) Graph of load against deflection shall be plotted both for loading and unloading.

(2) Comparison statement of actual and theoretical deflections shall be prepared. The two should closely agree with residual deflection not more than 20 per cent. of the maximum.

अनुक्रमणिका
Table of Contents



**BR.58.9.**

BR.58.6. *Defective Work.*—It the results and behaviour of structural members under the load test show defective materials and workmanship, the contractor shall take necessary measures at his own cost to rectify the defects as directed by the Engineer. A fresh loading test shall be taken after rectification in such a case and payment shall be made only for the test giving satisfactory results.

BR.58.7. *Item to include.*—(1) All labour, materials, equipment, tools and plant required for carrying out the bridge loading test satisfactorily.

(2) Erecting and removal of platforms, scaffolding, etc.

(3) Erecting and removing deflection measuring devices.

(4) Applying test loads and removing.

(5) Recording of observations.

(6) A fresh loading test after rectification if the results of the initial test are unsatisfactory.

BR.58.9. *Mode of measurement and payment.*—Contract rate shall be for carrying out necessary test on one span or one self-contained group of spans connected to one another in such a way that the loading of one part affects another in the same group.

The tests shall be recorded as a job and paid for at the contract rate. Test showing unsatisfactory results due to bad materials or defective workmanship will not be paid for.

TEST RECORD

| Sr. No. | Wt. in tonnes | Time Hr. Min. | Deflectometer Reading | Magnification Factor | Actual Deflection | Computed Deflection | Remarks |
|---|---|---|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# SECTION CD

# STANDARD SPECIFICATIONS

FOR

# CROSS DRAINAGE WORKS



अनुक्रमणिका
Table of Contents

## CROSS DRAINAGE WORKS

Many of the items for Cross Drainage Works are the same as those for Bridge Work. The specifications of the items of Cross Drainage Works which are identical with those of the corresponding bridge items may be referred directly to the bridge items as indicated in the list below.

*List of items which are common to Cross Drainage Works and Bridge Work.*

| Serial No. | Item of Cross Drainage Works | Identical Bridge Item |
|---|---|---|
| (1) | (2) | (3) |
| 1 | Constructing and maintaining temporary road diversion including barricading the existing road, maintaining night watchmen, red lights etc., as directed till the completion of the work. ... | BR.1 |
| 2 | Dismantling the existing structure including sorting out useful materials and stacking them within the specified lead neatly as directed and wasting the useless materials. ... | BR.2 |
| 3 | Excavation for foundation in--<br>(*a*) Earth, soils of all types, sand, gravel, soft murum, etc.<br>(*b*) hard murum.<br>(*c*) hard murum and boulders.<br>(*d*) soft rock.<br>(*e*) hard rock (blasted).<br>(*f*) hard rock (chiselled and wedged or line drilled).<br>(*g*) laterite ... ... ...<br>including shoring and strutting as necessary and disposing off the excavated stuff as directed. | BR.3. |
| 4 | Dewatering including diversion of stream, providing cofferdams, bunds, etc., as may be necessary for foundation and other parts of the work and bailing out and pumping out water during and after excavation as required. ... | BR.4 |
| 5 | Providing uncoursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for foundations including striking joints and watering complete. ... | BR.6 |
| 6 | Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for abutments, returns, wings, headwalls, etc., with khandki facing and pointing with cement mortar 1:3 for all khandki faces and rubble facing with struck joints for rubble backing including scaffolding and watering masonry complete | BR.25 |
| 7 | Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for piers with khandki facing and pointing with cement mortor 1:3 on all sides including cut and easewaters, necessary scaffolding and watering masonry complete. ... | BR.26 |
| 8 | Providing and fixing mild steel fixed plate bearing of ..... tonnes capacity as per detailed drawings. ... | BR.32 |
| 9 | Providing and fixing mild steel sliding plate bearings of ..... tonnes capacity as per detailed drawings. ... | BR.34 |
| 10 | Providing, cutting, bending, hooking, laying, in position and tying mild steel bars for reinforcement for the reinforced cement concrete work as shown on the detailed drawings. ... | BR.35 |
| 11. | Providing and fixing expansion joint as per drawing. ... | BR.43 |
| 12 | Providing trap/granite/quartzite/gneiss rubble filling over haunches and arches including hand packing. ... | BR.46 |

अनुक्रमणिका
Table of Contents



| Serial No. | Item of Cross Drainage Works | Identical Bridge Item |
|---|---|---|
| (1) | (2) | (3) |
| 13 | Providing vent holes in the slab and wearing course with iron grill at the top and galvanised iron pipe at bottom as per drawing. ... | BR.48 |
| 14 | Providing RCC parapet with 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal with cast-in-situ/precast panels as per the detailed drawings including reinforcement, scaffolding, form work, centering, compacting, finishing and curing complete. ... | BR.51(*a*) |
| 15 | Providing railing of mild steel angle/I/tee posts and galvanised iron pipes as per the detailed drawings including scaffolding and painting | BR.51(*b*) |
| 16 | Providing railing of cast in situ RCC posts with 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal and chains as per the detailed drawings including reinforcement scaffolding, centering, form work, compaction, finishing and curing complete. ... | BR.51(*c*) |
| 17 | Providing collapsible railing with mild steel channel posts and removable galvanised iron pipes as per the detailed drawings including scaffolding and painting. ... | BR.51(*d*) |
| 18 | Providing railing of cast in situ RCC posts with 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal and galvanised iron pipes as per the detailed drawings including reinforcement scaffolding, centering, form work, compaction, finishing and curing complete | BR.51(*e*) |
| 19 | Providing collapsible railing with channel posts, flats, angles, etc., as per the detailed drawings including scaffolding and painting ... | BR.51(*f*) |
| 20 | Providing coursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—for parapet with khandki facing and pointing with cement mortar 1:3 on all khandki faces including scaffolding and watering masonry complete ... | BR.53 |
| 21 | Extra over coursed rubble masonry for providing face stones with—<br>(*a*) Rough tooled dressing.<br>(*b*) chisel dressing,<br>(*c*) close punched dressing,<br>(*d*) fine tooled dressing. ... | BR.54 |
| 22 | Providing galvanised iron 150 mm. (about 6″) diameter water spouts as per drawings. ... | BR.55 |
| 23 | Providing trap/granite/quartzite/gneiss rubble filling behind the abutments, returns or wings. ... | BR.57 |

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



The specifications of the items of Cross Drainage Works which are not identical with those of the corresponding Bridge items or those which are entirely different from the latter are given hereinafter.

*List of items of Cross Drainage Works.*


| Serial No. (1) | Item (2) | Page (3) |
|---|---|---|
| 1 | Providing rubble filling of trap/granite/quartzite/gneiss stones in foundations including hand packing, and filling gravel/sand in the voids complete ... ... ... ... ... | 151 |
| 2 | Providing 1 : 1.5 : 3/1 : 2 : 4 proportion lime concrete of trap/granite/quartzite/gneiss metal for foundations and elsewhere including necessary formwork, laying, compacting and curing complete. ... | 151 |
| 3 | Providing and laying in situ cement concrete of—<br>(*a*) 1:3:6<br>(*b*) 1 : 4 : 8<br>(*c*) 1 : 5 : 10<br>proportion with trap/granite/quartzite/gneiss metal in foundations including necessary formwork, compacting and curing complete ... | 152 |
| 4 | Providing trap/granite/quartzite/gneiss rubble stone paving 15 cm. (about 6")/23 cm. (about 9") thick in 1:- cement mortar over a bedding of 15 cm. (about 6") thick cement concrete of 1:4:8 proportion with trap/granite/quartzite/gneiss metal including striking joints and watering complete ... ... ... ... | 152 |
| 5 | Providing trap/granite/quartzite/gneiss khandki paving of —cm. thickness in 1:—cement mortar over a bedding of 15 cm. (about 6") thick cement concrete of 1:4:8 proportion with trap/granite/quartzite/gneiss metal including pointing with cement mortar 1:3 and watering complete. ... ... ... ... | 153 |
| 6 | Providing uncoursed rubble trap/granite/quartzite/gneiss stone masonry in cement mortar 1:—Lime mortar 1: for piers, abutments, wings, returns, headwalls, parapets, etc., including striking joints of the non-exposed faces and pointing the exposed faces with cement mortar 1:3 for exposed faces, scaffolding and watering masonry complete ... ... ... ... ... ... | 154 |
| 7 | Providing and laying cement concrete pipe of I.S. NP2/NP3 class of— mm. diameter in proper line, level and slope including providing, fixing and collars in cement mortar 1 : 2 complete ... ... | 154 |
| 8 | Providing cast in situ block of 1:3:6 cement concrete with circular or other shaped opening for waterway including necessary formwork, compaction, finishing and curing complete ... ... ... | 155 |
| 9 | Providing and laying in situ ordinary 1:2:4 cement concrete/controlled cement concrete of trap/granite/quartzite/gneiss metal including centering formwork, scaffolding, compacting, finishing and curing complete in (*a*) solid/deck slab, (*b*) Main and Cross girders/arch ribs, (*c*) Arches, (*d*) other R. C. C. elements (excluding mild steel reinforcement) ... ... ... ... | 156 |
| 10 | Providing cut trap/granite/quartzite/gneiss stone arch face ring of:—<br>(*a*) ashlar fine tooled,<br>(*b*) ashlar rough tooled,<br>(*c*) ashlar rock faced,<br>(*d*) ashlar chamfered,<br>(*e*) ashlar block in course,<br>stones set in cement mortar 1: including necessary formwork, centering, striking joints and watering complete ... ... ... | 156 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| Serial No. (1) | Item (2) | Page (3) |
|---|---|---|
| 11 | Providing trap/granite/quartzite/gneiss stone slabs of—cm. thickness over the spans of Cross Drainage works as per the drawing including dressing, conveyance, fixing in cement mortar 1:—and curing complete ... ... ... ... ... ... | 157 |
| 12 | Providing precast 1:2:4 R.C.C. slabs over the spans of Cross Drainage works as per the drawings including reinforcement, conveyance, fixing in cement mortar 1:—and curing complete ... ... ... | 158 |
| 13 | Providing and laying in situ 1:4:8 cement concrete of trap/granite/quartzite/gneiss metal for haunch filling including forms, compacting, curing and scaffolding complete ... ... ... ... | 159 |
| 14 | Providing hard murum/selected earth filling including laying in layers of 15 cm. to 20 cm. (about 6″ to 8″) watering and compacting complete ... ... ... ... ... ... | 159 |
| 15 | Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal including compacting, finishing, curing and filling joints with bitumen complete for—<br>(*a*) wearing course 8 cm. (about 3″) thick,<br>(*b*) aproach slab (excluding mild steel reinforcement) ... ... | 159 |
| 16 | Providing dressed trap/granite/quartzite/gneiss stone work for coping, cornice, string course, corbels and inspection steps, etc., in cement mortar 1 : complete ... ... ... ... ... | 159 |
| 17 | Providing 5 cm. (about 2″) thick 1:3 cement mortar coping with stone chips embedded including scaffolding, formwork, finishing and curing | 159 |
| 18 | Providing and fixing in 1 : 2 cement mortar, marble year plate 30 cm. × 20 cm. (about 12″ × 8″) in the parapet including cutting border, figures and letters and painting complete ... ... ... | 160 |
| 19 | Providing and fixing in cement mortar 1:2, marble plate 30 cm.×20 cm. (about 12″×8″) showing the No. of Cross Drainage work and the direction of flow by arrow including cutting border line, figures, letters, and signs and painting complete ... ... ... ... | 160 |
| 20 | Providing stream lined R. C. C. guard stones including 1:2:4 cement concrete and mild steel bar reinforcement ... ... ... | 160 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



CD.1. *Providing rubble filling or trap/granite/quartzite/gneiss stones is foundations including hand packing, filling gravel/sand in the voids complete.*

CD.1.1. *General.*—The item provides for the rubble filling in foundation including dewatering, preparing the foundations, obtaining rubble and gravel or sand, hand packing rubble in the foundations and filling the voids with gravel or sand, as per the item.

CD.1.2. *Materials*—(i) *Rubble.*—This shall comply with specification No. Rd.19. Rubble stone shall be of the type mentioned in the item.

(ii) *Gravel.*—Gravel shall be natural gravel obtained from streams in the region and shall not contain particles bigger than 20 mm. (about $\frac{3}{4}''$) in diameter. It shall be clean and free from weathered, soft and crumbling portions.

Sand shall not contain more than 10% of clay or silt.

CD.1.3. *Dewatering.*—If the space in which rubble filling is to be done is under water, dewatering shall be arranged as necessary according to specification No. BR.4. The rate for rubble filling shall cover dewatering also unless dewatering is separately provided for in the tender.

CD.1.4. *Filling.*—The bed on which rubble filling is to be laid, shall be cleared of all loose materials, levelled and compacted and got approved by the Engineer before starting rubble filling. Such preparation of the base shall be covered by the rate of this item. Rubble filling shall be carried out to dimensions and levels indicated on the drawing or as ordered by the Engineer.

The rubble shall be laid with the largest face downwards and in close contact with each other in layers not exceeding 30 cm. The stones should break joint as far as possible. Each layer of the rubble filling shall be hand packed by wedging spalls and chips of rubble in the joints and voids and driving them by mallets or hammers so as to fill up the joints and voids as completely as possible. Further voids shall be filled with the gravel or sand as per the item collected for the purpose before the upper layer is laid.

The rubble filling shall be roughly levelled at the top with spalls and chips and voids shall be filled with gravel or sand as mentioned in the item.

Only dry gravel or sand shall be used for filling.

CD.1.5. *Item to include.*—(1) Dewatering if not separately provided for in the tender.

(2) Preparing the foundation for laying rubble.

(3) Providing rubble and gravel or sand required for the filling.

(4) Laying and hand packing of rubble and filling gravel or sand.

(5) Any other labour, materials and use of tools required for the completion of the item satisfactorily.

CD.1.6. *Mode of measurement and payment.*—The contract rate shall be for one cu. metre of rubble filling completed as specified. The dimensions shall be measured correct up to a cm. and the volume calculated correct up to two places of decimals of a cubic metre.

The dimensions shall be restricted to those shown on the plan or to those ordered by the Engineer.

No deduction shall be made for voids.

CD.2. *Providing 1:1.5:3/1:2:4 proportion lime concrete of trap/granite/quartzite/gneiss metal for foundations and elsewhere including necessary formwork, laying, compacting and curing complete.*

CD.2.1. *General.*—The item provides for lime concrete of 1: 1.5:3 or 1:2:4 proportion as per the wording of the item required for foundations and other items including dewatering, formwork, laying, compacting and curing.

CD.2.2. *Lime concrete.*—The lime concrete shall comply with specification No. B.4 subject to the following:

*Coarse aggregate.*—The miximum size of coarse aggregate shall be 50 mm. (about 2″) or $\frac{1}{4}$ the thickness of concrete whichever is less.

*Proportion.*—The proportion of lime, sand and coarse aggregate shall be 1:1.5:3 or 1:2:4 by volume, as per the item.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



CD.4.4.2.

CD.2.3 *Dewatering.*—Where water is met with, the area to be concreted shall be kept dry during the laying of the concrete and till the concrete is sufficiently set and also at the time of inspection and taking measurements. The method of dewatering shall be such as will not damage the concrete. Dewatering shall be included in the rate of the concrete unless it is separately provided for in the tender. Dewatering shall be done as per specification No. BR.4.

CD.2.4. *Finishing.*—If on removal of the forms, the lime concrete surface is found honeycombed, it shall be finished with fresh lime mortar of the same proportion as used in the concrete.

CD.2.5. *Item to include.*—According to specification No. B.4.8. Dewatering if necessary and if not provided for as a separate item in the tender shall be included.

CD.3. *Providing and laying in situ cement concrete of—*

(*a*) *1:3:6*

(*b*) *1:4:8*

(*c*) *1:5:10*

*proportion with trap/granite/quartzite/gneiss metal in foundation including necessary formwork, compacting and curing complete.*

CD.3.1. *General.*—The item refers to providing and laying cement concrete of the proportion mentioned in the wording of the item in the foundations.

The specification No. BR.5 shall be applicable to this item with the following modifications:—

(i) The proportion shall be as specified in the wording of the item.

BD.4. *Providing trap/granite/quartzite/gneiss rubble stone paving 15 cm. (about 6") 23 cm. (about 9") thick in 1:—cement mortar over a bedding of 15 cm. (about 6") thick cement concrete of 1:4:8 proportion with trap/granite/quartzite/gneiss metal including striking joints and watering complete.*

CD.4.1. *General.*—The item provides for the rubble stone paving of the specified type of stones and thickness over 15 cm. (about 6") thick bedding of cement concrete of 1:4:8 proportion, after dewatering if necessary and including striking joints and watering. Mortar shall be of specified proportions.

CD.4.2. *Materials.*—Stones for paving shall conform to specification No. B.9.k.4. The thickness of the paving shall be made up of one stone only allowing for the mortar bedding of about 20 mm. Other dimensions of stones shall be more than the thickness.

The coarse aggregate for concrete bedding shall conform to specification No. B.6.2.4 and be broken or crushed from the best stone of specified type available in the region and approved by the Engineer. The maximum size of the aggregate shall be 40 mm. (about 1½") and the aggregate shall be well graded from 40 mm. to 5 mm. (about 1½" to 3/16").

CD.4.3. *Dewatering.*—According to specification No. B.9.10.

CD.4.4. *Construction.*

CD.4.4.1. *Concreting.*—If the bed is sandy or earthy it shall be watered if not originally wet and the bed made even and compacted manually by rammers if necessary before laying concrete.

The 1:4:8 cement concrete shall conform to the relevant provisions of specification No. B.6 for ordinary cement concrete and laid evenly and well compacted manually by rammers to give a finished depth of 15 cm. (about 6").

The proportion of the cement concrete shall be one bag of 50 kg. of cement: 140 litres (about 4.8 Cft.) of sand: 280 litre (about 9.6 Cft.) of coarse aggregate.

The concrete may be mixed manually taking due precautions as specified in B.6.4 regarding increased cement content, etc. The water content may be decided for the consistency suitable for the work and as directed by the Engineer.

The concrete shall be cured for 14 days or till the stone paving is laid on it whichever is earlier. The surface of the concrete shall not be smoothened.

CD.4.4.2. *Rubble paving.*—The paving stones shall be laid not earlier than 48 hours after laying concrete. The stones for the paving shall be used after merely knocking out weak corners and edges by a mason's hammer.

अनुक्रमणिका
Table of Contents

The stones shall be wetted before they are laid.

The paving shall be laid to the levels and shapes as indicated on the drawings or as ordered by the Engineer in cement mortar of the proportions specified in the item.

The thickness of the paving shall be made up with one stone only.

The stone shall be laid to have a plain surface level or sloped for the paving at top The stones shall be fully bedded on cement mortar which shall be prepared as specified in B.5 (a). Spalls shall be used to fill the voids. There shall be no pinnings on the top surface. No hollows shall be left in the joints or bedding of the paving. The stones shall break joints on the surface. The joints shall not exceed 20 mm. The masonry shall generally conform to the relevant part of specification No. B.9.(*k*).

The surface joints shall be struck neatly while laying the stones and the paving shall be watered for 14 days after setting.

CD.4.5. *Item to include.*—(1) Preparing bed of stream.

(2) Dewatering unless separately provided in the tender.

(3) 1:4:8 cement concrete bedding.

(4) Rubble stone paving laid in cement mortar to levels and shape shown on the drawings or as ordered by the Engineer.

(5) Striking joints.

(6) Watering.

(7) All labour, materials and use of tools required for completing the item satisfactorily.

CD.4.6. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the finished rubble stone paving including the concrete bedding and striking joints. The dimensions shall be measured correct up to a cm. and the area worked out correct up to two places of decimals of a square metre.

CD.5. *Providing trap/granite/quartzite/gneiss khandki paving of cm. thickness in 1:— cement mortar over a bedding of 15 cm. (about 6″) thick cement concrete of 1:4:8 proportion with trap/granite/quartzite/gneiss metal including pointing with cement mortar 1:3 and watering complete.*

CD.5.1. *General.*—The item provides for the khandki paving of specified type of stones and thickness over 15 cm. (about 6″) thick bedding of cement concrete of 1:4:8 proportion after dewatering if necessary and including pointing with cement mortar 1:3 and watering.

CD.5.2. *Materials.*—As per B.9.2.

The khandkies shall be dressed to rectangular face with straight edges. The four sides shall be in one plane. Bushings shall not be more than 2 cm. (about ¾″). The sides of khandki shall be dressed square for at least 4 cm. (about 1½″) from the face and further taper shall not be steeper than 1 in 5.

All khandkies shall be more in length than the width on face and shall have tailing of the full specified depth of the pavement. All khandkies shall be of the same width. The width shall be as shown on the drawings or as ordered by the Engineer according to the availability of stones but not more than 30 cm. (about 12″) and not less than 15 cm. (about 6″).

The coarse aggregate for concrete bedding shall conform to specification No. B.6.2.4. and be broken or crushed from the best stone of specified type available in the region and approved by the Engineer. The maximum size of the aggregate shall be 40 mm. (about 1½″) and the aggregate shall be well graded from 40 mm. to 5 mm. (about 1½″ to 3/16″)

CD.5.3. *Dewatering.*—According to specification No. B.9.10.

CD.5.4. *Construction.*

CD.5.4.1. *Concreting.*—According to specification No. CD.4.4.

CD.5.4.2. *Khandki paving.*—The khandki paving shall be laid not earlier than 48 hours after laying concrete.

The khandkies shall be wetted immediately before use. The paving shall be laid to levels, slopes and shapes as indicated on the drawings or as ordered by the Engineer. The khandkies shall be laid on a bedding of cement mortar so as to embed the bottom completely in the mortar. Chips and spalls shall be inserted in the mortar joints and beds wherever necessary. The khandkies shall be laid in strips, rows of khandkies being laid lengthwise or diagonally as directed by the Engineer.

अनुक्रमणिका
Table of Contents



CD.7.3.

The cement mortar shall comply with the specification No. B.5(*a*). and shall be of the proportion mentioned in the item.

No hollows shall be left in the bedding or joints of the paving. The joints at right angles to the strips (joints formed by the width sides) shall break joints with similar joints in the adjacent strips.

The joints shall not exceed 12 mm. (about $\frac{1}{2}$").

The joints shall be pointed with cement mortar 1:3 as specified in B.13 and the paving shall be watered for 14 days thereafter.

CD.5.5. *Item to include.*—(1) Preparing bed.

(2) Dewatering unless separately provided in the tender.

(3) 1:4:8 cement concrete bedding.

(4) khandki paving laid in cement mortar to levels, shape and pattern as shown in the drawings or as ordered by the Engineer.

(5) Pointing with cement mortar 1:3.

(6) Watering.

(7) All labour, materials and use of tools, etc., required for completing the item satisfactorily.

CD.5.6. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the finished paving including the concrete bedding and pointing. The dimensions shall be measured correct up to a cm. and the area worked correct up to two places of decimals of a square metre.

CD.6. *Providing uncoursed rubble/trap/granite/quartzite/gneiss stone masonry in cement mortar 1:... lime mortar 1:—for piers, abutments, wings, returns, headwalls, parapets including striking joints of the non-exposed faces and pointing the exposed faces with cement mortar 1:3, scaffolding and watering masonry complete.*

CD.6.1. *General.*—The item provides for the uncoursed rubble stone masonry with specified type of stones and mortar for the piers, abutments, wings, returns, headwalls, parapets, etc., including striking joints of the non-exposed faces and pointing with cement mortar 1:3 the exposed faces dewatering, scaffolding, and watering the masonry.

The item shall comply with specification No. BR.6 in all respects and further—

(i) the rate of the item shall include pointing with cement mortar 1:3 to the exposed faces and up to 30 cm. below scour level. This shall comply with the specification No. B.13, and

(ii) no filling shall be done against the masonry till the mortar has set and permission given by the Engineer.

CD.7. *Providing and laying cement concrete pipe of I.S. NP2/NP3 class of — mm. diameter in proper line, level and slope including providing and fixing collars in cement mortar 1 : 2 complete.*

CD.7.1. *General.*—The item provides for the supply and fixing of the spun concrete pipes of the specified class and diameter in position for the Cross Drainage works including necessary collars, conveyance and fixing in cement mortar 1 : 2

CD.7.2. *Materials.*—Concrete pipes shall be of the class and diameter mentioned in the item and shall comply with I.S. 458-1961.

The collars shall be of the appropriate size for fixing of the concrete pipes specified on the drawings and shall comply with the I.S. 458-1961.

The cement mortar shall comply with the specification No. B.5(*a*), proportion of cement to sand being 1 : 2.

CD.7.3. *Fixing.*—The handling and laying of the concrete pipes shall comply with I.S. 783-1959 code of practice of laying concrete pipes, para. 9.2. The joints shall comply with para. 10.2.3 and bedding with para. 4.3.3 of the same I.S.

The pipes shall be laid to the lines and levels shown on the drawings and the slope shall be 1 in 100 towards the down stream unless other slopes are specified on the drawing or as ordered by the Engineer.



अनुक्रमणिका
Table of Contents

The ends of the pipes shall be flush with face of masonry or bell mouthed if so indicated on the drawings or ordered by the Engineer. Pipes of non-standard length may be used when standard length pipes do not fit in between the faces of walls. Otherwise extra lengths of standard pipes may be left projecting beyond face of masonry on the downstream. Such extra length will not be paid for.

Diversions of the road if found necessary, shall be provided according to BR.1 at the cost of the contractor unless separately provided in the tender.

The collar joints be cured satisfactorily. Till then the filling around shall not be done.

CD.7.4. *Item to include.*—(1) Supply, conveyance and fixing of the spun concrete pipes including collars, fixing in cement mortar 1 : 2 to the line, levels and slope.

(2) All labour materials, use of equipment and tools for completing the item satisfactorily.

CD.7.5. *Mode of measurement and payment.*—The contract rate shall be for providing one metre of the spun concrete pipe, joined and fixed in position. The measurement shall be for the length of pipes provided and fixed with collars from the outside of one face wall to the outside of the other face wall, limiting the length to that specified in the plan, or ordered by the Engineer.

The length shall be measured correct up to a centimetre. The rate shall be inclusive of all the projecting lengths, if any, projections being ignored in the measurements.

CD.8. *Providing cast-in-situ block of 1 : 3 : 6 cement concrete with circular or other shaped opening for waterway including necessary formwork, compaction, finishing and curing complete.*

CD.8.1. *General.*—The item provides for the laying of block of 1 : 3 : 6 cement concrete with vents of circular or other shapes for waterway including necessary form work, compacting, finishing and curing complete.

CD.8.2. *Cement concrete.*—The cement concrete shall comply with specification No. B.6 for ordinary cement concrete subject to the following:—

CD.8.2.1. *Proportion.*—The proportion of the cement concrete for the cast-in-situ block shall be 1 bag of 50 kg. cement: 105 litres (about 3.6 c. ft.) of sand: 210 litres (about 7.2 c. ft.) of coarse aggregate.

CD.8.2.2. *Coarse aggregate.*—The maximum size shall be 50 mm. (about 2″) shall be well graded between the 50 mm. (about 2″) and 5 mm. (about 3/16″) size.

CD.8.2.3. *Mixing.*—Mixing shall be by a mechanical mixer.

CD.8.2.4. *Forms.*—Forms shall be of wooden planks or steel sheets suitably assembled. The forms for the curved vents shall be in segments and suitably centred. The vent and face forms if of timber, shall be lined with G. C. I. sheets to give good cast finish. The sides shall be removed after 48 hours of concreting and the vent forms shall be removed after 14 days.

CD.8.2.5. *Placing.*—The stratum on which the concrete is to be laid shall be watered immediately before placing the concrete and compacted. The concrete shall be placed in horizontal layers of 30 cm. to 40 cm. (about 12″ to 16″) and well compacted by mechanical vibrators and rodding. The Engineer may permit manual compaction in which case concrete will be placed in layers of 15 cm. to 20 cm. (about 6″ to 8″). The concrete shall be placed in one continuous operation as far as possible but the Engineer may permit construction joints as directed by him under special circumstances.

CD.8.2.6. *Dowels, expansion and construction joints.*—When dowels, expansion and/or contraction joints are to be provided, they shall be provided as shown on the plans. The rate for concrete shall be inclusive of these items.

CD.8.2.7. *Finishing and curing.*—Immediately after the removal of the forms and in any case within one day thereof, the concrete surface shall be finished with cement mortar 1 : 3 mix wherever there is honey-combing or depressions or broken edges, etc., and thereafter cured for 14 days. The sides shall have wet sacking covering and the top horizontal surface ponded during the period of curing.

After complete curing, the joints shall be entirely cleaned and filled with poured joint filler as specified in specification No. BR.43.

CD.8.3. *Item to include.*—As per specification No. B.6.14. and in addition—

(1) dewatering if required unless it is separately provided for in the tender,

(2) providing and fixing dowels, and expansion and contraction joints.

CD.8.5. *Mode of measurement and payment.*—As per specification No. B.6.15.

CD.9. *Providing and laying in situ ordinary 1 : 2 : 4 cement concrete/controlled cement concrete of trap/granite/quartzite/gneiss/metal including centering, form work, scaffolding, compacting, finishing and curing complete in—*

(*a*) R. C. C. Solid/deck slab.

(*b*) R. C. C. Main and Cross-girders arch ribs.

(*c*) R. C. C. and plain Arches.

(*d*) Other .R C. C. elements (excluding mild steel reinforcement).

CD.9.1. *General.*—The item provides for the specified type of cement concrete in slabs, girders, arches and in other elements. It shall comply with the relevant provisions of the specification Nos. BR.29, BR.30, BR.38 and BR.50.

CD.9.2. *Forms.*—In case of ordinary concrete, centerings and the forms for small spans may be of well compacted earth-filling or stone and mud if found suitable and permitted by the Engineer. The top surface of such centering shall be plastered to regular shape with lime mortar or lean cement mortar. Side forms may be of wood or steel. In other cases, it shall be as in specification No. B.6.

CD.9.3. *Mixing.*—For ordinary grade cement concrete, mixing may be done manually with 5 per cent. additional cement unless mechanical mixing is specified in the special provisions. Ordinary grade 1 : 2 : 4 cement concrete of more than 15 cu. m. in any one job shall be mixed in a mechanical mixer unless manual mixing is permitted by the Engineer in writing. For the controlled concrete the mixing shall be done in a mechanical mixer only.

CD.9.4. *Compaction.*—For the ordinary grade 1 : 2 : 4 cement concrete involving 15 cu. m. or less in any one job, compacting may be done manually by rammers and rods when concrete shall be laid in layers of 15 cm. (about 6") only unless vibration is specified in the special provisions. Ordinary grade 1 : 2 : 4 cement concrete of more than 15 cu. m. in any one job shall be compacted with vibrator only unless manual compaction with rammers and rods is permitted by the Engineer in writing. For the controlled cement concrete, compaction shall be done by mechanical vibrators only.

CD.9.5. *Tests.*—For the ordinary cement concrete if so permitted by the Engineer, tests may not be carried out for the compressive strength when quantity of concrete involved is 15 cu. m. or less.

CD.10. *Providing cut trap/granite/quartzite/gneiss stone arch face ring of—*

(*a*) *ashlar fine tooled,*

(*b*) *ashlar rough tooled,*

(*c*) *ashlar rock faced,*

(*d*) *ashlar chamfered,*

(*e*) *ashlar block in course,*

*stones set in cement mortar 1 :—including necessary form work, centering, striking joints and watering complete.*

CD.10.1. *General.*—The item provides for the stone arch face rings of—

(*a*) ashlar fine tooled,

(*b*) ashlar rough tooled,

(*c*) ashlar rock faced,

(*d*) ashlar chamferred,

(*e*) ashlar block in course,

stones of the specified type set in cement mortar of specified proportion for arches including necessary form work, centering, etc., complete.

CD.10.2. *Materials—Stones.*—The stones shall comply with the specification No. A.8. The stones shall be of such size as to obtain the properly shaped arch stones of the required dimensions after dressing. The stones shall be of the specified type and the best available in the region. The least dimension of the arch stones may vary from 15 cm. (about 6") to 25 cm. (about 10") or as ordered by the Engineer.

*Mortar.*—The cement mortar shall comply with specification No. B.5(*a*) and shall be of proportion mentioned in the item.

CD.10.3. *Dressing.*—The stones shall be of the entire thickness of the arch and of sizes and shape as shown on the drawing or as ordered by the Engineer. They shall be carefully and accurately dressed giving the proper radial joints. The dressing of the stones shall conform to B.9(*a*), B.9(*b*), B.9(*c*) B.9(*d*) or B.9(*e*) as relevant.

CD.10.4. *Forms and centres.*—The forms shall be of the exact shape of the intrados and supported by strong centering suitably braced. In case of larger spans the steel or timber forms may be supported by a suitable steel or timber truss resting on centres. The forms shall not be eased or struck without the written permission of the Engineer. For smaller spans the forms may be prepared with earth filling or stone and mud if found suitable and permitted by the Engineer.

The contractor shall get the forms and centering approved by the Engineer and carry out modification suggested by him where necessary. However, the contractor shall be solely responsible for the safety of the forms, work, workmen and compensation for the damages or injuries.

CD.10.5. *Construction.*—The skew backs on both the sides shall be laid in cement mortar. The dressed stones shall first be laid dry on the forms erected to give correct radial joints and any inaccuracy found, corrected. The arch stones shall then be laid full in cement mortar from both the skew backs towards the crown. The face arch stones shall be laid header and stretcherwise on the soffit to afford good key with the concrete arch abutting the stone face work. The key stone shall then be laid in cement mortar. The width of joints shall be as specified for the particular class of masonry. The joints shall be struck and striking joints shall be included in the rate for arching. The arch shall be watered for 14 days thereafter. The forms and centering shall then be removed without harm to the arch.

The arch shall then be thoroughly cleaned of all stains and adhering mortar, etc., to give a neat appearance.

CD.10.6. *Item to include.*—(1) Providing, dressing and laying in cement mortar stone arch facing including striking joints, scaffolding, forms, centering and watering complete. Skew, backs shall be included in the archwork unless separately provided.

(2) All labour, materials, use of equipment, tools and plant required for satisfactory completion of the item.

CD.10.7. *Mode of measurement and payment.*—The contract rate shall be for one cu. metre of the stone arching dressed and fixed as specified. The measurements shall be net and recorded correct up to 5 mm. and the cubic contents calculated correct upto three places of decimals of a cubic metre. Skew backs shall be measured as a part of the archwork unless separately provided.

CD.11. *Providing trap/granite/quartzite/gneiss stone slabs of cm. thickness over the spans of Cross-Drainage works as per the drawing including dressing, conveyance, fixing in cement mortar 1 : —and curing complete.*

CD.11.1. *General.*—The item provides for the supply at site of stone slabs of specified type and dimensions including dressing all the sides except the upper side in the case of interior slabs and all the sides for face slabs and fixing them over spans of Cross-Drainage works in cement mortar of specified mix and curing complete.

CD.11.2. *Materials.*

CD.11.2.1. *Stones.*—The stones shall comply with the specification No. A.8. The stones shall be quarried in blocks of such size that the desired dimensions of the stone slabs shall be obtained on dressing. The thickness and the length shall be as shown on the drawings. The width shall be as large as possible and not less than the depth. The stones shall be entirely free from cracks, seams or any other defects.

CD.11.2.2. *Mortar.*—Cement mortar shall comply with specification No. B.5(*a*). The proportion of mortar shall be as mentioned in the item.

CD.11.3. *Dressing.*—The stones shall be rough tooled as specified in B.9 on all sides for face slabs and on all sides except the top in the case of interior slabs. All the dressed edges shall be true, square and straight or as directed.

CD.11.4. *Fixing.*—The stone slabs shall be conveyed carefully to site and fixed close to each other over the spans in cement mortar with the required bearing on the abutment and pier tops. The bearing areas shall be laid full in cement mortar and the vertical joints shall also be filled with cement mortar leaving no gaps. The mortar joints shall be struck neatly and face joints of end slabs pointed. The mortar in joints and bearings of the stone shall be watered for 14 days continuously. Vertical joints shall not exceed 10 mm. (about 3/8") in width.

CD.11.5. *Item to include.*—(1) Supply, conveyance, dressing and fixing stone slabs in position in cement mortar and watering.

(2) All labour, materials, use of equipment, tools, and plant necessary for completing the item satisfactorily.

CD.11.6. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of the slab dressed, laid and finished. The dimensions of length shall be measured over all including span and bearings. The width shall be measured between the outside faces of the headwalls including the joints between slabs. The actual depth shall be as specified. The dimension shall be limited to those shown on the drawings. The dimensions shall be measured correct up to a cm. and contents calculated correct up to 3 places of decimals of a cubic metre.

CD.12. *Providing precast 1 : 2 : 4 R. C. C. slabs over the spans of Cross Drainage works as per the drawings including reinforcement, conveyance, fixing in cement mortar 1 :—and curing complete.*

CD.12.1. *General.*—The item provides for supply at site, of precast 1 : 2 : 4 R. C. C. slabs of specified dimensions and fixing them over the spans of Cross Drainage works including reinforcement, manufacture and conveyance.

CD.12.2. *Materials.*

CD.12.2.1. *Cement concrete.*—1 : 2 : 4 cement concrete shall comply with specification No. B.6 for ordinary cement concrete. The maximum size of aggregate shall be 20 mm. (about $\frac{3}{4}$").

CD.12.2.2. *M. S. Reinforcement.*—The mild steel bar reinforcement shall be as per the drawings and shall comply with the specification No. B.10.

CD.12.2.3. *Cement Mortar.*—Cement mortar shall be of proportion as per the item and shall comply with the specification No. B.5 (*a*).

CD.12.3. *Construction.*

CD.12.3.1. *Manufacture.*—The slabs shall be of the dimensions as specified on the drawings. Wooden or steel forms shall be built up to give the required dimensions of the slab. The reinforcement as specified for the slabs shall be fabricated, assembled and placed in the form, keeping the specified cover. The slab shall then be cast in the form. The concrete may be mixed and compacted manually. The side forms shall be removed after 24 hours and the sides finished if so required, with 1:2 cement mortar immediately. The top of the slab shall be suitably marked when the concrete is green. The bottom form if provided, may be removed carefully after 7 days. The concrete shall be properly cured for 14 days after casting.

CD.12.3.2. *Conveyance.*—The slabs shall be carefully conveyed to the site only after 28 days after casting, keeping the top of the slab always at top. No damage shall be allowed to take place to the slabs during the conveyance or handling. The damaged slabs shall be rejected. During lifting and transporting, the slabs shall be strung only at both ends.

CD.12.3.3. *Fixing.*—The slabs shall be fixed with the marked top at the top over the spans keeping the specified bearings on the abutments and piers. The bearings shall be bedded in cement mortar and the vertical joints filled with cement mortar. Vertical joints shall not be more than 6 mm. (about $\frac{1}{4}$") in width. No gap shall be left in between adjacent slabs. The mortar shall be watered continuously for 14 days.

CD.12.4. *Item to include.*—(1) Reinforcement, concrete, precasting, curing, conveyance and fixing the R.C.C. precast slabs in cement mortar and curing.

(2) All labour, materials, use of forms, equipment, tools and plant for completing the item satisfactorily.

CD.12.5. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of the precast R.C.C. slabs provided and fixed in position as specified. Dimensions shall be measured correct up to a cm. for the length and width of the slab, limited to those specified. The width shall be measured between outside faces of the head-walls including the joints between the slabs. The thickness shall be measured correct up to half a cm. The quantity shall be calculated correct up to 3 places of decimals of a cubic metre. The reinforcement shall be included in the rate shall not be paid for separately.

No deduction shall be made for reinforcement.

CD.13. *Providing and laying in situ 1:4:8 cement concrete of trap/granite/quartzite/gneiss metal for haunch filling including form work, compacting, curing and scaffolding complete.*

The item shall comply with specification No. BR.45 except that the compaction may be done manually by rammers and rods.

CD.14. *Providing hard murum/selected earth filling including laying in layers of 15 cm. to 20 cm. (about 6" to 8"), watering and compacting complete.*

CD.14.1. *Materials.*—Hard murum shall conform to specification No. Rd.23 and shall be supplied at the site of the Cross-Drainage Work.

Selected earth shall be free from black soil, shadoo, humus and too much of clay. Granular material shall be preferred.

CD.14.2. *Laying.*—The material shall be conveyed to the site of deposition and laid in uniform horizontal layers of 15 cm. to 20 cm. (about 6" to 8"). Each layer shall be watered and fully compacted manually before the next layer is laid.

In the case of filling over arches, each layer shall be laid horizontally to the same thickness and level simultaneously on both sides, watered and fully compacted manually.

CD.14.3. *Item to include.*—(1) Supplying hard murum/selected earth, laying it in layers, watering and compacting.

(2) All labour, materials, scaffolding and use of tools and plant necessary to complete the item satisfactorily.

CD.14.4. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of filling laid and compacted. The dimensions shall be measured correct up to a centimetre in situ and the quantity calculated correct to two places of demicals of a cubic metre. 10 per cent. deduction shall be made in the quantity if measurements are taken before one monsoon has passed and 5 per cent. if taken after one or more monsoons have passed.

CD.15. *Providing and laying in situ 1:2:4 cement concrete of trap/granite/quartzite/gneiss metal including compacting, finishing, curing and filling joints with bitumen complete for—*

(*a*) *wearing course 8 cm. (about 3") thick,*

(*b*) *approach slab (excluding mild steel reinforcement).*

The item shall comply with the specification Nos. BR.47(*a*) and BR.47(*b*) respectively except that the compaction may be done manually with screed board tamper.

CD.16. *Providing dressed trap/granite/quartzite/gneiss stone work for coping, cornice, string course, corbels and inspection steps, etc., in cement mortar 1:—complete.*

The item shall comply with the specification No. BR.52 in all respects except that the dressing of the stones shall be one line dressing, i.e., rough tooled and the joints shall not exceed 3 mm. (about $\frac{1}{8}$") in width.

CD.17. *Providing 5 cm. (about 2") thick 1:3 cement mortar coping with stone chips embedded including scaffolding, form work, finishing and curing.*

CD.17.1. *General.*—The item provides for the 5 cm. (about 2") thick 1:3 cement mortar coping over the wings/returns with stone chips embedded.

CD.17.2. *Materials.*—The cement mortar 1:3 shall comply with the specification No. B.5(*a*).

The stone chips shall be about 10 cm. × 5 cm. × 2 cm. and shall be freshly broken from sound, durable and clean rubble, free from any defects and of a uniform colour.

CD.17.3. *Construction.*—The surface to receive the mortar shall be thoroughly cleaned, loose mortar or chips swept off and properly watered.

**CD.20.5.**

The cement mortar 1:3 shall then be laid evenly to an average thickness of 5 cm. to the full width of the top of wing or return wall masonry in suitable forms approved by the Engineer.

The stone chips shall be inserted into the green mortar with their board faces at right angles to the top of the coping and their thickness along or at right angles to the length of the wing or return for the full depth of the mortar and allowed to project uniformly about 5 cm. (about 2″) normal to the mortar surface. The chips shall be inserted at an interval of about 4 cm. (about 1½″) and properly staggered to form a decent pattern.

The coping shall be cured continuously for 14 days.

CD.17.4. *Item to include.*—(1) Preparing surface.

(2) Laying 5 cm. thick 1:3 cement mortar coping including form work.

(3) Providing and inserting stone chips.

(4) Curing for 14 days.

(5) All labour, materials, use of tools, etc., to complete the item satisfactorily.

CD.17.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of the coping. The dimensions shall be measured correct up to a cm. and limited to those shown on the drawings or as ordered by the Engineer. The area shall be worked out correct up to two decimals of a sq. m.

CD.18. *Providing and fixing in 1 : 2 cement mortar marble year plate 30 cm. × 20 cm. (about 12″×8″) in the parapet including cutting border line, figures and letters and painting complete.*

The item shall comply with the specification No. BR.56 in all respects except that the contract rate shall be per plate and the measurement shall be recorded in numbers.

CD.19. *Providing and fixing in cement mortar 1:2 marble plate 30 cm.×20 cm. (about 12″ × 8″) showing the number of Cross Drainage work and the direction of flow by arrow including cutting border line, figures, letters and signs and painting complete.*

The item shall comply with the specification No. BR.56 in all respects except that the contract rate shall be per plate and the measurement shall be recorded in numbers. There shall be no border of marble or mortar.

CD.20. *Providing streamlined R.C.C. guard stones including 1:2:4 cement concrete and mild steel bar reinforcement.*

CD.20.1. *General.*—The item provides for the R.C.C. streamlined guard stones over submersible bridges or cause-ways including 1:2:4 cement concrete and the mild steel bar reinforcement.

CD.20.2. *Materials.*—(i) 1:2:4 cement concrete shall conform to specification No. B.6. Maximum size of coarse aggregate shall be 20 mm.

(ii) Mild steel bar reinforcement shall conform to the specification No. B.10.

CD.20.3. *Construction.*—The reinforcement shall be fabricated and embedded as indicated on the drawings and the guard stone shall be cast to the shape and size as indicated on the drawing in suitable forms approved by the Engineer. The forms shall be removed after 48 hours and the concrete surface immediately finished with 1:2 cement mortar if necessary. The guard stone shall be cured for 14 days. It shall be whitewashed in 3 coats.

CD.20.4. *Item to include.*—(i) Mild steel bar reinforcement.

(ii) Providing and laying 1:2:4 cement concrete in situ in suitable forms, finishing and curing.

(iii) Whitewashing in three coats.

CD.20.5. *Mode of measurement and payment.*—The contract rate shall be for one number of guard stone. The measurement shall be for the number of guard stones provided. No separate payment shall be made for the reinforcement.

अनुक्रमणिका
Table of Contents

SECTION Rd.

# STANDARD SPECIFICATIONS

FOR

# ROAD WORK



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



CONTENTS

*List of items for Road Work.*


| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.1. | Cutting down trees including trunks and branches and stacking the materials neatly within a lead of 50 m. (about 164 feet) as directed with girths—<br>(*a*) above 30 cm. (about 1′) to 60 cm. (about 2′).<br>(*b*) above 60 cm. (about 2′) to 90 cm. (about 3′).<br>(*c*) above 90 cm. (about 3′) to 180 cm. (about 6′).<br>(*d*) above 180 cm. (about 6′) to 270 cm. (about 9′).<br>(*e*) above 270 cm. (about 9′) to 450 cm. (about 15′).<br>(*f*) above 450 cm. (about 15′). | 169 |
| Rd.1(*a*) | Clearing road land including cutting trees less than 30 cm. in girth clearing brush wood, loose stones, vegetation, bushes, stumps and mole hills. | 170 |
| Rd.2 | Excavation for roadway in earth, soils of all sorts, sand, gravel or soft murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading for embankment or stacking as directed. | 170 |
| Rd.3 | Excavation for roadway in hard murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading for embankment or stacking as directed. | 173 |
| Rd.4 | Excavation for roadway in hard murum and boulders including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading for embankment or stacking as directed. | 173 |
| Rd.5 | Excavation for roadway in soft rock including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading or stacking as directed. | 174 |
| Rd.6 | Excavation for roadway in hard rock by blasting including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading or stacking as directed. | 175 |
| Rd.7 | Excavation for roadway in hard rock, by wedging, chiselling or line drilling including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading or stacking as directed. | 175 |
| Rd.8 | Excavation for roadway in laterite rock including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading or stacking as directed. | 176 |
| Rd.9 | Excavation catch water gutters in all types of strata to the specified section including stacking the excavated stuff in a regular bund and disposing off unsuitable or excess stuff as directed. | 176 |


अनुक्रमणिका
Table of Contents

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.10 | Watering and compacting of embankment formed of materials obtained from the road cutting within a lead of 50 m. (about 164') to 95% of standard Proctor density after laying them in layers of 20 cm. to 30 cm. (about 8" to 12"). | 177 |
| Rd.11 | Conveying materials obtained from road cutting including all lifts, laying in layers of 20 cm. to 30 cm. (about 8" to 12"), breaking clods, dressing to the required lines, curves, grades and section, watering and compaction to 95% of standard Proctor density for a lead of—<br>(*a*) over 50 m. to 300 m. inclusive,<br>(*b*) over 300 m. to 500 m. inclusive,<br>(*c*) over 500 m. to 700 m. inclusive,<br>(*d*) over 700 m. to 1 km. inclusive,<br>from the site of excavation to the site of deposition as directed. | 178 |
| Rd.12 | Providing earthwork in embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 20 cm. to 30 cm. (about 8" to 12"), thickness, breaking clods, dressing to the required lines, curves, grades and sections, watering and compacting to 95% of standard Proctor density complete. | 179 |
| Rd.13 | Providing earthwork for embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 20 cm. to 30 cm. (about 8" to 12") thickness, breaking clods, dressing to the required lines, curves, grades and sections, watering and compacting with power roller. | 183 |
| Rd.14 | Preparing embankment with approved materials obtained from the cutting within a lead of 50 m. (about 164') including laying in layers of 20 cm. to 30 cm. (about 8" to 12"), breaking clods, dressing to the required lines, curves, grades and section and compacting with power roller. | 184 |
| Rd.15 | Preparing embankment with approved materials obtained from the road cutting including laying in layers of 20 cm. to 30 cm. (about 8" to 12"), breaking clods, dressing to the required lines, curves, grades and section and compacting with power roller for a lead of—<br>(*a*) over 50 m. to 300 m. inclusive,<br>(*b*) over 300 m. to 500 m. inclusive,<br>(*c*) over 500 m. to 700 m. inclusive,<br>(*d*) over 700 m. to 1 km. inclusive,<br>from the site of excavation to the site of deposition as directed. | 184 |
| Rd.16 | Earthwork in embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 15 cm. to 20 cm. (about 6" to 8"), breaking clods, and dressing to the required lines, curves, grades and section. | 184 |
| Rd.17 | Laying materials obtained from road cutting in layers, breaking clods, dressing to the required lines, curves, grades and section for embankment within a lead of 50 m. (about 164'). | 185 |
| Rd.18 | Conveying materials obtained from road cutting including all lifts, laying in layers, breaking clods, dressing to the required lines, curves, grades and section for a lead of—<br>(*a*) over 50 m. to 300 m.<br>(*b*) over 300 to 500 m.<br>(*c*) over 500 m. to 700 m.<br>(*d*) over 700 m. to 1 km.<br>from the site of excavation to the site of deposition as directed. | 186 |

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.19 | Supplying 15 cm. (about 6″)/23 cm. (about 9″) trap/granite/quartzite/ gneiss stone rubble at the roadside for soling including conveying and stacking complete. | 186 |
| Rd.19(*a*) | Supplying 80 mm. (about 3″) trap/granite/quartzite/gneiss stone metal at the roadside for filling the voids in the soling including conveying and stacking complete. | 188 |
| Rd.20 | Supplying 60 mm. (about 2½″) trap/granite/quartzite/gneiss stone oversize metal at the roadside including conveying and stacking complete. | 188 |
| Rd.21 | Supplying 50 mm. (about 2″) trap/granite/quartzite/gneiss stone metal at the roadside including conveying and stacking complete. | 189 |
| Rd.22 | Supplying 40 mm. (about 1½″) trap/granite/quartzite/gneiss stone metal at the roadside including conveying and stacking complete. | 190 |
| Rd.23 | Supplying hard murum/kankar at the roadside including conveying and stacking complete. | 190 |
| Rd.24 | Supplying soft murum at the roadside including conveying and stacking complete. | 191 |
| Rd.25 | Supplying sand at the roadside including conveying and stacking complete. | 191 |
| Rd.26 | Supplying gravel at the roadside including conveying and stacking complete. | 192 |
| Rd.27 | Laying 15 cm. (about 6″)/23 cm. (about 9″) trap/granite/quartzite/ gneiss rubble soling including hand packing with rubble chips complete excluding cost of materials. | 192 |
| Rd.28 | Spreading gravel over the rubble soling. | 193 |
| Rd.29 | Spreading oversize (60 mm.) metal including sectioning complete. | 193 |
| Rd.30 | Spreading sand over the oversize metal layer. | 194 |
| Rd.31 | Spreading blindage of soft murum over the oversize metal. | 194 |
| Rd.32 | Compacting subgrade, soling, gravel, oversize metal, sand and soft murum layers—m wide with power roller including artificial watering complete. | 194 |
| Rd.33 | Picking the road surface including sectioning complete. | 196 |
| Rd.34 | Spreading 40 mm. metal including sectioning complete. | 196 |
| Rd.35 | Compacting the metal layer —m wide with power roller including necessary labour, materials and artificial watering complete. | 197 |
| Rd.36 | Spreading blindage of—<br>(*a*) sand,<br>(*b*) soft murum,<br>over water bound macadam surface. | 197 |
| Rd.37 | Spreading hard murum/kankar on the road formation. | 197 |
| Rd.38 | Compacting the hard murum/kankar layer —m wide with power roller including artificial watering complete. | 198 |
| Rd.39 | Spreading hard murum/kankar for the side widths. | 198 |
| Rd.40 | Compacting the hard murum side width layer —m wide on each side with power roller including artificial watering complete. | 199 |

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.41 | Supplying:— (*a*) 40 mm. (about 1½″), (*b*) 25 mm. (about 1″), (*c*) 20 mm. (about ¾″), (*d*) 12 mm. (about ½″), (*e*) 10 mm. (about ⅜), (*f*) 6 mm. (about ¼″), trap/granite/quartzite/gneiss stone aggregate at the roadside including conveying and stacking for use in bituminous road surfaces. | 203 |
| Rd.42 | Supplying bitumen of I. S. grades at the site of work including conveying and stacking properly and protecting it till used. | 204 |
| Rd.43 | Laying 50 mm. (about 2″) thick full grout bituminous road surface including preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips and laying seal coat complete excluding cost of stone aggregate, bitumen and compaction. | 206 |
| Rd.44 | Compacting 50 mm. (about 2″) thick full grout surface with power roller including labour, use of plant etc. complete. | 208 |
| Rd.45 | Laying 50 mm. (about 2″) thick semi grout bituminous road surface including preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips and laying seal coat complete excluding cost of stone aggregate, bitumen and compaction. | 209 |
| Rd.46 | Compacting 50 mm. (about 2″) thick semi grout surface with power roller including labour, use of plant etc. complete. | 210 |
| Rd.47 | Laying 40 mm. (about 1½″) thick premix bituminous carpet including preparing and cleaning the base, heating bitumen, applying tack coat at—kg./100 sq. m., mixing bitumen and aggregates in a bitumen mixer and laying the carpet layers complete excluding cost of stone aggregate, bitumen and compaction. | 211 |
| Rd.48 | Compacting 40 mm. (about 1½″) thick premix bituminous carpet with power roller including labour, use of plant etc. complete. | 212 |
| Rd.49 | Laying 25 mm. (about 1″) thick premix bituminous carpet including preparing and cleaning the base, heating bitumen, applying tack coat at —kg./100 sq. m., mixing bitumen and chips in a bitumen mixer and laying the carpet layer complete with/without seal coat excluding cost of stone aggregate, bitumen and compaction. | 213 |
| Rd.50 | Compacting 25 mm. (about 1″) thick premix bituminous carpet with power roller including labour, use of plant etc. complete. | 214 |
| Rd.51 | Laying 20 mm. (about ¾″) thick premix bituminous carpet including preparing and cleaning the base, heating bitumen, applying tack coat at—kg./100 sq. m., mixing bitumen and chips in a bitumen mixer and laying the carpet complete with/without seal coat excluding cost of stone aggregate, bitumen and compaction. | 214 |
| Rd.52 | Compacting 20 mm. (about ¾″) thick premix bituminous carpet with power roller including labour, use of plant etc. complete. | 216 |
| Rd.53 | Providing single coat surface dressing including cleaning the road surface, heating and applying bitumen to the road surface, spreading chips etc. complete excluding cost of stone chips, bitumen and rolling. | 216 |

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.54 | Rolling the single coat bituminous surface dressing of road with a power roller including labour and use of plant complete. | 217 |
| Rd.55 | Providing two coat bituminous surface dressing including cleaning the road surface, heating and applying bitumen to the road surface and spreading chips complete excluding cost of stone chips, bitumen and rolling. | 217 |
| Rd.56 | Rolling the two coat bituminous surface dressing with a power roller including labour, use of plant etc. complete. | 219 |
| Rd.57 | Providing bituminous liquid seal coat to black top surfaces including preparing the existing road surface, heating and applying bitumen and spreading chips complete excluding cost of stone chips, bitumen and rolling. | 219 |
| Rd.58 | Rolling the bituminous liquid seal coat with a power roller including labour and use of plant complete. | 220 |
| Rd.59 | Providing 50 mm. ( about 2" ) thick full grout bituminous road surface including supplying all materials, preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips, laying seal coat and compacting complete. | 220 |
| Rd.60 | Providing 50 mm. (about 2") thick semi grout bitumenous road surface including supplying all materials, preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips, laying seal coat and compacting complete. | 220 |
| Rd.61 | Providing 40 mm. (about 1½") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, applying tack coat, at—kg./100 sq. m., mixing bitumen and aggregate in a bitumen mixer, laying the carpet layers and compacting complete. | 220 |
| Rd.62 | Providing 25 mm. (about 1") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, applying tack coat at—kg./100 sq. m., mixing hot bitumen and chips, laying the carpet layer and compacting complete. | 221 |
| Rd.63 | Providing 20 mm. (about ¾") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, applying tack coat at—kg./100 sq. m., mixing hot bitumen and chips, laying the carpet and compacting complete. | 221 |
| Rd.64 | Providing single coat surface dressing including supplying all materials, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, use of tools, plant and equipment and rolling complete. | 221 |
| Rd.65 | Providing two coat bituminous surface dressing including supplying all materials, cleaning the road scurface, heating and applying bitumen to the road surface, spreading chips and rolling complete. | 221 |
| Rd.66 | Providing bituminous liquid seal coat to black top surface including supplying all materials, preparing the existing road surface, heating and applying bitumen, spreading chips and rolling complete. | 221 |
| Rd.67 | Providing hot mix hot laid premixed bituminous concrete 25 mm. (about 1") thick wearing surface over 50 mm. (about 2") thick premixed bituminous macadam including diversion, aggregates, bitumen, etc. heating bitumen and chips, mixing chips and bitumen in mechanical bitumen mixer, laying the bituminous macadam base and bituminous concrete wearing course and compacting the two courses separately. | 221 |

| Sr. No. (1) | Item (2) | Page (3) |
|---|---|---|
| Rd.68 | Providing 1 : 2 : 4 : cement concrete of trap/granite/quartzite/gneiss metal pavement—mm. thick including diversion, compaction, finishing, curing, filling in joints with premoulded and poured bituminous joint filler and 1 : 4 : 8 lean cement concrete. | 224 |
| Rd.69 | Providing and fixing trap/granite/quartzite/geniss kilometre stones/ 200 metre stones of standard size and shape including fixing in a block of standard size of cement concrete 1 : 4 : 8, painting, etc. complete. | 231 |
| Rd.70 | Providing and fixing trap/granite/quartzite/gneiss guard stones/ indicator stones/boundary stones of standard size and shape including fixing in ground/in blocks of standard size of cement concrete 1 : 4 : 8, whitewashing, etc. complete. | 231 |
| Rd.71 | Providing and fixing trap/granite/quartzite/gneiss stone pinheaders at the toe of the pitching. | 232 |
| Rd.72 | Providing trap/granite/quartzite/gneiss stone khandki pitching 23 cm. (about 9″) thick. | 232 |
| Rd.73 | Providing dry rubble stone pitching 23 cm. (about 9″) thick. | 233 |
| Rd.74 | Providing dry trap/granite/quartzite/gneiss rubble stone masonry. | 234 |

Rd.1. *Cutting down trees including trunks and branches and stacking the materials neatly within a lead of 50 m. (about 164 feet) as directed with girths—*

(*a*) *above 30 cm. (about 1′) to 60 cm. (about 2′).*

(*b*) *above 60 cm. (about 2′) to 90 cm. (about 3′).*

(*c*) *above 90 cm. (about 3′) to 180 cm. (about 6′).*

(*d*) *above 180 cm. (about 6′) to 270 cm. (about 9′).*

(*e*) *above 270 cm. (about 9′) to 450 cm. (about 15′).*

(*f*) *above 450 cm. (about 15′).*

Rd.1.1. *General.*—The item includes cutting of trees having girths specified as above, measured one meter above the ground and standing within and without the road land as directed by the Engineer. The trees to be cut shall be duly marked to distinguish them from the trees not to be cut. The trees 30 cm. (about 1′) in girth and below shall be removed under clearing site of the particular item and shall not be paid for separately.

Rd.1.2. *Cutting of trees.*—The trees marked for cutting shall be cut without disturbing or inconveniencing traffic. Where the cut trees are likely to cause damage to any property, crops, trees that are to be left standing, road etc., ropes and guys shall be used to cause the tree to fall in a guided direction in a harmless manner. Where necessary to prevent injury to structure, road, property or other trees or to avoid damage and obstruction to traffic, trees shall be cut in section from the top downwards. Ones cut across the trunk just near the ground level to a uniform depth shall first be taken and the tree shall then be pulled by means of ropes so as to separate it from the roots and fall in the guided direction. If the tree cut falls in a manner to interrupt or obstruct the traffic, necessary diversions shall be prepared and maintained according to specification No. Rd. 27.2 so as to be safe for the traffic over it till the obstruction of the tree is entirely removed and the road surface restored to normal condition. Warning signals shall be displayed on either side of the obstruction. If the tree cannot be removed by sunset, warning red lights to indicate the danger shall be displayed from sunset to sunrise at 50 m. (164′) on either side or the obstruction till it is completely removed. Cost of preparing, maintaining, and operating diversions, providing warning boards, signals, etc., shall be borne by the contractor. The contractor shall take every precaution to safeguard the nearby property, crop and travelling public. If any damage to property or injury to life occurs due to the contractor's default in this respect, he shall be liable to compensate such damage or injury.

Rd.1.3. *Grubbing.*—In road cutting, all stumps and roots shall be removed to a depth of not less than 30 cm. (about 1′) below the graded formation and slopes. Under embankments they shall be removed to a depth of 15 cm. (about 6″) below original ground level or 30 cm. (about 1′) below formation level whichever is more. Outside embankments and cuttings, they shall be removed up to 15 cm. (about 6″) below ground level. All the excavations made for grubbing shall be filled with excavated material in 15 cm. (about 6″) layers rammed.

Rd.1.4. *Disposal of materials.*—All the products of cutting trees shall be the property of Government. All timber from which sawn logs and posts can be produced shall be cut into merchantable lengths as directed by the Engineer. Such timber will not be required to be cut to less than 3 m. (above 10′) lengths. Other types of trunks and bigger branches shall be cut into pieces of 1 m. (about 3′) or so and kept in neat stacks as directed within a lead of 50 metres (about 164′). Smaller branches and thinner pieces shall be stacked separately and very thin leafy portion destroyed or removed as directed. The contractor shall be responsible for the custody of the cut materials till handed over to the Department.

Rd.1.5. *Item to include.*—(1) Cutting the trees, grubbing roots and stacking the materials neatly and their safe custody.

(2) Displaying of warning signals and red lights.

(3) Diversions.

(4) Making good any damage to the road surface and compensation for any injury to life and property due to default of contractor.

(5) All labour, materials and use of equipment required to execute the work satisfactorily.

Rd.1.6. *Mode of measurement and payment.*—Measurement shall be for the number of trees cut of different sizes having girths of more than 30 cm. (about 1′). The girth shall be measured at a height of one metre from the ground before cutting and grouped under following size categories.

**Rd.2.2.**

*Size of trees.*—The size of the tree shall be determined by the girth at one metre height from the ground as follows:—

(*a*) above 30 cm. to 60 cm. (about 1′ to 2′).

(*b*) above 60 cm. to 90 cm. (about 2′ to 3′).

(*c*) above 90 cm. to 180 cm. (about 3′ to 6′).

(*d*) above 180 cm. to 270 cm. (about 6′ to 9′).

(*e*) above 270 cm. to 450 cm. (about 9′ to 15′).

(*f*) above 450 cm. (about 15′),

Payment shall be made after the cutting is done as specified and the materials handed over satisfactorily.

The contract rate shall be per tree of each size category.

Rd.1.(*a*). *Clearing road land including cutting trees less than 30 cm. in girth, clearing brush wood, loose stones, vegetation, bushes, stumps and molehills.*

Rd.1.(*a*).1. *General.*—The item pertains to the provision of road land clearing including cutting small trees, vegetation, bushes and clearing stumps and molehills in the road land excluding area covered by the cutting, banks and gutters.

Rd.1.(*a*).2. *Clearing site.*—The road land beyond the area covered by cutting and bank of road and gutters shall be cleared according to Rd.2.2. The clearance of road land covered by the cuttings, banks and gutters shall be covered by the respective items.

Rd.1.(*a*).3. *Disposal of the stuff removed.*—All the materials removed as a result of the clearance shall be the property of Government. Useful materials shall be stacked properly at places and as directed by the Engineer within a lead of 50 m. Useless materials shall be wasted by the contractor without causing nuisance and as approved by the Engineer.

Rd.1.(*a*).4. *Item to include.*—(1) Clearing roadside including cutting trees of girth less than 30 cm. removing vegetation, grubbing roots, removing loose stones and molehills and disposal of materials removed.

(2) All necessary labour, materials and use of tools required for carrying out the item.

Rd.1.(*a*).5. *Mode of measurement and payment.*—The contract rate shall be for a sq.m. The measurement for the length and the width shall be recorded correct up to 10 cm. limited to those shown in the drawings or as directed by the Engineer and the area calculated correct up to a sq.m.

The width shall be the width actually cleared excluding the roadway, width covered by slopes, gutters and catchwater gutters.

Rd.2. *Excavation for roadway in earth soils of all sorts, sand, gravel or soft murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164′) and spreading for embankment or stacking as directed.*

Rd.2.1. *General.*—Roadway and drainage excavation shall consist of excavation, removal, conveyance and satisfactory disposal of materials of the strata covered by the wording of the item for the construction of the road and its drainage including finishing the surface and the slopes to the required grade, lines, levels, curves and sections shown on the plans or as directed by the Engineer. The item also covers maintaining the work in finished condition until taken over by the Department.

Rd.2.2. *Clearing site.*—The land width required for the roadway, gutters, side slopes and catchwater gutters shall be cleared of all trees having a girth of 30 cm. (about 1′) and less, brushwood, loose stones, vegetation, bushes, stumps and all other objectionable materials. The roots of trees shall be removed to a depth of 30 cm. (about 1′) below the surface of the road formation and side slopes and the excavation filled up with excavated materials in 15 cm. to 20 cm. (about 6″ to 8″) layers and compacted. Brushwood, stumps, vegetation, etc., shall be cut flush with the ground. All the materials cleared will be the property of Government. Useful materials shall be arranged in convenient stacks along the road boundary or as directed at places within a lead of 50 metres (164′) and handed over to the Department in convenient sections. Unsuitable materials shall be burnt or otherwise disposed off by the contractor at his own cost as directed by the Engineer without causing any nuisance, inconvenience or damage to the work, property or people in the neighbourhood. If the material is disposed off outside the road land, necessary permission from the private land owners shall be taken by the contractor and royalty, etc., if any paid by him without claiming compensation. In all cases, the materials shall be disposed off in a neat manner.

Rd.2.3. *Setting out.*—After clearing the site, the alignment of the road shall be properly set out true to lines, curves, slopes, grades and sections as shown on the plans or directed by the Engineer. The contractor shall provide all labour and materials such as lime, strings, pegs, nails, bamboos, stones, mortar, concrete, etc., required for setting out, establishing Bench Marks and giving profiles. The contractor shall be responsible for maintaining the B.Ms., profiles, alignment and other stakes and marks as long as they are required for the work in the opinion of the Engineer. If the contractor defaults in this respect even after direction by the Engineer within the specified time, they may be restored by the Engineer at the cost of the contractor. Levels and sections of the ground shall be taken and recorded in the presence of the contractor or his authorised representative before the excavation is started to serve as the basis of measurement. The contractor or his representative shall sign the book in token of his acceptance of the levels, etc. If there is any disagreement, the contractor shall inform of it in writing to the officer concerned with specific reference to the sections before starting further work. Once further work is started, no cognizance of any complaint shall be taken. Merely not signing of the book shall not be deemed as disagreement.

Rd.2.4. *Classification of excavation.*—The classification of strata mentioned in the wording shall be as indicated in specification No. B.1.12.

Rd.2.5. *Construction methods.*—Profiles of the section including the roadside gutters to be excavated shall be laid at suitable intervals of 10 m. (about 32.8′) to 50 m. (about 164′) or other intervals directed by the Engineer to conform to the curved or straight alignment, sections, grades and side slopes. The lines of cuts shall be clearly marked and profiles of embankments where excavated materials are to be used shall be set up with the toe line marked on each side. The roadway section shall first be excavated with vertical sides for each lift and the side slopes for that lift shall be excavated in steps. These steps shall be smoothened to the required slope when the excavation reaches the road formation. The contractor shall on no account excavate beyond the slopes or below the specified grade unless so directed by the Engineer in writing. If excavations is done below the specified level or outside the section, it shall not be paid for and the contractor shall be required to fill up at his own cost such extra excavation in the road portion with approved materials of the embankment grade in layers of 15 cm. to 20 cm. (about 6″ to 8″) watered and fully compacted to attain maximum density laid down for the embankment in the same agreement elsewhere. The Engineer may require measurement ridges and dead-men to be left at specified intervals or places and kept intact till ordered to be removed for the purpose of check measurements. The excavation shall be finished neatly, smoothly and evenly to the correct lines, curves, grades, sections and side slopes as shown on the plans or directed by the Engineer. The sub-grade if loose shall be scarified, watered and compacted to the same density as the embankment. The section, side slopes and catchwater gutters shall be maintained by the contractor at his own cost in such a way that the formation and gutters will be well drained by providing necessary diversions, etc., and not damaged due to obstruction of any drainage. Necessary passages shall be provided for leading away seepage, springs, surface flow or rain water safely without damaging the work. If any damage occurs due to default of the contractor in this respect, he shall make good the damage at his own cost. If it is necessary in the execution of the work to interrupt existing surface drainage, irrigation channels, sewers or underdrainage, temporary arrangements shall be provided till such time as is necessary. The contractor at his own cost shall make good the interrupted drainage and sewer, etc., unless separately provided in the tender. Any damage to the existing works or work in hand caused as a result of his operations or negligence shall be made good by the contractor at his own cost.

Roadside gutters shall be excavated to the specified sections and shall be measured along with the main cutting in cubic metres.

Intercepting or catchwater gutters where necessary shall be built to the cross-sections shown on the plans in time to prevent damage to the cuts or banks.

Rd.2.6. *Dewatering.*—If water is met with in the excavation due to springs, seepage, rain or other causes it shall be removed by suitable diversions, pumping or bailing out and the excavation kept dry whenever so required or directed by the Engineer. Care shall be taken to discharge the water so as not to cause damage to the work, crops or any property or any inconvenience to the property holders in the neighbourhood. Unless separate provision is made in the tender for dewatering, the cost of dewatering shall be covered by the rate for excavation.

Rd.2.7. *Slides.*—If slides occur in the cutting they shall be removed as ordered by the Engineer. If finished slopes slide into the roadway before the final acceptance of the work, such slides shall be removed by the contractor and shall be paid for at the contract rate for the class of excavation involved provided the slides are not due to any negligence of the contractor. The classification of the material in slides shall conform to its condition at the time of removal and payment made accordingly regardless of its prior condition.

**Rd.2.13.**

Care shall be taken to see that excavation is arranged in a safe way so that there will be no risk to the work or workmen by slides, falling materials, boulders and collapsing sides, etc.

Rd.2.8. *Protection.*—If there is traffic nearby or if there are towns and villages in the neighbourhood, barricades and/or traffic signals shall be provided day and night for the duration of the work in such a way as to prevent accidents. Warning signals shall be displayed at 70 m. (about 225′) from the danger point on both sides to give sufficient warning. If necessary, signallers shall be stationed at each end to regulate traffic where it is heavy. Measures shall be taken to see that the excavation does not affect or damage adjoining structures or property. If there is damage to property, injury to workers, the members of the public, animals, etc., due to the negligence of the contractor, he will be responsible and liable to all the consequences including compensation.

Rd.2.9. *Diversions.*—If diversions are necessary for the traffic they shall be provided and maintained as specified under specification No. BR.1.

Rd.2.10. *Disposal of the excavated materials.*—All the excavated materials shall be the property of Government. When the useful excavated materials is to be used in embankment within a lead of 50 m. (about 164′), it shall be directly deposited at the required location in 15 cm. to 20 cm. (about 6″ to 8″) layers, the charges for watering and compacting such material being paid under a separate item. No handling or conveyance charges shall be paid if the material is temporarily deposited elsewhere and subsequently conveyed to site of deposition. The sequence of operations should be arranged properly. Useful excavated material to be used in embankment beyond 50 m. (about 164′) may be conveyed directly to the site of use and laid in layers or first deposited in heaps and conveyed and laid in layers subsequently; the conveyance and the charges for watering and compaction shall be paid for under a separate item. Materials reqiured for items other than bank shall be arranged in neat stacks at convenient places within a lead of 50 m. (about 164′) without interfering with the drainage in any way. If no Government land is available but the excavated useful stuff is to be stacked temporarily before use under the same agreement the contractor shall make his own arrangements for the stacking of this material temporarily on private lands by paying rents, etc., without claiming any compensation. Surplus material not required for use on embankment or unsuitable materials may be used at his own cost to uniformly widen embankment, to flatten slopes and to fill low places in the road land within a lead of 50 m. (about 164′) if so directed by the Engineer. Material not required for any use whatsoever may be disposed off by the contractor at his own cost in a manner approved by the Engineer. The excavated material shall not be deposited within 3 m. (about 10′) from the top edge of slope of toe of the bank unless expressly permitted by the Engineer in writing. When the excavated material is deposited or disposed off by the contractor in land not belonging to Government he shall be responsible for any compensation required to be paid to the private land owner. The leads shall be measured from approximate centre of gravity of the block of cutting to the approximate centre of gravity of block of deposited material.

Rd.2.11. *Maintenance.*—The excavated roadway shall be maintained satisfactorily and protected by the contractor at his own cost against all damage till it is taken over by the Department. If any damage occurs, the contractor shall be responsible to repair it at his own cost.

Rd.2.12. *Item to include.*—(1) Clearing site.

(2) Setting out including necessary labour, material and fixing reference marks.

(3) Diversion unless separately provided in the tender.

(4) Dewatering unless separately provided in the tender.

(5) Protective measures for work, workpeople, public, animals, property, etc.

(6) Excavation to the required lines, curves, sections and grades.

(7) Conveying the excavated materials including all lifts and lead up to 50 m. (about 164′), spreading in layers or stacking as directed and disposing off unwanted materials.

(8) All labour, materials and use of equipment and tools required for completing the item satisfactorily.

(9) Compensation on account of damages, accidents or use of private lands royalty, etc.

Rd.2.13. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre (about 35.3 cft.) for the strata mentioned in the wording of the item of excavation acceptably completed, limited to the dimensions shown on the plans or as directed by the Engineer. Excavation shall be measured in its original position by taking cross-sections

before the work starts and after it is entirely completed. The quantity shall be worked out by the average end area method. The individual dimensions and areas of the cutting shall be measured correct up to two places of decimals of a metre and square metre respectively and the quantity worked out correct up to two places of decimals of a cubic metre.

When the classification of the strata changes, the contractor shall bring this to the notice of the Engineer who will then verify and if necessary take levels for the changed strata for purposes of measurement.

The Engineer at his option may direct dead-men to be left at such intervals as he may indicate for purposes of measuring the depths and other dimensions either for initial measurements or for checking. Deductions shall be made for these dead-men. These shall be removed when no longer required and the deduction restored thereafter. If the dead-men are not removed and used in the work or otherwise disposed of as directed by the Engineer within 15 days of the date of check measurement, the Engineer shall have the right to remove them at the contractor's cost. If for any reason the dead-men are damaged at the time of measurement the measuring or check measuring officer shall estimate the quantity of earthwork at his discretion and such estimate shall be final.

Rd.3. *Excavation for roadway in hard murum including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (about 164') and spreading for embankment or stacking as directed.*

Rd.3.1. *General.*—According to Rd.2.1.

Rd.3.2. *Clearing site.*—According to Rd. 2.2.

Rd.3.3. *Setting out.*—According to Rd. 2.3.

Rd.3.4. *Classification of excavation.*—According to specification No. B.1.

Rd.3.5. *Construction methods.*—According to Rd. 2.5.

Rd.3.6. *Dewatering.*—According to Rd.2.6.

Rd.3.7. *Slides.*—According to Rd.2.7.

Rd.3.8. *Protection.*—According to Rd.2.8.

Rd.3.9. *Diversion.*—According to Rd.2.9.

Rd.3.10. *Disposal of excavated materials.*—According to Rd.2.10.

All the hard murum not intended for use in the bank-work shall be stacked neatly for future use as directed by the Engineer within a lead of 50 m. (about 164') on Government land. If no Government land is available but the excavated hard murum is to be stacked temporarily before use under the same agreement, the contractor shall make his own arrangements for the stacking of this hard murum temporarily on private lands for which he shall not be entitled for any compensation. Surplus hard murum may be used to uniformly widen embankment, to flatten slopes and to fill low places in the road and within a lead of 50 m. (about 164') or wasted at the cost of the contractor as may be directed by the Engineer.

Rd.3.11. *Maintenance.*—According to Rd.2.11.

Rd.3.12. *Item to include.*—According to Rd.2.12.

Rd.3.13. *Mode of measurement and payment.*—According to Rd.2.13.

Rd.4. *Excavation for roadway in hard murum and boulders including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (164') and spreading for embankment or stacking as directed.*

Rd.4.1. *General.*—According to Rd.2.1.

Rd.4.2. *Clearing site.*—According to Rd.2.2.

Rd.4.3. *Setting out.*—According to Rd.2.3.

Rd.4.4. *Classification.*—According to specification No. B.1.

Rd.4.5. *Construction methods.*—According to Rd.2.5.

If removal of boulders causes depressions in the formation, they shall be filled with approved materials in layers of 15 cm. to 20 cm. (about 6" to 8"), watered and consolidated. No boulder shall be allowed to project above the formation.

Rd.4.6. *Dewatering.*—According to Rd.2.6.

**Rd.5.13.**

Rd.4.7. *Slides.*—According to Rd.2.7.

Rd.4.8. *Protection.*—According to Rd.2.8.

Rd.4.9. *Diversions.*—According to Rd.2.9.

Rd.4.10. *Disposal of excavated materials.*—Hard murum obtained from excavation shall be dealt with as specified in Rd.3.10 The boulders obtained from the excavation shall be neatly stacked unless otherwise ordered, in regular stacks on roadsides beyond 3 m. (10′ approximate) of the edge of the cutting or the toe of the bank up to a distance of 50 m. (164′) without interfering with drainage. Suitable boulders, if so ordered, shall be used in the embankment within 50 m. (164′) in the lowest or any intermediate layer of the embankment as directed by the Engineer. If ordered to be disposed off, they shall be disposed off as specified in Rd.2.10.

Rd.4.11. *Maintenance.*—According to Rd.2.11.

Rd.4.12. *Item to include.*—According to Rd.2.12.

Rd.4.13. *Mode of measurement and payment.*—According to Rd.2.13.

Rd.5. *Excavation for roadway in soft rock including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (164′) and spreading or stacking as directed.*

Rd.5.1. *General.*—According to Rd.2.1.

Rd.5.2. *Clearing site.*—According to Rd.2.2.

Rd.5.3. *Setting out.*—According to Rd.2.3.

Rd.5.4 *Classification of excavation.*—According to specification No. B-1.

Rd.5.5. *Construction methods.*—According to Rd. 2.5. and further as under :—

If necessary, the excavation shall be done by blasting according to specification No. B-2 observing the instructions and the rules and regulations in force regarding storage, transport and use of explosives.

Where excavation is not possible by blasting due to the reasons such as proximity of structures, possibility of shattering the rock below or for any other reason, then the excavation shall be done by line drilling and or chiselling and wedging, both manual and mechanical. No blasting shall be used.

As far as practicable the excavation shall be done so as to leave no undrained pockets in the surface of the rock. If pockets are formed, the constractor shall at his own cost, provide drainage arrangements for them.

The average side slopes in rock cuts shall be excavated to those shown in the plans with no rock projecting more than 30 cm. (about 1′) from the true slope.

Rd.5.6. *Dewatering.*—According to Rd.2.6.

Rd.5.7. *Slides.*—According to Rd.2.7.

Rd.5.8. *Protection.*—According to Rd.2.8.

Rd.5.9. *Diversions.*—According to Rd.2.9.

Rd.5.10. *Disposal of excavated materials.*—Disposal of excavated materials shall generally comply with specification No. Rd.2.10. All the stuff obtained from the excavation unless otherwise ordered shall be stacked in regular heaps on the roadside beyond 3 m. (10′) of the cutting edge or the toe of the bank within 50 m. (164′) as directed by the Engineer without interfering with drainage. If ordered to be wasted, the same shall be wasted as indicated in Rd.2.10.

If the excavated stuff is ordered to be used for the bank work, it shall be conveyed and used in the required section of the road or for widening as ordered by the Engineer up to a lead of 50 m. (164′) or stacked properly for subsequent use.

Rd.5.11. *Maintenance.*—According to Rd.2.11.

Rd.5.12. *Item to include.*—According to Rd.2.12.

Rd.5.13. *Mode of measurement and payment.*—According to Rd.2.13.

The contractor shall remove the overburden so that necessary cross-sections may be taken for measurement. Boulders more than half a cubic metre in volume shall be measured individually and volume calculated from average dimensions taken in three directions perpendicular to each other.

All rock excavations shall normally be premeasured on cross-sections and check-measured before starting excavation. The final measurements and quantities shall be based on cross-section whenever possible.

Stack measurements may be taken for checking and 40 per cent. deduction made for the voids in the rubble-stacks, provided the stacks are made up without keeping purposely made hollows.

When it is impossible to take cross-sectional measurements and the Engineer certifies to that effect, the measurements in such cases may be taken on stacks and 40 per cent. deduction made for voids as above. Stack measurements will not be recorded when sectional measurements can be taken with adequate accuracy.

Rd.6. *Excavation for roadway in hard-rock by blasting including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts upto a lead of 50 m. (164') and spreading or stacking as directed.*

Rd.6.1. *General.*—According to Rd. 2.1. except that the excavation in rock shall be done by blasting according to specification No. B-2 and the instructions and the rules and regulations in force.

Rd.6.2. *Clearing site.*—According to Rd.2.2.

Rd.6.3. *Setting out.*—According to Rd.2.3.

Rd.6.4. *Classification.*—According to specification No. B-1.

Rd.6.5. *Construction Methods.*—According to Rd.5.5.

The excavation in rock shall be done by blasting according to specification No. B.2 observing the instructions and the rules and regulations in force regarding storage, transport and use of the explosives.

If excavation is done to dimensions larger than the specified, no payment shall be made for the excavation beyond the specified dimensions. If excavation is done to levels lower than the specified levels the excess excavation shall be made good by rubble and chips packing them closely by hand up to the designated level. Excavation shall be done as nearly as possible to the required section.

Rd.6.6. *Dewatering.*—According to Rd.2.6.

Rd.6.7. *Slides.*—According to Rd.2.7.

Rd.6.8. *Protection.*—According to Rd.2.8.

Rd.6.9. *Diversions.*—According to Rd.2.9.

Rd.6.10. *Disposal.*—According to Rd. 5.10.

The rubble obtained from blasting shall be stacked neatly in regular heaps as specified in Rd.2.10. In situations where it is not possible to collect blasted stone, the provision for such stacking may be waived under the specified authorisation of the Engineer. If the rubble is required for pitching, soling, masonry, breaking metal, etc., it will be sold to the contractor at the rate mentioned in the schedule A of the tender and if not so stated, at the Divisional schedule rate current at the time of tendering.

Rd.6.11. *Maintenance.*—According to Rd.2.11.

Rd.6.12. *Item to include.*—According to Rd. 2.12 and also blasting and all compensations arising out of the blasting operations.

Rd.6.13. *Mode of measurement and payment.*—According to Rd.5.13.

Rd.7. *Excavation for roadway in hard rock by wedging, chiselling or line drilling including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead 50 m. (164') and spreading or stacking as directed.*

Rd.7.1. *General.*—According to Rd.2.1.

The excavation in rock in the cases wherein no blasting can be allowed due to any reason such as damages to properties and injuries to people and when so ordered by the Engineer shall be done by line drilling or wedging and chiselling.

Rd.7.2. *Clearing site.*—According to Rd.2.2.

Rd.7.3. *Setting out.*—According to Rd.2.3.

Rd.7.4. *Classification.*—According to specification No. B.1.

Rd.7.5. *Construction methods.*—According to Rd.5.5.

The excavation in rock shall be done by line drilling and/or chiselling and wedging, both manual or mechanical. No blasting shall be used.

Rd.7.6. *Dewatering.*—According to Rd.2.6.

Rd.7.7. *Slides.*—According to Rd.2.7.

Rd.7.8. *Protection.*—According to Rd.2.8.

Rd.7.9. *Diversions.*—According to Rd.2.9.

Rd.7.10. *Disposal.*—According to Rd. 5.10.

Rd.7.11. *Maintenance.*—According to Rd.5.11.

Rd.7.12. *Item to include.*—According to Rd. 2.12. Chiselling, line drilling, etc. shall also be included.

Rd.7.13. *Mode of measurement and payment.*—According to Rd.5.13.

Rd.8. *Excavation for roadway in laterite rock including dressing section to the required grade, camber and side slopes and conveying the excavated materials with all lifts up to a lead of 50 m. (164') and spreading or stacking as directed.*

Rd.8.1. *General.*—According to Rd.2.1.

The excavation in laterite may be done either by cutting the laterite by 'dhokans' or by pickaxes or by blasting which shall be done according to specification No. B.2 and the contractor shall observe the instructions, rules and regulations in force for blasting.

Rd.8.2.—*Clearing site.*—According to Rd.2.2.

Rd.8.3. *Setting out.*—According to Rd.2.3.

Rd.8.4 *Classification.*—According to specification No. B.1.

Rd.8.5. *Construction methods.*—According to Rd.6.5.

Alternatively the laterite may be excavated by 'dhokans' or pickaxes. Ever when excavation is done by blasting, the irregularities shall be dressed with 'dhokans' to bring the section to that shown in the plan.

Rd.8.6. *Dewatering.*—According to Rd.2.6.

Rd.8.7. *Slides.*—According to Rd.2.7.

Rd.8.8. *Protection.*—According to Rd.2.8.

Rd.8.9. *Diversions.*—According to Rd.2.9.

Rd.8.10. *Disposal.*—According to Rd.5.10.

Rd.8.11. *Maintenance.*—According to Rd.2.11.

Rd.8.12. *Item to include.*—According to Rd.6.12.

Rd.8.13. *Mode of measurement and payment.*—According to Rd.5.13.

Rd.9. *Excavating catch-water gutters in all types of strata to the specified section including stacking the excavated stuff in a regular bund and disposing off unsuitable* or *excess stuff as directed.*

Rd.9.1. *General.*—The item provides for the excavation of the catch-water gutters of the specified section in all strata and stacking the excavated stuff in a bund and disposing off unsuitable or excess stuff, etc., as directed.

The item shall comply with relevant portion of the specification Nos. Rd.2 to Rd.8 except for the following :—

Rd.9.2. *Excavation.*—The gutter shall be excavated to the size, section and grades shown on the plans or ordered by the Engineer and includes excavation in all strata including rock. The excavated stuff shall be laid in 15 cm. to 20 cm. (about 6″ to 8″) layers and rammed to form a regular bund along the catch-water gutters on the downstream only to prevent spills. Excavated stuff if found to be useless or in excess, shall be used for strengthening the bund or wasted by the contractor satisfactorily or as directed. Outside material shall be brought and used for the bund where necessary.

अनुक्रमणिका
Table of Contents



The section of the gutter and the bund shall be finished in a workman like manner and such that there will be no stagnation of water.

Rd.9.3. *Item to include.*—(1) Clearing site.

(2) Setting out.

(3) Excavation to grade and section in all strata.

(4) Using the excavated and outside material if necessary for forming bund and disposing off surplus materials.

(5) All labour, materials, use of tools for completing the item satisfactorily.

Rd.9.4. *Mode of measurement and payment.*—The excavation shall be measured in metres correct up to 10 cm. for the length of the catch-water gutter of the specified section formed by excavating in all strata and putting up bund along the drain.

The contract rate shall be for one metre of the gutter excavated.

Rd.10. *Watering and compaction of embankment formed of materials obtained from the road cutting within a lead of 50 m. (about 164') to 95 per cent. of standard Proctor density after laying them in layers of 20 cm. to 30 cm. (about 8" to 12").*

Rd.10.1. *General.*—The excavated materials shall have been laid in layers of 20 cm. to 30 cm. (about 8" to 12") to the required lines, curves, grades and cross-section as shown on the plan or as ordered by the Engineer within a lead of 50 m. (about 164') under the item of excavation of the particular classification of stratum. This item refers to clearing site and setting out before laying the material and breaking clods watering and compacting the material in each layer to the required density within the lead mentioned in the wording of the item.

Rd.10.2. *Clearing site.*—According to specification No. Rd.12.2.

Rd.10.3. *Setting out.*—According to specification No. Rd.12.3.

Rd.10.4. *Materials.*—All the useful materials such as all types of soils (except the black or shadu or greatly shrinkable soils as ordered by the Engineer) sand and shingle mixed with soils, soft murum, hard murum, small boulders and broken rubble obtained from the road cutting within the lead mentioned in the wording of the item shall be made use of to the extent ordered by the Engineer. Some quantity of materials useful for other items may be ordered to be reserved for such use and in that case shall not be used into the bankwork. In the absence of any specific orders regarding reserving a portion of the materials, all the excavated stuff other than the black soil, shadu or greatly shrinkable soils and other materials considered by the Engineer as not suitable for bank work shall be put into the bank. If the contractor, for his own convenience, uses materials other than those from the road cutting, such quantities of outside materials shall be deemed to have been brought from the road cutting within the specified leads for the purposes of this item and payments. Stumps, pieces of wood or other perishable materials shall not be used in the bank. Sods with humus or grass may be used as surface covering for the bank slopes if so permitted by the Engineer for a depth of not more than 30 cm. at the top. Boulders, rubble broken from large boulders and materials obtained from excavating soft and hard rock may be used in bank work only if permitted by the Engineer.

Rd.10.5. *Equipment.*—According to specification No. Rd.12.5.

Rd.10.6. *Construction methods.*—According to specification No. Rd.12.6.

Proper sequence of all operations such as clearing site, setting out, preparing the bed, laying the excavated materials, watering and compacting each layer shall be maintained to get unhindered progress.

Rd.10.7. *Protection.*—According to specification No. Rd.12.7.

Rd.10.8. *Finishing.*—According to specification No. Rd.12.8.

Rd.10.9. *Maintenance.*—According to specification No. Rd.12.9.

Rd.10.10. *Tests.*—According to specification No. Rd.12.10.

Rd.10.11. *Item to include.*—(1) Clearing site.

(2) Setting out alignment including necessary labour and materials and maintaining it as long as required.

(3) Preparing the ground for laying the embankment.

(4) Providing and maintaining diversions unless provided as a separate item in the tender.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Rd.11.10.**

(5) Breaking clods, watering and compacting the materials in each layer laid from the excavated materials within the lead mentioned in the wording of the item to the required density.

(6) Carrying out tests.

(7) Finishing the embankment.

(8) Protecting and maintaining the bank.

(9) All labour, materials, use of equipment tools and plant, necessary for completion of the work satisfactoriy.

Rd.10.12. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre (about 35.3 c.ft.) of the finished bank work.

The quantity payable for the bank shall be the quantity of useful road cutting materials, required to be conveyed and used within a lead of 50 m. (about 164′) and measured in situ in cutting.

If the contractor for his own convenience uses materials other than those obtained from the cutting, all such materials used in place of the materials from the road cutting shall be deemed to have been obtained from the road cutting and paid under this item to the extent to which useful road cutting materials were available for bank within the specified lead.

If a portion of the road cutting materials is ordered to be reserved for other use, or rejected as not fit for bank, stack measurements of reserved or rejected materials shall be reduced by adopting following percentages to arrive at solid volumes to be deducted from the total quantities of relevant excavation items to obtain the quantities put into the banks:—

| | |
|---|---|
| (i) Earth, soils of all sorts, sand, gravel, soft murum | 16 per cent. |
| (ii) Hard murum ... ... ... | 16 per cent. |
| (iii) Boulders ... ... ... | 40 per cent. |
| (iv) Soft rock ... ... ... | 40 per cent. |
| (v) Hard rock ... ... ... | 40 per cent. |

The lead shall be reckoned along the centre line of the road from the centre of mass of the road cutting to the centre of mass of embankment volume where the excavated materials have been or were to be used irrespective of the actual route of transport.

The quantity of bank shall be paid on the basis of quantity of road cutting used in the bank.

Rd.11. *Conveying materials obtained from road cutting including all lifts laying in layers of 20 cm. to 30 cm. (about 8″ to 12″), breaking clods, dressing to the required lines, curves, grades and section, watering and compaction to 95 per cent. of standard Proctor density for a lead of—*

*(a) over 50 m. to 300 m. inclusive,*

*(b) over 300 m. to 500 m. inclusive,*

*(c) over 500 m. to 700 m. inclusive,*

*(d) over 700 m. to 1 km. inclusive,*

*from the site of excavation to the site of deposition as directed.*

Rd.11.1. *General.*—The work shall consist of conveying the excavated materials including all lifts to the leads mentioned in the wording of the item, laying in layers of 20 cm. to 30 cm. (about 8″ to 12″), breaking clods, dressing to the required section, lines, curves grades, watering and compacting to 95 per cent. of standard Proctor density.

Rd.11.2. *Clearing site.*—According to specification No. Rd. 12.2.

Rd.11.3. *Setting out.*—According to specification No. Rd. 12.3.

Rd.11.4. *Materials.*—According to specification No. Rd.10.4.

Rd.11.5. *Equipment.*—According to specification No. Rd.12.5.

Rd.11.6. *Construction methods.*—According to specification Nos. Rd.12.6. and Rd.10.6.

Rd.11.7. *Protection.*—According to specification No. Rd.12.7.

Rd.11.8. *Finishing.*—According to specification No. Rd.12.8.

Rd.11.9 *Maintenance.*—According to specification No. Rd.12.9.

Rd.11.10. *Tests.*—According to specification No. Rd.12.10.



अनुक्रमणिका
Table of Contents

Rd.11.11. *Item to include.*—According to specification No. Rd. 10.11 including conveyance of the materials up to the leads mentioned in the item.

Rd.11.12. *Mode of measurement and payment.*—According to specification No. Rd.10.12 except that the exacavated materials from cutting have to be conveyed to distances beyond 50 m. as mentioned in the item.

Rd.12. *Providing earth-work in embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 20 cm. to 30 cm. (about 8" to 12") thickness, breaking clods, dressing to the required lines, curves, grades and sections, watering and compacting to 95% of standard proctor density complete.*

Rd.12.1. *General.*—The work shall include preliminaries of clearing site, setting out and preparing the ground and thereafter forming embankment for the road with approved materials obtained from Departmental land or other sources, laying them in layers, watering and compacting to the required density and lines, curves, grades, cross section and dimensions shown on the plan or as directed by the Engineer with due allowance for shrinkage.

Rd.12.2. *Clearing site.*—The ground over which embankment is to be formed shall be cleared of all trees (unless cutting of trees of over 30 cm. girth is provided as a separate item vide Rd.1.), brushwood loose stones, vegetation, bushes, stumps and all other objectionable materials, under this item Roots of trees shall be grubbed to a depth of at least 15 cm.(about 6") below the original ground surface and at least 30 cm. (about 1') below the formation level whichever is deeper. The holes dug up for grubbing roots etc. shall be filled with execavated materials in layers of 15 cm. (about 6") and compacted. Brushwood, stumps, vegetation etc. shall be cut flush with the ground. Materials obtained from clearing site shall be dealt with according to specification No. Rd.2.2.

Rd.12.3. *Setting out.*—After the site is cleared, setting out shall be done as laid down in specification No. Rd.2.3. Profiles shall be set up with stout poles to mark the centre and edges of the formation with the top levels of formation clearly marked by paint or cut and the slopes with string and pegs at every 30 meters (about 1000') on straight portions and 10 m. (about 30') or less on curves or as directed by the Engineer. Toe line may be marked with pick marks. Longitudinal and cross-section levels shall be taken recorded and checked for measurements and signed by the contractor or his representative.

All the materials and labour required for this item shall be supplied and profiles, B.Ms. etc. put up by the contractor. These shall be covered by the rate.

Profiles, pegs, bench marks and other marks shall be maintained without any disturbance as long as they are required.

Rd.12.4. *Materials.*—After utilising, for the embankment all the useful and acceptable materials obtained from the road cutting within the specified leads the contractor shall obtain additional materials from borrows in Departmental Land or from other suitable sources. Satisfactory soil murum or a mixture of soil, sand, murum, gravel, small boulders or rubble shall normally be acceptable. Soils having laboratory dry density of less than 1.44 gm./cc. (about 90 lbs./cft.) may not normally be used in embankments. Soils having laboratory dry density of less than 1.52 gm./cc. (about 95 lbs./cft.) may not as far as possible be used in embankments exceeding 3 m. (about 10') in height or in embankments of any height subject to long periods of innundation. Only the materials considered suitable by the Engineer shall be used for the bank. Rejected materials shall not be put into the bank nor brought to the work site. Perishable materials such as stumps, pieces of wood, roots, rubbish, etc. and such other material as will effect the stability of the embankment shall not be used. Sods with appreciable amounts of organic matter, humus or vegetation shall not be used. Sods with humus or grass will be permitted to be used as surface covering for the bank slopes to a thicknesss of not more than 30 cm. (about 12").

The material required for embankment shall be obtained in any of the following ways provided the material is suitable in the opinion of the Engineer :—

(*a*) From cuttings from nearby sections of the road as directed.

(*b*) From excavation for improving sight distances in nearby curves as directed.

(*c*) By sectioning any adjacent nalla or waterways as directed.

(*d*) By excavating cuts to lead water away from the road.

(*e*) By excavating side drains and catch-water drains.

(*f*) From waste land outside the road land.

(*g*) From humps above the general ground level within the road land.

(*h*) From land acquired temporarily if any, outside the road land.

(*i*) From borrow pits in Departmental land when permitted and from non Departmental and private lands when necessary.

The contractor shall follow the priorities fixed by the Engineer for obtaining the materials from different sources.

All lifts and leads involved in conveying the material to site shall be included in the rate except when the materials from road cutting or other excavation being paid separately are to be conveyed for use in banks with different leads under items Rd. 10 and Rd.11.

No royalty shall be charged if the materials are allowed to be obtained from the borrows in Departmental land. Borrow pits in Departmental land shall be excavated according to direction of the Engineer. If the materials are to be obtained from non-Departmental and private lands, the contractor shall make his own arrangements and be responsible for payment of rents, compensation, royalty etc. and shall not be entitled for extra claims.

The Department shall remain indemnified regarding any claims that may be made by private owners in this respect.

Roadside borrow pits when permitted shall be rectangular in shape with one side parallel to the road and shall be dug as near the road boundary as possible. No borrow pits shall be dug within 5 m. (about 16′) of the toe of the final section after making due allowance for future development without written permission from the Engineer.

The borrow pits shall be dug as far as possible on the high side of the road. The depth of borrow pits in road land will depend on the quantity of soil needed to form the embankment after utilising materials obtained from road cutting, etc., and shall not normally exceed 1 m. (about 3.28′). Borrow pits shall not be dug continuously. Ridges of not less than 8 m. (about 25′) width shall be left at intervals not exceeding 30 m. (about 100′). Small drains shall be cut through the ridges to facilitate drainage. To prevent stagnant pools where mosquitoes may breed, the beds of borrow pits shall be dressed to slope down progressively towards the nearest natural drainage channel.

In temporarily acquired cultivable lands, the depth of borrow pits shall be such as not to damage the land permanently. The top soil to a depth of 15 cm. (about 6″) may be stripped and stacked aside. Thereafter soil may be dug to a further depth of about 30 cm. (about 1′) and used in forming the embankment. The top soil shall then be spread back on the land in the excavated portion.

Borrow pits shall not be dug within 500 m. (about 1600′) of any town or village site. If unavoidable in the opinion of the Engineer, they shall not exceed 30 cm. (about 12″) in depth and shall be well drained.

If all the useful materials available from the road cutting are not used and materials obtained from other sources are used instead by the contractor for his own convenience, such materials shall be deemed to have been obtained from the road cutting to the extent to which useful materials were available for bank and shall not be paid for under this item.

Rd.12.5. *Equipment.*—Pickaxes, crowbars, phawras and pans may be used for manual work. Scrapers, dozers, graders, shovels, dumpers, trucks, trolleys, etc., may be used for mechanised work. Three wheel 8 tonne Power Roller or sheeps-foot roller giving a pressure required to obtain the specified density may be used for compaction. Bullock carts with tanks or mechanically driven tankers may be used for watering.

Rd.12.6. *Construction Methods.*—

Rd.12.6.1. *Diversions.*—If diversions, barricading and signals are found to be necessary, they shall be provided as detailed in specification No. BR.1.

Rd.12.6.2. *Preparing the ground for laying bank.*—Before any material is laid for the bank the ground shall be cleared of all rubbish, etc., and the holes, if any, filled up as laid down in Rd.12.2. When the embankment is to be laid on hill sides or slopes, the existing slopes shall be ploughed deeply. If the cross slopes are steeper than 1 in 3, steps with reverse slope shall be cut into the slopes to give proper hold and seating to the bank as directed by the Engineer. On surfaces flatter than 1 in 15 no special surface treatment such as cutting steps shall be

necessary. The top 15 cm. (about 6″) of soil shall be scarified and watered if directed and compacted to the same density as specified for the embankment before any material is laid for the bank-work.

When the embankment is to be placed over an existing road or other hard surface which is within 15 cm. (about 6″) of the finished formation, the road or other hard surface shall be scarified to a minimum depth of 15 cm. (about 6″).

The rate for embankment includes all the operations for preparing the bed for laying the bank.

Rd.12.6.3. *Laying the bank.*—Embankment material shall be placed in successive horizontal layers of 20 cm. to 30 cm. (about 8″ to 12″) depth, extending to the full width of the embankment including the slopes at the level of the particular layer and 30 cm. (about 12″) more on both sides to allow compaction of the full specified section. The extra loose stuff at the edges shall be trimmed later after completion of the bank work without extra cost leaving the correct section fully compacted.

Keeping the width of the bank initially less and widening it later by dumping loose earth on the slopes shall not be permitted as the additional width and slopes will remain loose and uncompacted. Similar procedure to extend the embankment by dumping the material longitudinally shall also not be allowed. When placing the bankwork in 20 cm. to 30 cm. layers is not feasible as in water or over slopes too steep to operate the construction equipment, the embankment may be constructed in one layer to the minimum level at which equipment can be operated and above such a level, the embankment shall be made up in layers of specified thickness. When boulders, broken stones and similar hard materials are mixed up with the embankment materials care shall be taken to see that they are distributed uniformly into the bank and that no hollows are left near them. No stone or hard material shall project above the top of any layer. Each layer of embankment shall be watered, levelled and compacted as specified herein-after, before the succeeding layer is placed. The surface of the embankment shall, at all times during construction, be maintained at such a cross fall as will shed water and prevent ponding. If bridges and culverts on the road are not completed in advance of bankwork, a length of 15 m. to 30 m. (about 50′ to 100′) bank shall be left on each side of the structure and these lengths shall be dealt with later for placing the bankwork.

Rd.12.6.4. *Watering.*—If the bank material contains less than the optimum moisture water shall be added to the material in the borrow pits or alternatively in the loose layers of the embankment to bring the moisture uniformly up to requirement. If some moisture is likely to be evaporated in transit or in the bank before compaction, adequate water in excess shall be added to allow for the loss. If the material contains more than the required moisture, it shall be allowed to dry until the moisture is reduced to the required extent. If due to wet weather etc., the moisture content of the soil cannot be reduced to the appropriate amount by exposure, bank work shall be suspended till suitable conditions prevail without contractor's claiming any compensation.

Water to be used shall be free of harmful elements which may cause heavy efflorescence, etc., and approved by the Engineer. The contractor shall make his own arrangements for getting adequate quantity of acceptable water.

Rd.12.6.5. *Compaction.*—When a loose layer is levelled manually or mechanically and moistened or dried to a uniform moisture content suitable for maximum compaction, it shall be compacted by power rollers, sheeps foot rollers or heavy hauling or dozing equipment to give the specified 95% of the standard Proctor density. If on testing, the density is found to be less than 95% of the standard Proctor density the contractor shall do additional compaction necessary to get the specified density after adding water if required. If the density cannot be improved on reasonable efforts, the work may be accepted as substandard by the Engineer, if he thinks it not harmful for the purpose, at a reduced rate. Where the specified density is imperative the work shall be removed and redone by the contractor at his own cost to give the specified density.

Where the material allowed to be used is excessively stony or sandy so that it will not compact to the required density where such material is otherwise acceptable for embankment construction, the Engineer may waive the tests for stony or sandy portions, provided compaction effort is the same as in non-stony portions where the required test results are obtained. Each layer shall be compacted fully before the next layer is laid.

Proper sequence of all component operations shall be maintained to give individual progress.

To allow for subsequent settlement, the finished level of the embankment may be kept higher than the specified level by 1 cm. for each metre of the height of the bank and this, if provided, will be paid for.

**Rd.12.12.**

The hauling equipment, animals, labour, etc., shall be made to go over the bank as far as possible, to get the initial compaction.

Care shall be taken for getting good compaction behind abutments, returns and wing walls, etc.

Bank-work in areas not accessible to rollers such as those adjoining bridges, culverts and other works, shall be carried out independently of the main embankment and shall have the layers placed in 10 cm. to 15 cm. (about 4" to 6") height and each layer shall be moistened and thoroughly compacted with mechanical or manual tampers. Embankment shall be brought up simultaneously in equal layers on each side and compacted carefully to avoid unequal pressure, etc.

Rd.12.7. *Protection.*—Proper care shall be taken to ensure that the method of operation and compaction of the bank-work does not cause damage or undue strain to any structural element. Embankment over and around bridges or culverts shall be of approved materials and carefully placed and compacted. The contractor shall take all precautions necessary for the protection of the bank-work by diversion of streams, local surface drainage, rain water, etc., likely to damage the bank. Any damage to the bank-work due to no protection or inadequate protection shall be made good by the contractor at his own cost. Conveyance of materials shall not cause obstruction or nuisance to the nearby property owners and traffic.

Rd.12.8. *Finishing.*—The embankment shall be finished and dressed smooth and even in conformity with the alignment, levels, cross-sections and dimensions shown on the drawings with due allowance for shrinkage. On curves, sections shall be provided with super-elevation and increased widths as shown on the plans or directed by the Engineer. All damages caused by rain, flood or any other reason shall be made good in the finishing operations. The road land width shall be cleared of all debris and ugly spots near camping areas, etc., for which the contractor or his men were responsible.

Rd.12.9. *Maintenance.*—The contractor shall be responsible for maintaining the bank-work satisfactorily at his own cost till finally accepted including making good any damages.

Rd.12.10. *Tests.*—(*a*) Tests shall be made to determine the maximum density of the material to be used by the Proctor method before starting the work.

(*b*) Density tests shall be carried out for the bank-work during the progress of the work. One set of three core samples for every 1,000 sq. m. (about 1,000 sq. yd.) area of each layer of bank-work shall be taken and tested. The average density shall not be less than 95 per cent. of the standard Porctor density. A deviation of 80 kg. per cu.m. (5 lbs./cu. ft.) for fine and 160 kg. per cu.m. (10 lbs./cft.) for coarse grained soils shall be permitted in dry density in individual sample if the average density reaches up to 95 per cent. of standard Proctor density for each set.

Rd.12.11. *Item to include.*—(1) Clearing site.

(2) Setting out alignment including necessary labour and materials and maintaining it as long as required.

(3) Preparing the ground for laying the embankment.

(4) Providing and maintaining diversions if necessary unless provided as a separate item in the tender.

(5) Obtaining the embankment materials including all lifts and leads and laying the bank in layers, watering, compaction and tests and Royalties, fees, etc., if any.

(6) Protecting and maintaining the bank.

(7) Finishing the embankment.

(8) All labour, materials, use of equipment, tools and plant necessary for completing the work satisfactorily.

Rd.12.12. *Mode of measurement and payment.*—The contract rate shall be per cu. metre of the finished bank-work. Measurements shall normally be taken by levelling sections and chaining distances between them.

The measurements of the sections shall be limited to the dimensions shown on the drawings or those ordered by the Engineer in writing. The dimensions shall be recorded correct up to two places of decimals of a metre. The sectional areas shall be worked out correct up to two places of decimals of a sq. metre. The quantity shall be worked out correct up to two places of decimals of a cu. m. by the average end area method.

The volume of bank thus calculated shall be reduced by 5 per cent. for the purposes of payment when the measurements are taken for running bills and by 1 per cent. in final measurements.

अनुक्रमणिका
Table of Contents



A. B. Sawant



If outside materials have been used in the portions of the bank-work where materials from cutting were to be used according to Rd.10 and Rd.11 the outside material shall be deemed to have been obtained from the cutting as specified in those items and paid for under those items only.

The final quantity to be paid for under this item shall be the total quantity of bank-work reduced by 1 per cent. less the quantity to be paid for using materials from cutting under items Rd.10 and Rd.11.

Rd.13. *Providing earthwork in embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 20 cm. to 30 cm. (about 8" to 12") thickness, breaking clods, dressing to the required lines, curves, grades and sections and compacting with power roller.*

Rd.13.1. *General.*—The work includes preliminaries of clearing site, setting out, preparing the bed where necessary and constructing embankment for the road with materials obtained from departmental land or other sources, laying them in layers and compacting with a power roller to the required lines, curves, grades, cross-section and dimensions shown on the plan or as directed by the Engineer with due allowance for shrinkage

The work shall conform in all respects to the specification No. Rd.12 except for the following:—

Rd.13.2. *Materials.*—All types of soils (except the black or shady or greatly shrinkable or expansive soils as ordered by the Engineer), sand and shingle mixed with soils, soft murum, small boulders and broken rubble may be used. Stumps, pieces of wood or other perishable materials shall not be used in the bank. Sods with humus or grass may be used as surface covering for the bank slopes to a thickness of not more than 30 cm. (about 12") if so permitted by the Engineer.

The contractor shall obtain these materials from borrows in Government land if set apart for the purpose or from other suitable sources by making his own arrangement.

The stipulations of Rd.12.4 except the portion in first para. referring to densities shall also apply.

Rd.13.3. *Watering.*—No watering need be done. Scarifying and watering the base are not necessary.

Rd.13.4. *Compaction.*—The materials shall be laid in layers of 20 cm. to 30 cm. The layers shall be compacted with a power roller of 10 to 12 tonnes. The roller shall pass at least twice over the same area, once in the forward move and the second time in the backward move.

As far as possible, the trucks, carts, animals, labour, etc. shall be made to go over the bank while doing their work to get initial compaction.

Care shall be taken to get good compaction behind abutments, returns, wing walls, etc. Bank-work in areas not accessible to rollers such as those adjoining bridges, culverts and other works shall be carried out independently of the main embankment and shall have the layers placed in 10 cm. to 15 cm. (about 4" to 6") height and each layer shall be thoroughly compacted with manual tamper. Embankment shall be brought up simultaneously in equal layers on each side of the structure and compacted carefully to avoid unequal pressures, etc.

Rd.13.5. *Tests.*—There shall be no density tests but care shall be taken to see that rolling on each layer is done as specified above.

Rd.13.6. *Item to include.*—(1) Clearing site.

(2) Setting out alignment including necessary labour and materials and maintaining it as long as required.

(3) Preparing the ground for laying the embankment.

(4) Providing and maintaining diversions if necessary, unless provided as a separate item in the tender.

(5) Obtaining the embankment materials including all lifts and leads, laying the bank in layers, compacting and Royalties, fees, etc., if any.

(6) Protecting and maintaining the bank.

(7) Finishing the embankment.

(8) All labour, materials, use of equipment tools and plant for completing the work satisfactorily.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Rd.16.5.1.**

Rd.13.7. *Mode of measurement and payments.*—As per Rd.12.13 subject to the following:—

The volumes of bank calculated shall be reduced by 10 per cent. for the purposes of payment when the measurements are taken during the same working season and by 5 per cent. if one or more monsoons have lapsed.

Rd.14. *Preparing embankment with approved materials obtained from the cutting within a lead of 50 m. (about 164') including laying in layers of 20 cm. to 30 cm. (about 8" to 12"), breaking clods, dressing to the required lines, curves, grades and section and compacting with power roller.*

Rd.14.1. *General.*—The excavated stuff of the approved quality as specified in Rd.10.4 shall be laid in layers of 20 cm. to 30 cm. (about 8" to 12") to the required lines, curves, grades and cross-section as shown on the plans or as ordered by the Engineer within the lead as specified in the wording of the item and compacted as specified in Rd.13.4.

Rd.14.2. *Clearing site.*—According to Rd.12.2.

Rd.14.3. *Setting out.*—According to Rd.12.3.

Rd.14.4. *Materials.*—As per Rd.10.4.

Rd.14.5. *Equipment.*—According to Rd.12.5.

Rd.14.6. *Construction methods.*—According to Rd.12.6, except that the compaction shall be as per Rd. 13.4 and no watering need be done.

Rd.14.7. *Protecting.*—According to Rd.12.7.

Rd.14.8. *Finishing.*—According to Rd.12.8.

Rd.14.9. *Maintenance.*—According to Rd.12.9.

Rd.14.10. *Item to include.*—According to Rd.10.11 except for watering and tests.

Rd.14.11. *Mode of measurement and payment.*—According to Rd.10.12.

Rd.15. *Preparing embankment with approved materials obtained from the road cutting including laying in layers of 20 cm. to 30 cm. (about 8" to 12"), breaking clods, dressing to the required lines, curves, grades and section, and compaction with power roller for a lead of—*

*(a) over 50 m. to 300 m.—inclusive,*

*(b) over 300 m. to 500 m.—inclusive,*

*(c) over 500 m. to 700 m.—inclusive,*

*(d) over 700 m. to 1 km.—inclusive.*

*from the site of excavation to the site of deposition as directed.*

Rd.15.1. *General.*—The item shall comply with the specification No. Rd.14 in all respects except for the leads specified in the item.

Rd.16. *Earthwork in embankment with approved materials obtained from Departmental land or other sources including all lifts and leads, laying in layers of 15 cm. to 20 cm. (about 6" to 8"), breaking clods and dressing to the required lines, curves, grades and section.*

Rd. 16.1. *General.*—The work shall consist of preparing embankment for the road with approved materials obtained from the Departmental land or other sources, laying them in layers in the required lines, curves, grades, cross-section and dimensions shown on the plan or as directed by the Engineer.

Rd.16.2. *Clearing site.*—According to Rd.12.2.

Rd.16.3. *Setting out.*—According to Rd.12.3.

Rd.16.4. *Materials.*—According to Rd.12.4 except that somewhat inferior local materials shall be allowed to be used with the written permission of the Engineer. Borrow pits shall not be dug nearer than 3 m. (about 10') from the toe of the bank unless permitted in writing by the Engineer.

Rd.16.5. *Construction methods.*—Materials from borrow pits may be conveyed by trucks, carts, donkeys or headload.

Rd.16.5.1. *Diversions.*—According to Rd.12.6.1.

अनुक्रमणिका
Table of Contents

Rd.16.5.2. *Preparing the ground for laying bank.*—According to Rd.12.6.2. except that no scarifying, watering and compaction may be done. Surface levels of natural ground shall be taken and recorded for purposes of measurement.

Rd.16.5.3. *Laying the bank.*—The embankment material shall be placed in successive horizontal layers of 15 cm. to 20 cm. (about 6″ to 8″) depth extending to the full width of the embankment including the slopes at the level of the particular layer. When boulders, broken stones and similar hard materials are mixed up with the embankment materials care shall be taken to see that they are distributed well and uniformly into the bank and that no hollows are left. No stone or hard material shall project above the top of any layer. Clods in each layer shall be broken to about 50 mm. (2″) size. Suitable allowance shall be made for probable settlement of bank.

Rd.16.5.4. *Compaction.*—The work-people and/or the animals and the vehicles conveying the materials shall pass over the bank-work as uniformly as possible to effect possible compaction.

When wearing surface of hard murum is to be laid immediately after completion of the bank-work, the formation shall be dressed to the required section and rolled with a bullock or power roller, these operations being paid for under item Rd.38 for compacting the hard murum surface.

When the hard murum wearing surface is to be laid after the monsoon the formation shall be left with a little concavity. Earthen bunds on both the edges and cross-wise shall be laid at suitable intervals and maintained throughout the monsoon for ponding rain-water over the embankment for obtaining maximum compaction and settlement. This shall not be paid for separately.

Rd.16.6. *Protection.*—According to Rd.12.7.

Rd.16.7. *Finishing.*—According to Rd.12.8.

Rd.16.8. *Maintenance.*—According to Rd.12.9.

Rd.16.9. *Item to include.*—According to Rd.12.11 except that no watering compaction or testing shall be done.

Rd.16.10. *Mode of measurement and payment.*—According to Rd.12.12 except that the deduction in quantity shall be 15 per cent. instead of 5 per cent. when the measurements are taken in the same working season and 10 per cent. instead of 1 per cent. if one or more monsoons have passed.

Rd.17. *Laying materials obtained from road cutting in layers, breaking clods, dressing to the required lines, curves, grades and section for embankment within a lead of 50 m. (about 164′).*

Rd.17.1. *General.*—The work shall consist of preparing embankment for the road with approved materials obtained from road cutting after breaking clods, conveying, laying in layers to the required lines, curves, grades, cross-section and dimensions shown on the plans or as ordered by the Engineer.

Rd.17.2. *Clearing site.*—According to specification No. Rd.12.2.

Rd.17.3. *Setting out.*—According to specification No. Rd.12.3.

Rd.17.4. *Materials.*—According to specification No. Rd.10.4. Somewhat inferior materials may be allowed for this item.

Rd.17.5. *Construction methods.*—According to Rd.16.5.

Rd.17.6. *Protection.*—According to specification No. Rd.12.7.

Rd.17.7. *Finishing.*—According to specification No. Rd.12.9.

Rd.17.8. *Maintenance.*—According to specification No. Rd.12.9.

Rd.17.9. *Item to include.*—(i) Clearing site.

(ii) Setting out the alignment including necessary labour and materials and maintaining it as required.

(iii) Preparing the ground for laying the embankment.

(iv) Providing and maintaining diversions unless provided as a separate item in the tender.

(v) Spreading the materials for the bank in layers after breaking clods to the required line, curves, grades and section and providing bunds for ponding rain-water.

Rd. 19.2.

(vi) Finishing the road section.

(vii) Protecting and maintaining bank.

(viii) All labour, materials and use of tools and plant for the satisfactory completion of the item.

Rd.17.9. *Mode of measurement and payment.*—According to Rd.10.12.

Rd.18. *Conveying materials obtained from road cutting including all lifts, laying in layers, breaking clods, dressing to the required lines, curves, grades and section for a lead of—*

*(a) over 50 m. to 300 m.,*

*(b) over 300 m. to 500 m.,*

*(c) over 500 m. to 700 m.,*

*(d) over 700 m. to 1 km.,*

*from the site of excavation to the site of deposition as directed.*

Rd. 18.1. *General.*—The work shall consist of conveying the excavated materials including all lifts to the lead mentioned in the wording of the item, laying in layers of 15 cm. to 20 cm. (about 6″ to 8″), breaking clods, dressing to the required section, lines, curves and grades as specified in Rd.17 with additional lead.

Rd.18.2. *Clearing site.*—According to Rd.12.2.

Rd.18.3. *Setting out.*—According to Rd.12.3.

Rd.18.4. *Materials.*—According to Rd.17.4.

Rd.18.5. *Construction method.*—According to Rd.16.5.

Rd.18.6. *Protection.*—According to Rd.12.7.

Rd.18.7. *Finishing.*—According to Rd.12.8.

Rd.18.8. *Maintenance.*—According to Rd.12.9.

Rd.18.9. *Item to include.*—According to Rd.17.9 and also conveying the materials up to the specified lead.

Rd.18.10. *Mode of measurement and payment.*—According to Rd. 10.12.

Rd.19. *Supplying 15 cm. (about 6″)/23 cm. (about 9″) trap/granite/quartzite/gneiss stone rubble to soling at the roadside including conveying and stacking complete.*

Rd.19.1. *General.*—The item provides for the supply of stone rubble of the specified type and size at the roadside including obtaining the rubble from approved sources, conveying to the site of work including all lifts and leads and stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.19.2. *Quarries.*—Where suitable and approved Departmental quarries exist, the contractor shall be allowed to obtain the rubble of the requisite quality to the extent required for the work from these quarries without any royalty. He shall, however, be liable to pay compensation for any damage caused to the quarries or the Departmental land or property either deliberately or through negligence or otherwise, or from waste of materials in obtaining the requisite quantity of rubble.

Blasting, if required, shall be done with utmost care according to specification No. Bd.2 and the contractor shall be fully responsible for all accidents and compensation resulting therefrom.

When no suitable Departmental quarries exist or when the full quantity required for the work cannot be obtained from the Departmental quarries, the contractor shall make his own arrangements to obtain the rubble. The contractor shall get the sources and the quality of the rubble approved by the Engineer. The contractor shall be fully responsible for any and all compensations to be paid as royalty, rents or damages to properties and injuries to persons etc., caused in obtaining the rubble. No claim on account of any obstruction caused in collection of materials or difficulties or action arising out of quarrying in private and non-Departmental land shall be entertained and Government will remain indemnified with regard to such action and payment.

Quarrying shall be done only from sound portions of approved quarries, the disintegrated and weathered portions being rejected.

No rubble shall be obtained from within the road land unless so permitted in writing by the Engineer.

Rd.19.3. *Rubble*:—

Rd.19.3.1. *Quality.*—The rubble of the specified type of stones shall be hard, tough, sound, durable, dense, clean, of close texture and free from unsound material, cracks, decay and weathering. Their water absorption shall be as low as possible but not more than 5 per cent. They shall generally be broken rubble.

Rd.19.3.2. *Size.*—The shape of the stones shall be as regular as can be obtained by quarrying without attempt at shaping or dressing. They shall be sufficiently flat bedded. The stone shall be broken with the smallest dimensions equal to the specified thickness of soling. The length and breadth should not generally exceed twice its thickness.

Before starting collection, the contractor shall get a sample conforming to the required quality, shape and size approved by the Engineer who will keep it in his office for reference.

Rd.19.3.3. *Conveyance to site.*—Materials shall be brought to site sufficiently in advance of construction. The contractor shall be responsible to see that vehicles used for transporting materials do not drop any of the contents on the road and thus cause nuisance to traffic. The contractor shall also be responsible for any damage or accident arising out of any such material falling on the road or elsewhere and shall attend to all complaints in this regard. The Engineer may order the removal of such materials at the expense of the contractor in case of neglect. Vehicles conveying or depositing materials shall not obstruct traffic. All leads and lifts are included in the rate for the item.

Rd.19.3.4. *Stacking.*—The rubble shall be stacked uniformly along the roadside in regular stacks of 6 m.×3 m.×1 m. (about 20′×10′×3′) unless other sizes are ordered by the Engineer. Stacking shall be done only after the quality, shape and size of the rubble are approved. The stacks shall be made without appreciable hollows without making special efforts to hand-pack the material. The stacks shall be free of earth, rubbish vegetation, inferior or too much oversize or undersize material. Only requisite number of stacks shall be laid in each of the 200 m. section. One stack in each unit section may be of different length if necessary, to make up the total quantity in that particular section. Low and wide stacks with outer retaining walls and the centre filled in loosely shall not be permitted. The material shall be stacked entirely clear of the carriage way and as far as possible beyond the side widths and the side drains, on even ground or in the absence of such even ground on platforms prepared in advance for the purpose by the contractor at his cost. If no such land is available, the width of the stack may be reduced and the stacks may be laid on the side widths with the approval of the Engineer. Such stacks shall be protected from being disturbed. Necessary precautions such as barricading, signs and signals shall invariably be taken, the contractor being responsible for any accident, injury and compensation due to his negligence in this respect. On hill roads, material shall be stacked only on stacking berms. In the absence of such berms within a reasonable distance, stacks shall be made only at places where narrow width and sited on the side of the road as directed without interfering with free drainage.

The Engineer may, if required, get the stacks coming in the way of or obstructing the traffic removed at the cost of the contractor and the contractor shall not be entitled to claim for any loss or damage to the materials on that account. The stacking operations shall be started at the point farthest from the quarry and carried towards the nearest point. The stacks shall not be laid at such places where they are likely to be damaged on account of the traffic, washing out by rains or floods or drainage, slides of the banks or the slopes of cutting. Any loss on account of these or such other reasons shall be made good by the contractor without extra claims.

As far as possible the rubble shall be stacked evenly on one side of the road only and in such quantities per unit length as will be required for that particular length or as ordered by the Engineer.

Rd.19.4. *Special points.*—The contractor shall be responsible for obtaining consents of owners of quarries and lands, payment of royalties, fees, rents, taxes, octroi, etc., compensation due to injuries to persons or damages to property in any way connected with the execution of this item and for loss of materials due to improper stacking, etc., and shall make good the losses without extra claims.

The contractor shall also responsible for the blasting operations required for obtaining the rubble as explained in specification No. B.2.

**Rd.20.**

Rd.19.5. *Item to include.*—(1) Obtaining rubble of approved quality, shape and size by blasting if required and payment of royalties, fees, rents, etc., where necessary.

(2) Conveying to roadside including all leads and lifts.

(3) Stacking.

(4) All sorts of compensations involved in the execution of the item.

(5) Opening up of new quarries or reopening old ones including removal of overburden.

Rd.19.6. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of rubble supplied at site in stacks of approved size.

When the rubble is stacked in heaps of one uniform size, smallest heap may be chosen in the particular km. or unit section and measured for its length, breadth and depth. The cubic contents of this heap shall be multiplied by the number of such heaps in the km. or unit section to arrive at the quantity in the particular km. or unit section. The Engineer may measure any other heaps also for verification.

When the sizes of stacks are not uniform, each stack shall be measured individually.

The dimensions shall be measured correct to two places of decimals of a metre and quantity worked out correct to two places of decimals of a cubic metre. If there is reason to believe that the stacks are very loose and are having unduly large hollows and/or materials not satisfying the specifications, the stacks may be got opened and restacked properly after removing the inferior material by the Sub-Divisional Officer at the cost of the contractor. The measurements of such a stack shall then be taken and if they are less than those of a normal heap, the quality of the restacked heap shall be multiplied by the No. of stacks to arrive at the quantity in the particular unit of length.

No deduction shall be made for voids.

Rubble shall not be used until the full quantity is collected in a km. and measured. All stacks measured shall be marked with lime wash bands to distinguish them to avoid double measurement.

If the material is found to be of inferior quality or of size not satisfying the requirements the same may be rejected entirely or accepted by the Engineer at his discretion at a reduced rate if found to serve the purpose.

All labour, materials, etc., required for measuring, restacking, checking, lime washing, etc., shall be at the cost of the contractor.

Rd.19(*a*). *Supplying 80 mm. (about 3") trap/granite/quartzite/gneiss stone metal at the roadside for filling the voids in the soling including coveying and stacking complete.*

Rd.19(*a*).1. *General.*—The item provides for the supply of specified type of stone metal 80 mm. (about 3") size at the roadside for filling the voids in the soling including obtaining the rubble from approved sources and breaking to size, conveying to the site of work, including all lifts and leads and stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.19(*a*).2. *Quarries.*—As per Rd.19.2.

Rd.19(*a*).3. *Rubble:*—

Rd.19(*a*).3.1. *Quality.*—As per Rd.19.3.1.

Rd.19(*a*).3.2. *Size.*—The longest dimension may not be more than 100 mm. and the shortest dimension not less than 50 mm.

Rd.19(*a*).3.3 *Conveyance to site.*—As per Rd.19.3.3.

Rd.19(*a*).3.4. *Stacking.*—As per Rd.19.3.4.

Rd.19(*a*).3.5. *Special points.*—As per Rd.19.4.

Rd.19(*a*).3.6. *Item to include.*—According to Rd.5.8 and breaking the rubble to the required size.

Rd.19(*a*).3.7. *Mode of measurement and payment.*—According to Rd. 19.6.

Rd.20. *Supplying 60 mm. (about 2½") trap/granite/quartzite/gneiss stone oversize metal at the roadside including conveying and stacking complete.*

Rd.20.1. *General.*—The item provides for the supply of specified type of stone oversize metal of 60 mm. (about 2½") size at the roadside including obtaining the metal from approved sources, conveying to roadside with all leads and lifts, stacking in regular heaps as specified hereinafter, uniformly along the roadside.

Rd.20.2. *Quarries.*—Rubble for breaking oversize metal shall be obtained from quarries as per specification No. Rd.19.2.

Rd.20.3. *Oversize metal.*—60 mm. size metal is also usually called oversize metal.

Rd.20.3.1. *Quality.*—Quality should satisfy specification No. Rd.19.3.1.

Rd.20.3.2. *Size.*—The rubble shall be either manually broken or mechanically crushed to pieces so as to pass through a square mesh of 80 mm. (about 3") internal dimension and retained on a square mesh of 50 mm. (about 2"). However, the following tolerance should be permitted for water bound macadam. Not more than 20 per cent. of any sample shall exceed 90 mm. (about 3½") in its greatest dimension. The pieces shall, as far as possible, be cubical and have sharp edges. A sample conforming to the quality, shape and size shall be got approved by the Engineer before large scale breaking. The Engineer will keep the sample in his office for reference.

Rd.20.3.3. *Conveyance.*—According to specification No. Rd.19.3.3.

Rd.20.3.4. *Stacking.*—According to specification No. Rd.19.3.4. The heaps may be 6 m. × 3 m. × 0.5 m. (about 20′ × 10′ × 1.5′) or as ordered by the Engineer.

Rd.20.4. *Special points.*—According to specification No. Rd.19.4.

Rd.20.5. *Item to include.*—Providing and breaking the rubble to metal of the specified size of 60 mm. (about 2½"), conveying to roadside and stacking including all other relevant items mentioned in specification No. Rd.19.5.

Rd.20.6. *Mode of measurement and payment.*—According to specification No. Rd.19.6. where the heaps in a km. or a unit length are of uniform size one or more heaps in the km. may be restacked or refilled at the cost of the contractor in places and all the heaps in that km. or unit length will be taken as equal to the smallest of the restacked heaps and the total quantity worked out on that basis. In case of stacks suspected to contain inferior, oversize or undersize material, they shall be opened up and restacked properly at the cost of the contractor excluding the materials not conforming to specifications and shall be measured on the basis of such restacked heaps as mentioned in specification No. Rd.19.6.

Rd.21. *Supplying 50 mm. (about 2") trap/granite/quartzite/gneiss stone metal at the roadside including conveying and stacking complete.*

Rd.21.1. *General.*—The item provides for the supply of specified type of stone metal of 50 mm. (about 2") size at the roadside including obtaining the metal from approved sources, conveying to the roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.21.2. *Quarries.*—Rubble for breaking metal shall be obtained from quarries as per specification No. Rd.19.2.

Rd.21.3. *Metal:*—

Rd.21.3.1. *Quality.*—The stones for breaking metal shall be of the type mentioned in the item and shall be hard, tough, sound, durable, clean, dense, close grained and free from soft decayed and weathered portions and shall successfully resist weathering, abrasion and fracture under traffic. Stones should have freshly broken faces. Disintegrated stones or those with loose skin shall be excluded.

Rd.21.3.2. *Size.*—The rubble shall be broken or crushed to pieces to pass through a square mesh of 60 mm. (about 2½") internal dimension. All pieces shall be retained on a square mesh of 40 mm. (about 1½") internal dimension. However, the following tolerance shall be permitted for water bound macadam. Not more than 20 per cent. of any sample shall exceed 80 mm. (about 3") in its greatest dimension.

The pieces shall be roughly cubical in shape and more or less of uniform size with sharp edges for interlocking with one another and resisting displacement. Rounded, flaky, thin, elongated material shall not be accepted. Before large scale breaking, a sample conforming to the required quality, shape and size shall be got approved by the Engineer, who will keep it in his office for reference.

Rd.21.3.3. *Conveyance.*—According to specification No. Rd.19.3.3.

अनुक्रमणिका
Table of Contents



**Rd.23.3.1.**

Rd.21.3.4. *Stacking.*—According to specification No. Rd.19.3.4. The heaps may be 5 m. × 2 m. × 0.5 m. (16′ × 6′ × 1.5′ approx.) or as ordered by the Engineer.

Rd.21.4. *Special points.*—According to specification No. Rd.19.4.

Rd.21.5. *Item to include.*—Providing and breaking the rubble to metal of the specified size of 50 mm. (about 2″), conveying to roadside and stacking including all other relevant items mentioned in specification No. Rd. 19.5.

Rd.21.6. *Mode of measurement and payment.*—According to specification No. Rd.20.6.

Rd.22. *Supplying 40 mm. (about 1½″) trap/granite/quartzite/gneiss stone-metal at the roadside including conveying and stacking complete.*

Rd.22.1. *General.*—The item provides for the supply of metal of 40 mm. (about 1½″) size and of the specified type of stones at the roadside including obtaining the metal from approved sources, conveying to the roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.22.2. *Quarries.*—Rubble for breaking metal shall be obtained from quarries as specified in specification No. Rd.19.2.

Rd.22.3. *Metal*:—

Rd.22.3.1. *Quality.*—Metal shall be broken from approved rubble and shall satisfy specification No. Rd.21.3.1.

Rd.22.3.2. *Size.*—According to specification No. Rd.21.3.2 except that the rubble shall be broke by hand or crushed mechanically to pieces to pass through a square mesh of 50 mm. (about 2″) internal dimension and all pieces retained on a square mesh of 25 mm. (about 1″) internal dimension. However the following tolerance shall be permitted for water bound macadam: Not more than 20 per cent. of any sample shall exceed 65 mm. (about 2½″) in its greatest dimension.

Rd.22.3.3. *Conveyance.*—According to specification No. Rd.19.3.3.

Rd.22.3.4. *Stacking.*—According to specification No. Rd.21.3.4. Where metal for two layers has to be stacked, the metal for each layer shall be stacked on the opposite side of the road or as directed by the Engineer.

Rd.22.4. *Special Points.*—According to specification No. Rd.19.4.

Rd.22.5. *Item to include.*—Providing and breaking or crushing the rubble to metal of the specified size of 40 mm. (about 1½″) conveying to roadside and stacking including all other relevant items mentioned in specification No. Rd.19.5.

Rd.22.6. *Mode of measurement and payment.*—According to specification No. Rd.20.6.

Rd.23. *Supplying hard murum/kankar at the roadside including conveying and stacking complete.*

Rd.23.1. *General.*—The item provides for the supply of hard murum or kankar as mentioned in the item, at the roadside including obtaining it from approved sources, conveying to roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.23.2. *Quarries.*—Specifications applicable to rubble in Rd.19.2 will be applicable to hard murum quarries etc. except that the quarries shall be of hard murum or kankar as specified instead of stone.

Rd.23.3. *Hard Murum/kankar.*

Rd.23.3.1. *Quality*: *Hard Murum.*—The hard murum shall be of disintegrated trap, granite, quartzite or gneiss rock freshly quarried. It shall be sufficiently hard and free from soft murum, earth, organic matter or other deleterious or soft material. Before starting collection a sample should be got approved by the Engineer who will keep it in his office for reference.

The size of the hard murum shall generally be as follows:—

Size (square mesh) percentage passing through,

80 mm. (about 3″) 95 per cent.,

25 mm. (about 1″) 2 per cent.

अनुक्रमणिका
Table of Contents

*Kankar.*—Kankar shall be as tough as can be procured in the locality. A brown almost opalascent fracture will generally indicate a good kankar. It shall not contain any clay in the cavities between the modules. 100 per cent. shall pass through a square mesh of 65 mm. (about 2½"). Before starting collection a sample of kankar shall be got approved by the Engineer who will keep it in his office for reference.

Rd.23.3.2. *Conveyance.*—Specifications applicable to metal in specification No. Rd.20.3.3 will also be applicable to hard murum or kankar.

Rd.23.3.3. *Stacking.*—Specifications applicable to metal in specification No. Rd.20.3.4 will apply to stacking of hard murum or kankar also.

Rd.23.4. *Special points.*—The contractor shall be responsible for obtaining consents of owners of quarries and lands, payment of royalties, fees, rents, taxes, octroi etc., compensation due to injuries to persons or damages to property in any way connected with the execution of the item and for the loss of material due to improper stacking etc. and shall make good the losses without extra claims.

Rd.23.5. *Item to include.*—Obtaining hard murum or kankar as mentioned in the item of approved quality and size including payment of necessary royalties, fees, rents, and other relevant items according to specification No. Rd. 19.5 (2 to 5).

Rd.23.6. *Mode of measurement and payment.*—The stipulations applicable to rubble in specification No. Rd.19.6 will be applicable to hard murum or kankar also.

Rd.24. *Supplying soft murum at the roadside including conveying and stacking complete.*

Rd.24.1. *General.*—The item provides for the supply of soft murum at the roadside including obtaining the soft murum from approved sources, conveying to roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.24.2. *Quarries.*—Specification applicable to rubble in Rd.19.2 will be applicable to soft murum quarries also except that the quarries shall be of soft murum instead of stone.

Rd.24.3. *Soft murum.*—The soft murum shall be obtained from approved sources and shall be got approved before starting the supply.

Rd.24.3.1. *Quality.*—Soft murum shall be of granular type free from earth, organic matter, black cotton soil and any other inferior material.

Rd.24.3.2. *Conveyance to site.*—Specifications applicable to metal in specification No. Rd.20.3.3 will be applicable to soft murum also.

Rd.24.3.3. *Stacking.*—Specifications applicable to metal in specification No. Rd.20.3.4 will also be applicable to soft murum.

Rd.24.4. *Special points.*—According to Rd.23.4.

Rd.24.5. *Item to include.*—Collection of soft murum on roadside and relevant items mentioned in specification No. Rd.19.5.

Rd.24.6. *Mode of measurement and payment.*—The specifications applicable to rubble in Rd. 19.6 shall be applicable to soft murum also.

Rd.25. *Supplying sand at the roadside including conveying and stacking complete.*

Rd.25.1. *General.*—The item provides for the supply of sand to the roadside including obtaining the sand from approved sources, conveying to roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.25.2. *Source.*—The contractor shall make his own arrangements from available sources to obtain the sand.

The sources and the quality of the sand available from them shall be got approved before starting the supply. A sample shall be got approved by the Engineer who will keep it in his office for reference.

The contractor shall be fully responsible for any and all compensation to be paid as royalty, fees, rents, taxes, octroi, damage, injury etc. in obtaining the sand.

Rd.25.3. *Sand:*—

Rd.25.3.1. *Quality.*—The sand shall be got approved before starting the supply. The sand shall be free from organic or deleterious matter. The sand shall be coarse, hard and shall not generally contain particles bigger than 6 mm. (about ¼") and silt more than 10 per cent.

Rd.25.3.2. *Conveyance to site.*—The specification applicable to rubble in Rd.19.3.3. shall be applicable to sand also.

Rd.25.3.3. *Stacking.*—The specification applicable to metal in Rd.20.3.4 shall be applicable to sand also.

Rd.25.4. *Special points.*—According specification No. Rd.23.4.

Rd.25.5. *Item to include.*—Collection of sand on roadside and relevant items mentioned in specification No. Rd.19.5 so far as they are applicable for sand instead of rubble.

Rd.25.6. *Mode of measurement and payment.*—According to specification No. Rd.20.6.

Rd.26. *Supplying gravel at the roadside including conveying and stacking complete.*

Rd.26.1. *General.*—The item provides for the supply of gravel to the roadside including obtaining the gravel from approved sources, conveying to roadside with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the roadside.

Rd.26.2. *Sources.*—The contractor shall make his own arrangements from available sources to obtain the gravel.

The sources, the quality and size of gravel shall be got approved before starting the supply. A sample shall be got approved by the Engineer who will keep it in his office for reference.

The contractor shall be fully responsible for any and all compensations, royalty, fees, rents, taxes, octroi, damage, injury, etc. in obtaining the gravel.

Rd.26.3. *Gravel:*—

Rd.26.3.1. *Quality.*—The gravel shall be free from organic or deleterious matter. The gravel shall be hard, tough, dense and shall not generally contain particles bigger than 12 mm. (about 1/2") and silt more than 10 per cent.

Rd.26.3.2. *Conveyance to site.*—The specifications applicable to rubble in Rd.19.3.3 shall be applicable to gravel also.

Rd.26.3.3. *Stacking.*—The specifications applicable to metal in Rd.20.3.4 shall be applicable to gravel also.

Rd.26.4. *Special points.*—According to specification No. Rd.23.4.

Rd.26.5. *Item to include.*—Collection of gravel on roadside and relevant items mentioned in specification No. Rd.19.5 so far as they are applicable for gravel instead of rubble.

Rd.26.6. *Mode of measurement and payment.*—According to specification No. Rd.20.6.

Rd.27. *Laying 15 cm. (about 6")/23 cm. (about 9")/trap/granite/quartzite/gneiss rubble soling including hand packing with rubble chips complete (excluding the cost of materials).*

Rd.27.1. *General.*—The item provides for the labour for laying soling of specified type of stones in the specified thickness including preparing the subgrade to proper section by scraping, dressing, compaction, etc. and hand packing the rubble chips to the required line, curve, grade and section.

Rd.27.2. *Diversion.*—When the traffic can be allowed on the roadside berms without much inconvenience to traffic or impediment to the work, this shall be provided by the contractor at his own cost. He shall provide the necessary barricading, warning boards and signals and watchmen by day and red lights at night and comply with relevant provisions of specification No. BR.1. Otherwise, a separate diversion shall be provided according specification No. BR.1.

Rd.27.3. *Construction.*

Rd.27.3.1. *Preparation of sub-grade.*—The sub-grade shall be marked by stakes and strings for the required width for laying of the soling in line, curve, section and grade with reference to the centreline. The edge line stakes shall be ranged for a sufficiently long length to obtain straight lengths and uniform curves. The contractor shall clear off the area and do the necessary trimming or filling for laying of the soling in line, curves, grades and section. All fillings shall be watered and compacted to get maximum consolidation. The camber, super elevation etc. of the sub-grade shall conform in shape to those of the finished road surface and if in any section the road surface is loose, undulating or uneven, the contractor shall, at his own cost make it up with suitable material, water and compact it and obtain the correct section. Camber boards shall be used to get the required section.

Rd.27.3.2. *Laying soling.*—The rubble collected by the roadside shall be laid with the largest face downwards and in contact with each other. The stones shall break joint as far as possible. The full thickness of the soling shall generally be made with one stone only. The junction of the old road and the new construction shall be diagonal in plan and the soling shall be in level with the corresponding course of the old road.

Unless otherwise provided in the plans or directed by the Engineer, the width of the soling shall be 30 cm. (about 12") more than that of the metal above.

Rd.27.3.3. *Hand-packing.*—As the laying of rubble advances the soling shall be hand packed by wedging and packing with 80 mm. metal collected for the purpose in the joints of the soling and driving them by hammers in place so as to fill the voids as completely as possible. This operation of hand packing shall follow the rubble laying closely.

The soling shall be laid and hand packed true to grade and section and these shall be often checked by boning rods, template boards and fishline etc. The grades, section etc. of the soling shall correspond to those of the surfacing coming on it.

The soling thus laid shall be finished by knocking out projecting stones and filling depressions by chips to come up to the grade and camber.

Rd.27.4. *Item to include.*—(1) Setting out including labour and materials like stakes, strings, fishline, boning rods, and camber boards.

(2) Diversion, barricading, signalling and controlling traffic if necessary unless separately provided in the tender.

(3) Conveying the rubble from stacks on the roadside and laying the soling to the required line, curve, grade and section including clearing, sectioning, dressing grades and section and compacting the sub-grade, breaking rubble, and hand packing with 80 mm. metal.

(4) All labour, materials and use of equipment and tools required for carrying out the work satisfactorily.

Rd.27.5. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of soling laid hand packed and finished.

The width and depth shall be restricted to the specified width and depth. The dimensions shall be recorded correct up to two places of decimals of a metre and the quantity calculated correct up to two places of decimals of a cubic metre. No deduction shall be made for voids.

Rd.28. *Spreading gravel over the rubble soling.*

Rd.28.1 *General.*—The item provides for the labour for conveying gravel from the roadside stacks and spreading it for filling the interstices and voids in the rubble soling.

Rd.28.2. *Spreading.*—The gravel shall be conveyed from the stacks on the roadside and spread evenly over the rubble soling. The quantity of gravel to be spread per sq. m. of the rubble soling shall be as directed by the Engineer. If so ordered, initially less quantity of gravel may be spread and the remaining spread afterwards.

If the gravel does not enter the interstices of the soling fully it may be swept by brooms to fill them if so directed by the Engineer.

Rd. 28.3. *Item to include.*— (1) Conveying the gravel stacked along the roadside and spreading evenly over the rolled surface and brooming it to fill the voids and interstices.

(2) All labour and use of tools to complete the item satisfactorily.

Rd.28.4. *Mode of measurement and payment.*—According to specification No. Rd.29.5.

Rd.29. *Spreading oversize (60 mm.) metal including sectioning complete.*

Rd.29.1. *General.*—The item provides for the labour for conveying the oversize metal from the roadside stacks and spreading it for the road crust.

Rd.29.2. *Diversions.*—According to specification No. Rd.27.2.

Rd.29.3. *Spreading metal.*— The metal shall be screened if it contains grass, rubbish or other deleterious foreign material. The metal shall be spread evenly over the rolled rubble soling surface by giving a twisting motion to the basket at the time of spreading—Rolling over soling is included under the rolling of oversize metal true to line, grade and section to provide the requisite thickness of crust. In order to ensure the correct thickness, the road area shall be suitably marked so as to receive the contents of one heap for the specified thickness in the area marked. The unevenness and undulations after the spreading shall be rectified either by thinning the metal or adding it as required. The metal so spread shall be checked by camber

boards and line for the camber and grade at intervals of every 10 metres (about 30') or so. The edge line stakes shall be ranged for a sufficiently long length to obtain straight lengths and uniform curves.

The sides of the metal shall be held by bunds of murum to prevent metal from spreading if side widths are not provided at the time. These bunds shall be of such depth as to support the metal.

The junction of the existing road and the new construction shall be diagonal in plan. Between the straight lengths and curves and at the meeting points of convex and concave portions of reverse curves the change in the camber shall be made very gradually as directed by the Engineer.

Rd.29.4. *Item to include.*—(1) Providing bunds of murum, etc. at the edges of metal to one cubic meter of metal.

(2) Conveying the metal from the roadside and spreading evenly to the required depth, width and section.

(3) Diversion if necessary unless separately provided in the tender.

(4) All labour, materials and use of tools required for the satisfactory completion of the item.

Rd.29.5. *Mode of measurement and payment.*—The contract rate shall be for spreading one cubic metre of metal.

The quantity spread shall be arrived at by deducting the quantity in balance on site from the total collection existing on the roadside before spreading is started. The quantity on site shall be checked before spreading is started and after completion of spreading.

Rd.30. *Spreading sand over the oversize metal layer.*

Rd.30.1. *General.*—The item provides for the labour for conveying the sand from the stacks on the roadside and spreading it for filling the interstices and voids in the oversize metal layer.

Rd.30.2. *Spreading.*—Sand shall be spread in an even layer over the oversize metal after the metal is fully compacted to fill the interstices. The quantity of sand to be spread per sq. metre of the compacted metal shall be as directed by the Engineer. If the sand does not enter the interstices of the metal fully it may be swept by brooms to fill them if so directed by the Engineer.

Rd.30.3. *Item to include.*—According to specification No. Rd.28.3 except that sand shall be spread instead of gravel.

Rd.30.4. *Mode of measurement and payment.*—According to specification No. Rd.29.5.

Rd.31. *Spreading blindage of soft murum over the oversize metal.*

Rd.31.1. *General.*—The item provides for the labour for conveying soft murum from the roadside stacks and spreading it for blindage over the rolled oversize metal.

Rd.31.2. *Spreading.*—The soft murum shall be spread evenly over the fully compacted oversize metal layer to the thickness as directed by the Engineer. Unevenness shall be removed preferably by a broom without disturbing the metal. The blindage may be spread in one or more layers if so ordered by the Engineer.

Rd.31.3. *Item to include.*—(1) Conveying the soft murum from the roadside and spreading evenly over the campacted road surface in one or more layers as directed by the Engineer.

(2) All labour and use of tools to complete the work satisfactorily.

Rd.31.4. *Mode of measurement and payment.*—According to specification No. Rd.29.5.

Rd.32. *Compacting sub-grade, soling, gravel, oversize metal, sand and soft murum layers—m wide with power roller including artificial watering complete.*

Rd.32.1. *General.*—The item provides for fully compacting the oversize metal layer with a power roller of 10 to 12 tonnes weight including compacting the sub-grade, rubble soling and gravel before spreading the oversize metal and rolling over the oversize metal surface first dry to refusal and then again after watering and also after spreading of sand and soft murum blindage necessary labour, use of roller etc., complete.

Rd.32.2. *Road diversions.*—According to specification No. Rd.27.2.

Rd.32.3. *Rolling over the sub-grade and the soling.*—The sub-grade shall be rolled after it is dressed to the required grade and section before laying the soling. The soling after it is properly laid and hand packed shall be rolled dry with 10 to 12 tonne power roller to refusal i.e. till the stones in the soling cease to move under the roller and no more compaction can be achieved. In case of unevenness, highspots shall be knocked out and depressions filled by spalls and recompacted fully. Bunds shall be laid along the edges and compacted before starting rolling on soling to prevent spreading of stones.

Gravel shall then be spread (to be paid under the separate item of spreading gravel) over the rolled soling to fill the interstices entirely as directed by the Engineer and the surface rolled over again to wedge the gravel in the interstices of the soling tightly.

Rd.32.4. *Compaction of oversize metal.*

Rd.32.4.1. *General.*—The compaction shall be done with a 10 to 12 tonne power roller. The rolling shall begin with the outside rear wheel of the roller covering equal parts of shoulder and metal and the roller shall be run forward and backward until the shoulder holds the metal firmly. The rolling shall then progress from edges to the centre in strips parallel to the centre line of the road. Rolling shall be done by lapping uniformly each preceding rear wheel track by one half width of the track and shall continue until all the surface has been rolled by the rear wheels three or four times and to refusal. Side bunds shall be raised to hold the material before starting rolling.

On super elevations, the rolling shall be started at the inner edge and carried towards the outer edge. In all cases, the correct cross sections of the road as required at straight portions, superelevations and transitions shall be obtained on final rolling. During and after rolling, the sections and grades shall be checked with camber boards and straight edges and any defect set right at the time of rolling. Care shall be taken to see that the roller is worked or started and stopped without jerks. The roller shall not be stopped in the working section as far as possible. Rolling shall not normally be done in lengths of less than 100 m. (about 328′). The stretch started on a particular day shall as far as possible be completed on the very day. On completion of a day's work the roller shall be made to stand on the side width of the road and shall be guarded by watchmen and conspicuous barricades. Red light shall be hung on to the roller so as to be visible from both sides of the road.

Rd.32.4.2. *Dry rolling of oversize metal.*—The layer of metal shall be rolled dry first with 10 to 12 tonne power roller to refusal i.e., till the metal is completely interlocked and ceases to move under the roller and no more compaction can be achieved. This state can be judged by—

(i) metal ceasing to move in front of the roller or,

(ii) crushing of the metal with further rolling or,

(iii) loaded bullock cart leaving no indentation over the compacted surface.

In case of uneven spots, high spots shall be lowered by removing necessary metal pieces and depressions shall be filled by additional metal and full compaction of these portions redone to conform to the correct section.

Rd.32.4.3. *Wet rolling.*—The rolled surface shall then be watered freely and rolled again. Sand shall then be spread to a uniform thickness of 6 mm. (about ¼″) or such other thickness as directed by the Engineer and further rolling done to pack the interstices with sand. Watering shall be done again and soft murum blindage spread as directed by the Engineer and the surface finally rolled lightly. If no sand is provided there will be no rolling over sand.

Rd.32.4.4. *Opening road to traffic.*—The road may be opened to traffic after the macadam has set and not earlier than 24 hours after completion of final rolling. Watering shall be done in patches wherever necessary for 2-3 days after opening the road to traffic. For a week after the traffic is allowed to run on the surface, traffic should be distributed over the full width by bliding with gravel or by other acceptable means any tracks that may be forming in the surface.

Rd.32.5. *Item to include.*—(1) Rolling over the sub-grade and the soling and gravel including hire of machinery if any and all other charges involved.

(2) Dry and wet rolling of the oversize metal and sand including hire of machinery if any and all other charges involved.

(3) Making good unevenness.

(4) Final rolling over sand and murum blindage including hire and all other charges if any.

**Rd.34.2.**

(5) Artificial watering over the metal and sand.

(6) Diversion of traffic.

(7) All labour, materials, use of tools, roller and other equipment necessary for completing the work satisfactorily.

Rd.32.6. *Mode of measurement and payment.*—The contract rate shall be for compacting one km. length of the road of the full width of sub-grade, soling, oversize metal, and sand and/ or murum blindage as shown in the section including increased widths on curves, road crossings, etc.

The length of the road compacted shall be measured along its centre line correct upto one place of decimal of a metre.

Rd.33. *Picking the road surface including sectioning complete.*

Rd.33.1. *General.*—The item provides for the picking and sectioning of the road surface for receiving the new metal surface.

Rd.33.2. *Road diversion.*—If the traffic cannot be allowed to pass over the road side shoulders during the picking, spreading and compacting operations, diversions shall be taken out and maintained as specified under item No. BR.1.

Where specified, the work may be done in half width provided proper section is obtained and suitable arrangement for traffic is made without hindering or interfering with the work. Proper barricades, signs also be erected for the traffic if allowed to pass over the berms or a lane of the road. Watchmen and signallers shall be employed as directed by the Engineer. Red lights shall be hung during night time to indicate the danger. If the picked up road surface cannot be completely surfaced and rolled at the end of the day, red lights shall be put up at each end to warn the traffic.

Rd.33.3. *Picking.*—All the caked mud, slush, animal droppings, vegetation and all other rubbish accumulated on the road-surface shall be removed. Where the section of the road surface is good, the road surface shall be picked lightly only to loosen the surface stones. Where the section is uneven picking shall be done a little deeper to enable the sectioning to be done to the required shape with the picked up material. The picking shall always be ahead of the spreading of metal and compaction by about 100 meters. The edeges of the picking shall be truly in a line or curve as the case may be. This can be achieved by tying strings to nails driven on the road edge and ranging for a sufficiently long length.

The picked up surface shall be sectioned to the required grade and camber, super elevation or transition section. Templates shall be used to obtain correct and uniform camber, super elevation or transition section as the case may be.

The road surface may be watered by the contractor for easier picking without claiming extra for the same.

The junctions of the picked and non-picked surfaces shall be diagonal.

Rd.33.4. *Item to include.*—(1) Picking.

(2) Watering if required.

(3) Sectioning and grading.

(4) Diversions including barricading, warning signals, lights, etc., unless separately provided in the tender.

(5) All labour, materials, use of tools, etc., for carrying out the work satisfactorily.

Rd.33.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of surface picked and sectioned.

The area picked shall be worked out in sq. metres correct upto a sq. metre. The width shall be limited to the width specified or as ordered by the Engineer. The length shall be measured along the centre line of the road. The dimensions shall be recorded correct upto one place of decimal of a metre. Increased width on curves shall be measured.

Rd.34. *Spreading 40 mm. metal including sectioning complete.*

Rd.34.1. *General.*—The item provides for the labour for conveying the metal from the stacks on the roadside and spreading it evenly on the sectioned road surface.

Rd.34.2. *Diversions.*—According to specification No. Rd.27.2.

Rd.34.3. *Spreading metal.*—According to specification No. Rd.29.3. except that the metal shall be spread on the picked up surface. The picked up surface shall have been dressed to the typical section to suit straight reaches, superelevations or transition sections as the case may be under the item of picking and sectioning and shall be lightly rolled before the new metal is spread. Rolling of the picked up surface is included in the item No. Rd.35 for compacting metal layer with power roller including necessary labour, materials, use of roller and artificial watering complete.

The edges of the metal shall be held by sidewidths or bunds to prevent the metal spreading out under the roller. When the thickness of metal layer to be compacted is more than 80 mm. (about 3") the surfacing shall be done in two or more courses each course being not more than 80 mm. (about 3") nor less than 40 mm. (about 1½"). Camber boards shall be used to get the required section.

Rd.34.4. *Item to include.*—According to Rd. 29.4.

Rd.34.5. *Mode of measurement and payment.*—According to Rd.29.5.

Rd.35. *Compacting the metal layer—m wide with power roller including necessary labour, materials and artificial watering complete.*

Rd.35.1. *General.*—The item provides for light rolling on the picked up road surface after sectioning and for fully compacting the metal after it is spread with a power roller of 10 to 12 tonnes including necessary labour, and watering, etc., complete. The metal shall be rolled in layers of not more than 8 cm. (about 3").

Rd.35.2. *Road diversions.*—According to specification No. Rd.27.2.

Rd.35.3. *Compaction.*—According to Rd.32.4 except that the rolling shall be done on the size metal instead of oversize metal. The picked up road surface shall be rolled lightly after sectioning and before the spreading of the metal.

Rd.35.4. *Item to include.*—(1) Light rolling over the picked up road surface after sectioning including road diversions when required.

(2) Dry rolling of the metal to get full compaction.

(3) Wet rolling including artificial watering.

(4) Making good unevenness.

(5) Light rolling over blindage.

(6) Diversion of traffic to prevent rutting.

(7) All labour, materials, use of tools, plant and roller for completing the work satisfactorily.

Rd.35.5. *Mode of measurement and payment.*—According to specification No. Rd.32.6.

The contract rate shall be for compacting one km. length of the road of the specified width including increased widths at curves, road crossings etc.

The length of the road compacted shall be measured along the centre line of the road correct upto one place of decimal of a metre.

Rd.36. *Spreading blindage of—*

(*a*) *sand,*

(*b*) *soft murum, over waterbound macadam road surface.*

Rd.36.1. *General.*—The item provides for the labour charges for conveying soft murum or sand from road side stacks and spreading for blindage.

Rd.36.2. *Spreading.*—The soft murum or sand shall be conveyed from the stacks on the road side and spread evenly over the road surface to the thickness as instructed by the Engineer. If so ordered, part of the material shall be spread first and the remaining spread afterwards . Unevenness shall be removed by a phawra or broom without distrubing the metal. The blindage shall be rolled over.

Rd.36.3. *Item to include.*—(1) Conveying the material from road side stacks and spreading evenly over the rolled surface for blindage.

(2) All labour and use of tools and plant to complete the item satisfactorily.

Rd.36.4. *Mode of measurement and payment.*—According to Rd.29.5.

Rd.37. *Spreading hard murum/kankar on the road formation.*

**Rd.39.**

Rd.37.1. *General.*—The item provides for the labour charges for conveying the hard murum or kankar from the stacks on the roadside and spreading it to the required width, thickness, line, curve, grades and section.

Before spreading the material the section of the sub-grade shall be dressed to the required section and rolled. Rolling the sub-grade is included in the item No. Rd. 38.

Rd.37.2. *Diversion.*—According to specification No. Rd. 27.2.

Rd.37.3. *Spreading.*—The sub-grade shall be dressed and rolled to the required line, curve, grade and section before spreading hard murum or kankar. Hard murum or kankar shall be spread evenly true to line, grade and section and to the required thickness and width after ranging the edge lines stakes for a sufficiently long length. It shall be laid to such section and grade that after compacting, the section shall conform to the typical section and required grade specified or ordered by the Engineer. Any unevenness shall be removed by removal of excess material from high spots or filling in the depressions with additional material, both while spreading and rolling. The edges shall be supported by side widths. The section and grade shall be checked by means of camber boards and straight edges.

Rd.37.4. *Item to include.*—(1) Dressing of the sub-grade to the required section. It shall be compacted as required. Compaction is included in the item No. Rd. 38 for compacting hard murum or kankar.

(2) Conveying the material from the road side and laying it evenly on the road formation to conform to the specified section and thickness or as directed by the Engineer.

(3) All labour, use of tools and plant to complete the item satisfactorily.

Rd.37.5. *Mode of measurement and payment.*—According to specification No. Rd.29.5.

Rd.38. *Compacting the hard murum/kankar layer—m wide with power roller including artificial watering complete.*

Rd.38.1. *General.*—The item provides for rolling over the sectioned sub-grade and compaction of hard murum of kankar with a power roller of adequate weight including necessary labour, watering etc. complete.

Rd.38.2. *Road diversions.*—According to specification No. Rd.27.2.

Rd.38.3. *Compaction.*—Compaction shall be done on the general lines indicated in specification No. Rd.32.4 so far as is relevant to this item. The sub-grade shall be sectioned under the item of spreading before spreading hard murum or kankar. It shall also be rolled under this item before spreading the hard murum or kankar.

Rd.38.3.1. *Watering.*—Only just sufficient water as is necessary shall be sprinkled uniformly over the hard murum or kankar layer so as to obtain maximum compaction with the type of rolling adopted without total crushing of the material. Excessive watering shall be avoided as will rended the material plastic which will give way under the roller.

Rd.38.3.2. *Rolling.*—The course shall be compacted with a power roller to give maximum compaction.

The surface shall be checked by line and camber board for the line, grade and section or super-elevation from time to time during and after rolling and any unevenness corrected. If blindage is spread over the rolled surface, the blindage shall be lightly rolled over.

Rd.38.4. *Item to include.*—(1) Rolling over the dressed section of the sub-grade.

(2) Compacting the hard murum or kankar course with a power roller including necessary watering.

(3) Making good unevennesses under rolling.

(4) Rolling over blindage when necessary.

(5) All labour materials and use of tools and roller for completing the work satisfactorily.

Rd.38.5. *Mode of measurement and payment.*—The contract rate shall be for compacting one km. length of road specified width of sub-grade, hard murum or kankar and blindage including watering and rolling parts of side widths, increased widths at curves, road crossing, etc. The length of the road compacted shall be measured along its centre line correct upto one place of decimal of a metre.

Rd.39. *Spreading hard murum/kankar for the side widths.*

Rd.39.1. *General.*—The item provides for the labour for conveying the hard murum or kankar as mentioned in the item from the stacks on the roadside and spreading it to the required width, thickness, line, curves, grades and section and the sidewidths.

Rd.39.2. *Spreading.*—According to specification No. Rd. 37.3.

Rd.39.3. *Item to include.*—According to specification No. 37.4.

Rd.39.4. *Mode of measurement and payment.*—According to specification No. Rd.29.5.

Rd.40. *Compacting the hard murum sidewidth layer —m wide on each side with power roller includng artificial watering complete.*

Rd.40.1. *General.*—The item provides for compacting the hard murum sidewidths with a power roller including necessary labour, use of roller, watering if necessary, etc., complete.

Rd.40.2. *Road diversions.*—According to specification No. Rd.27.2.

Rd.40.3. *Compacting.*—According to specification No. Rd.38.3.

Rd.40.4. *Item to include.*—According to specification No. Rd.38.4.

Rd.40.5. *Mode of measurement and payment.*—The contract rate shall be for compacting one km. of the hard murum sidewidths of the specified width. Sidewidths on both sides shall be measured as one for the stretch of the road for the purposes of payment.

The length of the hard murum sidewidths compacted shall be measured along the centre line of each sidewidth and the average length shall be taken correct to one place to decimal of a metre.

## GENERAL SPECIFICATIONS FOR THE BITUMINOUS ROAD SURFACES

The following stipulations shall be applicable to all the bituminous road surfaces:—

The work shall be carried out in the best workman like manner and according to detailed specifications for each item.

The contractor shall where necessary make all arrangements for diverting and controlling traffic during the execution of the work. All arrangements such as proper barricading of road, signallers, red and green flags during the day and lights at night shall be made by the contractor to control and safeguard the traffic.

Approval of Materials:—

Representative samples of the materials proposed to be used shall be submitted to the Engineer and got approved. No material shall be used unless it is approved by the Engineer.

PLANT AND EQUIPMENT:

All equipment furnished by the contractor shall be of approved design and shall be maintained in its best mechinical condition. Equipment supplied on hire by the Government shall be operated, maintained and serviced in accordance with the manufacturer's instructions. Equipment shall be serviced and lubricated away from the paving site. Units which drip fuel, oil and grease shall be removed from the site until such leakage is corrected to the satisfaction of the Enginer.

Asphalt mixing plants: All plants used by the contractor for the preparation of asphalt paving mixes shall conform to all the requirements of the job except that scale requirements shall apply only where weight proportioning is used. All batch mixing plants shall conform to the special requirement of the job.

Requirement for all plants:—

(i) **Uniformity:** The plants shall be designed, co-ordinated and operated so as to produce a mixture of proper and uniform quality within limits specified.

(ii) **Plant scales:** Scales for any weigh box or hopper may be either of the beam or springless dial type and shall be of standard make and design, sensitive to one half to one per cent. of the maximum load that may be required.

(iii) **Bituminous binder control Unit:** Satisfactory means either by weighing, mettering, or volumetric measurements shall be provided to obtain the proper amount of bituminous binder. All measuring devices are to be sensitive to not more than two per cent. variation above or below the actual weight required.

Special requirements for batching plants:—

Weigh box or hopper: The equipment shall include a means for accurate weighing or measuring of each batch of aggregate.

Bitumen bucket: The bucket shall be so arranged that it will deliver the measured or weighed heated bituminous binder in a thin uniform sheet.

Mixer Unit: The plant shall include a batch mixer of approved twin pugmill type capable of producing a uniform mixture within the job mix tolerance formula fixed by the contract.

## SPECIAL REQUIREMENTS FOR CONTINUOUS MIXING PLANTS

The aggregate volume control Unit.—The plant shall include means for accurately controlling volume of aggregate delivered to the mixer.

Synchronisation of aggregate and binder feed: Satisfactory means shall be provided to afford positive inter-locking control between the flow of aggregate and the flow of bituminous binder from the meter.

Mixer unit for continuous methods.—The plant shall include a continuous mixer of an approved twin pugmill type. The paddles shall be of a type adjusted for angular position of the shafts and reversible to retard the flow of the mix.

Pavers and finishing machines: Unless otherwise provided, the mix shall be spread by a mechanical self-powered paver capable of spreading the mix true to line, grade and camber indicated on the plants or as directed by the Engineer. Paver shall be equipped with hoppers and distributing screws to place the mix evenly in front of the adjustable screws. They shall have a quick and efficient steering device and shall be capable of travelling both forwards and backwards.

Rollers: The rollers may be of two types, three wheel rollers or two axle tandem rollers. Rollers shall be in good working condition and be free from backlash, faulty steering mechanism or worn parts.

*Transport*:—

Haul vehicles used for the transportation of the mixes shall have tight metal bottom and shall be free from dust, screenings, petroleum oils, or other mineral spirits. The truck bottom must be lightly lubricated with a thin oil or soap solution just before loading to prevent the mix from sticking to the vehicle.

## INSPECTION AND CONTROL OF ASPHALT MIXING PLANTS:

General provisions: For verification of weights and measures, character of materials and determination of temperatures used in the preparation of the paving mixes, the Engineer or his authorised representative shall at all time have access to all portions of the paving plant, aggregate plant, mixing plant, storage yards, and other facilities for producing, processing and testing materials. They shall be under the control of the Engineer.

## CONSTRUCTION METHODS:

Weather limitations: The mixing and laying of asphalt mixes shall be performed only when weather conditions are suitable. When the moisture of the aggregate interfers with the uniformity of temperature of continuous plant operations, or pools of water are observed on the base, mixing and placing will not be permitted.

The following stipulations shall be applicable to the hot mix, hot laid bitumen concrete paving:—

Job mix formula: The Engineer shall make frequent graduation analysis of the hot aggregates and of the completed mix to be certain that the materials being used and produced are within the tolerances of the job mix formula and the specifications of the mix being used. If the mix is found to be outside the job mix formula tolerances or outside the specification limits, correction shall be made in the aggregate and bitumen proportions being used.

Sampling and Testing: Stockpiles and bins shall be sampled for gradation analysis, dust coating and for other purposes, at the option of the Engineer. Gradation analysis of each type of aggregate shall be made atleast twice a day. If the material does not run

uniform, more frequent tests shall be made. If the samples are tested in Departmental laboratory the cost of Rs. 5 per sample will be charged to the contractor but in case testing is done from an outside laboratory, the whole cost that may be charged by the laboratory shall be borne by the contractor.

Proportioning and mixing: When the mix is produced in a hot mix type plant, the aggregate shall be accurately weighed or measured in the designed proportions to provide the specified batch weight. The temperature of the aggregate at the time of introduction into the mixer shall be as directed by the Engineer with a tolerance of $\pm 8{\cdot}33°C$ ($\pm 15°F$).

In no case shall the temperature of the mixture exceed 163°C (about 325°F) or be less than 121°C (about 250°F). Arrangements to watch and control the temperature shall be made by the contractor by providing a thermometer to each boiler. The bitumen shall be heated so that it can be properly circulated through the pumping system and uniformly distributed throughout the batch. The degree of heat shall provide a material sufficiently fluid to produce a uniform coating on every particle of aggregate within the specified time. The temperature of the aggregates and bitumen immediately prior to mixing be approximately that of the completed batch. In no case shall the temperature of the bitumen and the aggregate vary by more than 15°C (about 25°F), when placed in the mixing chamber. Continuous mix plants shall conform to these requirements and in general shall be controlled in the same manner as batch type plants. Details of control, differing because of the continuous mixing principles, shall be governed by the instructions issued by the plant manufacturer wherever the instructions are not contrary to this specification. When a continuous mix type plant is used and the No. of revolutions of the feeder is indicated by a counter, a lorry load of mixture shall be weighed whenever an alteration is made in the feeder gate setting in order to determine the weight of aggregate delivered per revolution.

Spreading and finishing :

These operations shall be conducted in the following manner :—

(*a*) Mechanical spreaders:—The binder course mixture shall be spread and struck off with an approved self-powered and propelled mechanical spreader capable of spreading and finishing the mix true to line grade and cross-section without the use of forms or side supports. Finishing machines shall be operated so that material does not accumulate and remain along the sides of the receiving hopper.

The finishing machine shall be equipped with a positive controlled mechanical screed. The screed shall be equipped with a suitable controlled heating device to be used when required. The screed shall strike off the mix to the elevation and cross-section specified without the aid of manual adjustment during operation. The term 'Screed' includes any cutting or other practical device which will produce a smooth and uniform texture without tearing, shoving or gauging.

Longitudinal joints and edges shall be constructed true to line marking. Lines shall be established by the Engineer parallel to the centreline of the proposed roadway for the paver to follow in placing individual lanes. The paver shall be positioned and operated to closely follow the established line. When using paver in echelon, the first paver shall follow the marks of lines and the second paver shall follow the edge of material placed by the first paver. In order to assure a hot joint and obtain proper compaction, the paver shall work as closely together as possible and in no case shall they be more than 75 m. (about 250') apart. In backing trucks against the finisher care shall be taken not to jar the finisher out of its proper alignment. Delivery of material to the paver shall be at a uniform rate in an amount well within the capacity of the paving and compacting equipment.

As soon as the first load of material has been spread, the texture of the unrolled surfaee shall be checked to determine its uniformity. The adjustment of the screed, tamping bars, feed screws, hopper feed, etc. shall be checked frequently to assure uniform spreading of the mix to proper line and section and adequate initial compaction. Segregation of the materials shall not be permitted. If segregation occurs, the spreading operation shall be immediately suspended until the cause is determined and corrected.

Construction joints shall be placed in the same vertical plane. Longitudinal joints shall be offset at least 8cm. (about 3") and transverse joints in succeeding course shall be offset at least 60 cm. (about 2').

Any irregularities in alignment left by the paver shall be corrected by trimming directly behind the machine. Immediately after trimming, the edges of the course shall be throughly compacted by tamping. Distortion of the pavement during this operation shall be avoided.

Edges against which additional pavement is to be placed shall be vertically formed true to line. A lute or covered rake shall be used immediately behind the finisher, when required, to obtain a true line and vertical edge. Any irregularities in the surface of the pavement course shall be corrected directly behind the paver. Excess material forming high spots shall be removed by a shovel or lute. Indented areas shall be filled with hot mix and smoothed with the back of a shovel being pulled over the surface. Fanning of material over such areas shall not be permitted.

(*b*) Motor Grader: When the Engineer permits the use of motor graders for the spreading of the mix, the material shall be placed on the road bed in a windrow by windrow leveller, measuring devices or by other methods acceptable to the Engineer so that the proper amount of material is available. The mix shall be spread to the required thickness, line, section and grade with a uniform surface texture at a workable temperature. The Engineer may specify the length of the windrowed mix ahead of the spreading operations based upon the workability of the mix, weather conditions and the time required for the spreading operation.

(*c*) Hand Spreading: In small areas where the use of mechanical finishing equipment is not practicable, the mix may be spread and finished by hand if so directed by the Engineer.

Approved wood or steel forms, rigidly supported to assure correct grade and cross section, may be used. In such instances measuring blocks and intermediate strips shall be used for obtaining the required cross section. Placing by hand shall be performed carefully, the material being distributed uniformly to avoid segregation of the coarse and fine aggregate during the spreading operation. All material shall be thoroughly loosened and uniformly distributted by lutes or covered rakes. Material that has formed into lumps and does not break down readily shall be rejected. Following placing and before rolling, the surface shall be checked with templates and straight edges and all irregularities corrected.

Heating equipment for keeping hand tools free from asphalt shall be provided. Caution shall be exercised to prevent high heating temperatures which may burn the material. The temperature of the tools when used shall not be greater than the temperature of the mix being placed. Only heat will be employed to clean hand tools, petroleum oils or volatiles shall be permitted.

Compaction :

(*a*) The wheels of the rollers shall be wetted while rolling over the premix etc.

Rolling shall be by overlapping on successive trips by atleast one half the width of tandem rollers and uniformly lapping each preceeding track or covering the entire surface with the rear wheels when three wheel rollers are used. The rollers shall move at a slow but uniform speed (not to exceed three miles per hour) with the drive roller or wheel nearest the paver. They shall be in good condition capable of being reversed without backlash, and the line of rolling shall not suddenly changed or the direction of rolling suddenly reversed, thereby displacing the mix. If rolling causes displacement of the material, the affected areas shall be loosened at once with lute or shovels and restored to the original section of the loose material before being re-rolled. Heavy equipment or rollers shall not be permitted to stand on the finished surface until it has thoroughly cooled.

(*b*) Transverse joints: Transverse joints in both binder and surface course shall be carefully constructed and thoroughly compacted to provide a smooth riding surface over these points in the pavement. Joints shall be straight edged and string lined to assure smoothness and true alignment. If the joint is formed with a bulkhead, such as board, to provide a straight and vertical face, the joint face need not be trimmed before fresh material is placed against it to complete the joint. If a bulkhead is not used to form the joint and the roller is permitted to roll over the end of the new material, the line of joint shall be located back of the rounded edge a sufficient distance to provide a true surface and cross section. If the joint has been distorted by traffic or by other means, it shall be trimmed to line. In either case the joint face shall be painted with a thin coating of asphalt before the fresh material is placed against it.

(*c*) Longitudinal Joints: Longitudinal joints shall be rolled directly behind the paving operation. The first line placed shall be true to line, section and grade and have a vertical face. The material being placed in the abutting lane shall then be tightly crowded against the

vertical face of the previously placed lane. The finishing machine shall be positioned so that in spreading the material overlaps the edge of the lane previously placed by 1″ to 2″ and shall be left sufficiently high to allow for compaction. The machine shall closely follow the line of markings placed along the joint for alignment purposes. The width and depth of the overlapped material shall be kept uniform at all times. Before rolling, the material overlapping the joint shall be carefully moved with a broom or lute on to the surface of the unrolled lane. Rolling shall be continued until a thoroughly compacted, neat joint is obtained. If only tandem rollers are available they shall be similarly operated to complete the joint. When abutting lane is not placed in the same day, or the joint is distorted during the days' work by traffic or by other means, the edge of the lane shall be carefully trimmed to line and painted with a very thin coating of asphalt before the abutting lane is placed.

*Density and surface requirements.*—The completed pavement shall have a density equal to or greater than 95 per cent. of a laboratory specimen made in the proportions of the job mix formula as specified above.

The final surface shall be of a uniform texture conforming to line, section and grade shown on the plans. Before final acceptance of the project, or during the progress of the work, the thickness of the binder and surface courses shall be determined by the Engineer and any unsatisfactory work shall be repaired, replaced or corrected.

Both density and thickness shall be carefully controlled during construction and shall be in full compliance with plans and specifications. During compaction, preliminary tests as an aid for controlling the thickness shall be made by inserting a flat blade correctly graduated, through the material to the top of the previously placed base or by other means acceptable to the Engineer.

The checking of depth, cutting of test holes, refilling with acceptable materials and proper compaction shall be done by the contractor under the supervision of the Engineer.

For the purpose of testing the finished surface on both binder and surface course, a 5 m. (about 16′) straight edge shall be used except that a 3 m. (about 10′) straight edge may be used on vertical curves. The straight edge shall be held in successive positions parallel to the road centre line in contact with surface and the entire area checked from one side to the other. Advance along the pavement shall be in successive stages of not more than half the length of the straight edge. Any irregularities which vary more than 5 mm. in 3 m. or 6 mm. in 5 m. shall be corrected. Irregularities which may develop before the completion of rolling shall be remedied by loosening the surface mix and removing or adding material as may be required. Should any irregularities or defects remain after the final compaction, the surface course shall be removed promptly and sufficient new material laid to form a true and even surface. All minor surface projection, joint and minor honey-combed surfaces shall be ironed smooth as may be directed.

In order to check the average thickness, trial area shall be laid with a known weight of material in order to determine the area covered per tonne and daily checks shall be made on the coverage obtained with the assessed daily tonnage laid.

Rd.41. *Supplying—*

(*a*) *40 mm. (about 1½″),*
(*b*) *25 mm. (about 1″),*
(*c*) *20 mm. (about ¾″),*
(*d*) *12 mm. (about ½″),*
(*e*) *10 mm. (about ⅜″),*
(*f*) *6 mm. (about ¼″),*

*trap/granite/quartzite/gneiss stone aggregate at the road-side including conveying and stacking for use in bituminous road surfaces.*

Rd.41.1. *General.*—The item provides for the supply of stone aggregate of the specified type and size at the roadside including obtaining the stones of the specified quality from approved sources, crushing them in mechanical crushers, conveying to the road-side with all leads and lifts, stacking in regular heaps as specified hereinafter uniformly along the road-side.

Rd.41.2. *Quarries.*—Stones of approved type for crushing aggregate shall be obtained from quarries as specified in specification No. Rd.19.2.

Rd.41.3. *Stone aggregates*:—

Rd.41.3.1. *Quality.*—The aggregates shall be obtained by crushing approved stones of specified type in a mechanical crusher and shall be clean, strong, tough, dense, durable, close grained and free from soft, decayed and weathered portions and from coating of dust, dirt or other objectionable matter. They shall preferably have good hydrophobic characteristics. They shall generally satisfy the following physical requirements:—

| | For light or medium traffic | For heavy traffic |
|---|---|---|
| Los Angles abrasion test; per cent. fines maximum ... ... | 25 | 17 |
| Aggregate crushing test; per cent. fines maximum ... ... | 23 | 17 |
| Water absorption by weight after 24 hours immersion; per cent. not more than— | 1 | 1 |

Tests shall be carried out according to I. S. 383-1963—

Tests considered necessary shall be carried out in an approved laboratory when the Engineer considers the quality to be doubtful or there is a dispute about the quality. If the results are satisfactory, the cost of tests shall be borne by the Department and if unsatisfactory by the contractor.

Rd.41.3.2. *Size.*—Size of the metal and chips shall be as under :—

| Standard size | Wholly passing through square mesh of internal dimension. | Wholly retained on square mesh of internal dimension. |
|---|---|---|
| 40 mm. (about 1½″) | ... 50 mm. (about 2″) | ... 25 mm. (about 1″). |
| 25 mm. (about 1″) | ... 40 mm. (about 1½″) | ... 20 mm. (about ¾″). |
| 20 mm. (about ¾″) | ... 25 mm. (about 1″) | ... 12 mm. (about ½″). |
| 12 mm. (about ½″) | ... 20 mm. (about ¾″) | ... 10 mm. (about 3/8″). |
| 10 mm. (about 3/8″) | ... 12 mm. (about ½″) | ... 6 mm. (about ¼″). |
| 6 mm. (about ¼″) | ... 10 mm. (about 3/8″) | ... 5 mm. (about 3/16″). |

*Note.*—Not more than 20% of any sample shall exceed in its greatest dimension, standard size plus 25 mm. for 40 mm. standard size, standard size plus 12 mm. for 25 mm., 20 mm. and 12 mm. standard sizes and standard size plus 6 mm. for 10 mm. and 6mm. standard sizes.

The pieces shall be roughly cubical in shape and more or less of uniform size with sharp edges for interlocking. Rounded, flaky, thin, elongated pieces shall not be accepted. Before collection, samples of the metal and chips shall be got approved for quality, size and shape by the Engineer who will keep them in his office for reference. They shall be completely dry at the time of use.

Rd.41.3.3. *Conveyance.*—According to specification No. Rd.19.3.3.

Rd.41.3.4. *Stacking.*—According to specification No. Rd.22.3.4. Wherever a mixture of aggregates of two or more standard sizes is specified for the work, each size of aggregates shall be stacked separately and entirely clear of the carriageway and where possible clear of the shoulders also. They shall be stacked in such a manner as to prevent mixture, deterioration or contamination.

Rd.41.4. *Special points.*—According to specification No. Rd.19-4.

Rd.41.5. *Item to include.*—Crushing aggregates to the specified sizes from approved rubble and other items included in specification No. Rd.19.5.

Rd.41.6. *Mode of measurement and payment.*—According to specification No. Rd.20.6.

Rd.42. *Supplying bitumen of the I. S. Grades—at the site of work including conveying and stacking properly and protecting it till used.*

Rd.42.1. *General.*—The item provides for the supply of bitumen of the specified grade conforming to the requirements of the pertinent grade in I.S. No. 73-1961. Certain standard proprietory brands of bituminous materials having the properties conforming to the standard

grades may be specified as the grade acceptable for the type of surfacing and the conditions in which it is to be constructed. The bitumen shall be supplied in suitable drums including conveying it to the site of work, stacking properly and protecting till used.

Rd.42.2. *Grades and quality.*—The bitumen shall conform to the grade S. 35 with 30/40 penetration of grade S. 90 with 80/100 penetration as specified in I.S. 73-1961. Grade S. 65 with 60/70 penetration shall be used when so ordered.

Rd.42.3. *Supply.*—(i) When supplied by the Department, it shall be issued at the place mentioned in schedule "A" of the agreement and at the rate mentioned therein. Conveying it to the site shall be done by the contractor at his cost.

(ii) When not supplied by the Department, the contractor shall make his own arrangement to obtain at the worksite the bitumen of the specified grade from one of the standard companies. He shall on demand by the Engineer, obtain and furnish a laboratory test certificate proving to the satisfaction of the Engineer that the material conforms to the requirement of the specified grade. Bulk supply in standard tankers may be arranged at site of work, if approved.

Rd.42.4. *Packing and marking.*—The bituminous materials shall be supplied in non-returnable drums of such type and strength as will withstand transportation and handling and such as to have no leakage at any time. The grade of the material, the trade name, if any, the name of the manufacturer and the weight of the material in the drum shall be painted on each drum.

Rd.42.5. *Handling and transport.*—Great care shall be taken in loading and unloading the drums both in the case of road and rail transport, Wooden skids or other suitable arrangement shall be used for rolling the drums up or down to avoid damage in these operations. In no case shall the drums be thrown down. They shall be conveyed to the site of storage or use very carefully.

Rd.42.6. *Storage.*—Drums containing different grades shall be kept separate to allow easy inspection and identification and in such place as will not damage the drums and cause leakage of the material or intrusion of water and other foreign matter. They shall not be stored in low lying areas where water is likely to accumulate. As far as possible, the drums may be stacked on their sides and not on their ends so that rain-water, if any, will drain off quickly.

At the site of work the drums shall be stacked properly in suitable localities on the road-side and protected.

Any damage, loss or wastage in transport, handling and storage due to negligence or any other cause shall be the responsibility of the contractor and he shall make good the same without extra claims.

42.7. *Sampling and testing.*—When the supply is made by the contractor he shall furnish on demand, laboratory test certificate to show that the material satisfies the requirements of the specified grade. If there be any doubt about the quality thereafter, the tests shall be carried out again in an approved laboratory according to the standards specified in I.S. 73-1961 and the cost shall be met by the Department if the results are satisfactory and by the contractor if unsatisfactory. Material not satisfying the requirements shall be rejected.

Rd.42.8. *Keeping records.*—The contractor shall keep a day-to-day account of the supply and use of the bitumen in a separate register and obtain signatures of the responsible Departmental staff member. The register shall be maintained by the contractor and produced when so ordered by the Engineer.

Rd.42.9. *Return of empty drums.*—When supply is made by the Department, the contractor shall return the empty drums in good condition to the place of issue.

If the empty drums are not returned in good condition, compensation at the rate mentioned in the schedule 'A' or special provisions will have to be paid for such drums when the supply is made by the Department.

Rd.42.10. *Item to include.*—(i) Obtaining the bitumen from the Department or from a Company.

(ii) Transporting to site.

(iii) Storing and stacking.

(iv) Protecting.

(v) Keeping record of supply and use.

(vi) Cost of sampling and testing when the results of tests are unsatisfactory.

(vii) Returning or handling over the empty drums in good condition to the Department, when the supply in drums is made by the Department.

Rd.42.11. *Mode of measurement and payment.*—The contract rate shall be for one metric tonne of bitumen of the specified grade supplied in non-returnable drums. When the bitumen is supplied by the Department the drum shall be taken to weigh standard weight as certified by the company provided the drums are not leaking or damaged. The number of drums used by the contractor shall be recorded. The quality for payment shall be arrived at by multiplying the number issued by the standard weight. In case of leaking or damaged drums they will be actually weighed and the standard weight of empty drums will be deducted to arrive at the net quantity.

When the bitumen is not supplied by the Department the quantity shall be worked out by multiplying number of undamaged and untampered drums by the standard weight of bitumen in the drum certified by the company. In case of leaking or damaged drums, they will be actually weighed and the standard weight of empty drums will be deducted to arrive at the net quantity.

Rd.43. *Laying 50 mm. (about 2") thick full grout bituminous road surface including preparing the existing roadsurface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips and laying seal coat complete excluding cost of stone aggregate, bitumen and compaction.*

Rd.43.1. *General.*—The item provides for the labour for laying the full grout bituminous road surface of a compacted thickness of 50 mm. (about 2") including preparing the existing road surface to receive the full grout course, use of equipment and plant and materials such as the fuel, etc., but excluding stone aggregate, bitumen and compaction.

Rd.43.2. *Diversions.*—Diversions shall be taken out and maintained as specified under item No. Rd.27.2 by the contractor at his own cost unless separately provided in the tender.

Diversion shall be watered if its dust is likely to blow on to the road being bituminised.

Rd.43.3. *Construction.*

Rd.43.3.1. *Materials.*—The aggregates and bitumen for providing full grout surface of a compacted thickness of 50 mm. (about 2") shall comply with specification Nos. Rd.41 and Rd.42, respectively, and shall normally comply with the following regarding sizes and quantities of aggregates and grade and quantities of bitumen:—

| — | Rate of application for 100 Sq. m. | Rate of application for 100 Sq. ft. |
|---|---|---|
| (1) | (2) | (3) |
| (*a*) 40 mm (about 1½") size metal .. .. .. .. | 6·0 Cu. m. .. | 20 Cu. ft. |
| (*b*) 12 mm (about ½") size chips .. .. .. .. | 1·5 Cu. m. .. | 5 Cu. ft. |
| (*c*) 10 mm (about 3/8") size chips .. .. .. .. | 1·2 Cu. m. | 4 Cu. ft. |
| (*d*) Bitumen for grouting, I. S. grade S. 35 with 30/40 penetration or S. 65 with 60/70 penetration. | 500 Kg. .. | 100 Lbs. |
| (*e*) Bitumen of I. S. grade S. 90 with 50/100 penetration for seal coat. | 170 Kg. .. | 35 Lbs. |

The metal and chips shall be entirely dry at the time of spreading. If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out according to the requirements of special provisions.

Increase in the use of materials up to an extent of 10 per cent. shall not entitle the contractor for extra claims on labour charges, fuel, etc.

The above quantities are exclusive of patching materials.

The supply of patching materials shall be done and paid for under separate items.

Rd.43.3.2. *Preparing the base.*—Where the section of a water bound macadam road surface is good except for a few local depressions and unevenness, the surface shall be brought to the required section by adding suitable patching metal at places as required and compacting it fully. Such labour will be incidental to the item and shall not be paid for separately. The road surface shall be swept clean of all dirt, dust, caked mud, slush, animal droppings and other loose and foreign matter and the blindage shall be brushed and cleared off to expose the metal surface entirely. If so required by the Engineer, the contractor shall keep the side widths and nearby diversion watered to prevent dust from blowing over the surface to be bituminised.

Cement concrete surface shall be cleaned of all foreign matter.

Existing bituminous surfaces shall be swept clean of all loose and foreign matter.

There shall always be sufficient length of prepared surface ahead of the bituminous surfacing operations as directed by the Engineer to keep these operations continuous. The prepared surface shall be closed to traffic. The contractor shall at his own expense repair any damage to the prepared base caused by his own operations or use by traffic.

Edge lines shall be marked with stakes after ranging the line for a sufficiently long length for spreading the metal and about 30 cm. to 45 cm. wide metal or hard murum berms formed and compacted to hold the metal from spreading.

Rd.43.3.3. *Spreading.*—The 40 mm. (about $1\frac{1}{2}$") size aggregates shall be spread evenly at a rate of 6 cu. m./100 sq m. (20 cft./100 sq. ft.) or at a rate as ordered by the Engineer to form a uniform layer over the width of the road specified on the plans. If the aggregate contain dust, grass, etc., it shall be screened and if moist, dried before spreading. The section shall be checked with the camber boards and strings or straight edge. Inequalities shall be made good by adding reserve aggregate in depressions and removing surplus metal from high spots.

Rd.43.3.4. *Compacting.*—The layer shall be compacted as specified separately under specifications No. Rd.44.

The compaction shall be covered by that item. Inequalities observed during and after compaction shall be made good by spreading reserve metal in depressions and removing metal from high spots and compacting.

Rd.43.3.5. *Applying bitumen.*—Bitumen of I.S. grade S. 35, having 30/40 penetration shall be heated in a bitumen boiler to a temperature of 177°C. to 191°C. (350°F. to 375°F.) and that temperature shall be maintained at the time of actual application. The hot bitumen shall be applied through a pressure sprayer or when permitted, though a can with a rose to the road surface uniformly at the rate of 500 kg./100 sq. m. (100 lbs./100 sq. ft.). The road surface shall be divided into suitable rectangles marked by chalk so as to ensure correct rate of application of the bitumen to penetrate to the full depth of the aggregate. Bitumen of I.S. grade S-65 with 60/70 penetration may be used in cold weather, if so directed. When supply is made in bulk, pressure sprayers, or 'Bowsers' shall necessarily be used.

Rd.43.3.6. *Blinding.*—12 mm. (about $\frac{1}{2}$") chips shall then be spread evenly over the road surface at a uniform rate of 1.5 cu. m./100 sq. m. (5 cft./100 sft.) immediately after applying the bitumen when it is still hot. Brooms shall also be used to ensure uniform thickness of the layer of chips.

Rd.43.3.7. *Compacting.*—The surface shall then be compacted as specified separately under specification No. Rd.44. This compaction shall be covered by that item.

Rd.43.3.8. *Preparing the surface for seal coat.*—A seal coat shall be applied soon after the surface is laid and in any case within a month of the laying of the full grout surface.

The surface shall be cleaned of all foreign matter, dust, etc., by brooms, brushes and gunny bags before applying bitumen for seal coat.

Rd.43.3.9. *Applying bitumen for seal coat.*—Bitumen of I.S. grade S. 90 having 80/100 penetration shall be heated in a bitumen boiler to a temperature ranging between 163°C. to 177°C. (325°F. to 350°F.) which shall be maintained at the time of actual application. Hot bitumen shall be applied evenly at a uniform rate of 170 kg./100 sq. m. (about 35 lbs./100 s. ft.) with a sprayer or a rose can.

**Rd.44.3.3.**

Rd.43.3.10. *Blinding.*—Immediately after applying the bitumen, the road surface shall be blinded evently with 10 mm. (about $\frac{3}{8}$") size chips at a uniform rate of 1.2 cu. m./100 sq. m. (about 4 cft./100 sft.). Brooms shall be used to ensure the evenness of the layer of chips.

Rd.43.3.11. *Rolling.*—After spreading and evening up the blinding chips, the surface shall be rolled as specified separately under specification No. Rd.44. This rolling shall be covered by that item.

Rd.43.4. *Special requirements.*—Heating of bitumen shall be done in bitumen boilers with cock unless otherwise permitted by the Engineer. The heated bitumen shall be handled in iron buckets with handles or sprayers. The labour engaged in handling the heated bitumen shall use full length gumboots, leather hand gloves and leather jacket with fire proof apron to cover the chest and the back and reaching upto the knees.

Two thermometers shall be maintained on the site and used for checking the temperature of the heated bitumen.

Rd.43.5. *Item to include.*—(1) Diversions unless separately provided in the tender.

(2) Preparing the road surface, including patch-work.

(3) Spreading 40 mm. (about $1\frac{1}{2}$") size aggregates.

(4) Heating bitumen including fuel, etc., and applying to the road surface for grouting.

(5) Blinding the surface with 12 mm. (about $\frac{1}{2}$") size chips.

(6) Preparing the surface for the seal coat.

(7) Heating and applying bitumen for the seal coat including fuel, etc.

(8) Blinding the surface with 10 mm. (about 3/8") size chips for the seal coat.

(9) All labour, materials (excepting bitumen and aggregates) use of tools, plant and equipment for completing the item satisfactorily.

Rd.43.6. *Mode of measurement and payment.*—The contract rate shall be for 100 sq. m. (about 1,076 sq. ft.). The measurement shall be for the width of the road as executed limiting it to the width specified or as ordered by the Engineer and the length measured along the centre line.

The measurements of dimensions shall be recorded correct upto two places of decimals of a metre and the area worked out correct upto one place of decimal of a sq. m.

Rd.44. *Compacting 50 mm. (about 2") thick full grout surface with power roller including labour, use of plant, etc., complete.*

Rd.44.1. *General.*—The item provides for compaction of full grout surface to a compacted thickness of 50 mm. (about 2") with a power roller of 10/12 tonnes including necessary labour, materials and use of plant.

Rd.44.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.44.3. *Compaction General.*—According to specification No. Rd.32.4.1.

Rd.44.3.1. *Initial rolling.*—The surface on which the grouting is to be laid shall have been brought to the required section and grade and cleaned under the item No. Rd.43 preparatory to the spreading of the aggregate. This subgrade shall be rolled if necessary. The coarse aggregate shall be spread evenly to conform to the required section and grade as specified in specification No. Rd. 43. This layer of metal shall then be rolled to correct section and grade with a 10/12 tonne power roller to lock the metal without crushing the aggregate. The surface shall be checked for grade and section during and after rolling. Any irregularities shall be corrected by loosening the surface and removing or adding aggregate as required and the spots compacted. Rolling shall be stopped immediately the aggregate show signs of crushing.

Rd.44.3.2. *Final compaction.*—Immediately after spraying the bitumen and spreading the blinding chips as specified in specification No. Rd.43, the surface shall be rolled with a power roller to obtain full compaction and to force the blinding chips into the interstices of the coarse aggregate to pack them tightly. The rolling shall be continued till the asphalt hardens and the chips stop moving under the roller wheels.

Rd.44.3.3. *Rolling over the seal coat.*—The seal coat when laid as specified in Rd.43, shall be rolled lightly with a power roller so as not to crush the chips.

Rd.44.4. *Item to include.*—(1) Diversions unless separately provided in the tender.

(2) Compacting the prepared sub-grade surface where necessary.

(3) Initial and final rolling to the correct grade and section.

(4) Rolling over the seal coat.

(5) All labour, materials such as water or oil for applying to the wheels, fuel etc., use of plant such as power roller necessary for completing the item satisfactorily.

Rd.44.5. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.45. *Laying 50 mm. (about 2") thick semigrout bituminous road surface including preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips and laying seal coat complete excluding cost of stone aggregates, bitumen and compaction.*

Rd.45.1. *General.*—The item provides for the labour for laying the semi-grout bituminous road surface of a compacted thickness of 50 mm. (about 2") including preparing the existing roadsurface to receive the semi-grout course, use of equipment and plant and materials such as fuel etc., but excluding cost of stone aggregates, bitumen, and compaction.

Rd.45.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.45.3. *Construction.*

Rd.45.3.1. *Materials.*—The aggregates and bitumen for providing semigrout surface of a compacted thickness of 50 mm. (about 2") shall comply with specification No. Rd.41. and Rd.42, respectively, and shall normally comply with the following regarding sizes and quantities of aggregates and grade and quantities of bitumen:—

| — | Rate of application for 100 Sq. m. | Rate of application for 100 Sft. |
|---|---|---|
| (1) | (3) | (3) |
| (*a*) 40 mm (about 1½") size metal .. .. .. .. | 6·0 Cu. m. .. | 20 Cft. |
| (*b*) 12 mm (about ½") size chips .. .. .. .. | 1·5 Cu. m. .. | 5 Cft. |
| (*c*) 10 mm (about 3/8" ) size chips .. .. .. | 1·2 Cu. m. .. | 4 Cft. |
| (*d*) Bitumen of I. S. grade S. 35 with 30/40 penetration or I. S. grade S. 65 with 60/70 penetration. | 275 kg. .. | 55 Lbs. |
| (*e*) Bitumen of I. S. grade S. 90 with 80/100 penetration | 170 kg. .. | 35 Lbs. |

If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out according to the requirements of the special provisions.

Increase in the use of materials up to an extent of 10 per cent. shall not entitle the contractor for extra claims on labour charges, fuel etc.

The supply of these materials shall be done and paid for under separate items.

Rd.45.3.2. *Preparing the base.*—The road shall be closed to traffic. The edge line shall be marked with stakes after ranging the line for a sufficiently long length.

The existing road surface shall be picked to a depth of the top layer of existing metal uniformly over the full width on which the semi-grout surface is to be laid after edge line stakes are planted by ranging the edges for a sufficiently long length. The picked up road-surface shall then be brought to the required grade and section. Templates and strings shall be used to obtain the correct section and grade. If found necessary, soft murum or gritty material shall be obtained by the contractor and spread evenly to a thickness of about 12 mm. (about ½") or as directed by the Engineer to enable hoggin to work up to about half the thickness of the compacted course. This will be incidental to preparing the existing road surface and shall not be paid separately.

Rd.45.3.3. *Spreading.*—The 40 mm. (about 1½") size aggregate collected for the semi-grouting shall then be spread evenly at the rate of 6 cu. m./100 sq. m. (20 cft./100 sft.) or at the rate as ordered by the Engineer to form a uniform layer over the specified width. The surface shall be checked by camber boards and line for the section and grade. Irregularities if any, shall be corrected by adding and removing metal as necessary. If the aggregates contain dust, grass, etc. they shall be screened before spreading. A small quantity of aggregate shall be reserved to make up the inequalities.

Rd.45.3.4. *Compacting.*—The layer shall then be compacted as specified separately under specification No. Rd.46.

The compaction shall be covered by that item.

Inequalities observed during and after compaction shall be made good by spreading the reserve aggregate in depressions and removing aggregate from the high spots and by compacting.

Rd.45.3.5. *Applying bitumen.*—Bitumen of I. S. grade S. 35 or S. 65 supplied for the work shall be heated to a temperature of 177°C. to 191°C. (350°F. to 375°F.) in a bitumen boiler and that temperature shall be maintained at the time of actual application. The hot bitumen shall be applied through a pressure sprayer or can with a rose to the road surface uniformly at the rate of 275 kg./100 sq. m. The road surface shall be divided into suitable rectangles marked by chalk so as to ensure correct rate of application of the bitumen. When supply is made in bulk, pressure sprayers or "Bowsers" shall necessarily be used.

Rd.45.3.6. *Blinding.*—12 mm. (about ½") chips shall be spread evenly over the road surface at a uniform rate of 1.5 cu. m./100 sq. m. (5 c.ft./100s. ft.) immediately after applying the bitumen when it is still hot. Brooms shall also be used to ensure evenness of the layer of chips. Irregularities in surface shall be corrected by adding or removing chips, applying bitumen, blinding and compaction.

Rd.45.3.7. *Compacting.*—Immediately after spreading the blinding chips, the surface shall be compacted as specified separately under specification No. Rd.46.

The compaction shall be covered by that item.

Rd.45.3.8. *Preparing the surface for the seal coat.*—As specified in Rd.43.3.8.

Rd. 45.3.9. *Applying bitumen for seal coat.*—As specified in Rd.43.3.9.

Rd.45.3.10. *Blinding.*—As specified in Rd.43.3.10.

Rd.45.3.11. *Rolling.*—After spreading and evening up the blindage chips, the surface shall be rolled as specified separately under specification No. Rd.46.

This rolling shall be covered by that time.

Rd.45.4. *Special requirements.*—According to specification No. Rd.43.4.

Rd.45.5. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Preparing the base including soft murum filler if necessary.

(3) Spreading aggregates of 40 mm. size.

(4) Heating bitumen including fuel etc. and applying to the road surface for semi-grout.

(5) Blinding the surface with 12 mm. size chips.

(6) Preparing the surface for seal coat.

(7) Heating and applying bitumen for the seal coat including fuel etc.

(8) Blinding the surface with 10 mm. size chips for seal coat.

(9) All labour, materials (excluding bitumen and aggregates) such as soft murum, use of tools, plant and equipment for completing the item satisfactorily.

Rd.45.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.46. *Compacting 50 mm. (about 2") thick semi-grout surface with power roller including labour, use of plant etc. complete.*

Rd.46.1. *General.*—The item provides for compaction of semi-grout surface to a compacted thickness of 50 mm. (about 2") with a power roller of 10/12 tonnes including necessary labour, materials, use of plant etc.

The specification No. Rd.44 for the 50 mm. (about 2") thick full grout-surface compaction shall be applicable to this item entirely except that watering shall be done to the required extent at the time of initial rolling of the coarse aggregate to enable the hoggin to rise up to about half the depth of the course. Metal shall be allowed to dry before applying bitumen.

Rd.46.2. *Item to include.*—(1) Diversions unless separately provided in the tender.

(2) Light rolling over the sub-grade if necessary.

(3) Compacting the metal including watering.

(4) Rolling over blinding chips.

(5) Rolling over the seal coat.

(6) All labour, materials, use of tools, plant such as power roller necessary for completing the item satisfactorily.

Rd.47. *Laying 40 mm. (about 1½") thick premix bituminous carpet including preparing and cleaning the base, heating bitumen, applying tack coat at — kg./100 sq. m., mixing bitumen and aggregates in a bitumen mixer and laying the carpet layers complete excluding cost of stone aggregate, bitumen and compaction.*

Rd.47.1. *General.*—The item provides for the labour for laying premix carpet of a compacted thickness of 40 mm. (about 1½") including preparing the base, heating bitumen, applying tack coat, mixing aggregates and the hot bitumen in a bitumen mixer, laying the carpet layers, use of tools equipment and plant and materials such as fuel complete except aggregates, bitumen, and compaction.

Rd.47.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.47.3. *Construction.*

Rd.47.3.1. *Materials.*—The aggregates and bitumen for providing premix bituminous carpet of 40 mm. (about 1½") thickness shall comply with specification No. Rd.41 and Rd.42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 Sq. m. (2) | Rate of application for 100 Sft. (3) |
|---|---|---|
| (*a*) 25 mm (about 1") metal | 2·45 Cu. m. for base Course. | 8 Cft. for base course. |
| (*b*) 12 mm (about ½") chips | 1·2 Cu. m. for base course. | 4 Cft. for base course. |
| | 1·525 Cu. m. for wearing course. | 5 Cft. for wearing course. |
| Total | 2·725 Cu. m. Total | 9 Cft. |
| (*c*) 6 mm (about ¼") chips | 0·6 Cu. m. for wearing course. | 2 Cft. for wearing course. |
| (*d*) Bitumen of I. S. grade S. 90 with 80/100, penetration | 48·1 kg./cu. m. for 25 mm aggregates and 56 kg./cu. m. for 12 mm. and 6 mm. chips. | At 3 lbs/cft. for 1" aggregates and 3½ lbs Cft. for ½" and ¼" chips. |
| Total | 304 kg. Total | 62½ lbs. |

(*e*) For tack coat, bitumen of the same grade as for the premix.

(*i*) On bituminous surface .. .. .. .. 49 kg. to 73·5 kg. 10 to 15 lbs.

(*ii*) On water bound macadam .. .. .. .. 73·5 kg. to 97·5 kg. 15 to 20 lbs.

*Note.*—Actual quantity to be used shall be at the rate mentioned in the item.

The metal and chips shall be entirely dry at the time of mixing with bitumen. If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out according to the requirements of the special provisions. Increase in the use of materials upto an extent of 10 per cent. shall not entitle the contractor for extra claims on labour charges, fuel, etc.

**Rd.48.2.**

The supply of these materials shall be done and paid for under separate items.

Bitumen and aggregates required for patch work to prepare the road surface for laying premix carpet are not included in these quantities.

Rd.47.3.2. *Preparing of base.*—The road surface shall be thoroughly cleaned of all caked mud, dirt, dust etc. by using wire brushes, brooms, fibre brushes and gunny bags before laying the carpet. Where the surface has local pot holes or ruts, such irregularities shall be cleaned and made up by premixed chips and well compacted about a week before the carpet is laid. Such labour shall be incidental to the item and shall not be paid separately.

Rd.47.3.3. *Tack coat.*—Bitumen of the same grade as that used for premix shall be heated to a temperature of 163°C. to 177°C. (325°F. to 350°F.) in a bitumen boiler and the hot bitumen shall be applied to the cleaned road surface at the rate specified in the item. Application shall be done by a mechanical pressure sprayer or if permitted by pouring cans with roses. The tack coat shall be applied just before the carpet is laid. Application of tack coat shall be only slightly in advance of laying the premixed chips.

Rd.47.3.4. *Base course.*—25 mm. (about 1″) aggregate and 12 mm. (about ½″) chips shall be put into the mechanical mixer in 2:1 proportion by volumes. I. S. grade S-90 bitumen with 80/100 penetration shall be heated to 163°C. to 177°C. (325°F. to 350°F.) and the hot bitumen added to the aggregates at the rate of 48.1 kg./cu. m. (3 lbs./cft.) for 25 mm. aggregates and 56 kg./cu. m. (3½ lbs./cft.), for 12 mm. chips. The 25 mm. and 12 mm. chips for the base course and the hot bitumen in the proportion mentioned in specification No. Rd.47.3.1 above shall be mixed in the mixer till all the aggregates are uniformly coated.

The surface shall be suitably marked into rectangular areas to ensure correct rate of spreading of the aggregate. The premixed aggregate shall be discharged into wheel barrows and carried to the site without any loss of time. It shall be spread uniformly at the rate of 3.65 cu. m./100 sq. m. (12 cft./100 sft.) immediately after the tack coat is applied. All irregularities or inequalities in the carpet shall be set right before starting rolling.

The base course shall be compacted as specified separately under specification No. Rd.48 which will cover this item. If any high spots or depressions become apparent during and after rolling, they shall be corrected by removing or adding premix chips and compacting.

Rd.47.3.5. *Wearing course.*—12 mm. (about ½″) chips and 6 mm. (about ¼″) chips shall be put in the mixer in 5:2 proportion and heated bitumen added in required quantity as specified above and mixed in a similar manner as explained above for the base course. This mix shall be spread on the base course at the rate of 2.125 cu. m./100 sq. m. (7 cft./100 sft.) and compacted as specified under specification No. Rd.48. Compaction will be covered by that item.

Rd.47.4. *Opening to traffic.*—The traffic shall be allowed to pass over the road after 24 hours after compaction of the carpet or such time as specified by the Engineer.

Rd.47.5. *Special requirements.*—According to Rd.43.4.

Rd.47.6. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Preparing the original road surface including patch work.

(3) Heating bitumen.

(4) Applying tack coat.

(5) Mixing aggregates and bitumen in a bitumen mixer.

(6) Laying base course of premix chips.

(7) Laying wearing course of premix chips.

(8) All labour, materials (excluding bitumen and aggegates) such as fuel for heating bitumen, tools, use of equipment and plant for heating, mixing, conveying, laying and completing the work satisfactorily.

Rd.47.7. *Mode of measurement and payments.*—According to specification No. Rd.43.6.

Rd.48 *Compacting 40 mm. (about 1½″) thick premix bituminous carpet with power roller including labour, use of plant etc. complete.*

Rd.48.1. *General.*—The item provides for the compaction of premix carpet to a compacted thickness of 40 mm. (about 1½″) in two layers with a power roller of 10 to 12 tonnes including necessary materials, labour, use of plant, etc.

Rd.48.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.48.3. *Compaction—General.*—According to specification No. Rd.32.4.

Rd.48.4. *Base course compaction.*—The base course layer shall be compacted with 10 to 12 tonne power roller immediately after it is laid. The surface shall be checked for correct grade and section during and after rolling. Any irregularities shall be corrected by adding the pre-coated chips or removing the surplus. The disturbed surface shall be well compacted again. If necessary, the roller wheels shall be coated with oil to prevent the coated chips from sticking to the wheels.

Rd.48.5. *Wearing course rolling.*—As soon as the wearing course is laid it shall be compacted with 10 to 12 tonne power roller in the same manner as the base course.

Rd.48.6. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Compacting the base course including patch work.

(3) Compacting the wearing course.

(4) All labour, materials such as the oil for applying to the roller wheels, use of plant such as power roller for completing the item satisfactorily.

Rd.48.7. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.49. *Laying 25 mm. (about 1") thick premix bituminous carpet including preparing and cleaning the base heating bitumen, applying tack coat at — kg./100 sq. m. mixing bitumen and chips in bitumen mixer and laying the carpet layer complete with/without seal coat excluding cost of stone aggregate, bitumen and compaction.*

Rd.49.1. *General.*—The item provides for the labour for laying carpet of a compacted thickness of 25 mm. (about 1") including preparing the base, heating bitumen, applying tack coat, mixing chips and the hot bitumen in a bitumen mixer, laying the carpet layer, use of tools, equipment and plant and materials such as fuel except aggregates, bitumen and compaction.

Rd.49.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.49.3. *Construction.*

Rd.49.3.1. *Materials.*—The chips and bitumen for providing the premix bituminous carpet of 25 mm. (about 1") thickness shall comply with specification No. Rd.41 and Rd.42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 Sq. m. (2) | Rate of application for 100 Sft. (3) |
|---|---|---|
| (*a*) 20 mm (about ¾") chips | 1·85 Cu. m. | 6 Cft. |
| (*b*) 10 mm (about 3/8") chips | 1·2 Cu. m. | 4 Cft. |
| (*c*) 6 mm (about ¼") chips | 0·6 Cu. m. | 2 Cft. |
| (*d*) Bitumen of I. S. grade S. 90 with 80/100 penetration for premix. | 205 kg. | 42 Lbs. |
| (*e*) Bitumen for tack coat | | |
| (*a*) On bituminous surface | 49 kg. to 73·5 kg. | 10 to 15 Lbs. |
| (*b*) On W. B. M. surface | 73·5 kg. to 97·5 kg. | 15 to 20 Lbs. |

The exact quantity of bitumen to be used for tack coat within the range will be as mentioned in the item. The chips shall be entirely dry at the time of mixing.

If quantities of materials per unit stipulated in the special provisions differ from the above, those in the special provisions shall be provided. The supply of these materials shall be done and paid for under separate items.

Increase in labour charges due to use of materials upto 10 per cent. in excess of the stipulated shall not entitle the contractor for extra claims on labour charges, fuel, etc. Bitumen and aggregates required for patch work to prepare the base for laying premix carpet are not included in these quantities.

Rd.49.3.2. *Preparing the base.*—According to specification No. Rd.47.3.2.

Rd.49.3.3. *Tack coat.*—According to specification No. Rd.47.3.3.

Rd.49.3.4. *Carpet.*—20 mm. (about ¾") chips, 10 mm. (about 3/8") chips and the 6 mm. (about ¼") chips shall be put into the bitumen mixer in 3 : 2 : 1 proportion by volumes and the bitumen of the specified grade heated to a temperature of 163°C. to 177°C. (325°F. to 350°F.) in a bitumen boiler shall be added to the chips at the rate of 56 kg./cu. m. (3½ lbs./cft.) of the aggregate. The chips and the bitumen shall be mixed in the mixer till all the chips are uniformly coated.

The surface shall be suitably marked into rectagular areas to ensure correct rate of application of the chips. The premixed chips shall be carried in wheel barrows to the site of deposition without any loss of time and spread evenly in a layer of uniform thickness at the rate of 3.65 cu. m./100 sq. m. (12 c. ft. per 100 s. ft.) to get a compacted layer of 25 mm. (about 1").

Rd.49.3.5. *Compaction.*—The carpet shall be compacted as specified separately under specification No. Rd.50 and paid under that item.

If any high spots or depressions become apparent during or after rolling, they shall be corrected by removing or adding premixed chips and compacting.

Rd.49.3.6. *Seal coat.*—A seal coat shall be provided as specified in Rd.57 if so provided in the item.

Rd.49.3.7. *Opening to traffic.*—The traffic shall be allowed to pass over the road after 24 hours after completion of the carpet or such time as specified by the Engineer.

Rd.49.4. *Special requirements.*—According to specification No. Rd.43.4.

Rd.49.5. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Preparing the base including patch work.

(3) Heating bitumen.

(4) Applying tack coat.

(5) Mixing chips and bitumen in a bitumen mixer.

(6) Laying carpet.

(7) Seal coat if so provided in the item.

(8) All labour, materials (excluding bitumen and chips) such as fuel for heating bitumen, tools, use of equipment and plant for completing the item satisfactorily.

Rd.49.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.50. *Compacting 25 mm. (about 1") thick premix bituminous carpet with power roller including labour, use of plant, etc. complete.*

Rd.50.1. *General.*—The item provides for the compaction of premix carpet to a compacted thickness of 25 mm. (about 1" with a power roller of 8 to 10 tonnes including necessary materials, labour, use of plant, etc.

Rd.50.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.50.3. *Compaction—General.*—According to specification No. Rd.32.4.1.

Rd.50.4. *Compacting the carpet.*—The premix carpet shall be compacted immediately after it is laid. The surface shall be checked for correct grade and section during and after rolling. Any depressions and high spots shall be corrected by adding precoated chips or removing the surplus. The disturbed surface shall be well compacted again. If necessary, the roller wheels shall be coated with oil to prevent the coated chips from sticking to the wheels.

Rd.50.5. *Rolling the seal coat.*—The seal coat shall be rolled lightly as specified in Rd.58 if seal coat is provided in this item.

Rd.50.6. *Item to include.*—(1) Diversions if not separately provided with tender.

(2) Compacting the carpet.

(3) Rolling over seal coat if seal coat is provided in the item.

(4) All labour, materials such as oil for applying to the roller wheels, use of plant such as power roller for completing the item satisfactorily.

Rd.50.7. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.51. *Laying 20 mm. (about ¾") thick premix bituminous carpet including preparing and cleaning the base, heating bitumen, applying tack coat at —kg./100 sq. m., mixing bitumen and chips in a bitumen mixer and laying the carpet layer complete with/without seal coat excluding cost of stone aggregate, bitumen and compaction.*

Rd.51.1. *General.*—The item provides for the labour for laying premix carpet of a compacted thickness of 20 mm. (about ¾") including preparing the base, heating bitumen, applying tack coat, mixing chips and the hot bitumen in a bitumen mixer, laying the carpet layer, use of tools, equipment and plant and materials such as fuel except aggregates, bitumen, and compaction.

Rd.51.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.51.3. *Construction.*

Rd.51.3.1. *Materials.*—The chips and bitumen for providing the bituminous premix carpet of 20 mm. (about ¾") thickness shall comply with specification No. Rd.41 and Rd.42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 sq. m. (2) | Rate of application for 100 sft. (3) |
|---|---|---|
| (*a*) 12 mm (about ½") chips | 1·83 Cu. m. | 6 Cft. |
| (*b*) 10 mm (about 3/8") chips | 0·9 Cu. m. | 3 Cft. |
| (*c*) Coarse sand for dusting | 0·15 Cu. m. | ½ Cft. |
| (*d*) Bitumen of I. S. grade S. 90 with 80/100 penetration at 56 kg/cu. m. (about 3½ lbs./cft.) for carpet. | 156 kg. | 32 Lbs. |
| (*e*) Bitumen of the same grade for tack coat :— | | |
| (*i*) On bituminous surface | 49 kg. to 37·5 kg. | 10 to 15 lbs. |
| (*ii*) On W. B. M. surface | 73·5 kg. to 97·5 kg. | 15 to 20 lbs. |

Exact quantities to be used for tack coat within the range will be as specified—in the item.

The chips shall be entirely dry at the time of mixing.

If quantities of materials per unit stipulated in the special provision differ from the above, those in special provisions shall be provided. Materials required for patch-work to prepare the base for laying premix carpet are not included in these quantities.

The supply of these materials shall be done and paid for under separate items.

Increase in the use of materials upto an extent of 10 per cent. shall not entitle the contractor for extra claims on labour charges, fuel etc.

Rd.51.3.2. *Preparing the base.*—According to specification No. Rd.47.3.2.

Rd.51.3.3. *Tack coat.*—According to specification No. Rd.47.3.3.

Rd.51.3.4. *Carpet.*—12 mm. (about ½") chips and 10 mm. (about 3/8") chips shall be put into the bitumen mixer in 2 : 1 proportion by volumes and the bitumen of the specified grade heated to a temperature of 163°C to 177°C (325°F to 350°F) in a bitumen boiler shall be added to the chips at the rate of 56 kg./cu. m. (3.5 lbs./c. ft.) of the aggregate. The chips and the bitumen shall be mixed in the mixer till all the chips are uniformly coated.

The surface shall be suitably marked into rectagular areas to ensure correct rate of application of the chips. The premixed chips shall be carried in wheel barrows to the site of deposition without any loss of time and spread evenly in a layer of uniform thickness at the rate 2.73 cu. m./100 sq. m. (9 cu. ft. per 100 s. ft.) to get a compacted layer of 20 mm. (about 3/4").

Rd.51.3.5. *Compaction.*—The carpet shall be compacted with a 6 to 8 tonne roller as specified separately under specification No. Rd.52 and this will be covered by that item. If any high spots or depressions become apparent during or after rolling, they shall be corrected by removing or adding premixed chips and compacting.

Rd.51.3.6. *Opening to traffic.*—Course sand or stone dust shall be spread evenly at the rate of 0.15 cu. m./100 sq. m. (about ½ c. ft. per 100 s. ft.) over the compacted surface, brushed and lightly rolled.

The traffic shall be allowed to pass over the road after 24 hours of the completion of the carpet or such time as specified by the Engineer.

Rd.51.4. *Special requirements.*—According to Rd.43.4.

Rd.51.5. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Preparing the base including patch-work.

(3) Heating bitumen.

(4) Applying tack coat.

(5) Mixing chips and bitumen in a bitumen mixer.

(6) Laying carpet.

(7) Spreading stone dust or sand.

(8) All labour, materials (excluding bitumen and chips) such as fuel for heating bitumen, tools, use of equqipment and plant for completing the item satisfactorily.

Rd.51.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.52. *Compacting 20 mm. (about ¾") thick premix bituminous carpet with power roller including labour, use of plant etc. complete.*

Rd.52.1. *General.*—The item provides for the compaction of premix carpet to a compacted thickness of 20 mm. (about 3/4") and also over the blinding layer of sand with a power roller of 8/10 tonnes including necessary materials, labour, use of plant, etc. complete.

The item shall comply with the specification No. Rd.50 for compaction of the carpet, light rolling shall be done on the final sand layer also.

Rd.53. *Provinding single coat surface dressing including cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, etc. complete excluding cost of stone chips, bitumen and rolling.*

Rd.53.1. *General.*—The item provides for labour for providing single coat surface dressing of bitumen including preparing the base, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, use of tools, equipment, plant and materials such as the fuel for heating bitumen, etc. complete except stone chips, bitumen and rolling.

Rd.53.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.53.3. *Construction.*

Rd.53.3.1. *Materials.*—The chips and bitumen for providing single coat bitumen dressing shall comply with specification No. Rd.41 and Rd.42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 sq. m. (2) | Rate of application for 100 sft. (3) |
|---|---|---|
| *A. Over Water bound Macadam.* | | |
| (*a*) 12 mm (about ½") chips .. .. .. .. .. | 1·8 cu. m. | 6 Cft. |
| (*b*) Bitumen of I. S. grade S. 90 with 80/100 penetration .. | 225 kg. | 45 lbs. |
| *B. Over Bituminous surface.* | | |
| (*a*) 10 mm (about 3/8") chips .. .. .. .. | 1·2 cu. m. | 4 Cft. |
| (*b*) Bitumen of I. S. Grade S. 90 with 80/100 penetration.. | 125 kg. | 25 lbs. |

The chips shall be entirely dry at the time of spreading.

If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out according to special provisions.

Increase in the use of materials upto an extent of 10 per cent. shall not entitle the contractor for extra claims for labour charges, fuel etc.

The supply of these materials shall be done and paid under separate items.

Materials required for patch-work to prepare the base for laying the surface coat are not included in the above quantities.

Rd.53.3.2. *Preparing the base.*—If the existing road surface contains local pot holes or ruts, these shall be repaired by removal of all loose and defective material and replaced with corresponding patching material and compacted to produce a tightly bonded even surface

and section conforming with the adjacent area. High spots and depressions shall be corrected by removal or addition of suitable patching material and compacting. Such labour shall be incidental to the item and shall not be paid for. The surface shall be swept clean of all dust, loose and foreign material and kept dry prior to the application of the bitumen.

Rd.53.3.3. *Applying bitumen.*—The bitumen of the specified grade shall be heated to 163°C to 177°C (325°F to 350°F) in a bitumen boiler and the hot bitumen shall be applied evenly to the cleaned road surface at the uniform rate of 225 kg./100 sq. m. (45 lbs./100 s. ft.) on water bound macadam surface and 125 kg./100 sq. m. (25 lbs./100 sq. ft.) on a bituminous surface with a pressure sprayer or if permitted with pouring cans with rose. The road surface shall be marked into rectangular areas so that a measured quantity of bitumen and chips will cover each such area with uniform thickness as specified. The spraying shall be done along the longitudinal direction of the road only when the surface is thoroughly dry.

Rd.53.3.4. *Spreading chips.*—Immediately on applying the hot bitumen to the road, 12 mm. (about ½") chips shall be spread evenly at the rate of 1.8 cu. m./100 sq. m. (6 c. ft./100 s. ft.) over the water bound macadam road surface and 10 mm. (about 3/8") chips at the rate of 1.2 cu. m./100 sq. m. (about 4 c. ft./100 s. ft.) on bituminous road surface.

The surface shall be broomed for ensuring evenness of the layer before rolling.

Rd.53.3.5. *Rolling.*—The surface shall be rolled immediately thereafter as specified under specification No. Rd.54 and this will be covered by that item.

Excessive rolling shall be avoided to prevent crushing of the aggregate.

Rd.53.3.6. *Opening to traffic.*—The surface shall remain closed to traffic for 24 hours or such period as may be specified by the Engineer.

Rd.53.4. *Special requirements.*—According to specification No. Rd.43.4.

The chippings whipped off the road by fast moving traffic shall be collected and spread back on the surface uniformly till most of these are absorbed in the surface. This shall be done for 5 days after opening the surface to traffic and shall be incidental to this item.

Rd.53.5. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Patching up the road surface where necessary.

(3) Cleaning the road surface.

(4) Heating and applying bitumen.

(5) Spreading chips.

(6) All labour, necessary materials, such as the fuel (excluding bitumen and chips), use of tools, equipment and plant.

Rd.53.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.54. *Rolling the single coat bituminous surface dressing of road with a power roller including labour and use of plant complete.*

Rd.54.1. *General.*—The item provides for the rolling of the single coat bitumen surface dressing of the road with a power roller 8 to 10 tonnes including necessary materials, labour use of plant etc., complete.

Rd.54.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.54.3. *Compaction—General.*—According to specification No. 32.4.1.

Rd.54.4. *Rolling.*—Immediately after spreading the chips the surface shall be rolled lightly with a power roller of 8 to 10 tonnes capacity without allowing the chips to crush.

Rd.54.5. *Item to include.*—(1) Diversions if not separately provided in the tender.

(2) Rolling the surface.

(3) All labour, use of plant such as the roller for completing the work satisfactorily.

Rd.54.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.55. *Providing two coat bituminous surface dressing including cleaning the road surface, heating and applying bitumen to the road surface and spreading chips complete, excluding cost of stone chips, bitumen and rolling.*

**Rd.55.3.8.**

Rd.55.1. *General.*—The item provides for the labour for providing two coat surface dressing of bitumen including preparing the base, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, use of tools, equipment, and plant and materials such as the fuel for heating bitumen etc. complete.

Rd.55.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.55.3. *Construction.*

Rd.55.3.1. *Materials.*—The chips and bitumen for providing two coat surface dressing shall comply with specification No. Rd. 41 and Rd. 42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 sq. m. (2) | Rate of application for 100 sft. (3) |
|---|---|---|
| 1st coat:— | | |
| (*a*) 12 mm. (about ½") chips | 1·8 cu. m. | 6 Cft. |
| (*b*) Bitumen of I. S. Grade S. 90 with 80/100 penetration | 225 kg. | 45 Lbs. |
| 2nd coat:— | | |
| (*a*) 10 mm. (about 3/8") chips | 1 cu. m. | 3·5 Cft. |
| (*b*) Bitumen of I.S. Grade S. 90 with 80/100 penetration | 125 kg. | 25 Lbs. |

The chips shall be entirely dry at the time of spreading.

The supply of these materials shall be done and paid for under separate items.

If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out as stipulated according to the special provisions.

Increase in the use of materials upto an extent of 10 per cent. shall not entitle the contractor for extra claims on labour charges, fuel, etc.

Materials required for patchwork to prepare the base before laying the surface dressing are not included in the above quantities.

*First coat.*

Rd.55.3.2. *Preparing the base.*—According to specification No. Rd.53.3.2.

Rd.55.3.3. *Applying bitumen.*—The bitumen of the specified grade shall be heated to 163°C. to 177°C. (325°F. to 350°F.) in a bitumen boiler and shall be applied uniformly to the cleaned road surface at the rate of 225 kg./100 sq. m. (45 lbs./100 sft.) with a pressure sprayer or if permitted, with pouring cans with rose. The road surface shall be marked into rectangular areas so that a measured quantity of bitumen and chips will cover each such area with uniform thickness as specified. The spraying shall be done in the longitudinal direction of the road and only when the surface is thoroughly dry.

Rd.55.3.4. *Spreading chips.*—Immediately on applying the hot bitumen to the road, 12 mm. (about ½") chips shall be spread uniformly at the rate of 1.8 cu. m./100 sq. m. (6 cft./100 sft.) over the road surface. The surface shall be broomed for ensuring evenness of the layer. All high and low spots shall be corrected by removing or adding stone chips as required.

Rd.55.3.5. *Rolling.*—The surface shall be rolled immediately thereafter as specified under specification No. Rd.56. The rolling shall be covered by that item.

*Second coat.*

Rd.55.3.6. *Applying bitumen.*—Before applying the second coat of bitumen the surface shall be examined and any loose material or foreign matter removed by brooming.

The bitumen shall be applied at the rate of 125 kg./100 sq. m. (25 lbs./100 sft.).

Rd.55.3.7. *Spreading chips.*—Immediately after second application of hot bitumen 10 mm. (about 3/8") stone chips shall be spread uniformly at the rate of 1 cu. m./100 sq. m. (3.5 cft./100 sft.). The surface shall be broomed to obtain even distribution of the chips.

Rd.55.3.8. *Rolling.*—Rolling shall be done as in the case of the first coat.

Rd.55.3.9. *Opening to traffic.*—According to specification No. Rd.53.3.6 for single coat surface dressing.

Rd.55.4. *Special requirements.*—According to specification No. Rd.53.4 for single coat surface dressing.

Rd.55.5. *Item to include.*—Item mentioned in specification No. Rd.53.5 shall be included for each of the two coats.

Rd.55.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.56. *Rolling the two coat bituminous surface dressing with a power roller including labour, use of plant etc. complete.*

Rd.56.1. *General.*—The item provides for the rolling of the two coat bituminous surface dressing of the road with a power roller of 8 to 10 tonnes including necessary materials, labour, use of plant etc. complete.

Rd.56.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.56.3. *Compaction—General.*—According to specification No. Rd.32.4.

Rd.56.4. *Rolling.*—The first and the second coat of surface dressing shall be lightly rolled with a power roller of 8 to 10 tonnes capacity separately on each of the two coats immediately after spreading and brooming the chips, without allowing the chips to crush.

Rd.56.5. *Item to include.*—According to specification No. Rd. 54.5 (for each of two coats).

Rd.56.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

(Rolling over the two coats separately shall be measured as one for the complete treatment).

Rd.57. *Providing bituminous liquid seal coat to black top surfaces including preparing the existing road surface, heating and applying bitumen and spreading chips complete, excluding cost of stone chips, bitumen and rolling.*

Rd.57.1. *General.*—The item provides for labour for providing liquid seal coat to existing road surface spreading chips and use of equipment and plant and materials such as the fuel for heating bitumen etc.

Rd. 57.2. *Diversions.*—According to Rd. 43.2.

Rd.57.3. *Construction.*

Rd.57.2.1. *Materials.*—The chips and bitumen for providing the liquid seal coat shall comply with specification Nos. Rd.41 and Rd.42 respectively and the quantities shall normally be as under:—

| (1) | Rate of application for 100 sq. m. (2) | Rate of application for 100 sq. ft. (3) |
|---|---|---|
| (*a*) 6 mm. (about ¼") chips or coarse sand .. .. .. .. | 0·9 Cu. m. | 3 Cft. |
| (*b*) Bitumen of I. S. Grade S. 90 with 80/100 penetration .. | 100 kg. | 20 Lbs. |

The chips shall be entirely dry at the time of spreading.

If modifications in the above quantities are stipulated in the special provisions, the work shall be carried out according to the special provisions.

Increase in the use of materials up to an extent of 10 per cent. shall not entitle the contractor for extra claims for labour charges, fuel etc.

The supply of these materials shall be done and paid for under separate items.

Materials required for patch work to prepare the base for laying the seal coat are not included in the above quantites.

Rd.57.3.2. *Preparing the base.*—According to specification No. Rd.53.3.2

**Rd.61.1.**

Rd.57.3.3. *Applying bitumen.*—According to specification No. Rd.53.3.3. except that the rate of application of hot bitumen to the cleaned road surface shall be 100 kg./100 sq. m. (20 lbs./100 sft.).

Rd.57.3.4. *Spreading chips.*—Immediately on applying the bitumen to the road surface, 6 mm. (about ¼") chips shall be spread evenly at the rate of 0.9 cu. m./100 sq. m. (3 cft. per 100 sft.) over the road surface. The surface shall be broomed for ensuring evenness of the layer before rolling.

Rd.57.3.5. *Rolling.*—The surface shall be rolled as specified under specification No. Rd.58 and this will be covered by that item.

Rd.57.3.6. *Opening to traffic.*—The surface shall remain closed to traffic for 24 hours or such period as may be specified by the Engineer.

Rd.57.4. *Special requirements.*—According to specification No. Rd.53.4.

Rd.57.5. *Item to include.*—According to specification No. Rd. 53.5.

Rd.57.6. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.58. *Rolling the bituminous liquid seal coat with a power roller including labour, and use of plant complete.*

Rd.58.1. *General.*—The item provides for the rolling of the liquid seal coat with a power roller 8 to 10 tonnes including necessary materials, labour, use of plant complete.

Rd.58.2. *Diversions.*—According to specification No. Rd.43.2.

Rd.58.3. *Rolling.*—The liquid coat shall be rolled with a power roller of 8 to 10 tonnes capacity immediately after the chips are spread without allowing the chips to crush.

Rd.58.4. *Item to include.*—According to specification No. Rd.54.5.

Rd.58.5. *Mode of measurement and payment.*—According to specification No. Rd.43.6.

Rd.59. *Providing 50 mm. (about 2") thick fullgrout bituminous road surface including supplying all materials, preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips, laying seal coat and compacting complete.*

Rd.59.1. *General.*—The item provides for material and labour for providing a fullgrout bituminous road surface of a compacted thickness of 50 mm. (about 2") including preparing the existing road surface to receive the fullgrout course and use of equipment and plant and compacting. The item shall comply with all specifications for item No. Rd.43, and shall also include supply of all materials and compacting by roller.

Rd.60. *Providing 50 mm. (about 2") thick semigrout bituminous road surface including supplying all materials, preparing the existing road surface, laying the required thickness of metal layer, heating and spraying bitumen, spreading chips, laying seal coat and compacting complete.*

Rd.60.1. *General.*—The item provides for materials and labour for providing a semigrout bituminous road surface of a compacted thickness of 50 mm. (about 2") including preparing the existing road surface to receive the semigrout course, use of equipment and plant and compacting. The item shall comply with all specifications for item No. Rd.45 and shall also include supply of all materials and compacting by roller.

Rd.61. *Providing 40 mm. (about 1½") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, appyling tack coat at.—kg./100 sq. m. mixing bitumen and aggregate in a bitumen mixer, laying the carpet layers and compacting complete.*

Rd.61.1. *General.*—The item provides for materials and labour for providing a premix bituminous carpet of a compacted thickness of 40 mm. (about 1½") including preparing and cleaning the existing road surface to receive the premix carpet, heating the bitumen, applying tack coat, mixing aggregates and hot bitumen, laying the carpet layer, compacting and use of equipment and plant. The item shall comply with specifications for item No. Rd.47 and shall also include supply of materials and compaction by roller.

Rd.62. *Providing 25 mm. (about 1") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, applying tack coat, at—kg./ 100 sq. m., mixing hot bitumen and chips, laying the carpet layer and compacting complete.*

Rd.62.1. *General.*—The item provides for materials and labour for providing a premix bituminous carpet of a compacted thickness of 25 mm. (about 1") including preparing and cleaning the existing road surface to receive the premix carpet, heating the bitumen, applying tack coat, mixing chips and hot bitumen, laying the carpet layer, compacting and use of plant and equipment. The item shall comply with specifications for item No. Rd.49 and shall also include supply of materials and compaction by roller.

Rd.63. *Providing 20 mm. (about ¾") thick premix bituminous carpet including supplying all materials, preparing and cleaning the base, heating bitumen, applying tack coat, at—kg./ 100 sq. m., mixing hot bitumen and chips, laying the carpet and compacting complete.*

Rd.63.1. *General.*—The item provides for labour and materials for providing a premix carpet of a compacted thickness of 20 mm. (about ¾") including preparing the base, heating bitumen, applying tack coat, mixing chips and hot bitumen and laying the carpet. The item shall comply with specifications for item No. Rd.51 and shall also include the supply of materials and compaction by roller.

Rd.64. *Providing single coat surface dressing including supplying all materials, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, use of tools, plant and equipment and rolling complete.*

Rd.64.1. *General.*—The item provides for all materials and labour for a single coat surface dressing of bitumen including preparing the base, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, rolling and use of equipment and plant. The item shall comply with specifications for item No. Rd.53 and shall also include supply of materials and rolling by a roller.

Rd.65. *Providing two coat bituminous surface dressing including supplying all materials, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips and rolling complete.*

Rd.65.1. *General.*—The item provides for all materials and labour for providing two coat surface dressing of bitumen including preparing the base, cleaning the road surface, heating and applying bitumen to the road surface, spreading chips, use of tools and plant and rolling. The item shall comply with specifications for item No. Rd.55 and shall also include supply of materials and rolling.

Rd.66. *Providing bituminous liquid seal coat to black top surfaces including supplying all materials preparing the existing road surface, heating and applying bitumen, spreading chips and rolling complete.*

Rd.66.1. *General.*—The item provides for materials and labour for providing liquid seal coat to the existing road surface, including use of equipment and plant and rolling by roller. The item shall comply with specification for item No. Rd.57 and shall also include supply of materials and rolling.

Rd.67. *Providing hot mix, hot laid premixed bituminous concrete 25 mm. (about 1") thick wearing surface over 50 mm. (about 2") thick premixed bituminous macadam, including diversion, aggregates, bitumen, etc., heating bitumen and chips, mixing chips and bitumen in mechanical bitumen mixer, laying the bituminous macadam base and bituminous concrete wearing course and compacting the two courses separately.*

Rd.67.1. *General.*—The item provides for both the 50 mm. (about 2") thick bituminous macadam base and the 25 mm. (about 1") thick bituminous concrete course. The base course shall be premixed bituminous macadam and the wearing course shall be of hot mix and hot laid bituminous concrete. The item includes providing chips, bitumen, necessary fuel and heating of bitumen for base course and chips and bitumen for wearing course, mixing of chips and bitumen for the two layers in a mechanical mixer, laying and compacting of the base course and the wearing course separately with a 10 to 12 tonne power roller, use of equipment, tools and plant and carrying out tests on the bituminous concrete.

Rd.67.2. *Diversions.*—According to the specification No. Rd.43 2.

Rd.67.3. *Construction.*

Rd.67.3.1. *Base Course.*

**Rd. 67.3.2.1.**

Rd.67.3.1.1. *Materials.*—The chips shall conform to Rd.41 and further the sizes and quantities shall be as specified hereafter.

The bitumen shall conform to the specification No. Rd.42 and shall be of I.S. grade S. 90 with 80/100 penetration.

The requirement of materials for the base coat shall be as under:—

| (1) | Rate of application for 100 sq. m. (2) | Rate of application for 100 sq. ft. (3) |
|---|---|---|
| (*a*) 40 mm. (about 1½") aggregate .. .. .. .. | 4·90 Cu. m. .. | 16 Cft. |
| 20 mm (about ¾") chips .. .. .. .. .. | 2·45 Cu. m. .. | 8 Cft. |
| (*b*) Bitumen of I. S. grade S. 90 with 80/100 penetration— for premixing 40 mm. aggregates .. .. .. .. | 48·1 kg./cu. m. .. | 3 lbs./cft. |
| For premixing 20 mm. chips .. .. .. .. | 56 kg./cu. m. .. | 3½ lbs./cft. |

The chips shall be entirely dry at the time of mixing.

Rd.67.3.1.2. *Preparing the base.*—According to specification No. Rd.47.3.2.

Rd.67.3.1.3. *Premixing chips.*—The bitumen of S. No. 90 grade with 80/100 penetration shall be heated to 163°C. to 177°C. (325°F. to 350°F.). 40 mm. (about 1½") and 20 mm. (about ¾") chips shall be fed into the mixer in the proportion of 2 : 1 by volume. The heated bitumen shall be added to the chips at the rate of 48.1 kg./cu. m. (3 lbs./cft.) for 40 mm. aggregate and 56 kg./cu. m. (3½ lbs./cft.) for 20 mm. chips and mixed till all the chips are thoroughly coated with bitumen.

The road surface shall be suitably marked to ensure correct rate of application of the chips. The premixed chips shall be discharged into wheel barrows and shall be conveyed to the site with the least loss of time and spread uniformly at the rate of 7.35 cu. m./100 sq. m. (24 cft./100 sft.) immediately. Any irregularities shall be corrected before the rolling commences.

Rd.67.3.1.4. *Compaction.*—The base course shall be compacted thoroughly with a 10 to 12 tonne power roller as specified in Rd. 48 except that it will be done in a single course of 50 mm. compacted thickness.

Rd.67.3.2. *Hot mix Hot laid wearing course.*

Rd.67.3.2.1. *Materials.*—The aggregate grading including the mineral filler for the bituminous concrete may be of the following type:—

| I. S. sieve No. | % passing by weight |
|---|---|
| 12 mm. (about ½") ... ... | 100 |
| 10 mm. (about 3/8") ... ... | 80—100 |
| 480 ... ... | 55—75 |
| 240 ... ... | 35—50 |
| 60 ... ... | 18—29 |
| 30 ... ... | 13—27 |
| 15 ... ... | 8—16 |
| 8 ... ... | 4—10 |

Aggregates shall conform to specification No. Rd.41.

Sand shall conform to the specification No. A.6 and satisfy the requirements of the grading of the aggregate of the bituminous concrete as stated above or as determined by preliminary tests.

The filler shall be dry and clean limestone powder or hydrated lime having CaO content of not less than 60 per cent. both passing I.S. sieve No. 8. It shall be free from lumps and loosely bonded aggregation. When tested by laboratory sieves, 100 per cent. shall pass through I.S. sieves No. 15 and 80 per cent. shall pass through I.S. sieve No. 8. Filler shall be added to the aggregate to give the above grading or grading determined by preliminary tests.

Bitumen shall be of I.S. grade S. 65 with 60/70 penetration.

The actual mix design for the particular job shall be decided by preliminary laboratory tests by using the approved local aggregates and filler to satisfy the following requirements:—

Bitumen of I.S. grade S. 65 with 60/70 penetration shall be 6.5 per cent. to 8 per cent. by weight of total.

| | |
|---|---|
| Marshall stability. | 1,000 lbs. minimum. |
| % of air voids in total mix. by volume. | 3 to 5 |

Rd.67.3.2.2. *Preparing the base.*—Dirt and dust if accumulated shall be cleared off leaving the surface entirely clean.

Rd.67.3.2.3. *Mixing and laying wearing course.*—I.S. grade S. 65 bitumen shall be heated to a temperature of 163°C. to 177°C. (about 325°F. to 350°F.) in a boiler. The aggregate of the grading given above or as decided by preliminary tests shall be dried and heated in an Aggregate Drier to a temperature of 149°C. to 177°C. (about 300°F. to 350°F.) and fed into a twin shaft paddle type mixer at a temperature of not less than 149°C. (about 300°F.). The bitumen, the aggregates and the filler shall be measured separately and accurately to the proportions in which they are to be mixed and mixed intimately till all the particles are completely coated with bitumen. The quantities of aggregates, bitumen and the filler shall be such as to obtain the per cent. of each as specified above or decided after tests. Continuous batching and mixing plant shall be used.

The temperature of bituminous concrete when leaving the mixer shall not be less than 138°C. (about 280°F.) and it shall not be less than 121°C. (about 250°F.) at the time of laying.

The bituminous concrete shall be transported to the site of work in suitable tipping vehicles properly insulated and covered with canvas or other suitable material to protect the mixture from weather condition and to retain the heat. The mixture shall be spread with a mechanical self-powered spreader. The bituminous concrete shall be laid to the specified line, curve, grade and camber. Any irregularities shall be corrected immediately and before rolling is started. Before laying the mixture, the faces of the joints shall be pained with a uniform coating of hot bitumen.

The bituminous concrete shall be laid to such loose depth as to give a compacted layer of 25 mm. (about 1").

Rd.67.3.2.4. *Compaction.*—The bituminous concrete layer shall then be allowed to cool sufficiently such that it does not spread under the wheel load of a 10/12 tonne power roller. The compaction shall be done by the roller till no wheel marks are left on the surface and no further compaction is possible.

Rd.67.3.2.5. *Opening to traffic.*—The road shall be opened to traffic on cooling of the concrete to atmospheric temperature.

Rd.67.3.2.6. *Tests.*—Two specimen per day shall be tested by the contractor in the field laboratory provided by him for this purpose under the guidance of qualified personnel. Tests shall be conducted to ascertain stability, bitumen content, air voids and specific gravity. All expenses pertaining to the laboratory, tests, etc., shall be borne by the contractor.

The results shall be supplied to the Engineer every day for his record and information. The contractor shall give all facilities for the Departmental staff to inspect the work of tests being done by him at all times.

Rd.67.3.2.7. *Maintenance.*—The contractor shall be responsible for maintenance of the surface in good condition for three months after opening the road surface to traffic at his own cost. Maintenance includes repairing defects occuring in the work.

Rd.67.4. *Special points.*—According to Rd. 43.4.

Rd.67.5. *Item to include.*—(1) All materials such as aggregates, bitumen, filler, fuel for heating, for patchwork, the base course and the wearing course.

(2) All labour required to complete all the items of the work as specified satifactorily including compaction.

(3) Use of equipment tools and plant, conveying materials, heating, weighing, mixing, spreading and compacting.

**Rd.68.3.**

(4) Maintenance of the road surface for 3 months after opening to traffic.

(5) Sampling and testing.

Rd. 67.6. *Mode of measurement and payment.*—The contract rate shall be for one sq. m. of the paving as specified, consisting of the base course and wearing course both considered as one.

The width shall be recorded correct up to a cm. and limited to the width shown on the plans or directed by the Engineer.

The length shall be measured correct up to a cm. along the centre line of the road.

The area shall be calculated correct up to three places of decimals of a sq. metre.

Rd.68. *Providing 1 : 2 : 4 :cement concrete of trap/granite/quartzite/gneiss metal pavement—mm. thick including diversion, compacting, finishing, curing, filling in joints with premoulded and poured bituminous joint filler and 1 : 4 : 8 lean cement concrete.*

Rd.68.1. *General.*—The item provides for laying pavement of 1 : 2 : 4 cement concrete of specified thickness with specified type of metal for the road including patching of the sub-grade to the required section where necessary with 1 : 4 : 8 lean cement concrete, vibrating, finishing and curing and filling the joints with premoulded and poured bituminous joint filler. Concrete shall generally comply with specification No. B.6 subject to the following :—

Rd.68.2. *Materials.*

Rd.68.2.1. *Cement.*—Cement to be used shall comply with specification No. A.2.

Rd.68.2.2. *Coarse aggregate.*—Coarse aggregate shall generally comply with specification No. Rd.41 and relevant provisions of specification No. A.7. The grading shall be such as to give dense concrete with maximum of bigger size metal and lowest possible voids. The maximum size of the standard coarse aggregate shall be 40 mm. (about 1½"). Normally the following proportions with slight modifications will be found to be satisfactory :—

(1) Metal 40 mm. (IRC. Standard) roughly 60 to 66⅔ per cent.
(2) Metal 20 mm.
(3) Metal 10 mm. } (IRC. Standard) roughly 40 to 33⅓ per cent.

Samples of the materials and their grading shall be tested before the work in commenced and at intervals during construction when change of materials is indicated by change of quarry, change of crushing and screening machinery etc. and the precise proporation of the different grades in the coarse aggregate shall be fixed by the Engineer so as to secure a well graded material varying from 40 mm. to 6 mm. (about 1½" to ¼") giving the required strength of concrete. The grading and testing shall be done at the cost of the contractor who shall supply the necessary materials, sieves, and screens. They shall be measured in suiable measuring boxes approved by the Engineer and shall be mixed in approved proportion.

Rd.68.2.3. *Fine aggregate.*—Fine aggregate shall generally conform to specification No. A.6. Clean crushed stone screening may be permitted by the Engineer to be used wholly or in combination with natural sand where suitable natural sands are not available in required quantity. But they shall satisfy the requirements of grading specified in I.S. 383-1963 and the concrete prepared with it shall give the required strength. The grading of the particles shall be as laid down in specification A.6 or such other grading as will enable the concrete in which it is used to have the maximum density and a strength which shall not be less than specified.

Rd.68.2.4. *Water.*—Water for mixing and curing concrete shall comply with specification No. A.5.

Rd.68.2.5. *Reinforcement.*—Reinforcement when required to be used shall comply with specification No. B.10.

Rd.68.2.6. *Premoulded joint filler.*—According to specification No. BR.43.

Rd.68.2.7. *Poured joint filler.*—According to specification No. BR.43.

Rd.68.3. *Proportioning of concrete mix.*—The usual mix to be used in concrete roads shall be 1 : 2 : 4 and the quantities of ingredients based on one 50 kg. bag of cement shall be as under :—

Ordinary cement 50 kg. bag : 70 litres (about 2.4 cft.) of sand : 140 litres (about 4.8 cft.) of coarse aggregate.

The water cement ratio shall not exceed 0.50 for ordinary cement. Slump shall not exceed 40 mm. (about 1½").

Rd.68.4. *Equipment* :—

Rd.68.4.1. *General.*—All equipment, tools and machinery necessary for the proper preparation of the sub-grade, batching, mixing, conveying, placing, finishing and curing of the concrete pavement shall be of approved design and kept at site in first class working condition and shall have been inspected by the Engineer before the contractor is permitted to start the paving work. They shall be of such capacity and in such numbers as to ensure the required rate of progress. They shall be maintained in satisfactory working condition throughout the period of construction. They shall include:—

Rd.68.4.2. *Measuring boxes.*—When batching is done by volume, the boxes shall be strongly constructed and provided with handles for convenient lifting and loading the mixer. The sizes of boxes shall preferably be such as to be possible to measure the required quantity of each size or aggregate in whole boxes or multiples thereof and capable of being lifted by two men. A straight edge shall be provided for striking off after filling.

Rd.68.4.3. *Mixers.*—Mechanical concrete mixers of adequate capacity shall be provided and they shall be of the batch type, of standard design and shall have a rated capacity of not less than 0.2 cu. m. (7 cubit feet) of mixed concrete.

The mixers shall have an approved timing device or in its absence, a time piece with minute and second hands shall be provided by the contractor. The mixer shall also have approved water measuring device. There shall be approved measures for water in case measuring device gets out of order for use till the device is repaired.

Pick up and throwover blades in the drum of the mixer which are worn down 20 mm. (about $\frac{3}{4}$″) or more in depth shall be replaced with new blades.

Rd.68.4.4. *Water supply equipment.*—The water supply arrangement and equipment shall be of such capacity and nature as to insure at all times an ample supply for all the requirements of the work.

Rd.68.4.5. *Sub-grade template or strike board.*—The template shall be of rigid construction approximately 10 cm. (about 4″) wide and shall weigh about 45 kg. (about 100 lbs.).

Rd.68.4.6. *Scratch template.*—Scratch template shall be made of strong wooden scantling rigid enough to keep the shape in working condition and shall be provided with scratch points placed about 20 cm. (about 8″) apart and set to the exact profile required.

Rd.68.4.7. *Hand tamper.*—The tamper shall be shaped to the cross-section of the slab and shall weigh not less than 10 kg. per metre length (about 7 lbs./per rft.). It shall be durably constructed of 80 mm. (about 3″) timber or of steel channel cross-section, 60 cm. (about 2′) longer than the proposed width of pavement slab and sufficiently strong and rigid to retain its shape under all working conditions. If it is of timber it shall be shod with steel. The tamper shall be provided with handles which are resilient and sufficiently long to enable tamping operations to be performed by men in standing position.

Rd.68.4.8. *Vibrating screed.*—Vibrating screed shall be similar to hand tamper but mounted with a vibrating machine and shall be worked by an engine, compressed air or electric motor, hand propelled and travelling on side forms. Vibrators shall have a frequency of not less than 3,600 or preferably about 5,000 impulses per minute.

Rd.68.4.9. *Longitudinal float.*—The longitudinal float shall be about 1.2 metres in length and 10 cm. in width (about 4′×4″) and shall have a suitable handle.

Rd.68.4.10. *Bridges.*—The bridges shall be so designed that when placed straddling the forms, no part shall come in contact with the pavement and shall be sufficiently rigid.

Rd.68.4.11. *Brooms.*—The brooms shall not be less than 45 cm. (about 18″) in width and be made from good quality bass fibre. The handle shall be at least 30 cm. (about one foot) longer than half the width of the slab. A minimum of four brooms shall be provided.

Rd.68.4.12. *Three metre straight edge.*—The straight edge shall be 3 metres (about 10′) long and shall remain true and rigid under working conditions and shall have suitable handles for use from bridges across the pavement.

Rd.68.4.13. *Edging tool.*—The edging tool shall have a radius of 10 mm. (about 3/8″). The vertical limb shall extend to the required depth. A minimum of two edging tools shall be provided.

Rd.68.4.14. *Master straight edge.*—The master straight edge shall be of known accuracy for checking other straight edges. It shall be of steel or other suitable material, of sufficient length and of sufficient rigidity to maintain its accuracy.

अनुक्रमणिका
Table of Contents



**Rd.68.7.4.**

Rd.68.5. *Diversions.*—Diversion shall be provided as per specification No. Rd.27.2. Unless separate provision is made in the tender for diversion, the rate for concrete shall be inclusive of diversions.

Rd.68.6. *Preparation of the sub-grade and sub-bases.*

Rd.68.6.1. *General.*—All soft or spongy parts of the sub-grade or base shall be excavated and refilled with approved material, watered if necessary and well tamped in 8 cm. (about 3″) layers. The rate for concrete shall cover these operations for preparing the base and no extra payment will be made to the contractor on this account.

Rd.68.6.2. *Macadam sub-base.*—If there are depressions and hallows in the road surface they shall be levelled up before concreting by using a lean mix of 1 : 4 : 8 concrete properly compacted before laying of the concrete slab in addition to correcting the section with such lean concrete.

After this correction, the section shall be checked for trueness by means of a scratch template resting on the side forms. The template shall be drawn along parallel to the centre line of the road. The surface irregularities shall be rectified with 1 : 4 : 8 lean concrete.

Rd.68.6.3. *Black topped surface.*—Where concrete slabs are to be laid on the existing black topped surfaces, no special treatment is necessary where the surface extends over the required width and is worn uniformly under the traffic.

Rd.68.6.4. *Concrete base.*—Where concrete is to be placed on the existing base of concrete, all the joints and cracks in the base slab shall be cleaned and sealed with suitable bituminous sealing compound.

Rd.68.6.5. *Final finishing of base.*—Prior to depositing concrete on the base the section shall be checked with scratch template riding on the side forms and drawn along parallel to the centre line and unevenness corrected with lean concrete as detailed above.

The sub-grade and sub-base shall be completed in accordance with these requirements in advance of concreting. Correction with lean concrete should be limited to the bay to be concreted.

No concrete shall be laid on a freshly laid macadam sub-grade until passed by the Engineer.

The existing road surface shall be brushed and all the blindage and loose materials removed. The surface shall then be uniformly moistened just before laying the concrete slab with as much water as it will absorb readily without causing pools of standing water. It may be advisable to have the sub-grade or sub-base sprinkled or thoroughly wetted from 12 to 24 hours in advance of placing concrete where such procedure seems necessary.

Rd.68.7. *Forms*:—

Rd.68.7.1. *Steel forms.*—All side forms shall be of mild steel unless use of wooden sections is specially permitted. The steel forms shall preferably be mild steel channel sections and shall have the same depth as the edge thickness of the slabs.

The sections shall have a length of at least 10′ except on curves of less than 50 m. (about 164′) radius where shorter sections may be used. The use of bent, twisted or worn out forms will not be permitted. The supply of forms shall be sufficient to permit their remaining in place not less than 24 hours after concrete has been laid.

Rd.68.7.2. *Wooden forms.*—Wooden form may be used only when specified in special provisions. However their use is permitted for all curves having radius of less than 50 m. (about 164′). Wooden forms shall be 80 mm. (about 3″) in thickness and equal in depth to the edge thickness of the slab and dressed on one side and on top. These forms when used on straight shall have a minimum length of about 3 m. (about 10′).

Rd.68.7.3. *Setting of forms.*—The forms shall be set to the exact grade and alignment at least 60 m. (about 200′) in advance of the point of depositing concrete. The base on which the forms are to be set shall be well consolidated and rigid so that they will not sink with the equipment moving on them. Sufficient bracing pins or stakes of adequate length shall be driven into the ground along the outside edge of forms at suitable intervals to obtain required rigidity. Deviation of more than 6 mm. (about ¼″) in a length of 3 m. (about 10′) shall not be permitted.

Rd.68.7.4. *Removal of forms.*—The forms may be removed 24 hours after laying concrete. Great care shall be taken during the removal to ensure that the concrete and its edges are not damaged in any way. The forms shall be thoroughly cleaned, repaired if necessary and oiled each time before reuse.



अनुक्रमणिका
Table of Contents

Rd.68.8. *Joints*:—

Rd.68.8.1. *Transverse expansion joints.*—Transverse expansion joints shall be provided at every 35 m. (about 114'-8") and shall be of the premoulded type. It shall be 12 mm. (about ½") thick and extend to the entire width of the pavement and from the bottom of the slab to 25 mm. (about 1") below the surface of the pavement. A bulkhead cut to the exact section of the road shall be securely staked in place at right angles to the centre line of the road. The premoulded joint filler shall be placed against the bulkhead and held accurately in position by a metal channel cap or other approved method, during the placing and finishing of the concrete. When a day's concreting extends beyond the expansion joint, concrete shall be placed on both sides of the bulkhead. After the concrete has been compacted and struck off, the bulkhead shall be removed by lifting it slowly from one end and replacing it with concrete as it is lifted so that the joint filler will be left in the correct position. The metal channel cap when used shall be of 10 gauge steel having two equal parallel legs not less than 5 cm. (about 2") deep. The metal cap shall be placed over the top of the expansion joint material and the two held in position in the sub-grade by flat metal stakes spaced so closely together that the joint material will remain straight as the concrete is placed and finished. After the pavement has been struck off and finished, the metal cap shall be removed.

No concrete shall be left along the expansion joint materials or across the joint at any point. Any concrete spanning the ends of the joint next to the forms shall be carefully cut away after the forms are removed.

When expansion joints are made at the end of the day's work, they shall be formed by finishing the concrete to the bulkhead placed across the road. When work is resumed, the joint filler shall be placed against the hardened concrete with metal channel caps and held in position by pins until fresh concrete is placed against it. Dowels when provided, shall be fixed as shown on the plans and shall be paid for separately.

Rd.68.8.2. *Transverse contraction joints.*—Transverse contraction joints shall be placed at every 6 m. (about 20') to 9 m. (about 30') or as directed by the Engineer and shall be of the weakened plane or dummy groove type. They shall be formed by making a groove 6 mm. (about ¼") wide with a depth of not less than ¼ of the depth of pavement at the thinnest part of the section with a tee section or suitable tool soon after the concrete is laid.

Rd.68.8.3. *Transverse construction joints.*—Transverse construction joints shall be formed whenever placing of concrete is suspended for more than 30 minutes. Except for emergency stops, construction joints shall be located at the regular site for expansion or construction joints. At all construction joints, a bulkhead shall be placed and staked and concrete surface shall be finished to the face of the bulkhead. An edging tool shall be used along the bulkhead to make the construction joint a regular and well defined line.

Rd.68.8.4. *Expansion joint at structures.*—Expansion joints shall be formed about all structures and features projecting through, into or against the pavement, such joints shall normally be 12 mm. (about ½") wide and may be poured or premoulded as directed by the Engineer.

Rd.68.8.5. *Longitudinal joints.*—Longitudinal joints shall be plain butt type and shall be formed by placing the concrete against the faces of the slabs concreted earlier. The faces of the old concrete slabs shall be painted with bitumen before placing fresh concrete.

Where so provided for slabs thicker than 10 cm. (about 4"), tie bars shall be used at longitudinal joints. Their dimensions and spacings shall be as shown on the plans. Tiebars shall be fairly supported so as not to be displaced during construction operations. Tiebars shall be bonded in the slabs across longitudinal joints and while casting the first slabs they may be bent so that one end of them lies along the forms. After removal of the forms, bars shall be straightened so that they extend into the concrete placed on the other side of the joints.

Rd.68.9. *Construction Methods*:—

Rd.68.9.1. *Mixing.*—According to specification No. B.6.

In case of failure of mixer, hand mixing shall be permitted only to complete the particular slab with the precautions regarding additional cement etc. detailed in specification No. B.6.4. Such a slab shall be kept under observation for its response to traffic and shall be paid after the Engineer is satisfied about its performance within a week of opening the slab to traffic.

Rd.68.9.2. *Placing concrete.*—Reinforcement when provided shall be placed in position as shown in the plans and paid for separately. The concrete shall be deposited on the previously moistened sub-grade or sub-base. It shall be laid to the required depth and width of the pavement shown on the plans or directed by the Engineer rapidly in successive batches in continuous

operation without the use of intermediate forms or bulkheads between expansion or contraction joints. When consolidated and finished, the slab thickness required in the plans shall be obtained at all points and the surface shall not at any point deviate from the grade and section of the required finished surface. The spreading shall be as uniform as possible to avoid rehandling of the concrete. Where however certain amount of redistribution is necessary, it shall be done with shovels and not with rakes. While being placed, the concrete shall be rodded with suitable tools or vibrated so that the formation of voids or honeycomb pockets is prevented along the faces of the forms. Workmen shall not be allowed to walk on the freshly laid concrete.

In case of unavoidable interruption in placement of concrete continuously between transverse expansion joints, a full depth transverse construction joint shall be placed at the point of stopping work by putting a bulkhead provided the section on which work is suspended shall be at least 3 m. (about 10′) long. Shorter sections shall be removed. When work is resumed, the bulkhead shall be removed, care being taken not to disturb the concrete. The fresh concrete shall be placed directly against the face of the concrete previously laid.

Rd.68.9.3. *Compaction and finishing.*—The sequence of operation shall be—

(*a*) strike off and compaction,

(*b*) longitudinal floating and removal of laitance,

(*c*) straight edging,

(*d*) finishing at joints,

(*e*) final finish by brooming,

(*f*) edging,

(*g*) finishing sides.

Rd.68,9,3,(*a*). *Strike off and compaction.*—Concrete as soon as placed shall be struck off uniformly and screeded with a heavy screeder or tamper to the grade and cross section shown on the plans and to such level above the base that when compacted and finished the pavement shall conform to the grade, cross-section and depth indicated by the plans. The pavement concrete shall be compacted by means of a vibrating screed. For areas where the width of the slab is very small and tamper cannot be used, hand compaction and finishing may be adopted subject to the approval of the Engineer.

A hand tamper may be used for screeding and tamping where the work is unimportant or small i.e., not more than 100 m. (about 328′). The tamper shall rest on the side forms and shall be drawn ahead with sawing motion in combination with a series of lifts and drops alternating with lateral shifts, the aim of this operation being compaction and screeding to the approximate level required. Subsequent tamping should advance about 8 cm. (about 3″) at a time in the direction in which the work is proceeding and in the final stages, tamping should be closer about 12 mm. (about $\frac{1}{2}$″) at a time until a dense and smooth surface is obtained. At transverse joints, the tamper shall be drawn not closer than one metre (about 3.28′) towards the joint and shall then be lifted and set-down at the joint and drawn backwards away therefrom. Surplus concrete if any, shall then be taken out with the shovels.

For longer lengths, manually handled vibrating tamper consisting of a normal type of hand tamper to which pneumatic, mechanical or electric vibrating unit is attached shall be used for compaction. The concrete shall have been evenly spread to the required level above the base, making due allowance for compaction. The tamper shall be lowered vertically on to the concrete surface allowed to remain in position for a few seconds until compaction is complete, then lifted vertically and lowered on to the adjacent strip of uncompacted concrete. The tamper shall again be taken slowly over the surface sliding with its axis slightly tilted away from the direction of sliding and the operation repeated until a dense, close knit texture surface is obtained.

Segregated particles of coarse aggregate which collect in front of the tamper shall be thrown outside the forms or thoroughly mixed by hand with the mass of concrete already on the base. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass.

Compaction by tamping vibrator shall be carried on till the mortar in the mix just works upto the surface. Care shall be exercised to control the operation of tamping so as to prevent an excess of mortar and water from being worked to the top. Continuing vibration beyond what is required to secure necessary compaction and elimination of voids shall be avoided.

Immediately after the tamping has been completed and before the concrete has hardened, i.e., while the concrete is still in a plastic state, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete and tamping.

Rd.68.9.3.(*b*). *Hand floating.*—Soon after the concrete is struck off and compacted, it shall be further smoothened and laitance removed by means of a longitudinal float 1.2 metre long and 10 cm. wide (about 4′×4″). It shall be operated by a man sitting on a bridge spanning clear of slab. The longitudinal float shall be worked on the concrete surface with a sawing motion with its longer dimension parallel to the centre line of the road and passed gradually from one side of the pavement to the other. Movements ahead along centre line of the roadway shall be in successive advances of not more than one-half the length of the float.

Rd.68.9.3.(*c*). *Straight edging and surface correction.*—After the longitudinal floating has been completed and excess water if any, has disappeared but while the concrete is still plastic, the slab surface shall be tested for trueness with a 3 m. (about 10′) straight edge using two bridges for the purpose. The straight edge shall be held in successive positions parallel to the road centre line in contact with the surface and the whole area gone over from one side of the slab to the other. Advance along the road shall be in successive stages of not more than one-half the length of the straight edge. Any depressions found shall be filled immediately with freshly mixed concrete, struck, compacted and refinished. High area shall be cut down, compacted and refinished. The straight edging and refloating shall continue until the entire surface is found to be free from departures from the straight edge and the slab has the required grade and section.

A tolerance of $\pm$ 3 mm. (about 1/8″) in the straight edge length of 3 m. (about 10′) will be permitted. At the joints no tolerance shall be permitted. If at any place the departure is more than this, not more than 3 passes of the vibrating machine shall be allowed for rectification and the surface tested again. If the departure is still more than the tolerance limit, concrete in the defective portion will be cut out, fresh concrete placed, compacted and finished to the required standard without claiming any extra payment.

Rd.68.9.3.(*d*). *Finishing at joints.*—A suitable float shall be used at all joints. The device shall be so arranged as to float the surface for a width of at least 15 cm. (about 6″) on each side of the joint simultaneously and shall be used in such a manner as to produce a level surface across the joint. If there is any unevenness found after the concrete is set it shall be ground down flush by the contractor with an approved grinding tool or carborundum brick and water at the contractor's cost.

Rd.68.9.3.(*e*). *Brooming.*—After hand floating straight edging and finishing the surfaces at joints and when most of the water sheen has disappeared, the pavement shall be given a broom finish with an approved type of bass broom. The broom shall be pulled gently over the surface of the pavement perpendicular to the centre line of the road from edge to edge in such a manner that the corrugations will be uniform in width and depth. The depth shall not be more than 1.5 mm. (about 1/16″). Brooming shall be done when the concrete is in such condition that the surface will not be torn or unduly roughened by the operation. Brooms shall be maintained in good serviceable condition at all times by being washed thoroughly and dried at frequent intervals. Coarse or long bristles which cause irregularities or deep corrugations shall be trimmed or entirely cut off. Brooms which are worn out or otherwise unsatisfactory shall be discarded.

Rd.68.9.3.(*f*). *Edging.*—After brooming has been completed but before the concrete has taken its initial set, all the edges of the slab shall be carefully finished with an edging tool to a radius of 10 m. (about 3/8″) and the pavement edge shall be left smooth and true to line.

Edges of the slab near the berms shall be levelled and floated smooth for a width of 5 cm. (about 2″), and not broomed.

Rd.68.9.3.(*g*). *Finishing sides.*—After the forms are removed, all the exposed side faces shall be cleaned and honeycombed areas if any, pointed with 1 : 2 cement mortar and cured. The sides of the slab shall, thereafter be covered with earth upto the top of the slab.

Rd.68.10. *Curing* :—

Rd.68.10.1. *Initial curing.*—Immediately after final finishing operations and after the concrete has set sufficiently to prevent marring of the surface, the surface and sides of the concrete slab shall be entirely covered against rapid drying or any other damage with wet empty cement sacks, wetted burlap or jute mats, etc. and these must be kept continuously wet by sprikling water until the concrete has taken its final set and is sufficiently hard to be walked on without suffering damage. Walking on freshly laid concrete for placing burlap, etc. will not be permitted.

Rd.68.10.2. *Final curing by ponding.*—As soon as it is possible to remove the wet sacking, burlap, etc., without damaging the surface of the concrete, it shall be removed and the slab shall be thoroughly wetted and then cured in the following manner:—

Exposed edges of the slab shall be banked with substantial berms of earth. Upon the slab shall be spread about 25 mm. (1″) thick blanket layer of wet earth with transverse and longitudinal ridges or bunds 8 cm. to 10 cm. (about 3″ to 4″) high put up over the earth cover making square panels or 1 m. × 1 m. (about 3′ × 3′) and the panels filled with water. All portions of concrete surface shall be so treated and kept continuously saturated with water for 18 days and left to attain the required strength. The blanket earth layer shall be removed after 21 days of laying the concrete. If the earth covering becomes displaced during the curing period, it shall be replaced to the original depth and resaturated.

Rd.68.11. *Concreting during rains.*—Normally no concreting shall be done when there is rain. When rain is expected while concrete is being placed, a sufficient supply of tarpaulins or other waterproof covering shall be provided at the actual work site. When it rains, all freshly laid concrete which has not been covered for curing purposes shall be adequately protected by means of tarpaulins or other waterproof covering. Any concrete injured by rain shall be removed and satisfactorily replaced with fresh concrete at the cost of the contractor.

Rd.68.12. *Protection of concrete.*—Any part of the pavement which is defective or damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced by and at the expense of the contractor in a manner satisfactory to the Engineer. The contractor shall protect the pavement against both public traffic and the traffic caused by his own employees and agents.

Rd.68.13. *Cleaning.*—After the period of curing is over, the earth or other cover may be removed and pavement thoroughly washed, brushed, cleaned and allowed to dry.

Rd.68.14. *Sealing of joints.*—After cleaning the surface all foreign matter in transverse expansion and contraction joints shall be removed completely. All faces of the joints shall be cleaned with a wire brush to remove all loose material. If necessary, the foreign matter shall be blown out. The top of the transverse expansion joint shall be thoroughly cleaned out down to the top of the premoulded joint filler and the cavity thus formed shall be filled with an approved poured joint filler. The groove of the transverse contraction joint shall also be similarly cleaned and filled with the approved poured joint filler. Longitudinal joints, if any, shall also be similarly treated. Care shall be taken to see that no stones or pebbles get into the joints before the joint filler has been poured and that the joint filler is not spilled on the surface of the pavement adjacent to the joint. Any excess filler on the pavement surface shall be removed immediately and surface cleaned.

Rd.68.15. *Opening to traffic.*—Traffic shall not ordinarily be allowed on a newly constructed concrete pavement for a period of twenty-one days after placing concrete. This may be extended for a longer period upto 28 days if the tests of concrete fall short of the specified strength and indicate that it is advisable to extend the time.

Rd.68.16. *Keeping records.*—According to specification No. B.6.13.

Rd.68.17. *Maintenance.*—The contractor shall maintain the road at his expense for a period of three months after opening the pavement to traffic. He shall carry out repairs to joints as and when necessary, and rectify the defects developed, if any, due to bad work during the period and perform such other work as may be deemed necessary to carry out the intent and meaning of these specifications to the satisfaction of the Engineer. If the contractor fails to do this, maintenance may be done by the Department and cost recovered from the contractor.

Rd.68.18. *Tolerance in thickness.*—A tolerance of 3 mm. (about 1/8″) shall be permitted. If the tolerance is more than 3 mm. (about 1/8″) and upto 6 mm. (about ¼″) the work may be accepted as substandard and rate reduced in the proportion of square of the reduced thickness to the square of the designed thickness. If the thickness is less than the specified by more than 6 mm. that area of the slab may not be paid for or the rate further reduced as decided by the Engineer.

Rd.68.19. *Sampling and testing.*—According to specification No. B.6.

Rd.68.20. *Item to include.*—According to specification No. B.6.14 and (1) preparing the sub-grade or sub-base for placing cement concrete pavement of specified thickness including 1 : 4 : 8 lean cement concrete for patch-work and correction of camber and providing diversions

unless these are separately provided in the tender. (2) Providing cement concrete pavement of specified thickness including campacting, curing, finishing, providing premoulded and poured joint fillers and maintenance for 3 months after opening the pavement to traffic. (3) Testing.

Rd.68.21. *Mode of measurement and payment.*—The contract rate shall be for a unit of one sq. metre of completed and accepted pavement of concrete of specified proportion, strength and thickness. The width shall be measured at right angles to the centre line of the pavement from outside to outside of completed pavement limited to that shown on the plans or as directed by the Engineer correct upto two places of decimals of a metre. The length will be the actual length measured along the centre line of the pavement including all joints correct to two places of decimals of a metre. The quantity in square metres shall be calculated correct to two places of a square metre.

Rd.69. *Providing and fixing trap/granite/quartzite/gneiss kilometre stone/200 metre stone of standard-size and shape including fixing in a block of standard size of cement concrete 1 : 4 : 8, painting, etc., complete.*

Rd.69.1. *General.*—The item provides for the supply of killometre or 200 metre stone of the type mentioned in the item and standard-size and shape according to type plan including dressing, engraving letters and figures, fixing in a block of 1 : 4 : 8 cement concrete, painting, etc., complete.

Rd.69.2. *Materials.*—The kilometre stone or 200 metre stone shall be of the type mentioned in the item and of the standard-size and shape. The stone shall comply with the specification No. A.8. and shall be in one solid piece. The portion exposed above the ground or platform shall be chisel dressed as specified in specification No. B.9.3.(*b*), while the buried portion may be left undressed.

Figuring and lettering shall be of the size indicated on the type plans and shall be engraved in V cuts. The depth of cut will be half its width. The particular names and figures to be engraved on individual stones shall be as ordered by the Engineer.

The 1 : 4 : 8 cement concrete shall conform to the relevant provisions of the specification No. B.6. Maximum size of coarse aggregate shall be 40 mm. (about $1\frac{1}{2}''$).

The oil paint for the stones shall be white or other shade approved by the Engineer and that for lettering and figuring shall be black or other shade approved by the Engineer. The paint shall conform to the specification No. A.17.

Rd.69.3. *Fixing.*—The stone shall be fixed in a standard sized block of cement concrete of 1 : 4 : 8 proportion with the top of the block flush with the ground or road as indicated in the standard drawing at the designated spot or as ordered by the Engineer.

Any excavation necessary for fixing the stone shall be done by the contractor and the cost shall be included in the rate.

The exposed part shall be painted with two coats of good oil paint of approved shade as specified in B.21. The letters and figures shall be painted in black or any other shade approved by the Engineer.

Rd.69.4. *Item to include.*—(1) Supply of kilometre or 200 metre stones.

(2) Dressing and engraving letters and figures.

(3) Fixing in C. C. 1 : 4 : 8 block including excavating pits.

(4) Painting stone, figures and letters.

(5) All necessary labour, materials, use of equipment and tools, etc., for completing the job satisfactorily.

Rd.69.5. *Mode of measurement and payment.*—The contract rate shall be for one kilometre or 200 metres stone fixed. The measurement shall be for the number of the kilometre stones fixed in concrete in position and painted.

Rd.70. *Providing and fixing trap/granite/quartzite/gneiss and guard stones/indicator stones/boundary stones of standard size and shape including fixing in ground/in blocks of standard size of cement concrete 1 : 4 : 8, white washing, etc., complete.*

Rd.70.1. *General.*—The item provides for the supply of guard stones, indicator stones or boundary stones of the specified type and fixing them in position indicated on the drawings or as ordered by the Engineer in a block of cement concrete 1:4:8 of 45 cm.×45 cm.×45 cm. or ground as mentioned in the item and white washing.

Rd.70.2. *Materials.*—The guard stone, indicator stone or boundary stone shall be of the specified type of stone and of the standard size and shape shown in the type plans. The stone shall comply with the specification No. A.8. The portions of the stones exposed above the ground shall be rough tooled as specified in specification No. B.9.3.(*a*). An arrow mark shall be engraved on the boundary stones in V cuts as indicated on the type plan. The depth of the V cut shall be half its width.

The 1 : 4 : 8 concrete when included in the item shall conform to the relevant provisions of the specification No. B.6. Maximum size of coarse aggregate shall be 40 mm. (about 1½″).

Rd.70.3. *Fixing.*—The guard stone, indicator stone, or boundry stone, shall be fixed in position as indicated on the drawing or as ordered by the Engineer. It shall be fixed in ground or in a block of 1 : 4 : 8 cement concrete of size 45 cm. × 45 cm. × 45 cm. as mentioned in the item with the top of the block flush with the road or ground at the designated spot. Any excavation necessary for fixing of the guard stone and laying of the cement concrete bedding shall be done by the contractor at his cost. The exposed part of the stone shall be given two coats of whitewash.

Rd.70.4. *Item to include.*—(1) Supply of dressed guard stone, indicator stone or boundary stone, with arrow mark engraved on boundary stones.

(2) Fixing the stone in position in 1 : 4 : 8 cement concrete block or in the ground as mentioned in the item including whitewashing and necessary excavation.

(3) All labour, materials and use of tools and plant required for the completion of the item satisfactorily.

Rd.70.5. *Mode of measurement and payment.*—The contract rate shall be for one guard stone, indicator stone or boundary stone fixed in position in concrete block or ground as mentioned in the item. The measurement shall be for the number of such stones fixed in position.

Rd.71. *Providing and fixing trap/granite/quartzite/gneiss stone pinheaders at the toe of the pitching.*

Rd.71.1. *General.*—The item provides for the supply of pinheaders of the specified type of stone at the toe of the pitching including excavation in ground and fixing the pinheaders.

Rd.71.2. *Materials.*—The pinheaders shall be of stones complying with the specification No. A.8 and shall be of the specified type. They shall have an average cross-sectional area of not less than 0.03 sq. m. (about ⅓ s. ft.). The pinheaders shall be at least 60 cm. (about 2′) long with a face thickness of 20 cm. (about 8″) and a width of 20 cm. (about 8″) or more on the face. The top edges shall be dressed square or rectangular and the bushing on top face shall not exceed 40 mm. (about 1½″) and the side shall be dressed square for 4 cm. from the top edge.

Rd.71.3. *Fixing.*—The pinheaders shall be fixed securely at right angles to the bank slope into the ground after excavating a trench of the required dimenisions to have their top face flush with the plane of the face of the pitching and the lower edge flush with the ground. They shall be fixed close to each other along the toe of the pitching and the trench backfilled and compacted before pitching is started. The bed of the trench shall be at right angles to the slope of the pitching.

Rd.71.4. *Item to include.*—(1) Providing pinheaders including excavating trench, fixing them securely and backfilling along the toe of the pitching.

(2) All labour, materials and use of tools necessary for completing the work satisfactorily.

Rd.71.5. *Mode of measurement and payment.*—The contract rate shall be per metre of the line of the pinheaders. The length shall be measured correct upto one cm. along the centre line of the pinheaders.

Rd.72. *Providing trap/granite/quartzite/gneiss stone khandki pitching 23 cm. (about 9″) thick.*

Rd.72.1. *General.*—The item provides for khandki pitching 23 cm. (about 9″) thick for the bank slope.

Rd.72.2. *Materials.*—Stone shall comply with specification No. A.8. for face stones. The khandkies shall be rectangular with straight edges. The four sides shall lie in one plane. Bushing shall not be more than 40 mm. (about 1½″). The beds shall be square to the face

for at least 4 cms. (about 1½") and the sides for at least 2 cms. (about ¾") from the face. No special dressing is envisaged in the remaining position; however, the beds and the joints shall be made as plane as possible with the aid of a hammer and a chisel.

All khandkies shall be more in breadth than in height on face and shall have a tailing to the full depth of the pitching. The height of the khandkies shall not be less than 15 cm. (about 6") and all khandkies shall be of the same height.

Rd.72.3. *Preparation of the base.*—The slopes of the bank shall be made up with murum and trimmed to the required slope and properly compacted under this item. Profiles shall be put up with pegs and strings at required intervals to ensure that the pitching is laid true to line, curves, levels, thickness and slopes.

Rd.72.4. *Construction.*—A line of pinheaders shall be provided when necessary at the toe to support the pitching (*vide* item No. Rd.71); a masonry toe wall may also be provided as an alternative, both of which shall be paid for separately. The lowest course of pitching shall be started from the toe wall or the line of headers at the toe of the slope and the pitching of the specified thickness laid course by course, up the slope. The pitching shall be laid to lines, curves, levels and slopes indicated in the plans or directed by the Engineer. The khandkies shall be laid closely in position on the prepared bed and firmly set. The face of Khandkies shall be parallel to the slope and the bedding joints perpendicular to the slope. The khandkies shall break joint for at least 8 cm. (about 3"). Additional murum bedding if required for getting proper slope, shall be carried up simultaneously with each course of pitching watered if necessary and rammed. The interstics in the joints of tailing shall be filled with spalls of proper size and wedged in with hammers to secure tight packing. Such filling shall be carried out simultaneously with laying of each course of khandkies. The side joints shall be as close as possible. There shall be no pinnings on the face.

Rd.72.5. *Item to include.*—(1) Preparing the base and putting up profiles.

(2) Laying khandki pitching 23 cm. (about 9") thick to lines, levels, curves and batters as shown on the drawings or as ordered by the Engineer including preparing base, making up, trimming and compacting the bedding.

(3) All labour, materials, use of tools and plant necessary for the satisfactory completion of the item.

(4) Repairing disturbed pitching, if any, within three months of completion.

Rd.72.6. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of the finished surface of pitching.

The dimensions shall be measured correct upto a cm. and the area worked out correct upto two places of decimals of a sq. metre.

Rd.73. *Providing dry rubble stone pitching 23 cm. (about 9") thick.*

Rd.73.1. *General.*—The item provides for dry rubble stone pitching 23 cm. (about 9") thick for the bank work.

Rd.73.2. *Materials.*—The rubble stones for pitching shall be sound, hard and durable and fairly regular in shape. The depth of the stones shall be about equal to the specified thickness of pitching and stone shall generally be not less than 9.9 litres (about ⅓ c. ft.) or other size ordered by the Engineer having regard to the nature of the stones being quarried. The smaller size stones required for packing and wedging shall be brought to the site only to the required extent and they shall not be used in two or more thicknesses as a substitute for the stones of full thickness.

Rd.73.3. *Preparation of the base.*—The slopes of the bank shall be made up with murum and trimmed to the required slope and properly compacted under this item. Profiles shall be put up with pegs and strings at required intervals for the pitching to ensure that it is done true to line, curves, levels, thickness and slopes.

Rd.73.4. *Construction.*—A masonry toe wall or a line of pinheaders when necessary, shall be provided at the toe to support the pitching and shall be paid for separately *vide* specification No. Rd.72. The lowest course of pitching shall be started from the toe wall or the line of pinheaders at the toe of the slope and the pitching laid course by course up the slope.

The stones for the pitching shall be used after merely knocking out weak corners and edges with a mason's hammer. The stones shall be laid closely in position on the prepared bed and firmly set with the even face on top. The pitching shall be laid to lines, levels, curves and slopes as indicated in the plans or as ordered by the Engineer. Each stone shall cover the full

अनुक्रमणिका
Table of Contents



**Rd.74.2.**

depth of pitching and shall be perpendicular to the sloping bed. The stones shall be laid breaking joints as far as possible. Additional murum bedding if required for getting proper slope, shall be carried up simultaneously with each course of pitching, watered, if necessary and rammed.

The interstices in the joints between adjacent stones shall be filled in with spalls of the proper size and wedged in with hammers to ensure tight packing. Such filling shall be carried out immediately after placing larger stones and before the next upper layer is taken in hand.

Rd.73.5. *Item to include.*—(1) Preparing the base and putting up profiles.

(2) Laying dry rubble pitching of the specified thickness to lines, curves, slopes and levels including preparing base, making up, trimming and compacting the bed and hand packing.

(3) All labour, materials and use of tools and plant necessary for the satisfactory completion of the item.

(4) Repairing disturbed pitching, if any, within three months of completion.

Rd.73.6. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of finished pitching. The dimensions shall be measured correct upto a cm. and the area worked out correct upto the second place of decimal of a sq. metre.

Rd.74. *Providing dry trap/granite/quartzite/gneiss rubble stone masonry.*

Rd.74.1. *General.*—The item provides for the dry rubble stone masonry of the specified type of stone for the retaining walls, etc., including scaffolding, etc., complete.

The dry rubble stone masonry shall conform to the specification No. B.9.(*k*) for U. C. R. masonry except for the following deviations:—

(1) The masonry shall be without mortar (i.e., dry).

(2) The quoins may be dressed like khandkies on the face and need not be roughtooled.

(3) The spaces between larger stones shall be filled with spalls as tightly as possible.

Rd.74.2. *Mode of measurement and payment.*—According to specification No. B.9.(*k*).13.

There shall be no deduction for voids.

---



अनुक्रमणिका
Table of Contents

SECTION Bd

# STANDARD SPECIFICATIONS

FOR

# BUILDING WORK

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

SECTION Bd.

BUILDING WORK

CONTENTS

| | | PAGE |
|---|---|---|
| 1. | List of Indian Standards referred to ... ... ... ... | 239 |
| 2. | Specifications for items of— | |
| | Bd. A. Excavation ... ... ... ... | 243 |
| | Bd. B. Pile Foundations ... ... ... ... | 251 |
| | Bd. C. Structural Steel Work ... ... ... ... | 257 |
| | Bd. D. Lime Concrete ... ... ... ... | 265 |
| | Bd. E. Plain Cement Concrete ... ... ... ... | 269 |
| | Bd. F. Reinforced Cement Concrete ... ... ... ... | 277 |
| | Bd. G. Brick Work ... ... ... ... | 295 |
| | Bd. H. Stone Masonry ... ... ... ... | 309 |
| | Bd. I. Cement Concrete Block Masonry ... ... ... | 331 |
| | Bd. J. Waterproofing ... ... ... ... | 337 |
| | Bd. K. Expansion Joints ... ... ... ... | 341 |
| | Bd. L. Plastering and Pointing ... ... ... ... | 347 |
| | Bd. M. Paving, Floor Finishing and Dado ... ... ... | 357 |
| | Bd. N Wood Finishes ... ... ... ... | 381 |
| | Bd. O. Oil Painting ... ... ... ... | 385 |
| | Bd. P. Colour Washing, White Washing and Distempering ... ... | 393 |
| | Bd. Q. Wood Work ... ... ... ... | 399 |
| | Bd. R. Roofing and Ceiling ... ... ... ... | 431 |
| | Bd. S. Glazier's Work ... ... ... ... | 445 |
| | Bd. T. Door, Windows, Ventilators and Partitions ... ... ... | 449 |
| | Bd. U. Iron Work ... ... ... ... | 497 |
| | Bd. V. Water Supply and Sanitary Fittings ... ... ... | 501 |
| | Bd. W. Miscellaneous ... ... ... ... | 537 |

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



*List of Indian Standards referred to*

1. I.S. 63—1964. Whiting for paints.
2. I.S. 73—1961 with Amendment No. 1. Paving bitumen.
3. I.S. 102—1962 with Amendment No. 1. Ready Mixed Paint, Brushing, Red lead, Non-setting, Priming.
4. I.S. 2339-1963. Aluminium Paint, Brushing for general purposes, in dual container.
5. I.S. 195—1963. Fireclay mortar for laying Fireclay Refractory Bricks.
6. I.S. 197—1952. Methods of Test for Varnishes and Lacquers.
7. I.S. 204—1966. Tower Bolts.
8. I.S. 205—1966 with Amendment Nos. 1 and 2. But Hinges.
9. I.S. 206—1962. Tee and strap hinges.
10. I.S. 207—1964. Gate and Shutter Hooks and Eyes.
11. I.S. 208—1965. Door Handles.
12. I.S. 2107, 2108—1962. Malleable Iron Castings.
13. I.S. 277—1969. Galvanised steel sheets (plain and corrugated).
14. I.S. 278—1969. Galvanised steel barbed wire for Fencing.
15. I.S. 281—1964. Sliding Door Bolts for use with Padlocks.
16. I.S. 337—1964. Varnish, Finishing, Interior.
17. I.S. 338—1964. Varnish, Undercoating, Exterior, Natural Resin.
18. I.S. 339—1964. Varnish, Undercoating, Exterior, Synthetic.
19. I.S. 342—1952 with Amendment No. 1. Varnish Acid Resisting—(*a*) Clear and (*b*) Tinted.
20. I.S. 346—1952 with Amendment Nos. 1 and 2. Varnish Spirit Clear Hard.
21. I.S. 347—1952 with Amendment No. 1. Varnish, Shellac for General Purposes.
22. I.S. 348—1968. French polish.
23. I.S. 362—1962. Parliament Hinges.
24. I.S. 363—1961 with Amendment Nos. 1 and 2. Hasps and Staples.
25. I.S. 404—1962. Lead Pipes for other than Chemical Purposes.
26. I.S. 407—1966. Brass Tubes for General Purposes.
27. I.S. 412—1954 with Amendment Nos. 1, 2 and 3. Expanded Metal (Steel) for General Purposes.
28. I.S. 419—1967. Putty for use on wooden Frames.
29. I.S. 420—1953. Putty for use on Metal Frames.
30. I.S. 427—1953. Distemper, dry.
31. I.S. 428—1969. Distemper, Oil Emulsion.
32. I.S. 452—1963. Door Springs, Rat Tail Type.
33. I.S. 453—1963. Double Acting Spring Hinges.
34. I.S. 459—1962. Unreinforced Corrugated Asbestos Cement sheets.
35. I.S. 2932—1964. Enamel, Brushing, Exterior, Type 1 (Synthetic)—(1) Undercoating. (2) Finishing.
36. I.S. 524—1968. Varnish, Finishing, Exterior, Type 1 (Synthetic).
37. I.S. 525—1968. Varnish, Finishing, Exterior and General Purposes, Type 2.
38. I.S. 651—1965. Salt-Glazed Stoneware Pipes and Fittings.
39. I.S. 654—1962 with Amendment No. 1. Clay Roofing Tiles, Mangalore Pattern.
40. I.S. 702—1961. Industrial Bitumen.
41. I.S. 771—1963. White Glazed Earthenware Sanitary Appliances.
42. I.S. 774—1964 with Amendments Nos. 1 and 2. Flushing Cistern for Water Closets and Urinals (Valveless Syphonic Type).
43. I.S. 775—1962. Brackets for Supports for Lavatory Basins and Sinks.
44. I.S. 777—1961. Glazed Earthenware Tiles.
45. I.S. 779—1968 with Amendment No. 1. Water Meters (Domestic Type).
46. I.S. 781—1967 with Amendment Nos. 1 and 2. Sand-cast Brass Screw-Down Bib-Taps and Stop-Taps for Water services.
47. I.S. 782—1966. Caulking Lead.
48. I.S. 783—1959. Code of Practice for Laying of concrete pipes.
49. I.S. 800—1962 with Amendment Nos. 1 and 2. Code of Practice for Use of Structural Steel in General Building Construction.
50. I.S. 1003—1966 with Amendment Nos. 1 and 2. Timber Panelled and Glazed Doors and Windows.
51. I.S. 1038—1968. Steel Doors, Windows and Ventilators.
52. I.S. 1077—1966. Common Burnt Clay Building Bricks.
53. I.S. 1081—1960. Code of Practice for Fixing and Glazing of Steel Doors, Windows and Ventilators.
54. I.S. 1196—1968. Code of Practice for Laying Mastic Asphalt Flooring.

अनुक्रमणिका
Table of Contents

55. I.S. 1203—1958. Methods for Testing Tar and Bitumen, Determination of Penetration.
56. I.S. 1230—1968. Cast Iron Rain-water Pipes and Fittings.
57. I.S. 1237—1959. Cement Concrete Flooring tiles.
58. I.S. 1239—Part I—1968, Part III—1969. Mild Steel Tubes and Tabulars.
59. I.S. 1257—1958 with Amendment No. 1. Black Japan, Type B, Exterior.
60. I.S. 1322—1965 with Amendment Nos. 1 and 2. Bitumen Felts for Water-proofing and Damp-proofing.
61. I.S. 1328—1958 with Amendment No. 1. Veneered Decorative plywood.
62. I.S. 1363—1963. Black Hexagonal Bolts with Nuts and Black Hexagonal Screws.
63. I.S. 1443—1959. Code of Practice for Laying and Finishing of Cement Concrete Flooring Tiles.
64. I.S. 1464—1959. Ridge and Ceiling Tiles.
65. I.S. 1447 (Part I) —1966. Code of Practice for Finishing of Iron and Steel in Buildings Painting and Allied Finishes: Part I Operations and workmanship.
66. I.S. 1526—1960. Sizes and shapes for Firebricks.
67 I.S. 1536—1967. Centrifugally Cast (Spun) Iron Pressure Pipes for Water, Gas and Sewage.
68. I.S. 1537—1960 with Amendment No. 1. Vertically Cast Iron Pressure Pipes for Water, Gas and Sewage.
69. I.S. 1538—1960. Cast Iron Fittings for Pressure Pipes for Water, Gas and Sewage.
70. I.S. 1542—1960. Sand for Plaster.
71. I.S. 1592—1960. Asbestos Cement Pressure Pipes.
72. I.S. 1609—1966. Code of Practice for Laying Damp-proof coursing using Bitumen Felts.
73. I.S. 1626—1960. Asbestos Cement Building Pipes, Gutters and Fittings (Spigot and Socket Type).
74. I.S. 1630—1960 with Amendment No. 1. Mason's Tools for Plaster work and Pointing work.
75. I.S. 1634—1960. Code of Practice for Design and Construction of wood stairs.
76. I.S. 1661—1960 with Amendment No. 1. Code of Practice for Cement and Cement-Lime Plaster Finishes on Walls and Ceilings.
77. I.S. 1700—1960. Drinking Fountains.
78. I.S. 1711—1960 with Amendment No. 1. Self-closing Taps.
79. I.S. 1726—1967. Cast Iron Manhole Covers and Frames intended for use in Drainage work.
80. I.S. 1728—1960. Sheet Metal Rain-water Pipes up to 100 mm. Nominal size Gutters, Fittings and Accessories.
81. I.S. 1742—1960. Code of Practice for Building Drainage.
82. I.S. 1761—1960 with Amendment No. 1. Transparent Sheet Glass for Glazing and Framing purposes.
83. I.S. 1795—1961. Pillar Taps.
84. I.S. 1834—1961. Hot Applied Sealing Compounds for Joints in concrete.
85. I.S. 1838—1961. Preformed Fillers for Expansion Joint in concrete non-extruding and Resilient Type (Bitumen Impregnated Fibre).
86. I.S. 1946—1961. Code of Practice for Use of Fixing Devices in Walls, Ceilings and Floors of Solid Construction.
87. I.S. 2064—1962 with Amendment No. 1. Code of Practice for Selection. Installation and Maintenance of Sanitary Appliances.
88. I.S. 2104—1962. Watermeter boxes.
89. I.S. 2114—1962 with Amendment No. 1. Code of Practice for Laying *in situ*. Terrazo floor finish.
90. I.S. 2118—1962. Code of Practice for construction of Jack-Arch Type of Built-up Floor and Roof.
91. I.S. 2185—1967. Load Bearing Hollow Concrete Blocks.
92. I.S. 2191—1966—Part I and II with Amendment No. 1. Wooden Flush Door Shutters (Cellular and Hollow Core Type).
93. I.S. 2202—1966—Part I and II with Amendment No. 1. Wooden Flush Door Shutters (Solid Core Type).

अनुक्रमणिका
Table of Contents



## Bd. A. EXCAVATION

*List of items of excavation*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. A. 1. | Excavation for foundation in earth, soils of all types, sand, gravel and soft murum, including removing the excavated material up to a distance of 50 metres (about 164′) beyond the building area and all lift, stacking and spreading as directed dewatering, shoring and strutting, preparing the bed for the foundation and necessary back filling complete ... ... ... | 243 |
| Bd. A. 2. | Excavation for foundation in hard murum including removing the excavated material up to a distance of 50 metres (about 164′) beyond the building area and all lift, stacking and spreading as directed, dewatering, shoring and strutting, preparing the bed for the foundation and necessary back filling complete... | 243 |
| Bd. A. 3. | Excavation for foundation in hard murum and boulders including removing the excavated materials up to a distance of 50 metres (about 164′) beyond the building area and all lift, stacking and spreading as directed dewatering, shoring and strutting preparing the bed for the foundation and necessary back filling complete ... ... ... ... ... | 243 |
| Bd. A. 4. | Excavation for foundation in soft rock and old cement and lime masonry foundations including removing the excavated materials up to a distance of 50 metres (about 164′) beyond the building area and all lift, stacking as directed, dewatering, shoring and strutting, preparing the bed for the foundation and necessary back filling complete ... ... ... ... ... | 243 |
| Bd. A. 5. | Excavation for foundation in hard rock by blasting including trimming and levelling the bed by chiselling where necessary and removing the excavated material and stacking it in measurable heaps within a distance of 50 metres (about 164′) from the building area and all lift, dewatering and back filling complete ... ... ... ... ... | 243 |
| Bd. A. 6. | Excavation for foundation in hard rock by chiselling, wedging, line drilling, etc., including trimming and levelling the bed, removing the excavated material up to a distance of 50 metres (164′) beyond the building area, all lift, stacking as directed dewatering and back filling complete ... ... ... | 244 |
| Bd. A. 7. | Excavation for foundation in laterite rock soft or hard, including trimming and levelling the bed for the foundation, removing the excavated material up to a distance of 50 metres (about 164′) beyond the building area, all lift, stacking as directed, dewatering and back filling complete ... ... ... | 244 |
| Bd. A. 8. | Removing the excavated materials of all categories including loading, conveying, unloading, spreading or stacking beyond the initial free lead of 50 m. (about 164′)—<br>(i) for every 50 m. (about 164′) up to 1 km. (about 3,280′).<br>(ii) for every 100 m. (about 328′) beyond 1 km. (about 3,280′) | 244 |
| Bd. A. 9. | Dewatering the excavated trenches and pools of water in the building area by using pumps and other devices including disposing of the water to safe distance as directed ... ... | 245 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. A. 10. | Filling in plinth and floors with approved excavated materials in 15 cm. to 20 cm. (about 6″ to 8″) layers including watering and compaction complete ... ... ... ... | 246 |
| Bd. A. 11. | Filling in plinth and floors with contractor's soil, sand or murum in 15 cm. to 20 cm. (about 6″ to 8″) layers including watering and compaction complete ... ... ... | 247 |
| Bd. A. 12. | Providing dry trap/granite/quartzite/gneiss rubble stone soling ..... cm. (about .....″) thick including hand packing and compacting complete ... ... ... ... ... | 248 |
| Bd. A. 13. | Providing and filling in the foundation with sand of approved quality including compaction ... ... ... ... | 248 |




अनुक्रमणिका
Table of Contents

## Bd. A. EXCAVATION

Bd. A. 1. *Excavation for foundation in earth, soils of all types, sand, gravel and soft murum including removing the excavated material up to a distance of 50 metres (about 164') beyond the building area and all lift, stacking and spreading as directed, dewatering, shoring and strutting, preparing the bed for the foundation and necessary back filling complete.*

Bd. A. 1.1. *General.*—The excavation refers to excavation for foundation, wet or dry, in earth, soils of all types, sand, gravel, soft murum and similar other soft or loose material and shall comply with specification No. B. 1 subject to the following:

Bd. A. 1.2. *Disposal of excavated materials.*—Unsuitable materials obtained from clearing the site and excavation shall be disposed off within a lead of 50 metres (about 164') beyond the building area as directed by the Engineer. Useful materials obtained from clearing site and excavation, shall be stacked within a lead of 50 metres (about 164') beyond the building area as directed by the Engineer. Materials suitable for back-filling or other use shall be stacked at a convenient place within a lead of 50 metres (about 164') beyond the structure for reuse.

Surplus materials shall be used for levelling the ground around the structure within a lead of 50 metres (about 164') if directed by the Engineer. If the surplus materials are required to be conveyed and used or stacked beyond 50 metres (about 164') conveyance will be paid for under a separate item.

Bd. A. 1.3. *Item to include.*—As detailed in specification No. B. 1.13.

The lead for stacking or disposal of materials obtained from excavation or clearing site shall be limited to 50 metres (about 164') beyond the building on all sides.

Bd. A. 1.4. *Mode of measurement and payment.*—To be as per specification No. B. 1.14.

Bd. A. 2. *Excavation for foundation in hard murum including removing the excavated material up to a distance of 50 metres (about 164') beyond the building area and all lift, stacking and spreading as directed, dewatering, shoring and strutting, preparing the bed for the foundation and necessary back filling complete.*

The excavation refers to excavation for foundation wet or dry, and shall comply with specification No. Bd. A. 1 in all respects except that the excavation shall be in hard murum instead of in earth soils, of all types, sand, gravel and soft murum.

Bd. A. 3. *Excavation for foundation in hard murum and boulders including removing the excavated material up to a distance of 50 metres (about 164') beyond the building area and all lift, stacking and spreading as directed, dewatering, shoring and strutting preparing the bed for the foundation and necessary back filling complete.*

The excavation refers to excavation for foundation, wet or dry, in hard murum and boulders and shall comply with the specification No. Bd. A. 1 in all respects except that the excavation shall be in hard murum and boulders instead of in earth, soils, sand, gravel and soft murum.

Bd. A. 4. *Excavation for foundation in soft rock and old cement or lime masonry foundations including removing the excavated material up to a distance of 50 metres (about 164') beyond the building area and all lift, stocking as directed dewatering, shoring and strutting preparing the bed for the foundation and necessary back-filling complete.*

The excavation refers to excavation for foundation, wet or dry and shall comply with specification No. Bd. A. 1 in all respects except that the excavation shall be in soft rock and/or old cement or lime masonry, instead of in earth and soils of all types, sand, gravel and soft murum.

Bd. A. 5. *Excavation for foundation in hard rock by blasting including trimming and levelling the bed by chiselling where necessary and removing the excavated material and stacking it in measurable heaps within a distance of 50 metres (about 164') from the building area and all lift, dewatering and back filling complete.*

Bd. A. 5. 1. *General.*—The excavation refers to excavation for foundations wet or dry, in hard rock by blasting and shall comply with specification No. B. 1 subject to the following:—

Bd. A. 5. 2. *Excavation.*—The excavation shall be done by blasting to the dimensions shown in the drawings or as directed by the Engineer. Blasting shall be done strictly according to specification No. B 2.

During excavation in rock by blasting, the lowest 15 cm. (about 6") of the strata shall be blasted with light charges so as not to shatter or weaken the underlying rock on which the foundation will be actually laid. If excavation in rock is done to larger widths and lengths than those

shown on the drawings or as directed by the Engineer, no payment shall be made for such over break. If excavation is done to depths greater than those shown on the drawings or directed by the Engineer, excess depth shall be made up with foundation grade concrete or masonry as directed by the Engineer at the contractor's cost.

Bd. A. 5. 3. *Disposal of excavated materials.*—According to specification No. B.1.7 subject to the following.

Unsuitable materials obtained from clearing site and excavation shall be disposed off within a lead of 50 metres (about 164') as directed by the Engineer. Useful materials obtained from clearing site and excavation shall be stacked within a lead of 50 metres (about 164') beyond the building area as directed by the Engineer. Materials suitable for back-filling shall be stacked at convenient places within a lead of 50 metres (about 164') from the structure for reuse. Useful stones from rock excavation shall be stacked neatly within a lead of 50 metres (about 164') and will be allowed to be used by the contractor on payment at rates laid down in the contract or if not so laid down, at scheduled rates of the Division or at a mutually agreed rates if there are no such rates in the schedule.

If surplus materials are required to be conveyed beycnd 50 metres (about 164') conveyance will be paid for under a separate item.

Bd. A. 5. 4. *Item to include.*—As detailed in specification No. B. 1. 13. The lead for stacking or disposal of materials obtained from excavation or clearing site shall be limited to 50 metres (about 164') beyond the building on all sides.

Bd. A. 5. 5. *Mode of measurement and payment.*—To be as per specification No. B. 1. 14.

When section or trench measurement are absolutely not possible, stack measurements with 40 per cent. void deductions shall be given provided reasonable care has been taken to avoid deliberate hollows in the stacks.

Bd. A. 6. *Excavation for foundation in hard rock by chiselling, wedging, line drilling etc. including trimming and levelling the bed, removing the excavated material up to a distance of 50 metres (164') beyond the building area, all lift, stacking as directed, dewatering and back filling complete.*

Bd. A. 6. 1. *General.*—When local conditions preclude the use of blasting, excavation shall be done by chiselling, wedging or line drilling as specified or ordered by the Engineer. The excavation refers to excavation generally for foundation, wet or dry, in hard rock by chiselling, wedging or line drilling and shall comply with the specifications given for item No. Bd. A. 5 except that the excavation in rock shall be done without blasting.

Bd. A. 7. *Excavation for foundation in laterite rock soft or hard, including trimming and levelling the bed for the foundation, removing the excavated material up to a distance of 50 metres (about 164') beyond the building area, all lift, stacking as directed, dewatering and back-filling complete.*

The excavation refers to excavation for foundation, wet or dry, in laterite rock and shall comply with specification No. Bd. A. 5 in all respects except that the excavation shall be in laterite instead of in hard rock. Excavation may be done by blasting and/or dhokans. Blasting shall be done according to specification No. B. 2. Trimming and levelling the bed for laying the foundation shall be done with "dhokans."

Bd. A. 8. *Removing the excavated materials of all categories including loading, conveying, unloading, spreading or stacking beyond the initial free lead of 50 m. (about 164'),—*

*(i) for every 50 m. (about 164') up to 1 km. (about 3280').*

*(ii) for every 100 m. (about 328') beyond 1 km. (about 3280').*

Bd. A. 8. 1. *General.*—This item covers the payment for the additional lead over the initial free lead of 50 metres (about 164') involved in conveyance of surplus excavated materials required to be stacked or spread at a distance of more than 50 metres (about 164') from the building on all sides.

Any excavated material which is not allowed by the Engineer to be used in the construction of building and which cannot be retained on the site within a lead of 50 metres (about 164') shall be disposed off in the locality fixed by the Engineer.

The material shall be conveyed by means of suitable devices, and/or conveyance without any loss or damage to the materials being removed. The conveyance shall not also cause obstruction or nuisance to the traffic by scattering the material being conveyed, on to the road or cause any sort of nuisance to the nearby property owners. The material conveyed to the place of disposal shall either be stacked or spread as directed.

The opening up and maintenance of the route, payment of any royalties, compensation to land owners and for damages if any, etc., during the process of conveyance etc. shall be the entire responsibility of the contractor.

Bd. A. 8.2. *Item to include.*—All labour, material and equipment required for loading, conveyance, unloading, stacking or spreading the material for satisfactory completion of the item and the incidental charges, royalties, compensations or damages required to be paid.

Bd. A. 8.3. *Mode of measurement and payment.*—The distance of conveyance shall be measured from the centre of gravity of the bulk of excavation, to the centre of gravity of the finished stacks or spreading or disposal. This distance shall be the shortest practicable route between the above mentioned two centres of gravity as decided by the Engineer although the actual route taken by the contractor to lead out the material may be longer. The shortest practicable route is the shortest route which can be used by the contractor or which the Department could have used itself, whichever is shorter. The extra lead is obtained by deducting the initial free lead of 50 metres (about 164') from the above. This lead shall be measured one way only. The lead shall be measured in units of 50 m. up to 1 km. and beyond 1 km. in units of 100 m. In the former case, 25 m. or above shall be taken as one unit and less than 25 m. shall be ignored. In the latter case 50 m. or above shall be taken as one unit and less than 50 m. shall be ignored. All lifts are included in the rate.

The contract rate shall be for one cubic metre (35.3 Cft.) of materials conveyed to the place of disposal, the lead being measured in units of 50 m. up to 1 km. and 100 m. beyond 1 km. and stacked or spread as directed.

The quantity conveyed and disposed off shall be measured by stack measurements at the site of disposal. Deduction for stack measurements shall be 40 per cent. for rock and 20 per cent. for other materials. This quantity shall be roughly cross checked with the quantity excavated deducting therefrom the quantity used or disposed off at the work site within a lead of 50 metres (about 164') applying a factor of bulkage (as directed by the Engineer).

The dimensions of stacks shall be measured correct to two places of decimals of a metre and the quantity calculated correct up to two places of decimals of a cubic metre.

Bd. A. 9. *Dewatering the excavated trenches and pools of water in the building area by using pumps and other devices, including disposing of the water to a safe distance as directed.*

Bd. A. 9. 1. *General.*—The foundation trenches and the building area shall be kept dry by resort to pumps alone or in combination with manual labour for bailing out water with buckets, etc., or any other satisfactory method. The method to be adopted shall be entirely left to the choice of the contractor provided dewatering is carried out satisfactorily and the scheduled programme is adhered to. The contractor shall plan, construct, and maintain satisfactorily, safe and pool-proof arrangement for dewatering to ensure safe foundation excavation and laying concrete and masonry in the dry. The contractor shall supply details of his proposals for approval of the Engineer, but such an approval will in no way release the contractor from his responsibility for the adequacy of dewatering arrangements and for the quality and safety of the work, for all of which the contractor shall be solely responsible.

Cement grouting or other approved methods may be used by the contractor at his discretion and cost to prevent or reduce seepage and to protect the area to be excavated if the soil is porous.

Bd. A. 9. 2. *Pumping.*—Adequate pumping arrangements shall be made for dewatering foundation trenches and pools in the building area and keeping the same dry while excavation, masonry or concreting is in progress and till the mortar has sufficiently set. Pumps of required capacity and in required number and stages shall be provided to ensure the above. Pumping from the foundation trenches shall be done directly from the foundation trenches or from a sump outside the excavation as necessary, in such a manner as to preclude the possibility of movement of water through any fresh concrete or masonry and washing away parts of concrete or mortar. No pumping shall be allowed during laying of concrete or masonry and for a period of at least 24 hours thereafter unless it is done from a suitable sump separated from concrete or masonry by effective means. Pumping shall be done in such a way as not to cause damage to the work or adjoining property by blows, subsidence etc.

The contractor shall make his own arrangements for necessary labour, materials, pumps, engines, well-points, and other suitable machinery and devices required for successful execution of the item of dewatering.

Bd. A. 9. 3. *Desilting.*—If any foundation pits are filled due to accumulation of surface flow during the progress of the work or during rainy season or due to any other cause, all pumping required for dewatering the pits and removing silt shall be done without extra cost.

Bd. A. 9. 4. *Shoring etc.*—Staging, shoring, strutting, sumps and other protective works required for facility of dewatering shall be designed and put up by the contractor to ensure full safety to the work, workmen, machinery and property and shall be removed after they have served their purpose in a manner and to the extent directed by the Engineer. The contractor shall be responsible for all damage and injury caused by the execution of this item.

Bd. A. 9. 5. *Disposal of water.*—The water from the excavated trenches shall be disposed off in the manner detailed below or in any other manner in conformity with the rules in force and approved by the Engineer.

(*a*) in case the area is developed, such as cities which are sewered or have open gutters along the roadside, the water may be led to the nearest such gutters or sewers.

(*b*) in undeveloped areas such as countryside where sewering system has not been introduced, the water may be led to the nearest natural drain or pond through properly laid and dug channels or through pipes.

Disposal of water shall in no case cause inconvenience or nuisance to the inhabitants of the area or cause damage to the property and structures nearby. Municipal or Government regulations shall be complied with and rights or private land owners shall be respected regarding disposal of water.

Contractor shall be responsible for all the incidental formalities like obtaining permission of local bodies (municipalities etc.) and persons concerned, to lead the water to the open or underground sewers, or digging up channels, making use of lands and properties owned by private persons or public bodies etc. and for the damage caused in the operation of this item.

Bd. A. 9. 6. *Item to include.*—(1) All labour, materials, pumps, plants, equipment, staging, shoring, strutting, sumps and other arrangements necessary for dewatering during excavation and construction of other items requiring dewatering.

(2) Dewatering foundation trenches and construction area and keeping the same dry while excavation, masonry and concrete work is in progress and till the work comes above the water level and till the Engineer considers that the mortar or concrete has sufficiently set.

(3) Dewatering till all the items requiring dewatering are fully completed. This shall also include time required for passing foundation and taking measurements of all the items requiring dewatering.

(4) Removing stuff of any sort which might find access into the trenches by blowing, slip or due to any other cause whatsoever from the sides or bottom of the foundation or excavation or from elsewhere during, after or due to dewatering.

(5) Leading water, to the nearest natural or artificial drains, with all the incidental requirements like taking permission from Municipal and other authorities and private persons concerned, paying compensations etc.

(6) Compensation for the injury to the workmen and the public or damage to the nearby properties during and on account of dewatering and disposal of water.

Bd. A. 9. 7. *Mode of measurement and payment.*—The payment of dewatering shall be lump sum for the complete job or for each sub item as provided in the tender by any suitable and acceptable method of dewatering approved by the Engineer and for the depths shown on the drawings and up to 1.5 metres (about 5′) below such depths. The rate for dewatering shall not be reduced if the depth of dewatering is less than that shown in the drawings provided dewatering is actually required and done.

Dewatering required for excavation and other items below this additional depth of 1.5 m. will be paid for as extra work, rate for which will be fixed according to the general terms of the contract.

Full payment for the job of dewatering shall be made after completing the structural work up to the ground level or to such level beyond which no dewatering will be required either for construction or for allowing the mortar or concrete to set.

Bd. A. 10. *Filling in plinth and floors with approved excavated materials in 15 cm. to 20 cm. (about 6″ to 8″) layers including watering and compaction complete.*

Bd. A. 10. 1. *General.*—After the structural foundation and plinth construction is over, the space between ground level and such level below top of plinth depending upon the depth of flooring, its bedding and foundation is to be filled in with approved excavated materials watered and compacted.

Bd. A. 10. 2. *Construction.*—Firstly the ground over which the filling has to be done shall be cleared of all grass, loose stones, rubbish of all kinds, as well as trees, bushes, roots of trees, etc. If there is water in the area, it shall be pumped or bailed out.

The sides of concrete and masonry in the foundation trenches shall be filled with suitable excavated materials and compacted as provided in the specification No. B. 1.

Next, the approved excavated material, which has been stacked as per the direction of the Engineer shall be cleaned of all rubbish, large size stones etc., clods broken down to a size of 50 mm. or less, conveyed to the site of filling and laid in 15 cm. to 20 cm. (about 6″ to 8″) layers. Each layer shall be watered and compacted with heavy rammers before the upper layer is laid till the required level is reached so as to form a thoroughly compact base.

The process of filling in plinth, watering and compaction shall be carried out by the contractor in such a way as not to endanger the foundation columns, plinth walls etc. already built up.

Under no circumstances, black cotton soil shall be used for filling in plinth.

Bd. A. 10. 3. *Item to include.*—(1) Cleaning the ground on which filling has to be done and dewatering if necessary.

(2) Cleaning the useful excavated material of rubbish, breaking clods etc.

(3) Conveying the useful excavated material and filling in plinth in layers, watering and compacting.

(4) All labour, equipment and other arrangements necessary for the satisfactory completion of the item.

Bd. A. 10. 4. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre (35.3 Cft.) of compacted plinth filling with excavated materials. The dimensions shall be measured correct upto 2 places of decimals of a metre and the quantity calculated correct up to 2 places of decimals of a cubic metre. The measurements shall be net for the compacted filling and no deduction for shrinkage or voids shall be made. The levels of the areas to be filled up shall be taken in advance before filling is started to obtain the height of the compacted filling.

Bd. A. 11. *Filling in plinth and floors with contractor's soil, sand or murum in 15 cm. to 20 cm. (about 6″ to 8″) layers including watering and compaction complete.*

Bd. A. 11. 1. *General.*—After the structural foundation and plinth construction is over, and the sides of foundation trenches are filled up to ground level, the space between ground level and such level below top of plinth depending upon the depth of flooring, its bedding and foundation shall be filled in with contractor's soil, sand or murum, as specified and approved by the Engineer, watered and compacted.

Bd. A. 11. 2. *Construction.*—The filling shall be carried out as specified in Bd. A. 10 except that the material to be filled in shall be brought from outside instead of from the foundation excavation.

The material to be brought from outside shall be either sand, murum, good yellow soil, or a mixture of these and shall be got approved by the Engineer. In no case, black cotton or similar greatly expansive and shrinkable soil shall be used.

The approved material to be filled in shall be clean and free from all rubbish and perishable material and all clods shall be broken to a size of 50 mm. or less. The stacking of material should be done in such a way as not to interfere with any general traffic, or any constructional process or activities. The Contractor shall be responsible for any mishap or inconvenience of any kind due to his default in this respect.

Bd. A. 11. 3. *Item to include.*—(1) Clearing the ground on which filling is to be done and dewatering if necessary.

(2) Providing the approved material for filling in.

(3) Cleaning up the material to be used for filling if necessary.

(4) Filing Contractor's soil in plinth in layers, watering and compaction.

(5) All labour, equipment and other arrangements necessary for satisfactory completion of the item.

अनुक्रमणिका
Table of Contents



**Bd.A.13.2.**

Bd. A. 11. 4. *Mode of measurement and payment.*—According to specification No. Bd. A. 10. 4 except that the material for filling shall be brought by the Contractor from outside instead of from the excavation for the same building. The rate shall include the cost of material.

Bd. A. 12. *Providing dry trap/granite/quartzite/gneiss rubble stone soling—cm. (about—") thick including hand packing and compacting complete.*

Bd. A. 12.1. *General.*—After the structural foundation, plinth construction and filling are completed, rubble soling of specified thickness shall be laid over the consolidated plinth filling, hand packed and compacted.

Bd. A. 12. 2. *Materials.*—The stones to be used shall be broken rubble with fairly regular shape and free from weathered, soft and decayed portion. The rubble shall be of sound stones of the type mentioned in the item and selected for their larger size. Stones shall be of the full height of the soling and the length and width shall not generally exceed 2 times the height. The stones to be used for wedging in the joints between larger stones, shall be chips of the largest size possible to fit in the interstices. All sound and suitable rubble obtained from the foundation excavation and approved by the Engineer shall be necessarily made use of first unless otherwise directed.

Bd. A. 12. 3. *Construction.*—The bed on which rubble filling is to be laid shall be cleared of all loose materials, levelled, watered and compacted and got approved by the Engineer before laying rubble soling.

Rubble soling shall be laid to the specified thickness closely packed by hand and firmly set with their broadest face downwards. The interestices between adjacent stones shall be wedged in with stones of the proper size and shape and well driven in with wooden mallets to ensure a tightly packed layer. Such wedging shall closely follow the placing of the larger stones. After hand packing and wedging, compaction of the soling shall be done thoroughly with lograminers. Adequate care shall be taken by the Contractor while laying and compacting the rubble soling to see that the masonry or any part of the structure is not damaged. Rubble soling shall be started only after the masonry is fully cured.

Bd. A. 12. 4. *Item to include.*—(1) Supplying broken rubble of approved quality and size at site.

(2) All labour, material, tools and equipment for handling, laying, hand packing and compacting the rubble.

(3) Any other incidental charges to complete the work as per sanctioned plan.

Bd. A. 12.5. *Mode of measurement and payment.*—Rubble soling shall be measured in cubic metres limiting the dimensions to those shown on the drawings or as directed by the Engineer. The dimensions shall be measured correct to two places of decimals of a metre and quantities worked out correct to two places of decimals of a cubic metre. No deduction shall be made for voids.

The contract rate shall be for a unit of one cubic metre (35.3 Cft.).

If suitable rubble is available from excavated material it shall be issued to the Contractor at the rate mentioned in Schedule A and if there is no such provision the rate to be charged shall be that occurring in the Divisional Schedule or at a mutually agreed rate if there is no such rate in the Divisional Schedule. Such rubble shall be used first and only additional rubble required shall be brought from outside, unless otherwise directed.

Bd. A. 13. *Providing and filling in the foundation with sand of approved quality including compaction.*

Bd. A. 13. 1. *General.*—The item refers to filling sand in the foundations and plinth, watering and compacting.

Bd. A. 13. 2. *Materials.*—Sand required for filling in the foundations and the interstices in the soling shall be clean and coarse and generally obtained from the local sources unless found to be unsuitable. It shall not contain more than 10 per cent. of clay.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



*Construction.*—The sand approved by the Engineer shall be filled in the foundation trenches as shown on the drawings. The sand shall be filled, watered and compacted in layers 15 cm. to 20 cm. (about 6″ to 8″) thick. Sand shall be compacted to the maximum density with heavy hand rammers. The total compacted thickness of the sand layer shall be as shown on the drawings or ordered by the Engineer.

The sand required to fill the interstices in the soling shall be dry and spread uniformly over the soling and brushed and watered to fill the interstices fully.

Bd. A. 13. 3. *Item to include.*—Providing, filling, watering and compacting the sand in layers in the foundation trenches as detailed above and all incidental labour, material and tools etc. required for the satisfactory completion of the work. When sand is required to fill the interstices of the soling, the item shall include providing and spreading sand and watering.

Bd. A. 13. 4. *Mode of measurement and payment.*—Contract rate for sand used for filling in foundations shall be for a unit of one cubic metre. The dimensions shall be measured correct up to two places of decimals of a metre and the quantity worked out correct up to two places of decimals of a cubic metre.

When sand is required for filling in the interstices of the soling, the quantity collected shall be measured before starting, spreading and the balance remaining shall be measured after the spreading is completed. The difference shall be paid as the quantity spread.

No deduction shall be made for voids in both cases.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. B. PILE FOUNDATIONS

*List of items of Pile foundations*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. B. 1. | Taking out trial bores of — mm. (about —") diameter including locating and fixing the bore position, drilling below ground level, preserving the core and other samples neatly in wooden boxes or bottles, as directed, in (*a*) rock, (*b*) strata other than rock ... | 253 |
| Bd. B. 2. | Providing 1 : $1\frac{1}{2}$ : 3 R.C.C. cast in situ piles each of a load capacity of — tonnes placed through steel shells driven to the required depth through all strata to give the specified set including provision of reinforcement of mild steel bars and cast iron pile shoe, as per detailed design and drawings approved by the Engineer, compaction of concrete and withdrawal of shell complete ... ... | 254 |
| Bd. B. 3. | Providing 1 : $1\frac{1}{2}$ : 3 R.C.C. cast in situ raker piles each of a load capacity of — tonnes, placed through steel shells driven to required depth through all strata to give specified set including provision of reinforcement of mild steel bars and cast iron pile shoe as per detailed design and drawings approved by the Engineer, compaction of concrete and withdrawal of shell complete ... ... | 254 |
| Bd. B. 4. | Providing 1 : $1\frac{1}{2}$ : 3 R.C.C. cast in situ bored piles each of a load capacity of — tonnes, placed through steel shells sunk to the required deapth through all strata except rock including provision of reinforcement of mild steel bars as per detailed drawings and design approved by the Engineer, compaction of concrete and withdrawal of shell complete for a load capacity of —tonnes ... ... | 254 |
| Bd. B. 5. | Providing 1 : $1\frac{1}{2}$ : 3 R.C.C. cast in situ bored raker piles each of a load capacity of — tonnes, placed through steel shells sunk to the required depth, through all strata except rock including provision of reinforcement of mild steel bars as per detailed design and drawings approved by the Engineer, compaction of concrete and withdrawal of shell complete ... ... ... ... | 254 |
| Bd. B. 6. | Providing and driving precast R.C.C. piles each of a load capacity of — tonnes as per detailed design and drawings approved by the Engineer to the required depth through all strata to give the specified set including mild steel reinforcement and the cast iron pile shoe | 255 |
| Bd. B. 7. | Providing and driving precast R.C.C. raker piles each of a load capacity of —tonnes as per detailed design and drawings approved by the Engineer to the required depth through all strata to give the specified set including mild steel reinforcement and the cast iron pile shoe ... ... ... ... | 255 |
| Bd. B. 8. | Carrying out load test of pile or pile group in driven position, including construction of test cap, use of accessories and instruments, and dismantling the test cap ... ... ... ... | 255 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. B. PILE FOUNDATIONS

Bd. B.1. Taking out trial bores of——mm. (about ″) diameter including location and fixing the bore position, drilling below ground level, preserving the core and other samples neatly in wooden bottles as directed, in (*a*) rock, (*b*) strata other than rock.

Bd. B. 1. 1. *General.*—Trial bores of the specified diameter shall be taken to the required depth to ascertain the strata below ground level. The diameter of the bore refers to the diameter of the core.

Bd. B. 1. 2. *Boring rig and operations.*—Diamond or Calyx type drilling rig may be used unless a particular type of rig is specified in the special provisions. It shall be such as to give core samples of the required diameter. Only experienced operators who know proper handling of the machine, careful collection of the cores and samples, and correct logging of the operation shall be employed.

The contractor shall transport the necessary boring equipment to the site. The equipment shall be set up at predetermined location as directed by the Engineer. Boring shall be done from the ground level to the required depth as directed by the Engnieer in the strata met with.

Any water that will be met with shall be removed when necessary either by pumping or by any other method. Suitable casing pipes shall be provided wherever necessary to prevent collapse of the sides. A permanent mark shall be left to indicate the site of the bore.

The equipment shall be dismantled and removed from the site after boring is completed.

Bd. B. 1.3. *Classification.*—Boulders, soft rock, hard rock and laterite as indicated by the cores recovered shall be considered as rock and all other strata including non-recovery portions shall be considered as strata other than rock for the purpose of this item.

Bd. B. 1. 4. *Core samples and log.*—Cores and undisturbed samples shall be obtained in as long lengths as possible and shall be preserved in seasoned hard wood boxes and disturbed samples in closed glass jars of suitable dimensions. They shall be handed over to the Engineer. These shall always be accompanied by a bore log showing,—

(*a*) Number and location of bore,

(*b*) Date started,

(*c*) Date completed,

(*d*) Total Depth,

(*e*) Depths at which various strata were encountered and description of the same including boring time required to penetrate each kind of stratum.

(*f*) Depth at which water was met with and

(*g*) Standing level of water.

Bd. B. 1. 5. *Compensation.*—Any damage to property or injury to persons due to movement of machinery and taking out trial bores shall be made good or compensated by the contractor. Consent, compensation, rent, etc., for use of private land shall be arranged for by the contractor at his own cost.

Bd. B. 1. 6. *Item to include.*—(1) Carrying out core drilling and supplying cores and samples in seasoned hard wood boxes and glass jars with the log data.

(2) Compensation for any damage or injury during execution of the item and rent etc. for use of private land.

(3) Dewatering, if any and necessary during the operation.

(4) Conveying, erecting the boring machinery, dismantling and removing the same after completion.

(5) All labour, materials and use of equipment necessary to carry out the item satisfactorily.

Bd. B. 1. 7. *Mode of measurement and payment.*—The contract rate shall be per running metre of the trial bore taken (1) in rock and (2) strata other than rock separately. Unless otherwise specified in the special provisions, the diameter of the trial bore shall be as mentioned in the wording of the item or the special provisions. The depth shall be measured correct up to two places of decimals of a metre.

Part rate will be paid for the boring in the upper strata, full rate for the same being paid when the boring is carried to the required depth and strata and all the cores and samples with their logs are supplied to the Department.

अनुक्रमणिका
Table of Contents

Bd.B.5.2.

The rate shall be the same up to 3 m. beyond the specified depth. For greater depths than the above additional depth, the rate may be fixed according to the general conditions of contract.

Bd. B.2. *Providing 1 : 1½ : 3 R.C.C. cast in situ piles each of a load capacity of—tonnes, placed through steel shells driven to the required depth through all strata to give the specified set including provision of reinforcement of mild steel bars and cast iron pile shoe, as per detailed design and drawings approved by the Engineer, compaction of concrete and withdrawal of shell complete.*

Bd. B. 2. 1. *General.*—The item shall comply with specification No. B 14 in all respects subject to the following:—

The number of bars, their diameter, spacing, arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall all be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded.

Bd. B. 3. *Providing 1:1½:3 R.C.C. cast in situ, raker piles each of a load capacity—tonnes placed through steel shells driven to required depth, through all strata to give the specified set, including provision of reinforcement of mild steel bars and cast iron pile shoe as per detailed design and drawings approved by the Engineer, compaction of concrete and withdrawal of shell complete.*

Bd. B. 3. *General.*—The item shall comply with specification No. B 14 in all respects subject to the following:

Bd. B. 3. 2. *Reinforcement.*—The number of bars, their diameter, spacing and arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded.

Bd. B. 3. 3. *Driving.*—Pile driving leads provided shall be such as could permit driving the shell to the required batter shown on the drawings or as ordered by the Engineer.

The shell with the shoe of the raker piles shall be driven in the correct position with steam or compressed air hammer to the required depth or set and the required batter as shown on the drawing or as directed by the Engineer. Utmost care shall be taken to see that the shell is driven true and to the required batter. The deviation from the batter (as shown on drawing or as directed by the Engineer) shall in no case be more than 2 per cent of the effective finished length of the pile. If the deviation exceeds this limit appropriate remedial construction as may be approved by the Engineer shall be provided by the contractor at his own expense.

Bd. B. 4. *Providing 1 : 1½ : 3 R.C.C. cast in situ bored piles each of load capacity of —tonnes, placed through steel shells sunk to the required depth through all strata except rock including provision of reinforcement of mild steel bars as per detailed drawings and design approved by the Engineer, compaction of concrete and withdrawal of shell complete.*

Bd. B. 4. 1. *General.*—The item shall comply with specification No. B. 15 in all respects subject to the following:

The number of bars, their diameter, spacing and arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall all be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded.

Bd. B. 5. *Providing 1 : 1½ : 3 R.C.C. cast in situ bored raker each of a load capacity of —tonnes, placed through steel shells sunk to the required depth through all strata except rock including provision of reinforcement of mild steel bars as per detailed design and drawing approved by the Engineer, compaction of concrete and withdrawal of shell complete.*

Bd. B. 5. 1. *General.*—The item shall comply with specification No. B. 15 in all respects subject to the following:

Bd. B. 5. 2. *Reinforcement.*—The number of bars, their diamater, specing and arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall all be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded.

अनुक्रमणिका
Table of Contents



Bd. B. 5. 3. *Driving.*—The pile driver leads provided shall be such as could permit driving the shell to the required batter shown on the drawings or as directed by the Engineer. The shell shall be sunk to the required depth in suitable, strata or to rock and to the required batter. Deviation from the required batter shall in no case exceed 2 per cent. of the length of the pile. If the deviation exceeds this limit appropriate remedial construction as may be approved by the Engineer shall be provided by the contractor at his own expense.

*Bd. B. 6. Providing and driving precast R.C.C. piles each of a load capacity of— tonnes as per detailed design and drawings approved by the Engineer to the required depth through all strata to give the specified set including mild steel reinforcement and cast iron pile shoe.*

Bd. 6. 1. *General.*—The item shall comply with specification No. B. 16 in all respects subject to the following:—

The number of bars, their diameter, spacing and arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall all be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded. The laps for the main bars shall be 45 d.

*Bd. B. 7. Providing and driving precast R.C.C. raker piles of a load capacity of — tonnes as per detailed design and drawings approved by the Engineer to the required depth through all strata to give the specified set including mild steel reinforcement and the cast iron pile shoe.*

Bd. B. 7. 1. *General.*—The item shall comply with specification No. B. 16 in all respects subject to the following.

Bd. B. 7. 2. *Reinforcement.*—The number of bars, their diameter, spacing and arrangement in the cage, stirrups helical or otherwise, clear cover for the bars shall all be as shown in the drawings approved by the Engineer. The reinforcement bars and stirrups shall be tied with mild steel binding wire or tack welded.

Bd. B. 7. 3. *Driving.*—Pile driver leads provided shall be such as could permit driving piles at the required batter shown on the drawings or as ordered by the Engineer.

The raker pile shall be driven in correct position with steam or compressed air hammer to the required depth or set and to the required batter as shown in the drawings or as directed by the Engineer. Utmost care shall be taken to see that the pile is driven true and to the required batter. The deviation from the batter (as shown on the drawing or as directed by the Engineer) shall in no case more than 2 per cent. of the length of the pile. If the deviation exceeds this limit appropriate remedial construction as may be approved by the Engineer, shall be provided by the contractor at his own expense.

Bd. B.8.—*Carrying out load test of pile or pile group in driven position including construction of test cap, use of accessories and instruments, and dismantling the test cap.*

Bd. B. 8. 1. *General.*—The item shall comply with specification No. B. 17 in all respects.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. C. STRUCTURAL STEEL WORK.

*List of items of Structural Steel Work.*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. C. 1. | Providing structural steel work for foundations in grillage as per detailed designs and drawings or as directed including fabricating, hoisting, erecting, fixing in position R.S.J.s, channels, angles and other rolled sections, mild steel plates and making riveted/bolted/welded connections complete ... | 259 |
| Bd. C. 2. | Providing structural steel work in rolled sections like joists, channels, angles, tees, etc., as per detailed designs and drawings including fixing in position without connecting plates, braces etc. and painting complete ... ... ... ... | 259 |
| Bd. C. 3. | Providing structural steel work in rolled sections, fixed with connecting plates or angle cleats as in main and cross beams, hip and jack rafters, purlins connecting to truss members and the like, as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete ... ... ... ... ... | 259 |
| Bd. C. 4. | Providing structural steel work in riveted compound girders as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted connections and painting complete ... ... | 260 |
| Bd. C. 5. | Providing structural steel work in plate girders with or without stiffeners, mild steel plate bearings, as per detailed designs and drawings and as directed including cutting, fabricating, hoisting, fixing in position, anchors if necessary, making riveted/bolted/welded connections and painting complete ... | 260 |
| Bd. C. 6. | Providing structural steel work in single stanchions composed of RSJ, channel, etc., with caps, bases, mild steel plates, angle brackets, cleats, gusset plates, anchor bolts, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/welded/bolted connections and painting complete ... ... | 261 |
| Bd. C. 7. | Providing structural steel work in compound stanchions with caps, bases, fish plates, cleats, mild steel plates, angle brackets, gusset plates, anchor bolts, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/welded/bolted connections and painting complete ... ... ... | 262 |
| Bd. C. 8. | Providing structural steel work in trusses, other similar trussed purlins and members with all bracings, gusset plates, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connection and painting complete ... | 262 |
| Bd. C. 9. | Providing structural steel work in lattice girder with all bracings, gusset plates, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete ... ... ... ... | 262 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. C. 10. | Providing structural steel work in staircase of clear width of — m. with plain/chequered treads, risers, strings, hand rail, blusters, mild steel landing, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete ... ... ... ... | 262 |
| Bd. C. 11. | Providing structural steel work in spiral staircase of — m. diameter with plain/chequered treads, risers, central galvanised iron/mild steel pipe shaft, hand rail, balusters, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/welded/bolted connections, 1 : 3 : 6 cement concrete foundation and step and painting complete ... ... | 263 |
| Bd. C. 12. | Providing structural steel work in vertical framing (like staging for water tanks, etc.,) with/without mild steel ladder as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/welded/bolted connections and painting complete ... ... | 264 |




अनुक्रमणिका
Table of Contents

## Bd. C. STRUCTURAL STEEL WORK

Bd. C. 1. *Providing structural steel work for foundations in grillage as per detailed designs and drawings or as directed including fabricating, hoisting, erecting, fixing in position R.S.J.s, channels, angles and other rolled sections, mild steel plates and making riveted/bolted/welded connections complete.*

Bd. C. 1. 1. *General.*—The item refers to the structural steel work for grillage in foundations. The item shall be carried out in conformity with specification No. B. 19 for structural steel work subject to the following:—

Bd. C. 1. 2. *Preparation of foundation.*—The foundation concrete and the bed which shall be paid for separately shall be passed by the Engineer before the structural steel work is started.

Bd. C. 1.3. *Fabrication.*—Fabrication shall be done accurately as shown in the drawings and according to I.S. 800—1962. The beams shall be held in position with spacers as shown in the drawings. The first lengths of stanchions shall be bolted to the top tier of grillage or connected as shown in the drawings and the entire footing shall be filled solidly with cement concrete according to specification No. B. 6.7 with the required cover for steel shown in the drawings. Steel members shall be cleaned of rust and other coating likely to prevent proper bond with concrete.

The bases of beams shall be grouted with cement mortar of the specified mix to get full bearing. Grout mix shall be such as will develop the required strength.

Grouting of grillages shall not be allowed until the first lengths of stanchions have been plumbed.

The structural steel work embedded in concrete for grillage foundation shall not be painted.

The word 'Inspector' wherever occurring in I.S. 800—1962 shall carry the same meaning as the word 'Engineer'.

Bd. C. 1. 4. *Item to include.*—As per B. 19.8.

The grillage steel work shall include all the R. S. sections and plates used for the grillage and their spacers and bolts and nuts used in the grillage, fully erected and completed. Steel work in column, embedded in the grillage concrete shall be measured in the item of column. The encasing concrete shall not be included in the item.

Bd. C. 1. 5. *Mode of measurement and payment.*—As per B. 19.9.

The dimensions and shapes of steel sections shall be limited to those shown on the working drawings or as directed by the Engineer for measurement and payment. Weight of steel shall be calculated on the basis of actual shape of plates and sections provided without taking into account wastage or cut off.

Bd. C. 2. *Providing structural steel work in rolled sections like joists, channels, angles, tees, etc., as per detailed designs and drawings, including fixing in position without connecting plates, braces, etc., and painting complete.*

Bd. C. 2. 1. *General.*—The item refers to structural steel work in rolled sections (not built up) used and fixed without any connecting plates for column, beam, purlin, etc. The item shall comply with specifications for Item No. Bd. C. 5, with the difference that in this item no steel work for connections will be necessary. When the required lengths are less than the standard lengths of rolling, the sections shall be in length and splicing shall not be adopted unless specially permitted by the Engineer in writing.

Bd. C. 3. *Providing structural steel work in rolled sections fixed with connecting plates or angle cleats as in main and cross beams, hip and jack rafters, purlins connecting to truss members and the like, as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete.*

Bd. C. 3. 1. *General.*—The item refers to structural steel work in rolled steel sections fixed with connecting plates or angle cleats in main or cross beams, hip and jack rafters, purlins connected to truss members and the like. The item shall comply with specifications given for Bd. C. 5. except that instead of plate girder or gantry girder the steel work shall be in simple R.S.J.s or such other rolled sections. When the required lengths are less than the standard lengths of rolling, the section shall be in entire length and splicing shall not be adopted unless specially permitted by the Engineer in writing.

**Bd.C.5.4.**

Bd. C. 4. *Providing structural steel work in riveted compound girdars as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted connections and painting complete.*

Bd. C. 4. 1. *General.*—The item refers to structural steel work in compound girders. The specifications shall be the same as for item No. Bd. C. 5, except that the girder shall be compound girder built up from rolled steel sections and plates.

Bd. C. 5. *Providing structural steel work in plate girders with or without stiffeners, mild steel plate bearings, as per detailed designs and drawings and as directed including cutting, fabricating, hoisting, fixing in position, anchors if necessary, making riveted/bolted/welded connections and painting complete.*

Bd. C. 5. 1. *General.*—The item refers to the structural steel work in plate girders or gantry girders. The item shall comply with specification No. B 19 for structural steel work, subject to the following:—

Bd. C. 5. 2. *Shop Drawings.*—The contractor shall prepare shop drawings for the structural steel work to be executed as per I.S. 800—1962, clause 4.1.2. The contractor shall submit the drawings in triplicate to the Engineer for his approval. Fabrication shall not be taken in hand until the relevant shop drawings have been approved by the Engineer. However, the contractor shall remain wholly responsible for their correct conformation to designs and for accurate fabrication to meet the requirements of design and the Indian Standard. One copy of the drawings duly approved shall be returned to contractor and the work shall be carried out according to the approved designs.

Bd. C. 5. 3. *Laying out.*—As far as possible and whenever necessary, structural parts, their joints, gusset plates, etc., shall be drawn out to full size on a level platform, a steel tape being used for measurement. All angles shall be carefully set out and checked. Gusset plates shall be marked with as few sides as possible and of such shapes that there is a minimum waste in cutting a large number.

Steel metal templates of adequate dimensions shall be made to correspond to each member and plate and rivet holes marked in them accurately by drilled holes. The templates shall be laid on the steel, the holes marked through and the ends marked off for cutting. Temperature effect shall be taken into account where necessary.

Bd. C. 5. 4. *Fabrication.*—When the lengths of sections required for fabrication are not more than the standard lengths of rolling, no splicing of shorter lengths shall be allowed to fabricate the required lengths unless provided in the designs or specially permitted in writing by the Engineer.

All the rolled sections forming part of the structural member shall be cut square or accurately to shapes shown in the detailed drawings, dead correct to lengths and shapes, a steel tape being used for measurement. The cut ends shall be dressed true with hammer, chisel and file.

All straightening, levelling and shaping to form shall be done by pressure and not by hammering unless the latter is specially permitted by the Engineer. Bending, cutting, forging, etc., shall be done in such a manner as not to impair the strength of the metal.

Where tight fits are required or stress is to be transmitted through end contacts, the ends or surfaces shall be faced and brought to a true contact bearing.

The expansion bearing surfaces where provided, shall be machined true and smooth and in the direction of the movement.

Rivet holes are to be made at the correct positions and to exact sizes as required in I.S. 800—1962. Before riveting is commenced, every alternate hole in the joint shall be tightly bolted up so as to draw the parts firmly together and ensure tight riveting. Care must be taken that all component parts fit correctly and according to distinguishing joint marks. The rivets shall be heated all over equally to just below the welding heat, quickly inserted in the hole and smartly finished off. Rivets must look neat and finished with heads full and of equal size. They shall be central on shank and grip the assembled members firmly. In cutting out rivets, great care must be taken not to injure the adjacent metal. If possible, they shall be drilled out. In the alternative, the heads will be cut off and rivets drifted out. For testing rivets, a hammer weighing about 225 gm. (about 8 oz.) shall be used. Both heads of the rivet (specially the machined head) should be tapped. Slack rivets will give a hollow sound and a jar. All rivet heads must be painted with red lead oilpaint soon after they are cool.

When bolts are used, the end of the bolt over the tightened nut shall be hammered down to prevent nuts working loose if necessary.

Bd. C. 5. 5. *Erection.*—The plate or gantry girder fabricated as per design shall be hoisted with suitable lifting tackle supported at suitable predetermined points to avoid damage and placed in the required position. Immediately after placing in position, the girder should be secured against over turning if necessary. Precaution should be taken to prevent collapse. Temporary supports should be given to relieve erection stresses. The girder shall be fixed in position with connecting plates, angle cleats, brackets and riveted, bolted or welded connections as shown on drawings or as directed by the Engineer. Rivets shall be countersunk if so shown on the drawings or ordered by the Engineer. At the sliding bearings erection shall be done to provide full bearing and easy movement of the machined surfaces. All machined surfaces shall be greased with an approved type of grease. The girders shall be given the camber as directed by the Engineer. The steel work shall be painted with one coat of red lead and two coats of oil-paint of approved shade and conforming to the relevant Indian Standard. The painting shall be done as specified in B. 21. a.

The word 'Inspector' in I.S. 800—1962 shall carry the same meaning as the word 'Engineer'.

Bd. C. 5. 6. *Item to include.*—As per B. 19. 8.

The steel work in the item shall also include the gusset plates, anglecleats, anchor bolts if necessary, mild steel bearing plates and other connecting devices, etc. fully erected, greased and painted. The steel in the end connections with steel column however shall be paid in the separate item of steel work in column and not included in the steel work of plate girder.

Bd. C. 5. 7. *Mode of measurement and payment.*—As per B. 19.9.

Weight of steel plates and rolled sections shall be calculated separately on the basis of actual shape provided. Waste and cut off will not be measured. The dimensions and shapes of steel sections shall be limited to those shown on the working drawings or as ordered by the Engineer for measurement and payment.

Bd. C. 6. *Providing structural steel work in single stanchions composed of RSJ, channel, etc., with caps, bases, mild steel plates, angle brackets, cleats, gusset plates, anchor bolts etc. as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting fixing in position, making riveted/bolted/welded connections and painting complete.*

Bd. C. 6. 1. *General.*—The item refers to the structural steel work in single steel stanchions like RSJ or channel. The item shall comply with specification No. B. 19 for structural steel work, subject to the following.

Bd. C. 6. 2. *Shop drawings.*—The contractor shall prepare shop drawings for the structural steel work to be executed as per I.S. 800—1962, clause 4.1.2. The contractor shall submit the drawings in triplicate to the Engineer for his approval. Fabrication shall not be taken in hand until the relevant shop drawings have been approved by the Engineer. However, the contractor shall remain wholly responsible for their correct conformation to designs and for accurate fabrication to meet the requirements of design and the Indian Standard. One copy of the drawings duly approved shall be returned to the contractor and the work shall be carried out according to the approved designs.

Bd. C. 6. 3. *Fabrication.*—Fabrication shall be done as per I.S. 800—1962.

The single stanchions shall be fixed in the required positions accurately vertical or with the inclination as shown in the drawing or as directed. Any connections like angle brackets, cleats, gusset plates, anchor bolts, mild steel bearing plates with beams, foundations or other members shall be as shown in the drawings or as directed by the Engineer. The steel work shall be painted with one coat of red lead oil paint and two coats of oil paint of a shade approved by the Engineer and conforming to the relevant Indian Standard. Oilpainting shall comply with B. 21. a.

The word 'Inspector' whenever occurring in I.S. 800—1962 shall carry the same meaning as the word 'Engineer'.

Bd. C. 6. 4. *Item to include.*—As per B. 19.8.

The item shall include basides the rolled sections of stanchion, all structural steel in connections like brackets, anchor bolts, angle cleats, mild steel plates, gusset plates, rivets, bolts etc. fully erected and painted.

Bd. C. 6. 5. *Mode of measurement and payment.*—As per Bd. C. 5. 7.

**Bd.C.10.**

Bd. C. 7. *Providing structural steel work in compound stanchions with caps, bases, fish plates, cleats, mild steel plates, angle brackets, gusset plates, anchor bolts etc. as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position making riveted/welded/bolted connections and painting complete.*

Bd. C. 7. 1. *General.*—The item refers to structural steel work in compound stanchions consisting of more than one rolled section, laced or battened together. The item shall comply with specification for item No. Bd. C. 6 except that the stanchions shall be built up with two or more rolled sections as shown in the drawings.

Bd. C. 8. Providing structural steel work in trusses, other similar trussed purlins and fabricated items with all bracings, gusset plates etc. as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete.

Bd. C. 8. 1. *General.*—The item refers to structural steel work in trusses or trussed purlins or other members in roofs etc. with all members, connecting plates, all bracings, bearing plates, gusset plates and anchor bolts if necessary. The item shall comply with specifications No. B. 19 for structural steel work, and Bd. C. 5 subject to the following.

Bd. C. 8. 2. *Shop Drawings.*—The contractor shall prepare shop drawings for the structural steel work to be executed as per I.S. 800—1962, clause 4.1.2. The contractor shall submit the drawings in triplicate to the Engineer for his approval. Fabrication shall not be taken in hand until relevant shop drawings have been approved by the Engineer. However, the contractor shall be wholly responsible for their correct conformation to designs and accurate fabrication to meet the requirement of design and the Indian Standard. One copy of the drawings duly approved shall be returned to the contractor and the work shall be carried out according to the approved designs.

Bd. C. 8. 3. *Fabrication.*—Fabrication shall be done as per I.S. 800—1962.

The trusses shall be hoisted and fixed in required positions as shown on the drawings or as directed by the Engineer.

The connections between the truss and the supports shall be as shown on the drawings. Rivets shall be countersunk if so shown on the drawings or ordered by the Engineer. If sliding bearings are provided in the drawings or special provisions, the sliding faces of the plates shall be machined smooth in the direction of movement and the surfaces of the bearing plates shall be true over the whole bearing area. All the machined bearing surfaces in contact shall be fully greased with an approved grease.

The steel work shall be painted with one coat of red lead oil-paint and two coats of oil paints of a shade approved by the Engineer. The oil-paint shall comply with the relevant Indian Standard and oil-painting shall be done as specified in B. 21. (*a*).

The word 'Inspector' in I.S. 800—1962 shall carry the same meaning as the word "Engineer".

Bd. C. 8. 4. *Item to include.*—As per B. 19.8.

The item shall include all the structural steel in trusses, trussed, purlins, bracings, connecting brackets, mild steel plates, gusset plates, angle cleats, anchor bolts, etc., fully erected and painted. But all steel connections rigidly attached to the steel column however, shall be included in the item of structural steel for column and not in this item.

Bd. C. 8. 5. *Mode of measurement and payment.*—As per Bd. C. 5. 7.

Bd. C. 9. *Providing structural steel work in lattice girder with all bracings, gusset plates, etc., as per detailed designs and drawings or as directed including cutting fabricating hoisting, erecting fixing in position, making riveted/bolted/welded connections and painting complete.*

Bd. C. 9. 1. *General.*—The item refers to structural steel work in lattice girder with all bracings and connections. The item shall comply with specifications for item No. Bd. C. 8.

Bd. C. 10. *Providing structural steel work in staircase of clear width of — m. with plain/chequered treads, risers, strings, hand rail, balusters, mild steel landing, etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/bolted/welded connections and painting complete.*

Bd. C. 10. 1. *General.*—The item refers to structural steel work required for staircase including treads, risers, strings, hand rail, balusters and mild steel landings. The clear width of the staircase shall be as mentioned in the item. The item shall conform to specification No. B. 19 for structural steel work, subject to the following:—

Bd. C. 10. 2. *Shop Drawings.*—The contractor shall prepare shop drawings for the structural steel work to be executed, as per I.S. 800—1962, clause 4.1.2. The contractor shall submit the drawings in triplicate to the Engineer for his approval. Fabrication shall not be taken in hand until the relevant shop drawings have been approved by the Engineer. However, the contractor shall be wholly responsible for their correct conformation to designs and accurate fabrication to meet the requirements of design and the Indian Standard. One copy of the drawings duly approved shall be returned to the contractor and the work shall be carried out according to the approved designs.

Bd. C. 10. 3. *Fabrication.*—Fabrication shall be done as per I.S. 800—1962. The staircase shall be fabricated, hoisted and fixed in the required position shown in the drawings or as directed by the Engineer. The treads shall be of plain or chequered mild steel plates as mentioned in the item. The steel work shall be painted with one coat of red lead oil-paint and two coats of oil-paint of approved shade and complying with relevant Indian Standard. Oil-painting shall be done as per specifications B. 21. a on all parts of staircase except the top of the treads and landings. The foundation concrete or masonry shall be paid for separately. But anchor bolts will be included in this item.

The word 'Inspector' in I.S. 800—1962 shall carry the same meaning as the word 'Engineer'.

Bd. C. 10. 4. *Item to include.*—As per B. 19. 8.

The item shall include providing structural steel work in anchor bolts, treads, risers, strings, landings, balusters, hand rails, etc., fully erected and painted.

Bd. C. 10. 5. *Mode of measurement and payment.*—The contract rate shall be per step. Number of steps shall be counted. A step shall comprise of a riser and tread and shall include all relevant connecting members.

The measurement shall be by number of steps. Each quarter landing shall be regarded as one step and half landing as two steps.

Bd. C.11. *Providing structural steel work in spiral staircase of——m. diameter with plain/chequered treads, risers, central galvanised iron/mild steel pipe shaft, hand rail, balusters etc., as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted/welded/bolted connections, 1:3:6 cement concrete foundation and step and painting complete.*

Bd. C. 11. 1. *General.*—The item refers to structural steel work in mild steel spiral staircase. The item shall comply with specification No. B. 19 for structural steel work and the specifications given for item No. Bd. U. 4. for spiral staircase subject to the following.

Bd. C. 11. 2. *Material.*—The material to be used for spiral staircase shall be mild steel instead of cast iron. All the components of staircase shall be mild steel only. The treads, risers, shaft collars, etc., shall be prepared to the size, shape and designs shown in the drawings and as directed by the Engineer. 1:3:6 cement concrete shall comply with specification No. 8. 6.

Bd. C. 11. 3. *Item to include.*—The rate for the item shall include—

(1) Providing the structural steel sections, plates, galvanised iron or mild steel pipe shaft as mentioned in the item and different components of the staircase as per detailed design and drawings or as directed.

(2) Assembling, hoisting and fixing the staircase as specified above, including making riveted or bolted or welded connections as mentioned in the item.

(3) Providing 1:3:6 concrete foundations for the shaft and the first concrete step as shown in the drawings or as directed by the Engineer.

(4) All labour, material and use of equipment for satisfactory completion of the item.

Bd. C. 11. 4. *Mode of measurement and payment.*—This shall be as per Bd. U. 4. 5.

Bd. C. 12. *Providing structural steel work in vertical framing (like staging for water tanks, etc.) with/without mild steel ladder as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting, fixing in position, making riveted welded/bolted connections and painting complete.*

Bd. C. 12. 1. *General.*—The item refers to structural steel work in vertical framing with rolled steel sections, gusset plates, all connectings including riveting, bolting and/or welding and anchor bolts, if necessary, as per detailed drawings or as directed. The item shall comply with specifications for item Bd. C. 8. The base shall be securely anchored in cement concrete foundations with anchor bolts, etc., as shown in drawings. Anchor bolts shall be included and paid under this item.

Cement concrete foundation shall be paid as a separate item.

---

अनुक्रमणिका
Table of Contents



## Bd. D. LIME CONCRETE.

*List of Items of Lime Concrete*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. D. 1. | Providing and laying *in situ* 1:2:4 lime concrete, with trap/granite/quartzite/gneiss broken stone aggregates for foundation including dewatering, form-work, compaction and curing complete ... ... ... | 267 |
| Bd. D. 2. | Providing and laying *in situ* 1:2:4 lime concrete, with trap/granite/quartzite/gneiss broken stone aggregates for bedding under paving including form-work, compaction and curing complete ... ... ... | 267 |
| Bd. D. 3. | Providing and laying brick bat coba of average — mm. (about ″) thickness in 1:2:4 lime concrete over the specified areas including rubbing and cleaning the base, form-work if necessary, giving proper slope, compacting and curing ... ... ... | 267 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. D. LIME CONCRETE

Bd. D. 1. *Providing and laying in situ 1:2:4 lime concrete with trap/granite/quartzite/ gneiss broken stone aggregates for foundation including dewatering, form-work, compacting and curing complete.*

Bd. D. 1. 1. *General.*—The item shall comply with specification No. B. 4 for lime concrete with the following specifications in addition :

Bd. D. 1. 2. *Dewatering.*—If the area on which the concrete is to be placed is under water, it shall be kept dry by pumping or other methods and kept so throughout the period of laying concrete and till the concrete sets. Dewatering shall be done as specified in Bd. A. 9.

Bd. D. 1. 3. *Proportion.*—The proportion of the ingredients for the mortar shall be 1 of lime:2 of sand and that for the concrete shall be 1 of lime mortar:2 of coarse aggregates all by volumes and measured in measuring boxes. When water is met with, lime of good hydraulic properties shall be used.

Bd. D. 1. 4. *Coarse aggregates.*—Maximum size of coarse aggegates shall not exeeced 50 mm. (about 2") or $\frac{1}{4}$ the thickness of concrete whichever is smaller unless other maximum size is specified in the special provisions

Bd. D. 1. 5. *Item to include.*—According to specification No. B. 4. 8.

The rate shall include cost of dewatering also unless separate provision is made in the tender for it.

Bd D. 2. *Providing and laying situ 1 : 2 : 4 lime concrete with trap/granite/quartzite/ gneiss broken stone aggregates for bedding under paving including form-work, compaction and curing complete.*

The specification for the item shall be the same as for the item No. Bd. D. 1 except that the maximum size of coarse aggregate shall not exceed 40 mm. (about $1\frac{1}{2}$") or $\frac{1}{4}$ the thickness of the concrete whichever is smaller. The lime concrete shall be laid to the required thickness, levels and slopes.

Bd. D. 3. *Providing and laying brick bat coba of average ..... mm. (about .....") thickness in 1:2:4 lime concrete, over the specified areas including rubbing and cleaning the base, form-work if necessary, giving proper slope, compacting and curing.*

Bd. D. 3. 1. *General.*—The item shall comply with specification B. 4 for lime concrete except that aggregate shall be broken from bricks instead of stones and the specifications shall be subject to the following:

Bd. D. 3. 2. *Coarse aggregates.*—Coarse aggregates shall be broken from sound and thoroughly well burnt bricks. These shall be strong, durable, clean, and free from impurities. They shall not contain any soft or powdery material. These aggregates shall be approved by the Engineer before use. The aggregates shall be 40 mm. to 20 mm. in size and smaller particles shall be excluded.

Bd. D. 3. 3. *Proportion.*—The proportion for lime mortar shall be 1 of lime:2 of sand and the proportion for concrete shall be 1 of lime mortar:2 parts of brick aggregates all by volume and measured in measuring boxes.

Bd. D. 3. 4. *Laying.*—The bed shall be thoroughly rubbed and cleaned and slightly wetted. The concrete shall be laid in an even layer and to the required thickness and slope and compaction started immediately, observing the following precautions:—

(*a*) The concrete shall not be rammed with heavy iron rammers as the brick aggregates are likely to be crushed into powder thereby.

(*b*) The ramming shall be done lightly and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

(*c*) While ramming, fresh fracture may take place which may cause absorption of water from the mortar. Additional water may be sprinkled with ramming in such cases as considered necessary by the Engineer.

The average finished thickness of coba shall be as specified in the item and the top of the concrete shall be given the slope or made level as shown on the drawing or as directed by the Engineer.

---

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. E. PLAIN CEMENT CONCRETE

*List of items of Plain Cement Concrete*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. E. 1. | Providing and laying in situ, cement concrete 1 : 2 : 4/1 : 3 : 6/1 : 4:8/1:5:10 of trap/granite/quartzite/gneiss metal for foundation and bedding including dewatering, form-work, compacting and curing ... ... ... ... | 271 |
| Bd. E. 2. | Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for steps including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing ... ... ... ... | 272 |
| Bd. E. 3. | Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for coping to plinth or parapet, moulded or chamfered as per drawings or as directed including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing ... ... ... | 272 |
| Bd. E. 4. | Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for bed blocks, foundation blocks and such other items including dewatering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing ... ... ... ... ... | 273 |
| Bd. E. 5. | Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for plain or moulded sills, cornices, jambs, block in course, or architraves of required size and shape, including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing | 274 |
| Bd. E. 6. | Providing and casting in situ cement concrete 1 : 3 : 6 of trap/granite/quartzite/gneiss metal for plain or moulded sills, cornices, jambs, block in course, or architraves of required size and shape including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided, and curing complete ... | 275 |
| Bd. E. 7. | Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/ gneiss metal for arches including skew backs as per detailed drawings or as directed, in superstructure including centering, form-work, compacting, finishing with a minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing ... ... ... ... ... | 275 |


अनुक्रमणिका
Table of Contents

## Bd. E. PLAIN CEMENT CONCRETE

Bd. E. 1. *Providing and laying in situ, cement concrete 1 : 2 : 4/1 : 3 : 6/1 : 4 : 8/1 : 5 : 10 of trap/granite/quartzite/gneiss metal for foundation and bedding including dewatering, form-work, compacting and curing.*

Bd. E. 1.1. *General.*—The specifications pertain to cement concrete of the specified proportion to be laid in raft or strip foundations, thin bedding below RCC foundations, bedding below paved floors, etc.

Bd. E. 1. 2. *Preparation of foundation for laying concrete* :

*Passing foundation.*—The foundation shall be passed in writing by the Engineer before concreting is started. The bed of the foundation trenches shall be cleaned of all loose material and well wetted, if dry, to prevent absorption of water from the green concrete.

In the case of paved floors, plinth filling and rubble soling, if any, shall have been well compacted and brought to the required levels, etc., and passed by the Engineer before concrete is allowed to be laid.

Bd. E. 1. 3. *Dewatering.*—If the area on which the concrete is to be placed is under water, water shall be removed as specified for Bd. A. 9. Unless dewartering is separately provided for in the tender, the rate for concrete shall include the cost of dewatering also.

Bd. E. 1. 4. *Concrete.*—The cement concrete shall comply with specification No. B. 6 for ordinary cement concrete subject to the following:—

Bd. E. 1. 4. 1. *Proportion.*—Proportion of materials shall be as mentioned in the wording of the item.

Bd. E. 1. 4. 2. *Coarse aggregates.*—Coarse aggregate shall be broken from sound stones of the type mentioned in the item and of approved quality. Maximum size of aggregate shall not exceed 50 mm. (about 2″) when the depth of concrete footing is 20 cm. (about 8″) or more and the aggregate shall be well graded between the maximum size and 5 mm. (about 3/16″). For less depths, the maximum size shall not exceed ¼th the depth.

Bd. E. 1. 4. 3. *Forms.*—If the trenches are dug exactly to the dimensions of footings, no forms will be necessary. But the sides and bottom of the trenches shall be moistened to the extent necessary to prevent absorption of water from the concrete.

If, however, footings are dug to dimensions larger than those shown on the drawings or as directed by the Engineer, forms complying with specification No. B. 6. 5(*b*) shall be used at the contractor's cost. The side forms shall be removed 48 hours after placement of concrete.

Bd. E. 1. 4. 4. *Mixing.*—The concrete shall be mixed in mechanical mixers if the total quantity to be mixed is more than 15 cubic metres (about 530 cft.). For quantity of concrete less than 15 cubic meters (about 530 cft.) for which machine mixing is not specified in the special provisions, hand mixing shall be permitted with additional cement, etc., as specified in B. 6. 4.

Bd. E. 1. 4. 5. *Compaction.*—When the quantity of concrete required for a work is less than 15 cubic metres (about 530 cft.) and the special provisions do not specify mechanical vibration, manual compaction with tamping rods, etc., shall be permitted. In the case of manual compaction the depth of each shall not exceed 20 cm. (about 8″). However, if the quantity of concrete exceeds 15 cubic metres (about 530 cft.) and if the depth of concrete member exceeds 30 cms. (about 12″), compaction shall be done with mechanical vibrators.

In the case of concrete bedding below paved floors, a screed board shall be used to get a level or sloped surface as required for the top of the bedding. All laitance and loose aggregate, if any, shall be removed and top surface left slightly rough to improve bond with the topping.

Bd. E. 1. 4. 6. *Tests.*—If the Engineer so directs, 6 cubes of 15 cm. size shall be cast on the first day and tested for compression at 7 and 28 days. Later on, if the Engineer so directs, 3 cubes shall be tested for every 60 cu. metres of the concrete cast. No tests need be made for 1 : 5 : 10 cement concrete. If there is doubt about the strength of 1 : 3 : 6 and 1 : 4 : 8 concrete, tests may be carried out and their cost borne by the Department if the results are satisfactory and by the contractor if they are unsatisfactory.

Bd. E. 1. 5. *Interval for starting masonry.*—Masonry will be allowed to be started on the concrete 48 hours after completion of concrete. Side filling between the concrete and sides of excavation shall also be allowed after 48 hours after placement of concrete. But the material adjoining the concrete shall be kept wet for the duration of the curing period.

**Bd.E.3.3.**

Paving or RCC work over concrete bedding shall be allowed after the concrete is sufficiently set.

Bd. E. 1. 6. *Item to include.*—In addition to the items mentioned in specification No. B. 6. 14, the item shall include dewatering, if necessary, if not provided as a separate item in the tender.

Bd. E. 1. 7. *Mode of measurement and payment.*—As in specification No. B. 6. 15.

Bd. E. 2. *Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for steps including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing.*

Bd. E. 2. 1. *General.*—The specifications pertain to the cement concrete required for the concrete steps. The concrete shall conform to the specification No. B. 6, for ordinary cement concrete subject to the following:—

Bd. E. 2. 2. *Proportion.*—Proportion of materials shall be 1 : 2 : 4.

Bd. E. 2. 3. *Coarse aggregates.*—Coarse aggregate shall be crushed from sound stones of the type mentioned in the item and of approved quality. The maximum size of coarse aggregate shall be 40 mm. (about 1½″) and aggregate shall be properly graded from 40 mm. to 5 mm. (about 1½″ to 3/16″) and shall conform to specification No. A. 7.

Bd. E. 2. 4. *Placing.*—The concrete steps shall be cast strictly according to the size and shape as shown on the drawings or as directed by the Engineer. When the top surface of the step is not to be covered with other materials like tiles or is not to be provided with chequered design it shall be levelled and floated to a smooth finish while laying the concrete only. The floating shall be done so as not to bring any excess of mortar to the surface of the concrete. If so directed, chequered design shall be impressed on the treads when it is green at no extra cost.

Bd. E. 2. 5. *Compaction.*—The Engineer may permit manual compaction.

Bd. E. 2. 6. *Finishing.*—Immediately after removing the forms and within a day thereof, the exposed formed surfaces shall be roughened and finished smooth with 1 : 3 cement plaster to give a uniform surface and cured, unless special finishing is specified under a separate item. The concreting shall be done in such a way that the thickness of finishing plaster should not normally exceed 6 mm. In case a special finishing like tiling, etc., is specified, the above noted cement plaster finishing shall not be done but the exposed surface, to receive special finish, shall be roughened. The special finishing will be paid under a separate item in the tender.

Any tiling work for the treads and risers shall be done only after 48 hours after the placing of concrete.

Bd. E. 2. 7. *Item to include.*—In addition to items mentioned in general specification No. B. 6. 14 the item shall include roughening the exposed faces to receive the special finish specified under a separate item or otherwise finishing with minimum thickness of 1 : 3 cement plaster to give an even and uniform surface to formed surfaces remaining exposed. Treads shall have chequered design if so directed.

Bd. E. 2. 8. *Mode of measurement and payment.*—According to specification No. B. 6. 15.

The dimensions shall be measured before finishing plaster is applied on exposed formed faces.

Bd. E. 3. *Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for coping to plinth or parapet, moulded or chamfered as per drawing or as directed including centering, form-work, compacting finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing.*

Bd. E. 3. 1. *General.*—The specifications pertain to the cement concrete required for concrete coping over the plinth or parapet in building work. The concrete shall generally conform to the specification No. B. 6 for ordinary cement concrete subject to the following:—

Bd. E. 3. 2. *Proportion.*—Proportion of materials shall be 1:2:4.

Bd. E. 3. 3. *Coarse aggregates.*—Coarse aggregates shall be crushed from sound stones of the type mentioned in the item and of approved quality. The maximum size of coarse aggregates shall be 40 mm. (about 1½″) or ¼th the depth of concrete member whichever is

smaller and aggregates shall be properly graded from the maximum sizes to 5 mm. (about 3/16") and conform to specification No. A. 7.

Bd. E. 3. 4. *Form-work.*—The forms shall be prepared to bring out the mouldings, chamfers, etc., correctly to conform to the drawings.

Bd. E. 3. 5. *Compaction.*—Concrete in this particular item of work shall be normally manually compacted but the Engineer may insist on mechanical compaction by immersion vibrators if the height of coping is 30 cm. (about 12") or more.

Bd. E. 3. 6. *Finishing.*—Coping shall be constructed strictly according to the lines, curves, slopes, size and shape including moulding, etc., as shown in the drawings and as directed by the Engineer. Immediately after removing the forms and within a day thereof, concrete surfaces shall be roughened, plastered with 1:3 cement mortar of minimum sufficient thickness to give a smooth and even surface and cured unless special finishing is specified under a separate item. Concreting shall be done in such a way that this thickness of finishing shall not normally exceed 6 mm. In case a special finishing is specified then the above finishing with cement plastering shall not be done for such areas. The surface shall be only roughened to receive the special finish and cured. The special finishing will be paid under a separate item.

Bd. E. 3. 7. *Item to include.*—As per specification No. Bd. E. 2. 7.

The item shall also include providing moulding, chamfers, etc., to the concrete and finishing the surfaces with 1:3 cement plaster of minimum thickness and producing the correct shape and size of mouldings, chamfers, etc.

Bd. E. 3. 8. *Mode of measurement and payment.*—The tendered rate is for one cubic metre, the length shall be measured along the centre line correct to two places of decimals of a metre and the sectional dimensions measured correct to half a centimetre. The quantity shall be calculated correct to three places of decimals of a cubic metre. The sectional dimensions shall be measured overall square to cover the mouldings and chamfers and limited to those shown on the drawings or as directed. The dimensions shall be measured before finishing plaster.

Changes ordered by the Engineer in dimensions shown in the drawings, etc., will not entitled the contractor to make extra claims.

Bd. E. 4. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/gneiss (when the tendered rate is per running metre, the length shall be measured as above) metal for bed blocks, foundation blocks and such other items including dewatering, form-work, compacting, finishing, the exposed faces with sufficient minimum thickness of 1:3 cement plaster to give a smooth and even surface or roughening the if special finish is to be provided and curing.*

Bd. E. 4.1. *General.*—The specifications pertain to cement concrete foundation blocks under stanchions, bed blocks under beams or trusses and such other items in the foundation and superstructure of a building. The cement concrete shall generally conform to the specification No. B. 6 for ordinary cement concrete subject to the following:—

Bd. E. 4. 2. *Proportion.*—Proportion of materials shall be 1:2:4.

Bd. E. 4. 3. *Coarse aggregates.*—Coarse aggregates shall comply with specification No. A. 7 and shall be crushed from sound stones of the type mentioned in the item and of approved quality. The maximum size of coarse aggregate shall be 40 mm. (about 1½") or ¼th the thickness of the concrete member whichever is smaller and aggregate shall be properly graded from the maximum size to 5 mm. (about 3/16") and shall conform to specification No. A. 7.

Bd. E. 4. 4. *Forms.*—Forms shall be provided to the exact shape required for the item and shall be supported and braced adequately to give rigid form-work. It shall generally comply with specification No. B. 6. 5(*b*).

Bd. E. 4. 5. *Laying.*—In case of bed blocks for steel trusses or steel stanchions, the necessary anchor bolts as shown on the drawings shall be embedded in the concrete at the correct positions and levels and the top surface shall give full bearing to the base plates. Or else, holes of appropriate size shall be left in the blocks at places specified on the drawings or as directed and anchor bolts shall be grouted in the holes later on. The anchor bolts however shall be paid under structural steel work. The top surface shall be formed to give full bearing to the base plates in this case also.

Bd. E. 4. 6. *Compaction.*—Concrete shall be normally compacted with vibrators when the depth of course is more than 30 cm. (about 12″) but the Engineer may allow manual compaction in layers of 15 to 20 cm. depth. But a dense concrete shall be ensured.

Bd. E. 4. 7. *Finishing.*—Bed block, etc., shall be constructed strictly according to the size, shape, chamfers, mouldings, etc., as shown in the drawings or as directed by the Engineer. Immediately after removing the forms and within a day thereof the concrete surfaces remaining exposed shall be roughened and plastered with 1:3 cement mortar of sufficient minimum thickness to give a smooth and even surface unless special finishing is specified under a separate item. The concreting shall be done in such a way that this thickness of finishing plaster should not normally exceed 6 mm. The finished concrete shall be cured adequately. In case a special finishing is specified, then the above plastering shall not be done but the exposed surfaces shall be only roughened to receive the special finish. The special finishing will be paid under a separate item.

Bd. E. 4. 8. *Item to include.*—As per specification No. Bd. E. 2. 7.

The item shall also include fixing and grouting of anchor bolts, bolts themselves being paid for separately under steel work. Dewatering shall also be included when necessary if not provided as a separate item in the tender.

Bd. E. 4. 9. *Mode of measurement and Payment.*—The contract rate shall be for one cubic metre. The length and breadth shall be measured correct up to two places of decimals of a metre and depth up to half a cm. and quantity worked out correct to three places of decimals of a cubic metre.

The sectional dimensions shall be measured overall square to cover chamfers, etc., limited to those shown on the drawings or as directed, but finishing plaster shall be excluded.

No deductions shall be made for anchor bolts.

Bd. E. 5. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for plain or moulded sills, cornices, jambs and block in course or architraves of required size and shape, including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1:3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing.*

Bd. E. 5. 1. *General.*—The specifications pertain to cement concrete required for plain or moulded sills, jambs and block in course in the superstructure of a building. Cement concrete shall generally comply with specification No. B. 6, subject to the following:—

Bd. E. 5. 2. *Proportion.*—Proportion of materials shall be 1:2:4:

Bd. E. 5. 3. *Coarse aggregates.*—Coarse aggregates shall comply with specification No. A. 7 and shall be broken from sound stones of the type mentioned in the item and of approved quality. For sections thicker than 15 cm. the maximum size of coarse aggregates shall not exceed 40 mm. (about 1½″) and in thinner sections the maximum size of coarse aggregates shall not exceed ¼th the minimum thickness of the concrete member. The coarse aggregate shall be graded from the maximum size down to 5 mm. (about 3/16″) and shall conform to specification No. A. 7. In the case of mouldings, the size of aggregate shall be adjusted to get the required shape for the moulding.

Bd. E. 5. 4. *Forms.*—Forms shall be provided to give the exact shape required for the concrete item and shall be supported and braced to give adequate rigidity. It shall generally comply with specification No. B. 6. 5(*b*).

Bd. E. 5. 5. *Compaction.*—Concrete shall be normally compacted with vibrators when the depth of course is more than 30 cm. (about 12″) but the Engineer may allow manual compaction.

Bd. E. 5. 6. *Finishing.*—Sills, jambs, block in coarse, shall be constructed strictly according to the size and shape including chamfers, mouldings, etc., as per drawings or as directed by the Engineer. Immediately after removing the forms and within a day thereof, the surface remaining exposed shall be roughened and plastered with 1:3 cement mortar of sufficient minimum thickness to give a smooth and even surface unless special finishing is specified under a separate item. The concreting shall be done in such a way that this thickness should not normally exceed 6 mm. The finished concrete shall be cured. If a special finishing is specified, then the above plastering shall not be done. The exposed surfaces shall be only roughened to receive the special finish. The special finishing shall be paid under a separate item.

Bd. E. 5. 7. *Item to include.*—As per specification No. Bd. E. 3. 7.

अनुक्रमणिका
Table of Contents



Bd. E. 5. 8. *Mode of measurement and payment.*—As per Bd. E. 3. 8.

Bd. E. 6. *Providing and casting in situ cement concrete 1 : 3 : 6 of trap/granite/quartzite/gneiss metal for plain or moulded sills, cornices, jambs, block in course or architraves of required size and shape including centering, form-work, compacting, finishing the exposed faces with sufficient minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing complete.*

The specifications shall be exactly the same as for item No. Bd. E. 5 except that the proportion of mix of concrete shall be 1 : 3 : 6.

Bd. E. 7. *Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for arches including skew backs as per detailed drawings or as directed, in superstructure including centering, form-work, compacting, finishing with a minimum thickness of 1 : 3 cement plaster to give a smooth and even surface or roughening them if special finish is to be provided and curing.*

Bd. E. 7. 1. *General.*—The specifications pertain to cement concrete arching in the superstructure of a building. The concrete shall conform to specification No. B. 6, for ordinary cement concrete subject to the following:—

Bd. E. 7. 2. *Proportion.*—Proportion of materials shall be 1 : 2 : 4.

Bd. E. 7. 3. *Coarse aggregates.*—The maximum size of coarse aggregates shall be 40 mm. (about $1\frac{1}{2}$″) and aggregate shall be properly graded from 40 mm. to 5 mm. (about $1\frac{1}{2}$″ to 3/16″) and shall conform to specification No. B. 7.

Bd. E. 7. 4. *Centering and form-work.*—According to specification No. B. 6. 5(*b*). The centering of arch shall be so designed and shall have such a profile that with the full weight of the concrete on it, the correct curvature, form and dimensions indicated in the drawings or as ordered by the Engineer are obtained for the concrete arch. If shown on drawings or directed by the Engineer, the fillets shall be fixed to the form-work to get false joints radially to show voussoir shapes, chamfers, etc., for the face ring. Timber or steel centering and form-work may be used. They may be in sections if necessary, for convenience of handling, putting up and removing. The design of centering and form-work shall be got approved by the Engineer but this will not relieve the contractor of his responsibility for the safety of the work and workmen. The centres shall be provided in such numbers and be used in such sets as in the opinion of the Engineer will ensure the progress of the work as scheduled. Forms shall be removed as laid down in specification No. B. 6. 5(*b*) 8.

Bd. E. 7. 5. *Laying concrete.*—The arch ring shall be concreted in one continuous operation. If it is not possible, the concrete must be stopped with a radial joint.

Bd. E. 7. 6. *Compaction.*—Concrete shall be normally compacted with a mechanical vibrator when the depth of the arch exceeds 30 cms. (about 12″); but the Engineer may allow manual compaction.

Bd. E. 7. 7. *Finishing.*—As per item No. Bd. E. 3. 6. False joints if provided shall be neatly finished with the finishing plaster.

Bd. E. 7. 8. *Item to include.*—As per Item No. Bd. E. 3. 7. and false joints, etc., as above.

Bd. E. 7. 9. *Mode of measurement and payment.*—According to specification No. B. 6. 15. The quantity shall be measured net before finishing plaster is applied and no deduction shall be made for chambers, skewbacks shall be included in the measurements for arches.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. F. REINFORCED CEMENT CONCRETE

*List of Items of Reinforced Cement Concrete*


| SERIAL NO. | ITEM. | PAGE |
|---|---|---|
| Bd. F. 1. | Providing and casting *in situ* cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for R.C.C. pile caps as per detailed design and drawing including dewatering, centering, form-work, compacting, finishing and curing (excluding mild steel reinforcement) ... ... ... | 281 |
| Bd. F. 2. | Providing and laying *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. work in foundations like raft, grillage, strip foundations and footings of R.C.C. columns and steel stanchions including dewatering, form-work, compaction, finishing and curing (excluding mild steel reinforcement and structural steel) ... ... | 281 |
| Bd. F. 3. | Providing and laying *in situ* cement concrete 1:1½:3 of trap/granite/quartzite/gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions including dewatering, form-work, compaction, finishing and curing (excluding mild steel reinforcement and structural steel) ... ... ... | 282 |
| Bd. F. 4. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. columns as per detailed drawings and designs, or as directed including dewatering, centering, form-work, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughning, if special finish is to be provided and curing (excluding mild steel reinforcement) ... | 282 |
| Bd. F. 5. | Providing and casting *in situ* cement concrete 1:1½:3 of trap/granite/quartzite/gneiss metal for R.C.C. columns as per detailed designs and drawings or as directed including dewatering, centering, form-work, compacting, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface, or roughening, if special finish is to be provided and curing (excluding mild steel reinforcement) ... | 284 |
| Bd. F. 6. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed, including dewatering, centering, form-work, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening, if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... | 284 |
| Bd. F. 7. | Providing and casting *in situ* cement concrete 1:1½:3/1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. portals as per detailed designs and drawings, or as directed including dewatering, centering, form-work, compacting, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening, if special finish is to be provided and curing (excluding mild steel reinforcement)... | 285 |
| Bd. F. 8. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. slabs and landings—— cm. (about —") thick as per detailed designs and drawings including centering, form-work, compacting, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... ... | 286 |
| | (*a*) up to and inclusive of 10 cm. (about 4") thick. | |
| | (b) Above 10 cm. (about 4") and up to and inclusive of 12.5 cm. (about 5") thick. | |
| | (*c*) Above 12.5 cm. (about 5") and up to and inclusive of 15 cm. (about 6") thick. | |
| | (*d*) Above 15 cm. (about 6") thick. | |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM. | PAGE |
|---|---|---|
| Bd. F. 9. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. chajja as per detailed design and drawings including centering, form-work, compacting, finishing the formed surfaces with cement mortar of 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... ... | 287 |
| Bd. F. 10. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. canopy, as per detailed designs and drawings including centering, form-work, compacting, all special finishes and ornamental work and curing (excluding mild steel reinforcement) ... ... ... | 288 |
| Bd. F. 11. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. pardi — mm. (about —") thick including centering, form-work, compacting, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided, and curing (excluding mild steel reinforcement) ... ... ... | 288 |
| Bd. F. 12. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. coping to plinth or parapet and sills of doors and windows, moulded as per detailed drawings or chamfered approved by the Engineer including centering, form-work, compacting, finishing the exposed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... ... | 288 |
| Bd. F. 13. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. waist slab, and steps as per detailed drawings for staircases including centering, form-work, compacting, finishing the formed surface with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if a special finish is to be provided and curing (excluding mild steel reinforcement)... | 288 |
| Bd F. 14. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. newel posts of staircases as per detailed drawings including centering, form-work, compacting, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... | 289 |
| Bd F. 15. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. arches with skew backs as per detailed drawings or as directed including centering, form-work, compacting, finishing. the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... | 289 |
| Bd F. 16. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. fins — mm. (about —") thick in positions as shown on the drawings or as directed by the Engineer including centering, form-work, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement) ... ... ... | 290 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM. | PAGE |
|---|---|---|
| Bd. F. 17. | Providing and fixing in position mild steel bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardis, copings, fins, arches. etc., as per detailed designs, drawings and schedules including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required completed. ... ... | 290 |
| Bd. F. 18. | Providing welded joints for mild steel reinforcement bars of—<br>(*a*) 25 mm. diameter and under.<br>(*b*) 28 mm. diameter<br>(*c*) 32 mm. diameter<br>(*d*) 36 mm. diameter<br>(*e*) 40 mm. diameter | 290 |
| Bd. F. 19. | Providing and fixing in position after hoisting, precast 1:2:4 R.C.C. fins of trap/granite/quartzite/gneiss metal—mm. (about —") thick in cement mortar 1:3, in the positions shown in the detailed drawings or as directed by the Engineer and curing complete (including mild steel reinforcement). ... ... ... | 290 |
| Bd. F. 20. | Providing and fixing in position after hoisting precast 1:2 cement mortar reinforcement jali — mm. (about — ") thick, of approved design, in cement mortar 1:3 and curing complete (including mild steel bar reinforcement) ... ... ... | 291 |
| Bd. F. 21. | Providing and fixing in position, after hoisting if necessary, precast reinforced balusters of 1:2 cement mortar as per detailed design, shown on the approved drawings in cement mortar 1:3 and curing including mild steel reinforcement). ... ... ... | 292 |
| Bd. F. 22. | Providing and casting *in situ* water proofed cement concrete 1:1½:3/1:1:2 of trap/granite/quartzite/gneiss metal for R.C.C. columns in required places as per detailed designs and drawings or as directed including centering, form-work, compacting, finishing the formed faces with water proofed cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement). ... ... ... | 292 |
| Bd. F. 23. | Providing and casting *in situ* water proofed cement concrete 1:1½:3/1:1:2 of trap/granite/quartzite/gneiss metal for R.C.C. beams in required places as per detailed designs and drawings, or as directed including centering, form-work, compacting, finishing the formed faces with water proofed cement mortar 1:3 of sufficient minimum thickness to be provided and curing (excluding mild steel reinforcement). ... ... ... | 292 |
| Bd. F. 24. | Providing and casting *in situ* water proofed cement concrete 1:1½:3/1:1:2 of trap/granite/quartzite/gneiss metal for R.C.C. slabs in required places, as per detailed designs and drawings or as directed including centering, form-work, compaction, finishing the formed surfaces with water proofed cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement). ... ... | 293 |
| Bd. F. 25. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for encasing steel stanchions as per detailed designs and drawings or as directed including centering, form-work, compacting, finishing the formed surfaces with cement plaster 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding structural steel work in stanchion, and mild steel reinforcement). ... ... ... | 293 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM. | PAGE |
|---|---|---|
| Bd. F. 26. | Providing and casting *in situ* cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for encasing steel beams as per detailed designs and drawings or as directed including centering form-work, compacting, finishing the formed surfaces with cement plaster 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding structural steel and mild steel reinforcement). | 293 |
| Bd. F. 27. | Carrying out load test of R.C.C. slab or slab and beam in position as ordered by the Engineer including all instruments, loads complete. ... ... | 294 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. F. REINFORCED CEMENT CONCRETE

Bd. F. 1. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/ gneiss metal for R.C.C. pile caps as per detailed design and drawings including dewatering, centering formwork, compacting, finishing and curing (excluding mild steel reinforcement).*

Bd. F. 1.1. *General.*—The item refers to cement concrete required for R.C.C. pile caps. The concrete shall conform to specification No. B. 6, for ordinary cement concrete subject to the following:—

Bd. F. 1. 2. *Materials*:

Bd. F. 1. 2. 1. *Proportion.*—The proportion of materials for the cement concrete shall be 1:2:4 as laid down in specification No. B. 6. 3.

Bd. F. 1. 2. 2. *Coarse aggregate.*—Coarse aggregates shall conform to specification No. A. 7 and shall be crushed from sound stones of the type mentioned in the item and obtained from approved quarries. The maximum size of the coarse aggregate shall be 40 mm. (about $1\frac{1}{2}$") or 6 mm. (about $\frac{1}{4}$") less than the clear cover, whichever is smaller unless other maximum size is specified in the special provisions.

Bd. F. 1. 3. *Construction.*

Bd. F. 1. 3. 1. *Mixing.*—The cement concrete shall be mixed mechanically. The water cement ratio shall be 0.60 or as directed by the Engineer. Slump shall be 5 cm. to 10 cm. If the mixer fails while concreting, hand-mixing may be allowed by the Engineer with additional cement and due precautions as detailed in specification No. B. 6.

Bd. F. 1. 3. 2. *Placing.*—The reinforcement bars of the shapes and sizes shown in the drawings for pile caps and full bars or lap lengths required for column footings and connecting beams shall be placed in the formwork with the required spacing and cover and shall be inspected, passed and measured by the Engineer before concreting is allowed to be started. Cap reinforcement shall be tied with the reinforcement coming out of the piles before concreting. The reinforcement in the pile cap hall be paid as a separate item. Formwork shall be correct to give the required dimensions and shape and of adequate strength to bear the loads safely. Placing shall be done in one continuous operation without break.

Bd. F. 1. 3. 3. *Compaction.*—The compaction shall be done by mechanical vibration and also by rods so that a dense concrete is obtained, all reinforcement is properly embedded, all corners are properly filled and honey-combing avoided.

Bd. F. 1. 4. *Dewatering.*—If the area on which concrete is to be placed is under water, dewatering shall be done as specified for item No. Bd. A. 9. Unless dewatering is separately provided for in the tender, the cost of dewatering shall be covered by the rate of concrete.

Bd. F. 1. 5. *Item to include.*—According to specification No. B. 6. 14.

The item shall also include the necessary dewatering unless, it is to be paid under a separate item in the tender.

Bd. F. 1. 6. *Mode of measurement and payment.*—According to specification No. B. 6. 15. The top of piles embedded in the pile cap shall be considered as part of the pile cap and shall be included in the pile cap measurements. No deduction shall be made in the pile cap for the embedded part of piles. The length of pile shall be measured only up to the bottom of the pile cap. The dimensions may be changed to suit the actual requirements and such changes shall not entitle the contractor for extra claims.

Bd. F. 2. *Providing and laying in situ cement concrete 1:2:4 of trap/granite/quartzite/ gneiss metal R.C.C. work in foundations life raft, grillage, strip foundations and footings of R.C.C. columns and steel stanchions including dewatering, formwork, compaction, finishing and curing (excluding mild steel reinforcement and structural steel).*

Bd. F. 2. 1. *General.*—The item refers to the cement concrete required for R. C. C. footings of columns and steel stanchions, grillage and raft and strip foundations in building construction. The concrete shall conform to specification No. B. 6 for ordinary cement concrete in all respects subject to the following:—

Bd. F. 2. 2. *Materials.*

Bd. F. 2. 2. 1. *Proportion.*—Proportion of materials for the cement concrete shall be 1:2:4 as laid down in specification B. 6. 3.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.F.4.**

Bd. F. 2. 2. 2. *Coarse aggregates.*—Coarse aggregates shall conform to specification No. A. 7 and shall be crushed from sound stones of the type mentioned in the item and obtained from approved quarries. The maximum size of the coarse aggregate shall be 40 mm. (about 1½″) or 6 mm. (about ¼″) less than the cover whichever is smaller in each case unless other maximum size is specified in the special provisions.

Bd. F. 2. 3. *Construction.*

Bd. F. 2. 3. 1. *Mixing.*—The cement concrete shall be mixed in mechanical mixers. Water cement ratio may be about 0.60 or as directed by the Engineer. Slump shall be 5 cm. to 10 cm. (2″ to 4″).

Bd. F. 2. 3. 2. *Placing.*—(1) The foundations shall be passed by the Engineer and lean concrete bedding placed, compacted and cured till set before concrete for R.C.C. is laid. The concrete for R.C.C. foundations shall be deposited after the Engineer has inspected and passed the placement of steel and the forms, measured the steel reinforcement, or structural steel and given permission to place the concrete. Reinforcement and structural steel and lean concrete will be paid as separate items.

(2) As far as possible, concreting of footings, raft and grillage shall be finished in one continuous operation, but the Engineer may permit construction joint at suitable sections and allow the concreting to be completed in the next operation.

In the case of footings for steel stanchions, anchor bolts as shown on the working drawings or as directed shall be fixed in their correct positions with templates when the concrete is being placed. Alternatively, holes of appropriate dimensions shall be left at the specified places so that later on, anchor bolts could be inserted and concreted or grouted. The anchor bolts shall be paid separately in steel work.

Bd. F. 2. 3. 3. *Compaction.*—Compaction shall be done by mechanical vibrators and also by rods so that a dense concrete is obtained, all reinforcement is properly embedded, all corners are properly filled and honey-combing is avoided.

Bd. F. 2. 4. *Dewatering.*—If the area on which the concrete is to be placed is under water, water shall be removed as specified for Item No. Bd. A. 9. Unless dewatering is separately provided for in the tender, the cost of dewatering shall be covered by the rate of concrete.

Bd. F. 2. 5. *Item to include.*—According to specification No. B. 6. 14.

The item shall also include (1) embedding of anchors and/or leaving holes for anchors, etc., and subsequent grouting of the holes with cement concrete 1:2:4 or 1:2 cement sand mortar grout. Anchors will be paid for separately.

(2) Dewatering unless it is provided for under a separate item in the tender.

Bd. F. 2. 6. *Mode of measurement and payment.*—According to specification No. B. 6. 15. In the case of tapering portion of column footings, the quantity shall be calculated by the prismoidal formula correct up to three places of decimals of a cubic metre.

No deduction shall be made for reinforcing steel bars and anchors. No deduction shall be made for embedded structural steel if their combined sectional area is less than 500 sq. cm. Holes for anchors shall not be deducted nor payment made for grouting these holes.

The sizes of R.C.C. members as assumed in the estimate or preliminary drawings are likely to be changed. The contractor shall not be entitled to extra claims due to such changes.

Bd. F. 3. *Providing and laying in situ cement concrete 1 : 1½ : 3 of trap/granite/quartzite/gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footing of R.C.C. columns and steel stanchions including dewatering, formwork, compaction, finishing and curing (excluding mild steel reinforcement and structural steel).*

Bd. F. 3. 1. *General.*—The specification for this item shall be the same as for item No. Bd. F. 2 in all respects except that the proportion of materials for the cement concrete shall be 1:1½:3 as laid down in specification No. B. 6. 3.

Bd. F. 4. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for R.C.C. columns as per detailed drawings and designs, or as directed including dewatering, centering, formwork, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening if special finish is to be provided and curing (excluding mild steel reinforcement).*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. F. 4. 1. *General.*—This item refers to the cement concrete required for R.C.C. columns in building work. The concrete shall conform to specification No. B. 6 for ordinary cement concrete subject to the following:

Bd. F. 4. 2. *Materials.*

Bd. F. 4. 2. 1. *Proportion.*—Proportion of materials for the cement concrete shall be 1:2:4 as laid down in specification No. B. 6. 3.

Bd. F. 4. 2. 2. *Coarse aggregates.*—Coarse aggregates shall be crushed from stones of the type mentioned in the item and obtained from approved quarries. The maximum size of the coarse aggregate shall be 20 mm. (about $\frac{1}{4}$") unless other maximum size is specified in the special provisions.

Bd. F. 4. 3. *Construction.*

Bd. F. 4. 3. 1. *Formwork.*—The formwork for columns shall comply with specification No. B. 6. 5.(*b*) subject to the following:—

The formwork for columns shall be built up so that planks on three sides are put up to the required height and those on the fourth side put up in stages of a metre (3.28') or so in height for facility of placing and compacting. The column formwork shall be kept absolutely plumb during and after placing the concrete and shall be checked and approved by the Engineer. The forms shall be kept rigidly plumb with inclined or other supports from as many sides as possible. Plumb bomb shall be kept suspended from the formwork so that verticality of the formwork could be easily checked. If a column is shown in the drawings to be inclined, then the formwork for such columns should also have exactly the same batter as for the column. Arrangements for providing rounding of the corners, grooves, slots, etc.; for the columns, if shown in the drawings, or mentioned in the special provisions shall be made by fillets, grooves, etc., in the formwork.

Bd. F. 4. 3. 2. *Mixing.*—The cement concrete shall be mixed in mechanical mixers. water cement ratio shall not exceed 0.65 unless otherwise directed by the Engineer. The slump shall be 5 cm. to 10 cm. (2" to 4").

Bd. F. 4. 3. 3. *Placing.*—No concrete shall be deposited until the Engineer has inspected and passed the forms, placement of steel, copper strip and other fixtures for expansion joints if any, and measured the steel reinforcement, etc., and given permission to place the concrete. Reinforcement will be paid as a separate item. The copper strip will be paid as a part of separate item in expansion joints.

Care shall be taken to avoid segregation of materials while placing. Each column shall be concreted in lifts of a metre or so. Before laying the upper lift, the top surface shall be cleaned of all laitance and loose particles and 6 mm. (about $\frac{1}{4}$") coat of cement mortar 1 : 2 applied immediately before placing concrete for the upper lift.

Bd. F. 4. 3. 4. *Compaction.*—Compaction shall normally be done by mechanical vibrators to get a dense concrete and also by rods to get all reinforcement properly embedded, all corners properly filled and honey-combing avoided. The Engineer may permit manual compaction. But a dense concrete must be ensured.

Bd. F. 4. 3. 5. *Finishing.*—Immediately on removing the forms and within a day thereof, the formed faces shall be roughened and finished with 1:3 cement plaster of sufficient minimum thickness to give a smooth and even surface and the same cured. The average thickness of finishing plaster in such cases should not normally exceed 6 mm. (about $\frac{1}{4}$"). If however, it is intended to give a special finishing to the formed surfaces, then the above plastering shall not be done and the formed faces shall only be roughened to receive the special finishing. The special finishing shall be paid under a separate item.

Bd. F. 4. 3. 6. *Dewatering.*—If the area on which the concrete is to be placed is under water, water shall be removed as specified for item Bd. A. 9. Unless dewatering is separately provided for in the tender, the cost of dewatering shall be covered by the rate for concrete.

Bd. F. 4. 4. *Item to include.*—According to specification No. B. 6. 14. The rate shall also include finishing with 1:3 cement plaster of required thickness after roughening or simply roughening to receive the special finish and dewatering where necessary.

अनुक्रमणिका
Table of Contents

Bd. F. 4. 5. *Mode of measurement and payment.*—As per B. 6. 15.

Increase in dimensions caused by plaster finish shall not be taken into account.

Any concrete work in columns carried out in excess of the dimensions shown on the working drawings or as directed by the Engineer shall not be measured and paid. The sizes of R.C.C. columns as assumed in the estimates or preliminary drawings are approximate and likely to be changed. The contractor shall not be entitled to extra claims due to such changes in sizes.

For columns below plinth level and having piled foundations, the height of column shall be measured from top of pile cap to the top of the plinth. In case of open foundations, the height shall be measured from top of footing to the top of plinth. For columns in upper storeys the height shall be measured from the top of plinth level to top of upper floor slab surface. Any portion of beam and slab bearing on column shall be included in the column concrete.

The height of column shall be measured correct to 1 cm. The sectional dimensions shall be measured correct up to $\frac{1}{2}$ a centimetre and the quantity worked out correct up to three places of decimals of a cubic metre.

No deductions shall be made for mild steel reinforcing bars.

B. F. 5. *Providing and casting in situ cement concrete 1 : 1½ : 3 of trap/granite/quartzite/gneiss metal for R.C.C. columns as per detailed designs and drawings or as directed including dewatering, centering, formwork, compaction, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening if special finish is to be provided and curing (excluding mild steel reinforcement).*

The specifications for this item shall be the same as for item No. Bd. F. 4 except that the proportion of materials for the cement concrete shall be 1 : 1½ : 3 instead of 1 : 2 : 4.

Bd. F. 6 *Providing and casting in situ cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. beams and lintels as per detailed designs and drawings or as directed, including dewatering, centering, formwork, compaction, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 6. 1. *General.*—The item refers to the cement concrete required for R.C.C. beams (including cantilevered) and lintels in building construction. This item shall be carried out according to specification No. B. 6 for ordinary cement concrete in all respects subject to the following:

Bd. F. 6. 2. *Materials.*

Bd. F. 6. 2. 1. *Proportion.*—Proportion of cement concrete shall be 1 : 2 : 4 and shall conform to specification No. B. 6. 3.

Bd. F. 6. 2. 2. *Coarse aggregates.*—Coarse aggregates shall be crushed from sound stone of the type mentioned in the item and obtained from approved quarries. The maximum size of coarse aggregate shall be 20 mm. (about ¾") or 6 mm. (about ¼") less than (*i*) the minimum laterial space between the bars or (*ii*) the cover whichever is less. The maximum size of the coarse aggregate may be reduced around the congested reinforcement to comply with the above requirement.

Bd. F. 6. 3. *Construction.*

Bd. F. 6. 3. 1. *Dewatering.*—According to specification No. Bd. F. 1. 4, dewatering, if any, for placing plinth or any other beams shall be covered by the rate of concrete unless a separate item for dewatering is provided in the tender.

Bd. F. 6. 3. 2. *Mixing.*—The concrete shall be mixed in mechanical mixers.

Water cement ratio shall be as directed by the Engineer. Slump shall not exceed 8 cm. (about 3") but in thin sections and where reinforcing bars are crowded, slump up to 12 cm. (about 5") may be allowed by the Engineer if considered necessary.

Bd. F. 6. 3. 3. *Formwork.*—According to specification No. B. 6. 5(*b*). The bottom boards of the formwork for beams shall be given a camber of 1/240 of the span or as directed by the Engineer.

Clamps, hooks, etc., required to be embedded shall be fixed in the formwork at the correct location as directed by the Engineer. Chamfers, roundings, mouldings, etc., shall be made in the form itself.

अनुक्रमणिका
Table of Contents



Concreting of the upper floor shall not be done until the concrete of the lower floor has set adequately to take the load.

Bd. F. 6. 3. 4. *Placing.*—The forms, centering and reinforcement shall be checked and passed by the Engineer and reinforcement measured before concreting is permitted. Reinforcement will be paid as a separate item. Placing shall be done in a balanced manner to avoid eccentric loading on the formwork. The concreting of the beam shall be done in one continuous operation as far as possible. The Engineer may, however, permit construction joints at approved sections of the beam. The ribs of beams shall normally be concreted together with the slab of which they form a part. The schedule of programme shall be got approved by the Engineer and adequate labour and machinery shall be provided to keep up the programme. Clamps, fan hooks, and other fixtures, etc., shall be embedded in the concrete while placing, if so, required by the Engineer. Clamps, etc., themselves will be paid for separately. Bridges shall be provided to avoid walking over the reinforcement and fresh concrete.

Bd. F. 6. 3. 5. *Compaction.*—Compaction shall be done by vibrators and rods as the concrete is being placed to give a dense concrete free of honey-combing. It should be seen that the vibrator needle does not touch the reinforcement and disturb the concrete already set. Where it is not possible to use the vibrator, rodding shall be resorted to and the concrete with greater slump may be used.

Bd. F. 6. 3. 6. *Finishing.*—Immediately on removing the forms and within a day thereof the formed faces shall be roughened and finished with 1 : 3 cement plaster of sufficient minimum thickness to give a smooth, even and finished surface and the same cured. The average thickness of finishing plaster should not normally exceed 6 mm. If, however, it is intended to give a special finish to the formed surface the above plastering shall not be done and the formed faces shall only be roughened to receive the special finish. The special finish shall be paid under a separate item.

Bd. F. 6. 4. *Item to include.*—According to specification No. B. 6. 14.

Finish with 1 : 3 cement plaster or roughening the surfaces when a special finish is to be provided and labour for embedding clamps, fixtures, etc., shall be included in the rate.

The rate shall also include dewatering if required when there is no separate provision for it in the tender.

Bd. F. 6. 5. *Mode of measurement and payment.*—According to specification No. B. 6. 5.

The concrete beam and lintel shall be measured for their net length inclusive of bearing on walls correct to a cm. and the sectional measurements correct to the nearest half centimetre. The sizes of beams and lintels assumed in the estimate or preliminary, drawings are approximate and likely to be changed. The contractor shall not be entitled to extra claims due to any such changes in the sizes. The quantity shall be worked out correct to three places of decimals of a cubic metre. The increase in dimensions due to plaster finish shall not be taken into account.

No deduction shall be made for reinforcement bars, for pipes not exceeding 25 sq. cms. each in sectional area, for fixtures embedded, for ends of dissimilar materials like beams, girders etc. having a sectional area up to 500 sq. cm. (about $\frac{1}{2}$ sq. ft.) or for chamfers or roundings of edges. The length of a plinth beam shall be measured clear between the faces of pile caps. When a beam is supported on columns, the length of the beam shall be measured between the faces of columns. In beam and slab construction the beam shall be measured as the rib or part below or above the slab.

Fillets between beams and slabs and haunches of beams shall be measured as part of beam.

Bd. F. 7. *Providing and casting in situ cement concrete 1 : 1$\frac{1}{2}$ : 3/1 : 2 : 4 of trap/granite/quartzite/gneiss metal for R.C.C. portals as per detailed designs and drawings, or as directed including dewatering, centering, formwork, mechanical vibration, finishing the formed surface with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild, steel reinforcement.)*

Bd. F. 7. 1. *General.*—The item refers to cement concrete required for R.C.C. portals in building construction. The concrete shall conform to specification No. B. 6 for ordinary cement concrete in all respects subject to the following :

Bd. F. 7. 2. *Materials.*

Bd. F. 7. 2. 1. *Proportion.*—The proportion of the materials for the cement concrete shall be 1 : 1$\frac{1}{2}$ : 3 or 1 : 2 : 4 as mentioned in the wording of the item and shall conform to specification No. B. 6. 3.

अनुक्रमणिका
Table of Contents

Bd. F. 7. 2. 2. *Coarse aggregates.*—According to specification No. Bd. F. 6. 2. 2.

Bd. F. 7. 3. *Construction.*—The beams of the portals shall be constructed as specified for R.C.C. beams in Bd. F. 6 and the columns of the portals shall be constructed as per specifications in Bd. F. 4. Where the column and beam join or when the column is to be fixed at the base, the portion near the joints of beam and column or column and foundation concreted in one operation together. If hinges are to be introduced, they shall be constructed as specified on the drawings or as directed by the Engineer. Reinforcement will be paid under a separate item.

Bd. F. 7. 4. *Item to include.*—As per Bd. F. 4. 4.

Bd. F. 7. 5. *Mode of measorement and payment.*—As per Bd. F. 4. 5.

Bd. F. 8. *Providing and casting in situ cement concrete 1 : 2 : 4, of trap/granite/ quartzite/gneiss metal for R.C.C. slabs and landings as per detailed design and drawings including centering, formwork, compacting, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

(*a*) Upto and inclusive of 10 cm. (about 4″) thick.
(*b*) Above 10 cm. (about 4″) and upto and inclusive of 12.5 cm. (about 5″) thick.
(*c*) Above 12.5 cm. (about 5″) and upto and inclusive of 15 cm. (about 6″) thick.
(*d*) Above 15 cm. (about 6″) thick.

Bd. F. 8. 1. *General.*—The item refers to cement concrete required for R.C.C. slabs and landing in building construction. The concrete shall conform to specification No. B. 6 for ordinary cement concrete in all respects subject to the following :

Bd. F. 8. 2. *Materials.*

Bd. F. 8. 2. 1. *Proportion.*—Proportion of the materials for the cement concrete shall be 1:2:4 and shall conform to specification No. B. 6. 3.

Bd. F. 8. 2. 2. *Coarse aggregates.*—Coarse aggregates shall be crushed from sound stone of the type mentioned in the item and obtained from approved quarries and shall conform to specification No. A. 7. The maximum size of coarse aggregates shall be 20 mm. (about $\frac{3}{4}$″) or 6 mm. (about $\frac{1}{4}$″) less than the cover whichever is smaller unless other maximum size is specified in special provisions.

Bd. F. 8. 3. *Construction.*

Bd. F. 8. 3. 1. *Mixing.*—The concrete shall be mixed in mechanical mixers. Water cement ratio shall not exceed 0.55 unless otherwise directed by the Engineer. Slump shall be 8 cm. to 12 cm. (3″ to 5″).

Bd. F. 8. 3. 2. *Formwork.*—According to specification No. Bd. F. 6. 3. For cantilever slabs the formwork shall comply with relevant portion of specification No. Bd. F. 9.

Bd. F. 8. 3. 3. *Placing.*—No concrete shall be deposited until the Engineer has inspected and passed the forms and the placement of steel reinforcement, measured the steel reinforcement and given permission to place the concrete. The reinforcement will be paid as a separate item.

Slab shall be laid to the thickness shown on the working drawings approved by the Engineer. The required thickness of slab shall be ensured at all points by check gauges and straight edges. As far as possible the concreting of slab shall be done in one continuous operation. But the Engineer may allow the joints at suitable sections and allow concreting to be continued in the next operation. For a slab, the placing of concrete shall be done in such a manner as to avoid the necessity of workmen crossing over green concrete. Bridges shall be provided to avoid walking over the reinforcement and fresh concrete. If any hooks, pipes, clamps, frames or other fixtures are to be embedded, they shall be fixed at their correct position. All these fixtures themselves shall be paid for separately.

Bd. F. 8. 3. 4. *Compaction.*—Compaction shall be done manually with tamping bar, screed board tampers, rods etc. to get a dense concrete.

Bd. F. 8. 3. 5. *Finishing.*—Immediately on removing the forms and within a day thereof, the formed surfaces of the slab shall be roughened if necessary and finished with 1 : 3 cement plaster of such minimum thickness as is necessary to give a smooth, even and finished surface and cured. Engineer's permission shall be taken for such finishing. Edges and junctions of the slabs and beams shall be rounded or chamfered if so required. Unformed exposed surfaces shall be finished to an even and plain surface at the time of compacting. The surfaces on which paving is to be provided shall be left a little rough for bond. If special finishes and borders are to be provided, they shall be paid for separately, but the formed faces shall be roughened to receive the special finish and the above finishing plaster shall not be done.

Bd. F. 8. 3. 6. *Bedding.*—In the case of basement floor slabs, a lean concrete bedding shall be placed first and cement concrete for the R.C.C. work laid above it. The lean concrete will be paid as a separate item.

Bd. F. 8. 3. 7. *Dewatering.*—If dewatering is necessary, it shall be done according to specification for item No. Bd. A. 9. Dewatering shall be considered as incidental to the item unless separately provided for in the tender.

Bd. F. 8. 4. *Item to include.*—As per B. 6. The rate also includes finishing of formed surfaces with plaster 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the formed faces to receive the special finish if such special finish is to be provided and also dewatering where necessary. Rounding, chamfering of corners, and edges and labour for embedding fixtures, clamps, pipes, fastenings etc. shall be included in the rate. The item shall cover cantilever slabs also.

Bd. F. 8. 5. *Mode of measurement and payment.*—The contract rate shall be per cubic metre of the slab laid to exact thickness as shown in the detailed drawings or ordered by the Engineer. The increase in dimensions caused by plaster finish shall not be taken into account. The length and width limited to those shown in the drawings or directed by the Engineer shall be measured correct up to a centimetre and thickness correct up to half a centimetre. The quantity shall be worked out correct up to three places of decimals of a cubic metre. If the slab is laid to thickness more than that shown in the drawings or ordered by the Engineer, the excess of the concrete quantity shall not be paid. The dimensions assumed in the estimate or preliminary drawings are only approximate and may be changed. The contractor shall not be entitled to any extra claims due to such changes.

Any chamfers, rebates, pipes etc. each up to 25 square cm. in section provided in the work shall not be deducted from the overall dimensions of the work, and the slab shall be paid for as if these were not existing.

In beam and slab construction, the slab shall be taken as running continuously through and the beam as that portion above or below the slab.

Any concrete in the portion of slab resting over the column shall be paid in the column.

Bd. F. 9. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/ gneiss metal for R.C.C. chajja as per detailed design and drawings including centering, formwork, compacting, finishing the formed surfaces with cement mortar of 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 9. 1. *General.*—The item refers to cement concrete required for R.C.C. chajja of the section shown in the working drawings or as directed. The concrete shall conform to specification No. B. 6. for ordinary cement concrete in all respects subject to the following:

Bd. F. 9. 2. *Materials.*—According to specification No. Bd. F. 8. 2.

Bd. F. 9. 3. *Construction.*—According to specification No. Bd. F. 8. 3. The formwork shall be arranged and the concrete cast to obtain the shape, dimensions, slope etc. shown in the drawings. The weight of concrete, centering and shuttering shall be supported rigidly on the floor below and in other secure ways. Care shall be taken to see that formwork is removed only after the period mentioned in B. 6 has lapsed and after full stability for the overhanging portion is obtained by anchoring and/or building up masonry over the bearing for all conditions of loading likely to occur during and after construction. The sequence of removal of centering shall be such that no tension is caused in the bottom face. The supports at the overhanging end shall be removed first after the concrete has developed sufficient and full stability is obtained for all overhang.

The chajja shall be laid to lines, curves, slopes and the sections shown in the working drawings or as directed by the Engineer.

Bd. F. 9. 4. *Finishing.*—According to specification No. Bd. F. 8. 3. 5. Grooves, throatings and borders shall be provided in the concrete and finishing plaster if shown in the drawings and shall be included in the item. But special finishing if intended shall be paid under a separate item.

Bd. F. 9. 5. *Item to include.*—According to specification No. Bd. F. 8. 4. It shall also include grooves, throatings, and borders in the chajja if shown in the drawings.

Bd. F. 9. 6. *Mode of measurement and payment.*—According to specification No. Bd. F. 8. 5 except for the following:—

Where the chajja is combined with lintel, beam, slab etc., the bearing shall form a part of the item with which it is combined, the chajja being measured only for the projecting portion.

**Bd.F.13.**

Where chajja is not combined with beam, slab etc., the bearing shall be included in the measurement of the chajja and shall be deducted from the masonry in which it is embedded.

Bd. F. 10. *Providing and casting in situ cement concrete 1:2:4, of trap/granite/quartzite/gneiss metal for R.C.C. canopy as per detailed design and drawing including centering, formwork, compacting all special finishes and ornamental work and curing (excluding mild steel reinforcement).*

Bd. F. 10. 1. *General.*—The item refers to cement concrete required for R.C.C. canopy in a building. The concrete shall conform to specification No. B. 6 for ordinary cement concrete in all respects subject to the following :—

Bd. F. 10. 2. *Materials.*—According to specification No. Bd. F. 8. 2.

Bd. F. 10. 3. *Construction.*—According to specification No. Bd. F. 9. 3.

The canopy shall be cast to the thickness, dimensions, shape, lines, curves, taper etc., exactly as per drawings and as directed by the Engineer. As far as possible, the concreting of the canopy shall be done in one continuous operation. But the Engineer may allow joints at suitable sections and allow concreting to be continued in the next opertion with the usual precautions detailed in specification No. B. 6 and Bd. F. 9. 3. Conduits, clamps, lamp holder, etc., shall be embedded in their appropriate positions as shown in the drawings or as directed by the Engineer. Fixtures shall be paid separately. But the labour for fixing shall be included in the item of canopy. Special care shall be taken regarding stability of the canopy while removing the forms.

Bd. F. 10. 4. *Finishing.*—According to specification No. Bd. F. 8. 3. 5. If any special finishes and ornamental design are to be provided they shall be carried out as per detailed drawings or as directed.

Bd. F. 10. 5. *Item to include.*—According to specification No. B. 6. 14.

All special finish and the ornamental work as per detailed drawings shall also be included in the item.

Bd. F. 10. 6. *Mode of measurement and payment.*—According to specification No. Bd. F. 9. 6. Special finishes and ornaments work if any shall be included in the rate.

Bd. F. 11. *Providing and casting in situ, cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. pardi.....mm. (about—") thick including centering, form-work, compacting, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided, and curing (excluding mild steel reinforcement).*

Bd. F. 11. 1. *General.*—The item refers to cement concrete required for R.C.C. pardi of the thickness shown in the detailed drawings approved by the Engineer. The item shall comply with specifications for item Bd. F. 6 except for the following :—When the pardi is high, formwork for the pardi shall be built up in stages of a metre or so in height at least on one side. The formwork shall be kept absolutely plumb, during and after the placing of concrete and shall be checked and approved by the Engineer. Compaction may be done manually.

Bd. F. 12. *Providing and casting in situ, cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. coping to plinth or parapet and sills of doors and windows, moulded or chamfered as per detailed drawings approved by the Engineer including centering, formwork, compacting, finishing the exposed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roguhening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 12. 1. *General.*—The specifications pertain to the cement concrete for R.C.C. copings to the plinth or parapet and sills of doors and windows in building construction.

The item shall generally conform to the specifications for item No. Bd. E. 3 subject to the following:

Before the concrete is placed the formwork and reinforcement of the coping shall be passed by the Engineer and the measurements of mild steel bar reinforcement recorded. The mild steel bar reinforcement shall be paid under a separate item.

1 : 3 finishing plaster referred to in the item shall be provided for all the exposed surfaces.

Bd. F. 13. *Providing and casting in situ, cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. waist slab, steps and parapet as per detailed drawings for staircases including centering, formwork compacting, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if a special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 13. 1. *General.*—The item refers to cement concrete required for R. C . C. staircase in building construction. The concrete shall conform to specification No. B. 6 for ordinary cement concrete in all respects, subject to the following:

Waist slabs and steps shall be constructed complying with specification No. Bd. F. 8. If the staircase has an R.C.C. parapet, it shall be constructed as per specifications for item Bd. F. 11 for R.C.C. pardi. Formed surfaces which will remain exposed shall be finished with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface. Surfaces which are to receive special finishings or tiling shall be roughened immediately on removing the forms and within a day thereof. Special finishings or tiling shall be paid for separately. Rowl plugs, bolts or other devices similar to those mentioned in I.S. 1946-1961 shall be embedded in the concrete if required by the Engineer for fixing railings etc. The rate for concrete shall be inclusive of such plugs and their fixing. Cement concrete for R.C.C. landing shall be paid under slab concrete.

Bd. F. 13. 2. *Item to include.*—(1) Providing and laying cement concrete for waist slabs, steps and parapets to dimensions and shapes shown on the drawings or as directed by the Engineer, including centering, form-work, compacting, finishing with cement plaster of minimum thickness to give a smooth and even surface for formed surfaces remaining exposed, roughening the surfaces which are to receive tiling or special finish, embedding plugs and curing.

(2) Beams, Cross-beams, railings etc. shall not be included in the item.

(3) All labour, materials, equipment for satisfactory completion of the item as specified above.

Bd. F. 13. 3. *Mode of measurement and payment.*—As per specification No. B. 6.

The measurement shall be taken before finishing plaster is applied. No deduction shall be made for the embedded plugs nor separate payment made for them. Any portion of steps, waist slab or parapet embedded in the newel post shall be paid as part of item of the newel post, under a separate item.

Portions of waist slab and steps embedded in the masonry shall be included in these measurements and deductions made for them in the masonry.

Bd. F. 14. *Providing and casting in situ, cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. newel posts of staircases as per detailed drawings including centering, form-work, compacting, finishing the formed surfaces with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 14. 1. *General.*—The item refers to cement concrete required for R.C.C. newel post. The item shall comply with specifications given for Bd. F. 4 for R.C.C. column subject to the following:—

Bd. F. 14. 2. *Construction.*—The shapes and sizes of newel posts, with all mouldings shall be as per the detailed working drawings approved by the Engineer by preparing the form-work suitably. Any recesses or grooves etc. required to receive the hand railing or parapet shall be left in the newels at appropriate places.

Bd. F. 14. 3. *Mode of measurement and payment.*—The contract rate shall be per cubic metre of the concrete. The cross sectional dimensions shall be measured correct up to half a cm. and length measured up to 1 cm. The dimensions shall be over square covering all mouldings etc. and averaged. The volume shall be calculated correct up to 3 places of decimals of a cubic metre. Any portion of R.C.C. staircase, steps, parapet, stringer embedded in newel post shall be paid in the newel post and no deductions shall be made for the recesses or grooves left for receiving the above parts of staircase.

Bd. F. 15. *Providing and casting in situ, cement concrete 1 : 2 : 4. of trap/granite/quartzite/gneiss metal for R.C.C. arches with skew backs as per detailed drawings or as directed including centering, form-work, compacting, finishing the formed surface with cement mortar 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 15. 1. *General.*—The item refers to cement concrete required for R.C.C. arches with skew backs. The item shall comply with specifications for item No. Bd. E. 7 subject to the following:—

Bd. F. 15. 2. *Placing of concrete.*—Before placing concrete, the form-work and reinforcement of the arch shall be passed by the Engineer and the measurement of mild steel bar reinforcement taken. The mild steel reinforcement shall be paid under a separate item. The skew back and the arch may be concreted together. If hinges are to be introduced, they shall be as per detailed designs and drawings or as directed by the Engineer.

अनुक्रमणिका
Table of Contents



**Bd.F.19.1.**

Bd. F. 16. *Providing and casting in situ, cement concrete 1 : 2 : 4, of trap/granite/quartzite/gneiss metal for R.C.C. fins —— mm. (about—") thick in positions on the drawings or as directed by the Engineer including centering, form-work, compaction, finishing the formed surfaces with cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 16.1. *General.*—The item shall comply with specification for item No. Bd. F. 11 in all pertinent particulars subject to the following:

(1) The shape, thickness and other dimensions of the fins shall be exactly as shown in the drawings or specified in the special provisions.

(2) The fins shall be cast in exactly the same place and to the same shape, thickness, curve, inclination, etc., as shown on the drawings and as directed by the Engineer.

(3) If special finishes are to be applied, the surfaces shall be roughened immediately on removal of forms and within a day thereof so as to get a good hold for the finish.

(4) For the fins, only the clear dimensions shall be measured. Any portion of the fin, which is embedded in masonry or any other part of the building shall not be paid as fin but shall be included in the item in which it is embedded. No deductions shall be made for these embedded parts from the corresponding items.

Bd. F. 17. *Providing and fixing in position mild steel bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams, columns, canopies, staircases, newels, chajjas, lintels, pardis, copings, fins, arches, etc., as per detailed designs, drawings and schedules including cutting, bending, hooking the bars, binding with wires or tack-welding and supporting as required complete.*

*General.*—The item shall comply with specification No. B. 10 in all respects.

In case of reinforcement for pile caps, the splicing of main longitudinal bars shall be by lap only. The main longitudinal reinforcement bars of the piles protruding above the top of the piles shall be tied to the reinforcement of the pile cap as shown in the plans or as directed by the Engineer. No separate payment shall be made for tying the protruding bars of the piles with bars of pile caps.

Bd. F. 18. *Providing welded joints for mild steel reinforcement bars of—*

(*a*) *25 mm. diameter and under.*

(*b*) *28 mm. diameter.*

(*c*) *32 mm. diameter.*

(*d*) *36 mm. diameter.*

(*e*) *40 mm. diameter.*

Bd. F. 18. 1. *General.*—The item provides for welding joints in mild steel round bars of 25 mm. diameter and under and other larger diameter bars used for reinforcement in R.C.C. work and includes necessary welding materials, use of electric arc/oxyacetylene process of welding, equipment and tests. The item shall be carried out in conformity with specification No. B. 10. 7 in all respects. Welding shall be done when the bars are crowded and if and as required by the Engineer.

Bd. F. 18. 2. *Mode of measurement and payment.*—The contract rate shall be per number of welded joint for different diameters of the bars as below:—

(*a*) 25 mm. and below.

(*b*) 28 mm.

(*c*) 32 mm.

(*d*) 36 mm.

(*e*) 40 mm.

Bd. F. 19. *Providing and fixing in position after hoisting, precast 1 : 2 : 4 R.C.C. fins of trap/granite/quartzite/gneiss metal — mm. (about —") thick in cement mortar 1:3 in the positions shown in the detailed drawings or as directed by the Engineer and curing complete (including mild steel reinforcement).*

Bd. F. 19. 1. *General.*—The precast R.C.C. fins shall be made by filling the moulds with a complete batch of 1 : 2 : 4 cement concrete so that the whole may set at one time. If one batch is insufficient to complete a unit, each succeeding batch should follow the preceding batch as quickly as possible. All the specifications for ordinary cement concrete as per B. 6 shall



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



apply to this work. The maximum size of coarse aggregate shall not exceed ¼th, the thickness of the fins. Coarse aggregate shall be of the type of stone mentioned in the item. The fins shall be of the thickness mentioned in the wording of the item. The fins shall also be of shapes and dimensions shown on the drawings or as directed by the Engineer and all the exposed surfaces and edges shall be smooth without plaster finish.

Bd. F. 19. 2. *Reinforcement.*—The reinforcement shall be 6 mm. (about ¼″), mild steel bars at 15 cms. (about 6″) centres vertically and horizontally unless other sizes and spacings are specified in special provisions. Tying or tack welding, fixing, etc., shall be done in conformity with specification No. B. 10. The reinforcement shall be placed along the middle of the fins.

Bd. F. 19. 3. *Cement mortar.*—Cement mortar shall be of proportion 1 : 3 and shall comply with specification No. B. 5. (*a*).

Bd. F. 19. 4. *Fixing.*—The fins shall be hoisted and fixed in cement mortar 1 : 3 in positions and at inclinations as shown on the drawings or as directed by the Engineer. The curing shall be done for 14 days. Care shall be taken to see that edges and surfaces are kept intact during all stages of handling and fixing. Damaged fins shall be rejected.

Bd. F. 19. 5. *Finishing.*—If any finishing is required at the Joints they shall be finished with 1 : 3 cement mortar to match with the general finish and as approved by the Engineer.

Bd. F. 19. 6. *Item to include.*—(1) Providing precast R.C.C. fins as specified above including reinforcement.

(2) All labour, material and equipment required for handling, transporting, hoisting and fixing the fins in position to complete the item as specified above.

Bd. F. 19. 7. *Mode of measurement and payment.*—The contract rate shall be per square metre. The dimensions shall be measured correct up to a centimetre and the area worked out correct up to 2 places of decimals of a square metre. In the case of curved fins, curved length shall be measured along the centre-line of the curved edge. The rate shall be inclusive of reinforcement and fixing the fins in position. The dimensions shall be measured as specified in item No. Bd. F. 16.

Bd. F. 20. *Providing and fixing in position after hoisting precast 1 : 2 cement mortar reinforced jali — mm. (about —″) thick, of approved design, in cement mortar 1 : 3 and curing complete (including mild steel bar reinforcement).*

Bd. F. 20. 1. *General.*—The precast jali shall be made by filling the mould of the approved design pattern with one complete batch of 1 : 2 cement mortar so that the whole may set at one time. If one batch is insufficient to complete a unit, each succeeding batch should follow the preceding batch as quickly as possible. All the specifications for ordinary cement mortar as per specification No. B. 5.a shall apply to this work. The sand for the mortar shall be graded from coarse sand of 5 mm. (3/16″) downwards. The jali shall be cast to the design and dimensions shown on the detailed working drawings approved by the Engineer. All the surfaces and edges shall be smooth and sharp without plaster finish.

Bd. F. 20. 2. *Mild steel reinforcement.*—This shall conform to specification No. B. 10. The reinforcement shall be bent to the exact shape of jali work and fixed exactly in the centre of the jali and fully embedded in the mortar.

The 6 mm. (about ¼″) bars shall be used.

Bd. F. 20. 3. *Cement mortar.*—Cement mortar for fixing the jali shall be of proportion 1 : 3 and shall comply with specification No. B. 5.a.

Bd. F. 20. 4. *Fixing.*—The jali shall be fixed in 1 : 3 cement mortar between supports in grooves as shown on drawings or as directed by the Engineer. Jalis with damaged surfaces or edges shall not be fixed. The joints shall be cured for 14 days.

Bd. F. 20. 5. *Item to include.*—(1) Providing the precast jali of the required design conforming to specifications detailed above including reinforcement.

(2) All material, equipment, labour for handling, transporting, hoisting and fixing the jali in position as specified above and curing the joints.

Bd. F. 20. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre. The jali shall be measured between supports, portions in the grooves being not measured and also no deductions shall be made for these grooves from the quantity of the correspond-

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



ing supports. The supporting pillars, etc., shall not be included in the jali. The dimensions shall be measured correct up to a centimetre and the area worked out correct up to 2 places of decimals of a square metre. No deductions shall be made for the openings in the jali.

Bd. F. 21. *Providing and fixing in position, after hoisting, if necessary, precast reinforced balusters of 1 :2 cement mortar as per detailed designs, shown on the approved drawings, in cement mortar 1 : 3 and curing (including mild steel reinforcement).*

Bd. F. 21. 1. *General.*—All the specifications for cement mortar as per specifications No. B. 5(*a*) shall apply to this item. The precast reinforced cement mortar balusters shall be prepared by filling the moulds. The moulds shall be formed to give to the balusters the exact shapes and dimensions shown on the drawings approved by the Engineer. The surfaces of balusters shall be smooth and flawless and no separate finishing shall be allowed. Balusters having chipped edges, rough surfaces or other defects shall be rejected.

Bd. F. 21. 2. *Mild steel reinforcement.*—This shall conform to specification No. B. 10. The reinforcement shall be in the centre of the baluster fully embedded in the mortar. The reinforcement shall be as per drawings or as directed by the Engineer. Bars of 12 mm. diameter shall be used when the size is not specifically mentioned.

Bd. F. 21. 3. *Cement mortar.*—The balusters shall be fixed in the required places in the same way as jali in Bd. F 20. 4. The heads and sills of the openings in which the balusters are fixed shall be cast in situ by arranging to hold the balusters in their correct position so as to leave both their ends embedded in sills and heads which shall be paid under a separate item.

Bd. F. 21. 5. *Item to include.*—(1) Providing and fixing the reinforced cement mortar balusters of the required design conforming to specifications detailed above including the reinforcement.

(2) All material, labour, equipment for handling, transporting, hoisting, and fixing the balusters are specified above and curing the joints.

Bd. F. 21. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the clear area in which the balusters are fixed. The height shall be the clear height between top and bottom members in which the balusters are fixed. The length shall be average clear length between the sides of the balustrade. The dimensions shall be measured correct up to 2 places of decimals of a square metre and area worked out correct up to 2 places of decimals of a square metre.

The portions of balusters embedded in the R.C.C. sills and tops shall not be deducted from the sills and tops. Sills, tops and sides shall be measured under relevant item.

Bd. F. 22. *Providing and casting in situ water proofed cement concrete 1 : 1½ : 3/1 : 1 : 2 of trap/granite/quartzite/gneiss metal for R.C.C. columns in required places as per detailed designs and drawings or as directed including centering, form-work, compaction, finishing the formed faces with water proofed cement mortar 1 :3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 22. 1. *General.*—The item shall comply with the specifications for item No. Bd. F. 4, subject to the following:—

Bd. F. 22. 2. *Water proofing material.*—Water proofing material to be used as an additive to the cement concrete and mortar to make it waterproof shall be a proprietory product like Pudlo. Impermo, Accoproof, Sika, etc., approved by the Engineer.

Bd. F. 22. 3. *Proportion of concrete.*—The proportion of materials for the cement concrete shall be as mentioned in the item and shall comply with specification No. B. 6. 3. The quantity of water-proofing material to be added and the method of addition shall be as specified by the manufacturers. The aggregates of the concrete shall be so graded that there will be minimum possible voids.

Bd. F. 22. 4. *Mixing.*—The concrete shall be mixed mechanically. The mixing of the water-proofing material in cement, water or concrete shall be done according to the specifications of the manufacturers.

Bd. F. 23. *Providing and casting in situ water proof cement concrete 1 :1½ :3/1 :1 :2 of trap/granite/quartzite/gneiss metal for R.C.C. beams in required places as per detailed designs and drawings or as directed including centering, form-work, compaction, finishing the*

अनुक्रमणिका
Table of Contents

*formed faces with water-proofed cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 23. 1. *General.*—The item shall comply with the specifications for item Bd. F. 6 subject to the following.

Bd. F. 23. 2. *Water proofing material.*—As per Bd. F. 22. 3.

Bd. F. 23. 3. *Proportion of concrete.*—As per Bd. F. 22.3.

Bd. F. 23. 4. *Mixing.*—As per Bd. F. 22. 4.

Bd. F. 23. *Providing and casting in situ water-proofed cement concrete 1 : 1½ : 3/1 : 1:2 of trap/granite/quartzite/gneiss metal for R.C.C. slabs in required places, as per detailed designs and drawings or as directed including centering, form-work, compaction, finishing the formed surfaces with water-proofed cement mortar 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding mild steel reinforcement).*

Bd. F. 24. 1. *General.*—The item shall comply with the specification for item No. Bd. F. 8 subject to the following:—

Bd. F. 24. 2. *Water proofing material.*—As per Bd. F. 22. 2.

Bd. F. 24. 3. *Proportion of concrete.*—As per Bd. F. 22.3.

Bd. F. 24.4. *Mixing.*—As per Bd. F. 22. 4.

Bd. F. 25. *Providing and casting in situ cement concrete 1:2:4 of trap/granite/quartzite/gneiss metal for encasing steel stanchions as per detailed designs and drawings or as directed, including centering, form-work, compacting, finishing the formed surfaces with cement plaster 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding structural steel work in stanchion and mild steel reinforcement).*

Bd. F. 25. 1. *General.*—The item shall comply with specifications given for item No. Bd. F. 4 subject to the following:—

Bd. F. 25. 2. *Placing concrete.*—Before placing concrete, the forms and all structural steel work in stanchion including the mild steel reinforcement shall be checked and passed by the Engineer and the mild steel reinforcement and structural steel work measured. The reinforcement and structural steel work will be paid under separate items.

The form-work shall be put up on all sides in stages of one metre or other heights as directed by the Engineer to enable the concrete to be placed and compacted satisfactorily. Compaction may be done manually with rods, etc., if vibrators cannot be used.

Bd. F. 25. 3. *Mode of measurement and payment.*—As per Bd. F. 4. 5.

Volume occupied by joists and reinforcement shall not be deducted except in the case of boxed stanchions or girders in which case the boxed portion only shall be deducted.

Bd. F. 26. *Providing and casting in situ cement concrete 1 : 2 : 4 of trap/granite/quartzite/gneiss metal for encasing steel beams as per detailed designs and drawings or as directed including centering, form-work, compacting, finishing the formed surfaces with cement plaster 1 : 3 of sufficient minimum thickness to give a smooth and even surface or roughening them if special finish is to be provided and curing (excluding structural steel and mild steel reinforcement).*

Bd. F. 26. 1. *General.*- The items shall comply with specifications given for item No. Bd. F. 6 subject to the following:—

Bd. F. 26. 2. *Placing concrete.*—Before placing concrete, the form-work and all structural steel work of beams including the mild steel reinforcement shall be checked and passed by the Engineer and the mild steel reinforcement and structural steel work measured. The reinforcement and structural steel work shall be paid under separate items.

Special care shall be taken to see that the concrete is well worked around structural steel sections and also compacted. For this, form-work on sides shall be constructed in stages of suitable heights. Water cement ratio shall be adjusted to afford satisfactory placing and compaction.

**Bd.F.27.4.**

Bd. F. 26. 3. *Mode of measurement and payment.*—As per Bd. F. 6.5.

Volume occupied by joists and mild steel reinforcement shall not be deducted except in the case of boxed girders in which case, boxed portion only shall be deduced.

Bd. F. 27. *Carrying out load test of R.C.C. slab or slab and beam in position as ordered by the Engineer including all instruments, loads complete.*

Bd. F. 27. 1. *General.*—The test shall be carried out on any R.C.C. slab or slab and beam as ordered by the Engineer in case a doubt arises as to the strength of the slab or beam and slab, etc., due to defective materials and/or workmanship.

Bd. F. 27. 2. *Load testing.*—The test shall be carried out for a load equivalent to 125 per cent. of the designed load. The whole load including the live load shall be converted into a uniformly distributed dead load and loading shall be done in such a manner as to produce the maximum bending moment and shear due to such load. The loads shall be applied in 20 per cent. increments or other suitable increments as directed by the Engineer at intervals of one hour. The behaviour of the structural components and deflections shall be observed before and after application of each increment of load. Loads shall be removed at the same rate and at the same intervals as for loading and observations similarly made. Staging, free of the loaded members shall be erected below for support in case of collaps. Contractor shall be responsible for accidents and damage, if any.

Deflections shall be observed by deflectometers or tested dial gauges. The tests shall be carried out at described in I.S. 456:1964 clause 8. 4. The load may be in the form of sand bags or other suitable materials.

The observations shall be made by the Deputy Engineer in charge.

Bd. F. 27. 3. *Item to include.*—The rate shall include—

(1) Providing the necessary loads and instruments and setting them up and removing them away after the test is complete.

(2) Carrying out the test as specified.

(3) Compensation for accidents and damages, if any.

Bd. F. 27. 4. *Mode of measurement and payment.*—The item shall be paid on the basis of actual cost.

If the test proves that the strength of the structure is not satisfactory, the cost of the test shall be borne by the contractor. If, however, the test proves to be satisfactory, the Department shall bear the cost.

If the test results are unsatisfactory due to materials and workmanship not satisfying the specifications, the contractor shall carry out the remedial measures as approved by the Engineer at the contractor's own cost to the satisfaction of the Engineer.

---

अनुक्रमणिका
Table of Contents



## Bd. G. BRICK WORK

*List of items of Brick Work*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. G. 1. | Providing second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1: /lime mortar 1: in foundations and plinth of inner walls/in plinth external walls including dewatering, striking joints on unexposed faces, raking out joints on exposed faces and watering complete ... ... ... ... ... | 297 |
| Bd. G. 2. | Providing first class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1 : /lime mortar 1 : in plinth including dewatering, striking joints on unexposed faces, pointing with cement mortar 1 : 3 on exposed faces and watering complete ... ... ... ... | 297 |
| Bd. G. 3. | Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1: /lime mortar/1: in plinth as backing in composite masonry including dewatering, striking joints and watering complete ... ... ... | 298 |
| Bd. G. 4. | Providing first class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1: /lime mortar 1: in superstructure including pointing with cement mortar 1: 3 on outside exposed faces and raking out joints where plastering is to be done, watering and scaffolding complete ... ... | 298 |
| Bd. G. 5. | Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1: /lime mortar 1: in superstructure including striking joints, raking out joints, watering and scaffolding complete ... ... ... | 299 |
| Bd. G. 6. | Providing second class Burnt Brick masonry, with conventional/I.S. type bricks in cement mortar 1: /lime mortar 1 : in superstructure, as backing in composite masonry including scaffolding, raking out joints and watering complete. ... | 300 |
| Bd. G. 7. | Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1 : in half brick thick wall including mild steel longitudinal reinforcement of 2 bars of 6 mm. (about $\frac{1}{4}$") diameter/2 hoop iron strips 25 mm.×1.6 mm. (16 guage) at every third course, properly bent and bonded at ends, scaffolding, raking out joints and watering complete. | 300 |
| Bd. G. 8. | Providing Burnt Brick-on-edge masonry with second class bricks of conventional type in cement mortar 1 : including mild steel longitudinal reinforcement of 2 bars of 6 mm. (about $\frac{1}{4}$") diameter/one strip of hoop iron 25 mm.×1.6 mm. (16 guage) placed at every third course, properly bent and bonded at ends, scaffolding, raking out joints and watering complete. ... | 301 |
| Bd. G. 9. | Providing first class Burnt Brick masonry with conventional/I.S. type bricks, in cement mortar 1: /lime mortar 1: including scaffolding, pointing with cement mortar 1 : 3 and watering in pillars of—<br>(*a*) rectangular or square shape,<br>(*b*) curved shapes,<br>as shown in the drawings ... ... ... | 301 |
| Bd. G. 10. | Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement motar 1 : /lime mortar 1 : including scaffolding, raking out joints and watering in pillars of—<br>(*a*) rectangular or square shape,<br>(*b*) curved shapes,<br>as shown in the drawings ... ... ... | 302 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. G. 11. | Providing first class Burnt Brick honey-comb masonry with conventional/I.S. type bricks in half brick/one brick thickness, in cement mortar 1 : as per detailed drawings or as directed including scaffolding, striking joints, pointing with 1 : 3 cement mortar and watering complete. ... ... ... | 302 |
| Bd. G. 12. | Providing second class Burnt Brick honey-comb masonry with conventional/I.S. type bricks in half brick/one brick thickness, in cement mortar 1 : as per detailed drawings or as directed, including scaffolding, raking out joints, plastering with 1:4 cement plaster and watering complete ... ... | 302 |
| Bd. G. 13. | Providing second class Burnt Brick masonry coping of conventional/I.S. type bricks in cement mortar 1 : /lime mortar ... 1 : of rectangular, chamfered or of other shape as per detailed drawings over plinth, parapet or wall including raking out joints, and watering complete. ... ... ... | 303 |
| Bd. G. 14. | Providing Burnt Brick string course drip mouldings, cornice with conventional/I.S. type second class bricks in cement mortar 1 : /lime mortar 1 : , moulded as per detailed drawings including scaffolding, raking out joints, plastering with cement mortar 1:4 and watering complete ... ... | 303 |
| Bd. G. 15. | Providing Burnt Brick archwork with conventional/I.S. type second class bricks, in cement mortar 1 : as per detailed drawing or as directed including centering, form-work, scaffolding, raking out joints and watering complete. ... ... ... | 304 |
| Bd. G. 16. | Providing Burnt Brick archwork of flat or curved shape with conventional/I.S. type first class bricks in cement mortar 1 : /lime mortar 1 : as per detailed drawings or as directed including centering, form-work, scaffolding, pointing with cement mortar 1:3 and watering complete. ... ... | 305 |
| Bd. G. 17. | Providing Burnt Brick archwork with conventional/I.S. type second class bricks for jack arch type floor or roof as per detailed drawings or as directed in cement mortar 1 : /lime mortar 1 : including centering, form-work, scaffolding, raking out joints, watering complete. ... ... ... | 305 |
| Bd. G. 18. | Providing second class Burnt Brick masonry with conventional/I.S. type bricks in mud mortar in superstructure including pointing with cement mortar 1 : 3/raking out joints when plastering is to be done, scaffolding and watering complete. ... ... | 306 |
| Bd. G. 19. | Providing sundried brick work in mud mortar with conventional/I.S. type bricks in superstructure including the necessary scaffolding, striking joints and raking out joints when mud plastering is to be done. ... ... ... ... ... | 306 |
| Bd. G. 20. | Providing brick work of fire bricks to the shape and size as shown on drawing in fire clay including the necessary scaffolding, raking out joints, pointing and curing complete. ... ... | 307 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. G. BRICK WORK

Bd. G. 1. *Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1 :— [lime mortar :— in foundations and plinth of inner walls/ in plinth of external walls including dewatering, striking joints on unexposed faces, raking out joints on exposed faces and watering complete.*

Bd. G. 1. 1. *General.*—The item refers to second class Burnt Brick masonry in foundations and plinths of buildings. The item shall comply with specification No. 8. 8(b) subject to the following.

Bd. G. 1. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

Bd. G. 1. 3. *Mortar.*—Cement mortar or Lime mortar as mentioned in the item shall comply with specification No. B. 5 a or No. B. 3 a, respectively and shall be of proportion as mentioned in the wording of the item.

Bd. G. 1. 4. *Preparation of foundation bed.*—If the foundation is to be laid directly on the excavated bed, the bed shall be levelled, cleared of all loose materials, cleaned and wetted before starting masonry. If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the Engineer's approval for the foundation bed, before foundation masonry is started.

Bd. G. 1. 5. *Laying.*—The thickness of the joints in brick work shall be 12 mm. (about $\frac{1}{2}$"), for conventional bricks and 10 mm. (about 3/8") for I.S. type bricks. When pucca flooring is to be provided flush, with the top of, plinth, the inside plinth offset, shall be kept lower than the outside plinth top by the thickness of the flooring.

In addition to the individual mason's tools like trowel, a set of mason's tools comprising of string, plumb bob, mason's square, mason's spirit level and wooden straight edge shall be kept on the work site for every group of three masons or less for frequent use and checking during the progress of work.

Bond shall be English unless otherwise specified or directed by the Engineer. Quoin bricks shall be laid header and stretcher in alternate courses, bond being obtained by placing a closer next to the quoin header. The arrangement of quoins in a course shall generally be symmetrical. Holes of required size shall be left in the brick work during laying only for fixing pipes, service lines, passage of water etc. After the service lines etc. are fixed, the extra hollow left in the holes shall be filled with 1 : 3 cement mortar or 1 : 3 : 6 cement concrete and the face neatly made up with bricks in cement mortar. When iron fixtures etc. are to be laid in the brickwork, in lime, the portion of iron fixtures etc. in the brick work shall be entirely covered with not less than 10 mm. of 1 : 3 cement mortar to prevent corrosion.

The face of exposed brick work shall be cleaned and mortar droppings removed the very day the brickwork is laid.

Bd. G. 1. 6. *Striking joints and raking out joints.*—For foundation brick work, joints shall be struck smooth while laying the brick work only. If this is not done, the joints shall be raked out to a depth of not less than the thickness of the joints when mortar is green. If the raking is not done when the mortar is green chipping of mortar in the joints shall be done without damaging the brick work. The raked out joints shall be cleaned of all loose particles wetted and filled with 1 : 3 cement mortar pressed and struck smooth with trowel. It shall be watered for 14 days. In plinth brick work, the joints in the inside surface shall be struck smooth as described above.

The joints in the outside exposed surfaces up to 15 cm. (about 6") below the finished ground level shall be raked out for a depth of not less than the thickness of the joints when the mortar is green if plastering or pointing is to be done.

Bd. G. 1. 7. *Item to include.*—According to specification No. B. 8. a. 8.

Preparing foundations, fixing pipes, service lines etc. and filling hollows shall also be included in the item.

Change of dimensions of brick masonry shall not entitled the contractor to create claim.

Bd. G. 2. *Providing first class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1:— [lime mortar 1:— in plinth including dewatering striking joints on unexposed faces, pointing with cement mortar 1 : 3 on exposed faces and watering complete.*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.G.4.2.**

Bd. G. 2. 1. *General.*—The specifications pertain to first class Burnt Brick masonry in plinth commencing from 15 cm. (about 6″) below the general finished ground level up to the top of plinth. The item shall generally comply with specification No. B. 8(*a*) subject to the following :—

Bd. G. 2. 2. *Bricks.*—Bricks shall be of first class of the type mentioned in the item.

Bd. G. 2. 3. *Mortar.*—Cement mortar or lime mortar as mentioned in the item shall comply with, specification No. B. 5. a or B. 3. a respectively. The proportion shall be as mentioned in the wording of the item.

Bd. G. 2. 4. *Laying.*—According to specification No. B. 8(*a*) and Bd. G. 1. 5. But the thickness of joints shall be 10 mm. (about 3/8″) for both types of bricks.

Bd. G. 2. 5. *Striking joints and pointing with cement mortar 1 : 3.*—The joints on the inside faces shall be struck smooth while laying the masonry only. The joints in the outside faces shall be pointed according to specification No. B. 13 with cement mortar 1 : 3 up to 15 cm. (about 6″) below the finished ground level. It shall be watered for 14 days.

Bd. G. 2. 6. *Item to include.*—According to specification No. B. 8. a.

Pointing the outside faces with 1 : 3 cement mortar, fixing pipes, service lines, etc. shall also be included in the item, pipes, etc. being paid for separately.

Bd. G. 3. *Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1:— /lime mortar 1:— in plinth as backing in composite masonry including dewatering, striking joints and watering complete.*

Bd. G. 3. 1. *General.*—The item refers to second class Burnt Brick masonry in plinth as backing in composite masonry. The item shall generally comply with the relevant specifications given for item No. Bd. G. 1 subject to the following.

Bd. G. 3. 2. *Laying.*—The laying of brick work as backing in composite masonry shall be done simultaneously with the laying of the facing work. Each facing course shall correspond to the height of complete number of courses of brick backing including mortar joints.

Bd. G. 3. 3. *Bond.*—Bond shall be English or as directed by the Engineer. The brick backing shall be bonded well with the facing by using cut bricks where necessary Facing bond-stones shall pass right through to the rear face of the backing.

Bd. G. 3. 4. *Item to include.*—As specified in specification No. B. 8. a. 8 and shall also include cutting of bricks and wasting for securing proper bond with the facing.

Bd. G. 3. 5. *Mode of measurement and payment.*—According to specification No. B. 8. a. 9.

The contract rate shall be for a unit of one cubic metre.

The thickness of backing shall be taken as the full thickness of the wall minus the total width of facing required to be paid as facing. No further deductions shall be made for the tailing back of any part of facing into the backing. Dimensions shall be measured correct to two places of decimals of a metre and quantity worked out correct to two places of decimals of a cubic metre.

Bd. G. 4. *Providing first class Burnt Brick masonry with conventional/I.S. type bricks cement mortar 1:— /lime mortar 1:— in superstructure including pointing with cement mortar 1 : 3 on outside exposed faces and raking out joints where plastering is to be done, watering and scaffolding complete.*

Bd. G. 4. 1. *General.*—The item refers to first class Burnt Brick masonry in superstructure of buildings. The specifications given for item No. Bd. G. 2 shall apply to this item with the following specification in addition :—

Bd. G. 4. 2. *Laying.*—Brick work shall be laid in English bond unless specified otherwise. Bricks in each course shall break joint with those in the course below and above. Brick work shall be constructed for the number of floors as specified on the drawings. The fixtures, plugs, frames of doors, windows, cupboards, etc., shall be housed into the brick work at the correct location and levels while laying brick work only. The iron and steel fixtures in brick-in lime masonry shall be laid in 1 : 3 mix cement mortar to prevent corrosion. The ends of steel beams resting on masonry shall be built round with space for repainting where necessary. If required to be embedded, they shall be protected with red lead primer coat and a thick coat of hot coal tar or embedded in 1 : 2 : 4 cement concrete. Portions of timber scantlings in contact shall be painted with 2 coats of hot boiling coal tar before fixing in masonry.



अनुक्रमणिका
Table of Contents

The beams shall be supported on templates of dressed stone or plain or reinforced concrete fixed in the wall. The templates will be paid for separately. Where the R.C.C. slabs bear on the walls, the top of the wall shall be levelled and finished smooth with 12 mm. thick 1 : 4 cement mortar and cured. The plaster may be white washed of covered with paper to minimise friction when movement of slab is expected. Where require, rebates shall be cut into the brick work to hold the frames of doors, windows, etc. Holdfasts shall be built into the brick work. Holes, chases, sleeves, openings, etc., of the required size and shape shall be left in the brick work during laying only for fixing pipes, service lines, passage of water, etc. The dimensions of openings shall as far as possible conform to the whole multiples of brick dimensions to minimise cutting of bricks. After the service lines, pipes etc., are fixed the extra hollow left in the hole shall be filled with 1:3 cement mortar or 1:3:6 cement concrete and shall be finished neatly with facing bricks. The frames of wooden doors and windows and heavy steel door and window frames shall be built in as the brick work is being constructed. But for ordinary steel doors and windows, required openings for frames, holdfasts, etc., shall be left in the wall and frames embedded later to avoid damage to the frames. Well seasoned tapered wooden plugs of the size shown in the drawings or directed by the Engineer shall be embedded in the brick work during laying only. The joints with frames etc. shall be neatly finished while pointing or plastering.

The top of brick work for receiving slopping roofs, gables, etc., shall be finished to the required slope and the required height. No hollow space shall be left between the roof and the top of the wall. Anchors of roof trusses, etc., shall be embedded in the masonry as it proceeds.

Fixtures (except wooden plugs), frame, anchors, templates, etc., shall however, be paid for under separate items.

For the face of brick work where plastering is to be done, joints shall be raked out to a depth not less than the thickness of joints. Other faces shall be pointed as specified in B. 13.

The face of brick work shall be cleaned and mortar droppings removed the very day that brick work is laid. Scaffolding shall be double.

Bd. G. 4. 3. *Item to include.*—As per B. 8. a. 8.

The rate shall also include provision of wooden tapered plugs, leaving holes for fixing pipes etc., at required places, building in of holdfasts, erecting doors and window frames, filling the hollows with cement concrete or mortar and finishing, forming chases and grooves, rough cutting and waste for forming gables, splays at jambs, etc., pointing with cement mortar 1 : 3 on outside exposed faces, raking out joints and plastering and white washing for preparing tops of walls under R.C.C. slabs. Holdfast and other fixtures however, shall be paid under separate items.

Bd. G. 4. 4. *Mode of measurement and payment.*—According to B. 8. a. 9.

For walling which is more than 3 bricks in thickness, the actual thickness of wall shall be measured to the nearest one cm.

Deductions for doors, windows, etc., shall be made for the actual square opening in the masonry at the frames although the jamb, sills, etc., may be splayed. No deduction shall be made for the embedded portions of items like cornices, string courses, corbels, etc., which are paid separately on running metre basis. Floor and roof slabs, sills, lintels and portion of R.C.C. staircases which occur in the masonry and are separately paid for shall be deducted.

Bd. G. 5. *Providing second class Burnt Brick masonry with conventional/I.S. type bricks, in cement mortar 1:— /lime mortar 1:— in superstructure including striking joints, raking out joints, watering and scaffolding complete.*

Bd. G. 5. 1. *General.*—The item refers to second class brick work in superstructure and shall comply with specification No. Bd. G. 4 subject to the following:

Bd. G. 5. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

Bd. G. 5. 3. *Thickness of joints.*—Thickness of joints shall be 10 mm. (about 3/"8) for brick work with I.S. type bricks and 12 mm. (about ½") for brick work with conventional bricks.

Bd. G. 5. 4. *Scaffolding.*—Scaffolding may be single.

Bd. G. 5. 5. *Raking out joints.*—The joints shall be raked out to a depth of not less than the thickness of joints for affording good bond when plastering or pointing is to be done. Otherwise joints shall be struck.

Bd. G. 5. 6. *Item to include.*—According to Bd. G. 4. 3.

The item provides for striking joints. Pointing shall be done when it is specially included in the wording of the item.

Bd. G. 6. *Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1 :— /lime mortar 1 :— in superstructure, as backing in composite masonry including scaffolding, raking out joints and watering complete.*

Bd. G. 6. 1. *General.*—The item refers to second class burnt brick masonry in superstructure, as backing in composite masonry. The relevant specifications for item Nos. Bd. G. 3 and Bd. G. 5. shall also apply for this item subject to the following:—

Bd. G. 6. 2. *Scaffolding.*—Scaffolding may be single.

Bd. G. 6. 3. *Item to include.*—According to specification No. Bd. G. 3. 4 and Bd. G. 4. 3.

Bd. B. 6. 4. *Mode of measurement and payment.*—According to specification No. Bd. G. 3. 5.

Deductions shall be made as specified in Bd. G. 4. 4.

Bd. G. 7. *Providing second class Burnt Brick masonry with convential/I.S. type bricks in cement mortar 1 :— , in half brick thick wall including mild steel longitudinal reinforcement of 2 bars of 6 mm. (about ¼") diameter, 2 hoop iron strips 25 mm. ×1.6 mm. (16 gauge) at every third course, properly bent and bonded at ends, scaffolding, raking out joints and watering complete.*

Bd. G. 7. 1. *General.*—The item refers to Burnt Brick masonry in half brick wall, exclusive of any finishing on either side. The item shall comply with specification No. B. 8. b. subject to the following:—

Bd. G. 7. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

Bd. G. 7. 3. *Mortar.*—Cement mortar shall conform to specifications No. B. 5. a. The proportion of the mortar shall be as mentioned in the wording of the item.

Bd. G. 7. 4. *Reinforcement bars.*—The mild steel reinforcing bars shall conform to specification No. A. 10. Two bars of 6 mm. (about ¼") diameter shall be used longitudinally at every third course of the brick work. The first reinforcement shall be placed on the top of bottom most course. The bars shall be fully embedded in the mortar and the ends shall be properly bonded in the vertical joints of brick work or to the main walls as directed by the Engineer. Laps shall be provided of minimum length 45 d.

Bd. G. 7. 5. *Hoop iron strips.*—These may be used instead of mild steel bar reinforcement. Two hoop iron strips of size 25 mm. (about 1") wide and 1.6 mm. thick (16 gauge) shall be placed longitudinally in every third joint of the brick courses. The first reinforcement shall come on the top of the bottom most course. The strips shall be fully and properly embedded in the mortar and the ends shall be properly bonded in the vertical joints of the brick work or to the main walls as directed by the Engineer. If continuous strip is not available, strips shall be rivet jointed with a minimum overlap of 8 cm. (3").

Bd. G. 7. 6. *Laying.*—All the bricks shall be laid stretcherwise breaking joint with those in the upper and lower courses. Fixtures, plugs, holdfasts, frames of doors, windows shall be housed into the brick work while laying only and at the correct levels and positions. Holes of required size and shape shall be left in the brick work during laying for fixing pipes, or service lines, passage of water, etc. After the service pipes, etc., are fixed, the extra hollow left in the hole shall be filled with 1 : 3 cement mortar or 1 : 3 : 6 cement concrete. Holdfasts for frames or doors and windows shall be accommodated in the joints of the brick work while laying. The joints in the courses where reinforcement is placed shall admit of a mortar cover of at least 5 mm. for the reinforcement. For joints in other layers the thickness shall not be more than 10 mm. (about 3/8") for brick work with I.S. type brick and not more than 12 mm. (about ½") for brick work with conventional bricks. A set of mason's tools shall be maintained on work for each group of 3 masons or less for frequent use and checking. The ends of walls shall be bonded into the side walls where necessary.

Bd. G. 7. 7. *Raking out joints.*—The joints shall be raked out to a depth of not less than the thickness of the joints.

Bd. G. 7. 8. *Item to include.*—

According to B. 8(a). 8. but with second class bricks. The rate shall also include—

(1) Providing and fixing of mild steel reinforcement bars as mentioned in the item or hoop iron strips.

(2) Leaving holes for fixtures, pipes, etc., fixing them and finishing.

(3) Building in frames, holdfasts, etc., and forming chases, grooves, etc.,

The fixture, frames, pipes, etc., themselves shall be paid for under separate items.

Bd. G. 7. 9. *Mode of measurement and payment.*—The contract rate shall be per square metre of the completed brick work area. The dimensions shall be measured correct up to one centimetre and area worked out correct up to 2 places of decimals of a square metre. Where half brick thick wall is joined to the main walls, the measurement for half brick thick wall shall be taken for its clear length from the faces of the main or partition walls.

No deductions shall be made for (*a*) ends of dissimilar materials, (i.e. joists beams, lintels, posts, girders, ogers, etc.) up to 500 sq. cm. each in section and (*b*) openings up to 0.1 sq. m. in area.

Deductions for doors and windows shall be inclusive of their frames. If R.C.C. or other beams, posts, etc., are embedded in the brick work and are paid for separately, their face areas shall be deducted.

Bd. G. 8. *Providing Burnt Brick-on-edge masonry, with second class bricks of conventional type, in cement mortar 1 : including mild steel longitudinal reinforcement of 2 bars of 6 mm. (about ¼") diameter/one strip of hoop iron 25 mm.×1.6 mm. (16 gauge) placed at every third course, properly bent and bonded at ends, scaffolding, raking out joints and watering complete.*

Bd. G. 8. 1. *General.*—These specifications pertain to brick-on-edge masonry, with second class Burnt Bricks of the conventional type the thickness of wall being the least edge thickness of one brick without plastering or finishing. The specifications given for item No. Bd. G. 7 shall apply with the following changes:—

Bd. G. 8. 2. *Bricks.*—Bricks shall be of the second class of the conventional type.

Bd. G. 8. 3. *Laying.*—Bricks shall be laid on edge. When hoop iron is used for reinforcement, only one strip shall be used.

Bd. G. 9. *Providing first class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1: /lime mortar 1: including scaffolding, pointing with cement mortar 1: and watering in pillars of—*

(*a*) *rectangular or square shape;*

(*b*) *curved shapes;*

*as shown in the drawings.*

Bd. G. 9. 1. *General.*—The item provides for the construction of first class Burnt Brick masonry in pillars of sizes and shapes shown in the drawings or as directed by the Engineer. The work shall be classed as pillar if the ratio of sides is equal to or less than 3 : 1 and as wall if the ratio of sides is larger than 3 : 1. The specifications given for item No. Bd. G. 4 shall apply subject to the following:—

Bd. G. 9. 2. *Bricks.*—Bricks shall be of the type mentioned in the item. Where curved shapes are required specially moulded burnt bricks of the required shape and size shall be used.

Bd. G. 9. 3. *Mortar.*—The type and mix of the mortar shall be as indicated in the item.

Bd. G. 9. 4. *Laying.*—The brick pillar shall be of the exact shape and size as shown on the drawings or as directed by the Engineer. For shapes other than rectangular or square, specially moulded bricks shall be used. In all cases, joints shall be 10 mm. thick.

Bd. G. 9. 5. *Cement pointing.*—Brick work shall be neatly pointed with cement mortar 1:3 as specified in B. 13.

Bd. G. 9. 6. *Item to include.*—As per B. 8. a. 8. The rate shall also include specially moulded bricks and setting them to obtain the required shapes for the pillars and cement pointing.

अनुक्रमणिका
Table of Contents



**Bd.G.12.2.**

Bd. G. 9. 7. *Mode of measurement and payment.*—According to B. 8. a. 9.

Pillars with shapes other than square or rectangular shall be measured and paid separately for their net quantity.

Bd. G. 10. *Providing second class Burnt Brick masonry with conventional/I.S. type bricks in cement mortar 1 : /lime mortar 1 : including scaffolding, raking out joints and watering in pillars of—*

*(a) rectangular or square shape ;*

*(b) curved shapes ;*

*as shown in the drawings.*

Bd. G. 10. 1. *General.*—The item provides for the construction of second class Burnt Brick masonry in pillars of sizes and shapes shown in the drawings or as directed by the Engineer. The specifications given for item No. Bd. G. 5. and the additional stipulations given in Bd. G. 9 shall apply subject to the following:—

Bd. G. 10. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

Bd. G. 10. 3. *Laying.*—Cut and rubbed bricks shall be permitted when the shape is curved.

Bd. G. 10. 4. *Item to include.*—According to specification No. B. 8. a. 8.

The rate shall include cutting and rubbing the bricks so that when set in the pillars, the pillars shall conform to the required shapes.

Bd. G. 10. 5. *Mode of measurement and payment.*—According to specification No. Bd. G. 9. 7.

Bd. G. 11. *Providing first class Burnt Brick honey-comb masonry with conventional/I.S. type brick in half brick/one brick thickness in cement mortar 1 : as per detailed drawings or as directed including scaffolding, striking joints pointing with 1 : 3 cement mortar and watering complete.*

Bd. G. 11. 1. *General.*—The item refers to first class Burnt Brick, honeycomb masonry wall half brick thick or one brick thick as mentioned in the item. The item shall comply with general specification No. B. 8. a subject to the following:—

Bd. G. 11. 2. *Brick.*—Bricks shall be of the first class of the type mentioned in the item.

Bd. G. 11. 3. *Mortar.*—Mortar shall be of cement and sand complying with specification B. 5. a and proportion shall be as specified in the wording of the item.

Bd. G. 11. 4. *Laying.*—The honey-comb brick-work shall be constructed as per drawings given to the contractor or as directed by the Engineer. For half brick thick walls, stretcher bond shall be used through out the wall keeping holes of rectangular shapes or of shapes as shown on the detailed working drawings approved by the Engineer. For one brick thick wall, bond shall be as directed by the Engineer. Bricks shall have a minimum bearing of 4 cm. for half brick and 2 cm. for one brick on either side. The wall shall be half brick or one brick thick as mentioned in the item without any plastering on either side. The thickness of joints shall be 10 mm. (about $\frac{3}{8}$") and the joints shall be struck smooth or pointed with 1:3 cement mortar as mentioned in the item.

Bd. G. 11. 5. *Item to include.*—According to B. 8. a. 8.

Bd. G. 11. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the honey-comb work without any deductions for holes. Linear dimentions shall be measured correct up to a centimetre and the area worked out correct up to two places of decimals in square metre.

Bd. G. 12. *Providing second class Burnt Brick honey-comb masonry with conventional/ I.S. type bricks in half brick/one brick thickness, in cement mortar 1 :—as per detailed drawings or as directed including scaffolding, raking out joints, plastering with 1 : 4 cement plaster and watering complete.*

Bd. G. 12. 1. *General.*—The item refers to second class Burnt Brick honey-comb masonry wall half brick or one brick thick as mentioned in the item. The specification for item No. Bd. B. 11 shall apply with following changes:—

Bd. G. 12. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

अनुक्रमणिका
Table of Contents

Bd. G. 12. 3. *Laying.*—The thickness of joints in brick work shall be 12 mm. (about ½") with conventional bricks and 10 mm. (about 3/8") with I.S. type bricks.

Bd. G. 12. 4. *Plastering.*—The brick work shall be plastered with cement mortar 1 : 4 with a thickness of 12 mm. (about ½") according to specification No. B. 11.

Bd. G. 12. 5. *Item to include.*—As per B. 8. a. 8.

The item shall include cement plaster also.

Bd. G. 12. 6. *Mode of measurement and payment.*—According to specification No. Bd. G. 11. Less plaster due to holes and more plaster due to sides shall be covered by the rate per square metre of the finished work.

Bd. G. 13. *Providing second class Burnt Brick masonry coping of conventional/I.S. type bricks in cement mortar 1:— /lime mortar 1:— of rectangular chamfered or of other shape as per detailed drawings over plinth, parapet or wall including raking out joints and watering complete.*

Bd. G. 13. 1. *General.*—The specifications pertain to second class Burnt Brick masonry for coping over plinth, parapet or wall as per detailed drawings and as directed by the Engineer. The item shall generally comply with specification No. B. 8. b subject to the following :

Bd. G. 13. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item. If mouldings are to be provided, the bricks shall be cut to the required shape unless specially moulded bricks are specified in the special provisions.

Bd. G. 13. 3. *Mortar.*—Cement mortar or lime mortar as mentioned in the item shall comply with specification No. B. 5(a) or B. 3(a) respectively. The proportion shall be as mentioned in the wording of the item.

Bd. G. 13. 4. *Laying.*—When coping is chamfered, moulded or otherwise shaped, the bricks shall be cut and rubbed to the required shape and laid to conform to the size and shape of the coping shown on the drawings or as directed by the Engineer. The bricks shall normally be laid on edge except at the corners unless otherwise directed by the Enigneer. Corners shall be made up by quoin bricks, laid header and stretcherwise. Joints shall be 12 mm. thick for conventional bricks and 10 mm. for I.S. type bricks.

Bd. G. 13. 5. *Raking out joints.*—The joints on the exposed faces shall be raked out for not less than the thickness of the joints for affording proper bond for the plaster.

Bd. G. 13. 6. *Item to include.*—As specified in specification No. B. 8. a 8. and shall include cutting of bricks to the required shape, laying them on edge in cement mortar to the shape or moulding shown in the plans, providing stable quoins of the required shape with flat bedding of bricks and raking out joints.

Bd. G. 13. 7. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre (35.3 cft.) of brick masonry in coping. The quantity of brick work to be paid under this item shall be in number of cubic metres measured for the completed work and to dimensions not exceeding those shown on the drawings or as ordered by the Engineer. Chamfered, curved or other shaped portions obtained by cutting bricks shall be measured to the least rectangular dimensions before cutting bricks to shapes or chamfer. Dimensions shall be measured and quantity of item worked out correct to two places of decimals in metres and cubic metres respectively. If brick work is to be plastered the measurements shall be exclusive of plaster. When tendered rate is per running metre, the length shall be measured along the centre line correct up to a cm.

Bd. G. 14. *Providing Burnt Brick string course, drip moulding cornice with conventional/ I.S. type second class bricks in cement mortar 1:— /lime mortar 1:— moulded as per detailed drawings including scaffolding raking out joints, plastering with cement mortar 1 : 4 and watering complete.*

Bd. G. 14. 1. *General.*—The item refers to second class Burnt Brick cornice, etc., as per detailed drawings or as directed by the Engineer. The item shall conform to specification No. B. 8. B. subject to the following :—

Bd. G. 14. 2. *Bricks.*—Bricks shall be of second class of the type mentioned in the item.

Bd. G. 14. 3. *Mortar.*—Cement mortar or lime mortar as mentioned in the item shall comply with specification No. B. 5. a or B. 3. a respectively. The proportion of mortar shall be as mentioned in the wording of the item.

Bd. G. 14. 4. *Laying.*—All burnt brick string courses cornices, drip mouldings shall be laid with bricks to the shapes shown in the detailed drawings or as directed by the Engineer by cutting and rubbing the bricks if necessary. The bricks shall be laid flat or on edge as shown in the drawings or as directed by the Engineer. Cornices, string courses, etc., shall not ordinarily project by more than about 15 cm. (about 6″) and this projection shall be obtained by projecting each brick course by not more than ¼th of the brick length.

The thickness of joints in the brick work shall be 12 mm. (about ½″) with conventional brick and 10 mm. (about 3/8″) with I.S. type bricks. The joints shall be raked out to a depth of 12 mm. (about ½″). The cornices, string courses, etc., shall be adequately protected against any damage during execution. Plastering shall be done to such thickness as to bring out the mouldings shown in the detailed drawings faithfully and not less than 12 mm. thick in any one place.

Bd. G. 14. 5. *Item to include.*—As specified in the specification No. B. 8. a 8, and shall also include cutting the bricks to required shape and plastering with cement mortar 1 : 4. The mouldings shall be brought out faithfully.

Bd. G. 14. 6. *Mode of measurement and payment.*—The contract rate shall be per running metre of the cornice, string course, etc., the section and shape of the projecting portion conforming to those given in the drawing approved by the Engineer.

The linear measurement shall be taken over all, over the plaster along the centre line of projection of cornices, etc., and correct up to a centimetre.

No deductions shall be made from the masonry of wall for the bearings of cornices, string, courses, etc.

Bd. G. 15. *Providing burnt Brick archwork with conventional/I.S. type second class bricks, in cement mortar 1 : as per detailed drawing or as directed including centering form-work, scaffolding, raking out joints and watering complete.*

Bd. G. 15. 1. *General.*—The item refers to second class burnt brick archwork to be done in the superstructure of buildings. The item shall comply generally with specification No. B. 8. b. subject to the following :

Bd. G. 15. 2.—*Bricks.*—All bricks for archwork shall be second class of the type mentioned in the item. Normally they shall not be cut. Bricks forming skew backs shall be cut so as to give proper radial bearing to end voussoirs unless specially moulded bricks are specified in the special provisions.

Bd. G. 15. 3. *Mortar.*—Mortar shall be cement mortar conforming to B. 5. a with proportion as mentioned in the wording of the item.

Bd. G. 15. 4. *Form-work.*—Formwork and centering for arch shall conform to specification No. B. 6. 5(*b*). Before constructing the arch masonry, the formwork shall be inspected and passed by the Engineer. The centering shall be tightened with hard wood wedges so that the same could be struck without any jerks being transmitted to the arch. The striking arrangements shall permit of all portions of shuttering being lowered 2 cm. to 4 cm. simultaneously. The design of centering must permit this being effected. The centering should be struck after one week after completion of arch when the mortar is fully set and thi. too only with the permission of the Engineer and after the spandrel has been filled in and the arch safely loaded.

Bd. G. 15. 5. *Laying.*—Arches shall be plain arches and shall be built half brick thick in concentric rings and each ring shall be fully completed before the one above it is commenced. The arch work shall be carried up from both ends uniformly and keyed in the centre. In all cases centre line of the brick face shall be radially placed, and bricks in each ring shall break joint with those in the next. The arch rings shall in all cases be bonded together by brick keys or special keys which may be of stone, or concrete. The Engineer may issue special drawings or orders regarding details of these keys. Thickness of joints in archwork with plain cement bricks shall not be less than 5 mm. (3/16″) at intrados and not more than 15 mm. (9/16″) at extrados. As soon as the archwork is completed, the spandrel walls shall be built up in a balanced manner from both sides to load the arch uniformly.

Skewbacks shall be of cut bricks and set to give proper radial bearing to end bricks. Defects in this particular shall not be remedied by the extravagant use of mortar nor shall patching up by chips, etc., be permitted.

*Raking out joints.*—The joints shall be raked out to a depth of 12 mm. (½″) when mortar is still green.

Bd. G. 15. 6. *Item to include.*—According to Bd. 8. a. 8 but rate shall also include (1) all labour, material, and equipment, to erect, ease, strike, dismantle and remove the centering and formwork for arches.

(2) All labour, material and equipment to provide and fix, the key bricks to the arches as per detailed drawings or as directed by the Engineer. Keys of other materials will be paid separately.

(3) Skew backs with cut bricks where necessary.

Bd. G. 15. 7. *Mode of measurement and payment.*—As per B. 8. a. 9.

The length of such shall be measured as the mean of the extrados and intrados of the arch correct to 1 cm. Thickness and width shall be measured correct to a cm.

Brick work for skewbacks shall be included in the arch work and shall be measured net as cut. Only those bricks which are cut to act as skewbacks shall be paid under this item.

If, however, the skewbacks and keys are made of materials other than bricks, they shall be paid separately.

Bd. G. 16. *Providing Burnt Brick arch work of flat or curved shape with conventional/ I.S. type first class bricks in cement mortar 1 : /lime mortar 1 : as per detailed drawings or as directed including centering, form-work, scaffolding, pointing with cement mortar 1 : 3 and watering complete.*

Bd. G. 16. 1. *General.*—The item refers to first class burnt brick arch work to be done in the superstructure of buildings. The specifications given for item No. Bd. G. 15 shall apply subject to the following :

Bd. G. 16. 2. *Bricks.*—Bricks shall be of the first class of the specified type and shall be cut and rubbed to the required shape to give uniformly wide radial joints unless specially moulded bricks are specified in the special provisions.

Bd. G. 16. 3. *Laying.*—Curved arches shall be gauged arches built out of bricks cut and rubbed to the required shape as per detailed drawings or as directed. Cut and rubbed bricks and specially moulded bricks when provided in the special provisions shall be laid with radial joints. Laying shall be as specified in Bd. G. 15. 5 except that the arches shall not be laid in half brick thick rings but the bricks shall be laid alternately as header and stretcher in section breaking joints with continuous radial joints for the full depth of the arch. The thickness of joints shall not exceed 10 mm. (3/8") and shall be uniform throughout. Bricks for the spandrel walls shall be cut to fit the curvature of the arch.

*Flat Arches.*—These shall be gauged arches of bricks, cut and rubbed to the required shape as per drawings or as directed by the Engineer unless specially moulded bricks are specified in the special provisions. The extrados shall be kept horizontal and the intrados shall be given a slight camber of 1/100th of the span. The centre of the arch from which joints shall radiate shall be determined by the point of intersection of the two lines drawn from the ends of the arch at the springing level and at 60° to the horizontal. In flat arches, bricks shall be laid with radial through joints to the full depth of the arch and voussoirs shall break joints with each other. The arch work shall be carried up from both ends uniformly and keyed in the centre. The thickness of the joints shall not exceed 10 mm. The top of the arch shall be horizontal.

Bd. G. 16. 4. *Pointing.*—The brick work shall be finely pointed with cement mortar 1 : 3, as specified in specification No. B. 13 to give a neat appearance.

Bd. G. 16. 5. *Item to include.*—As per Bd. G. 15. 7.

The rate shall include cutting of bricks and cement pointing.

Bd. G. 16. 6. *Mode of measurement and payment.*—As per Bd. G. 15. 7.

Bd. G. 17. *Providing Burnt Brick archwork with conventional/I.S. type second class bricks for jack arch type floor or roof as per detailed drawings or as directed in cement mortar 1 : /lime mortar 1 : including centering, form-work, scaffolding, raking out joints and watering complete.*

Bd. G. 17. 1. *General.*—The item refers to second class brick arch work for jack arch floors or roof as per detailed drawings. The jack arch floor or roof shall consist of the following components : (*a*) Brick jack arches constructed in bricks laid on edge in a single course with specified type of mortar and specified mix and supported over steel or concrete, I shaped joists spaced at centres of 1 to 1.5 metres. The joists will be paid under a separate item.

अनुक्रमणिका
Table of Contents





(*b*) A course of brickbat lime concrete laid and compacted to specified thickness over the brick arches and having the required floor finish at top. This item will be paid for separately.

The jack arch floor shall be constructed as per I.S. 2118-1962, Code of practice for Construction of Jack arch type of built up floor or roof, subject to the following :—

Bd. G. 17. 2. *Laying of Brick work.*—The joints shall be fixed and centering erected according to specification No. I.S. 2118-1962 to give a smooth and correct curvature. The bricks shall be laid on edge symmetrically as specified in Bd. G. 15. The thickness of joints shall be as mentioned in Bd. G. 15. 5.

Bd. G. 17. 3. *Raking out joints.*—The joints of the soffit shall be raked out to a depth of not less than 12 mm. (about ½").

Bd. G. 17. 4. *Item to include.*—As per B. 8. a. 8. The rate shall also include providing striking and removing centering. Only the brick work in jack arches shall be paid under this item. Supports of steel or R.C.C. joints, tie rods for end brick arches, finishing of the soffit, brickbat lime concrete laid over the brick arches, and the required floor finish at the top shall be paid under separate items in the tender.

Bd. G. 17. 5. *Mode of measurement and payment.*—As per Bd. G. 15. 7.

Bd. G. 18. *Providing second class Burnt Brick masonry, with conventional/I.S. type bricks, in mud mortar, in superstructure, including pointing with cement mortar 1 : 3/taking out joints when plastering is to be done, scoffolding and watering complete.*

Bd. G. 18. 1. *General.*—The item provides for second class brick work in mud mortar for walls in superstructure of buildings. The specifications for item No. Bd. G. 5 shall apply with the difference that mud mortar shall be used instead of cement or lime mortar. Mud mortar shall comply with following specification :—

Bd. G. 18. 2. Mud mortar shall be prepared from carefully selected earth of tenacious nature, approved by the Engineer and free from roots, grass, miry earth and other injurious material. No clay shall be used which contains efflorescing salts, nor clay taken from a locality infested with white ants. Sand and chopped straw shall be added to this earth in such quantity that a dried lump of the mixture shall not show signs of cracking. The sand shall be thoroughly mixed with the mud. The Engineer's decision about the proportion of sand to mud shall be final. The mixture shall be well trodden and worked into the consistency of a thick paste by the addition of sufficient water and kept wet for not less than 2 days. The mud thus soaked shall be trodden again when it is to be used in the work, care being taken to remove all clods and stones.

Bd. G. 18. 3. *Laying.*—When brick-work at the top of wall or round the timber door or window frame is required to be built in cement or lime mortar, mud mortar shall not be used in such parts. This brick-work in cement or lime mortar shall be paid separately.

Bd. G. 18. 4. *Cement pointing.*—If specified in the wording of the item, the pointing shall be done in cement mortar 1 : 3 as per B. 13.

Bd. G. 18. 5. *Item to include.*—As per Bd. G. 4. 3 but with second class bricks.

Bd. G. 18. 6. *Mode of measurement and payment.*—As per Bd. G. 4.

Bd. G. 19. *Providing sundried brick work in mud mortar with conventional/I.S. type bricks in superstructure including the necessary scaffolding, striking joints and raking out joints when mud plastering is to be done.*

Bd. G. 19. 1. *General.*—The item provides for masonry of sundried bricks laid in mud mortar.

Bd. G. 19. 2. *Materials.*

Bd. G. 19. 2. 1. *Sundried bricks.*—These shall comply with specification No. A. 9. 3. Sizes of bricks shall conform to conventional or I.S. size as mentioned in the item.

Bd. G. 19. 2. 2. *Mud mortar.*—Mud mortar shall comply with the specifications given in Bd. G. 18. 2.

Bd. G. 19. 3. *Workmanship and method of laying.*

*Construction details—Size.*—Bricks of different dimensions shall not be allowed on the same work except when specially permitted by the Engineer.



अनुक्रमणिका
Table of Contents

*Face work.*—Bricks of entirely uniform colour should be selected for face work when it is not to be plastered.

*Bats.*—No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closers, in which case, full bricks shall be laid at corners, the bats being placed in the middle of the courses.

*Laying.*—The bricks shall be laid to lines, levels and shapes shown on the plans and thoroughly bedded in mud mortar and all joints shall be completely filled with mortar. Bricks shall be handled carefully so as not to damage their edges. All courses shall be laid truly horizontal. Vertical joints in one course shall break joints with those in the upper and lower courses. For battered faces, bedding shall be at right angles to the fact. The top of the masonry shall be finished to the shape and slope as shown on the drawings or as directed by the Engineer. The brick work shall be built for the number of floors shown in the drawings. Holes shall be left for pipes, fixtures, etc. Hold fasts shall be built into the masonry while laying only. Ends of beams, joints, slabs, lintels, sills, trusses, etc., shall be built in while laying only. When so specified, the brick work at the top of wall or round the frames of timber doors and windows shall be built in burnt brick in lime or cement mortar. This part of brick work shall be paid under separate items.

*Bond.*—Bond used shall be English unless otherwise specified and shall be carried through out the work. At all corners, alternate courses of brick work shall be laid header and stretcherwise so as to secure good bond. These shall be symmetrical in each course.

*Joints.*—Joints shall not exceed 12 mm. (about ½") for conventional bricks and 10 mm. (about 3/8") for I.S. type bricks in thickness and the thickness shall be uniform throughout. The joints shall be struck flush but they shall be raked out 12 mm. (about ½") deep when the mortar is soft, where mud plastering is to be done.

*Uniform raising.*—Structure shall be carried up regularly in all cases where the nature of work will admit it, not leaving any part, 60 cm. (about 2 ft.) lower than another. But where building at different levels is necessary, the breaks shall be stopped flat so as to give later a uniform level and effectual bond. Horizontal courses should be to line, and level and face plumb or to the batter as shown on the drawings. The rate of laying masonry may be up to a height of 60 cm. (about 2 ft.) per day.

Bd. G. 19. 4. *Scaffolding.*—According to specification No. B. 8. a. 3.

Bd. G. 19. 5. *Item to include.*—(1) All labour, materials, tools equipment and other items incidental to the satisfactory completion of brick masonry.

(2) Erecting and removing after completion of work all scaffolding, ladders and plant required for the execution of the work to the height as shown on the plan or as ordered by the Engineer.

(3) Constructing brick work in mud mortar to lines, level, batters and curves and to any position or shape and to the height shown on the plans or as ordered by the Engineer including striking joints and raking out joints when plastering is to be done.

(4) Clearing the site round the brick work so as to restore the area to its original condition.

Bd. G. 19. 6. *Mode of measurement and payment.*—As per Bd. G. 4. 4.

Bd. G. 20. *Providing brick work of fire bricks to the shape and size as shown on drawing in fire clap including the necessary scaffolding, raking out joints, pointing and curing complete.*

Bd. G. 20.1. *General.*—The item provides for brick work with fire bricks in lining to boilers, furnaces chimney, etc. The item shall generally comply with specifications given for item No. Bd. G. 4 subject to the following :—

Bd. G. 20. 2. *Bricks.*—They shall be moulded from fire clay, burnt at a high temperature in special kilns. They shall be dense, tough, evenly burnt throughout and of the required sizes and shapes and shall conform to I.S. 1526-1960. They shall be white or yellowish in colour. They shall show no signs of fusion when heated to a temperature of about 1,600°C. Crushing strength of fire bricks shall not be less than 130 kg. per sq. cm. (about 1,800 lbs./sq."). Weight of fire bricks shall be about 2.40 gm./c.c. (150 lbs./cft.) and absorption of water shall not be more than 10 per cent by weight when tested according to I.S. No. 1077-1966. All wedges or other shaped bricks not conforming to I.S. shape shall be normally specially moulded to suit the required shapes. Normal shaped fire bricks shall not be cut, unless specified or permitted by the Engineer in writing.

**Bd.G.20.6.**

Bd. G. 20. 3. *Fire-clay.*—Instead of ordinary cement mortar for laying the fire bricks, fire-clay shall be used. Fire-clay shall be of the best quality, finely ground of uniform texture and shall be of the approved manufacture. It shall conform to I.S. 195—1963. Fire-clay shall be mixed with water to get the consistency of paste and well puddled so that there will be no appreciable thickness of joint between the fire bricks.

Bd. G. 20. 4. *Laying.*—Fire brick work shall be constructed in the required places and to the required thickness, shapes, and height as shown in the drawings.

The fire bricks shall be merely dipped in well puddled fire-clay mixed with water to the consistency of paste, so that there is no appreciable thickness of joints between the fire bricks.

Fire brick lining shall be laid with one course of headers followed by two courses of strechers and the outer ordinary brick work if any laid to correspond with this setting. Where brick work touches the boiler, fire-clay only shall be used and on no account shall mortar containing lime or cement come in contact with the boiler.

Fire brick work shall be pointed in approved fire-clay. Ordinary burnt brick work behind the lining shall be built up, in cement 1 : 5 and coursed in the normal way. Broken brick filling will not be permitted. Ordinary brick work shall be paid for separately.

Bd. G. 20. 5. *Item to include.*—As per B. B. a 8. But the work shall be done in fire bricks set in fire-clay and pointed with fire-clay.

Bd. G. 20. 6. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre. The dimensions of the brick work shall be measured correct up to 2 places of decimals of a metre and quantity worked out correct up to 2 places of decimals of a cubic metre. No deductions shall be made for (*a*) ends of dissimilar materials up to 500 sq. cm. in section and (*b*) openings up to 0.1 sq. m. in area.

## Bd. H. STONE MASONRY

*List of items of Stone Masonry.*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. H. 1. | Providing uncoursed rubble masonry of trap/granite/quartzite/ gneiss stones in cement mortar 1 : /lime morter 1 : in foundations and plinth of inner walls/in plinth of external walls including dewatering, striking joints on unexposed faces and pointing with cement mortar 1 : 3 on outside exposed faces and watering ... ... ... ... ... | 313 |
| Bd. H. 2. | Providing uncoursed rubble masonry of trap/granite/quartzite/ gneiss stones in cement mortar 1 : /lime mortar 1 : in basements including dewatering, scaffolding, pointing with cement mortar 1 : 3 on exposed faces, raking out joints when plastering is to be done, striking joints where no pointing or plastering is to be done and watering ... ... ... | 313 |
| Bd. H. 3. | Providing uncoursed rubble masonry of trap/granite/quartzite/ gneiss stones in cement mortar 1 : 3 in basements with patent water proofing compound added to it including dewatering, scaffolding, pointing with cement mortar 1 : 3 or raking out joints when plastering is to be done and watering ... ... | 315 |
| Bd. H. 4. | Providing uncoursed rubble masonry of trap/granite/quartzite/ gneiss stones in cement mortar 1 : /lime mortarl : in superstrueture including pointing with cement mortar 1 : 3 on the outside and raking out joints when plastering is to be done/striking joints/pointing with cement mortar 1 : 3 when no plastering is to be done on the inside, watering and *scaffolding* ... ... ... ... ... | 315 |
| Bd. H. 5. | Providing random rubble masonry second sort of trap/granite/ quartzite/ gneiss stones in cement mortar 1 : /lime mortar 1 : in plinth including dewatering, striking joints on unexposed faces and pointing with cement mortar 1 : 3 on exposed faces and watering ... ... ... ... | 315 |
| Bd. H. 6. | Providing random rubble masonry second sort of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside, raking out joints when plastering is to be done/pointing with cement mortar 1 : 3/ striking joints when no pointing or plastering is to be done on the inside, watering and scaffolding ... ... | 316 |
| Bd. H. 7. | Providing random rubble masonry first sort of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime striking joints inside and pointing with cement mortar striking joints inside and pointing with cement mortar outside and watering ... ... ... ... ... | 316 |
| Bd. H. 8. | Providing random rubble masonry first sort of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 and raking out joints on the inside when plastering is to be done, watering and scaffolding ... ... | 316 |
| Bd. H. 9. | Providing coursed rubble masonry 3rd sort of trap/granite/ quartzite/gneiss stones in cement mortar 1 : : /lime mortar 1 : in plinth including dewatering, striking joints on unexposed faces and pointing with cement mortar 1 : 3 on exposed faces and watering ... ... ... | 316 |
| Bd. H. 10. | Providing coursed rubble masonry 3rd sort of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside and raking out joints when plastering is to be done and striking joints when no plastering is to be done on the inside, watering and scaffolding ... ... | 316 |

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. H. 11. | Providing coursed rubble masonry 2nd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering ... ... ... ... | 317 |
| Bd. H. 12. | Providing coursed rubble masonry 2nd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside, raking out joints where plastering is to be done and striking joints when no plastering is to be done on the inside, watering and scaffolding ... ... | 317 |
| Bd. H. 13. | Providing coursed rubble masonry 1st sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external work of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering ... ... ... ... | 317 |
| Bd. H. 14. | Providing coursed rubble masonry 1st sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside and raking out joints on the inside when plastering is to be done, watering and scaffolding ... ... ... ... | 317 |
| Bd. H. 15. | Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering ... ... ... ... | 318 |
| Bd. H. 16. | Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 and raking out joints on the inside when plastering is to be done, watering and scaffolding ... ... ... ... | 318 |
| Bd. H. 17. | Extra charges over C.R./C.R. 1st sort/C.R. 2nd sort masonry for providing face stones with —<br>(*a*) Rough tooled dressing ...<br>(*b*) Chisel dressing ...<br>(*c*) Close punched dressing ...<br>(*d*) Fine tooled dressing ... | 318 |
| Bd. H. 18. | Providing Ashlar fine tooled/close punched/chisel dressed masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints and watering complete ... ... ... ... ... | 319 |
| Bd. H. 19. | Providing Ashlar fine tooled/close punched/chisel dressed masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including striking joints, watering and scaffolding complete ... | 319 |
| Bd. H. 20. | Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block in course masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints and watering complete ... ... | 320 |
| Bd. H. 21. | Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including striking joints, watering and scaffolding complete ... ... ... ... | 320 |


अनुक्रमणिका
Table of Contents

| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. H. 22. | Providing laterite stone masonry in cement mortar 1 : / lime mortar 1 : in foundations and plinth including dewatering, striking joints on the unexposed faces, pointing with cement mortar 1 : 3 on the exposed faces and watering complete ... ... ... ... ... | 320 |
| Bd. H. 23. | Providing laterite stone masonry in cement mortar 1 : / lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3, and raking out joints where plastering is to be done watering and scaffolding complete ... ... | 320 |
| Bd. H. 24. | Providing Ashlar fine tooled/close punched/chisel dressed facing masonry of trap/granite/quartzite/gneiss, stones —cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in plinth including, dewatering, striking joints and watering complete ... ... ... ... ... | 321 |
| Bd. H. 25. | Providing Ashlar Fine tooled/close punched/chisel dressed facing masonry of trap/granite/quartzite/gneiss stones —cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in superstructure including striking joints, watering and scaffolding complete ... ... ... | 321 |
| Bd. H. 26. | Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course facing masonry of trap/ granite/quartzite/gneiss stones — cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in plinth including dewatering, striking joints and watering complete ... | 322 |
| Bd. H. 27. | Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course facing masonry of trap/ granite/quartzite/gneiss stones — cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in superstructure including striking joints and watering and scaffolding complete ... ... ... ... | 322 |
| Bd. H. 28. | Providing uncoursed rubble masonry backing of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in composite masonry in plinth including dewatering, striking joints and watering complete ... ... ... | 322 |
| Bd. H. 29. | Providing uncoursed rubble masonry backing of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in composite masonry in superstructure including raking out joints for plastering, watering and scaffolding complete ... ... ... ... | 322 |
| Bd. H. 30. | Providing Ashlar fine tooled/close punched/chisel dressed arching — cm. thick of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including centering, scaffolding and watering ... ... ... ... | 322 |
| Bd. H. 30 (a). | Providing Ashar fine tooled/close punched/chisel dressed/rough tooled flat arch— cm. thick of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including centering, scaffolding and watering ... ... | 323 |
| Bd. H. 31. | Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block in course arching cm. thick of trap/ granite/quartzite/gneiss stones in cement mortar 1 : / lime mortar 1 : including centering, scaffolding and watering ... ... ... ... | 324 |
| Bd. H. 32. | Providing laterite stone arching cm. thick in cement mortar 1 : /lime mortar 1 : including pointing with cement mortar 1 : 3, centering, scaffolding and watering ... | 324 |
| Bd. H. 33. | Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone sills of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : for doors and windows including scaffolding and watering ... ... | 324 |

| SERIAL No. | ITEM | PAGE |
|---|---|---|
| Bd. H. 34. | Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone corbels of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including scaffolding and watering ... ... ... | 325 |
| Bd. H. 35. | Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone coping cm. wide and cm. thick (about " × ") of trap/granite/quartzite/gneiss stone in cement mortar 1 : /lime mortar 1 : including scaffolding and watering ... ... ... | 325 |
| Bd. H. 36. | Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone cornice/string course of trap/granite/quartzite/ gneiss stones in cement mortar 1 : /lime mortar 1 : including scaffolding and watering ... ... ... | 326 |
| Bd. H. 37. | Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone steps of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including watering ... ... ... | 326 |
| Bd. H. 38. | Providing fine tooled/close punched/chisel dressed/rough tooled — stones slab veneer facing — mm. thick set in cement mortar 1 : 3/1 : 4 to masonry with/without wrought iron hold fasts, pins etc. including scaffolding and watering complete ... | 327 |
| Bd. H. 39. | Providing and fixing white/—-coloured Indian — mm. thick Mount Ab/Makrana/Bhanslana/Jaisalmeer/Baroda marble slab facing in cement mortar 1 : 3/1 :4 to masonry with/without wrought iron hold fasts, pins etc. including scaffolding and watering complete ... ... ... ... ... | 328 |
| Bd. H. 40. | Providing coursed rubble masonry 1st sort pillars of trap/granite/ quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including pointing with cement mortar 1 : 3 scaffolding and watering ... ... ... ... | 329 |
| Bd. H. 41. | Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering ... ... | 329 |
| Bd. H. 42. | Providing coursed rubble masonry IIIrd sort of trap/granite/quartzite/gneiss stones in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering ... | 329 |

## Bd. H. STONE MASONRY

Bd. H. 1. *Providing uncoursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in foundations and plinth of inner walls/in plinth of external walls including dewatering, striking joints on unexposed faces and pointing with cement mortar 1 : 3 on outside exposed faces and watering.*

Bd. H. 1. 1. *General.*—The item provides for the construction of uncoursed rubble masonry in foundations and plinth and shall comply with the specification No. B. 9 (k) fully subject to the following:—

Bd. H. 1. 2. *Construction.*—If masonry is to be laid directly on the excavated bed or on concrete footing, the bed or footing shall be cleared of all loose materials, cleaned and wetted just before laying masonry. Bushings shall not project more than 40 mm. (about 1½") in faces where joints are to be pointed or struck. Quoins in the unexposed portions shall have the same facing as the rubble stones and shall have uniform chisel drafts of 40 mm. (about 1½") at the corner edge. In the exposed portions and up to 15 cm. (about 6") below the finished ground level, quoins shall be rough tooled or have Khandki face as directed. They shall have chisel drafts of 40 mm. (about 1½") at the corner edge.

Where flooring is to be provided flush with the top of plinths, the inside offset of the plinths walls shall be kept below the outside offset by the depth of the flooring at the time of laying the masonry.

Verandah walls shall also be built with due regard to the slope to be given to the floors.

The top of the plinth and verandah walls shall be levelled up with flat chips laid in mortar if necessary to receive damp-proof course, coping, etc.

Holes of the required size and shape shall be left in the masonry during construction alone for fixing pipes, service lines or for passage of water. After the service lines, pipes, etc., are fixed, the extra hollow left if any shall be filled with 1:3 cement mortar or 1:3:6 cement concrete and the face shall be neatly finished with matching stones. If any fixtures are to be provided, they shall be neatly embedded in the required positions while laying the masonry. Iron fixtures shall be embedded in 1 : 5 cement mortar. When the masonry is in lime mortar without extra cost.

Joints in the outside faces of external walls of plinth shall be pointed with cement mortar 1:3 up to 15 mm. (about 6") below the finished ground level. Pointing shall conform to specification No. B. 13 unless otherwise specified in the special provisions. All other joints inside shall be struck flush while laying the masonry. If no pointing for the outside face is provided in the wording of the item, the joints shall be struck during construction alone.

Bd. H. 1. 3. *Item to include.*—According to specification No. B. 9. k. 12.

Pointing outside faces of external walls with cement mortar 1:3 up to 15 cm. (about 6") below finished ground level shall also be included in the rate for the item.

Bd. H. 1. 4. *Mode of measurement and payment.*—According to specification No. B. 9. k. 13.

No deduction shall be made for, opening each up to 0.1 sq. m. area or for pipes or fixtures embedded in the masonry up to 500 sq. cm. in section.

Bd. H. 2. *Providing uncoursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in basements including dewatering, scaffolding, pointing with cement mortar 1:3 on exposed faces, raking out joints when plastering is to be done, striking joints where no pointing or plastering is to be done and watering.*

Bd. H. 2. 1. *General.*—The item provides for the construction of uncoursed rubble masonry in basements and shall comply with the specification No. B. 9. k. fully subject to the following :—

Bd. H. 2. 2. *Construction.*— If masonry is to be laid directly on the excavated bed or concrete footing or raft, the area on which the masonry is to be built shall be cleared of all loose materials, cleaned and wetted just before laying masonry. Bushings shall not project more than 40 mm. (about 1½") in faces where joints are to be pointed or struck and 12 mm. (about ½") in faces proposed to be plastered. Quoins in the unexposed portions shall have the same facing as the rubble stones and shall have uniform chisel drafts of 40 mm. (about 1½"). In the exposed portions and up to 15 cm. (about 6") below the finished ground level, quoins shall be rough tooled with 40 mm. (about 1½") chisel drafts at the corner edge. Finer dressing if required shall be provided in the special provisions.

Verandah walls shall also be built with due regard to the slope to be given to the floors.

अनुक्रमणिका
Table of Contents



**Bd.H.2.5.**

Stones in corners of walls and angles which are to be plastered shall be rounded. The corners shall also be rounded in plaster while plastering. The frames of doors, windows, cupboards, etc., shall be housed into the masonry while laying the masonry only. If so shown on the drawings or specified in the special provisions, rebates shall be cut into the jambs to hold the frames. Otherwise, chisel dressing for the width of door and window frames shall be done to obtain good fit between the frame and the masonry.

Jambs shall be made up of quoins only. Where shown to be other than square, the jambs shall be splayed to conform to the drawings or the instructions of the Engineers and shall be true to the template. Quoins of the full thickness of the wall shall be provided at the rate of 3 for each side of the door opening and 2 for each side of the window opening when the wall is 40 cm. (about 15″) thick or less. In thicker walls, two quoins may be used to make up the full thickness of the wall with break of joint of not less than 8 cm. (about 3″) with stones above and below.

Holes of the required size and shape shall be left in the masonry during construction alone for fixing pipes, service lines, passage of water, etc. After the service lines, pipes, etc., are fixed, the extra hollow left shall be filled with 1:3 cement mortar or 1:3:6 cement concrete and the face shall be finished with matching stones.

Niches shall also be cut in the sill stones to house the ends of vertical scantlings of door frames where no sills are provided for the door frames. Wooden and heavy steel door and window frames shall be put up as the masonry is being built up. But for ordinary steel doors and windows, openings required for them and their hold fasts, etc., shall be left in the wall and frames embedded later to avoid warping and damage to the steel frames. Iron and steel fixtures shall be embedded in 1:5 cement mortar without extra cost, when the masonry is in lime mortar.

Well seasoned tapered wooden plugs of sufficient length and cross section shall be built up in the masonry as the work proceeds at locations and levels directed by the Engineer for facility of fixing of frames, door and window shutter appliances, rails, service lines, etc.

The top of masonry, on which coping, R.C.C. slab or other flooring is to be laid, shall be finished level or to the required slope with stones and mortar to give an even bearing. Bed blocks of stone or R.C.C. shall be built up in the masonry under beams, if separately provided in the tender.

The jambs of doors, windows and clerestorey windows and sills for windows and clerestorey windows shall be square or splayed as shown in the drawings or directed by the Engineer. If concrete or stone slabs are to be provided for sills, they shall be paid for separately.

Bd. H. 2. 3. *Joints.*—Joints in the outside faces shall be raked out when the mortar is green and pointed with cement mortar 1:3 up to 15 cm. (about 6″) below the finished ground level. Pointing with cement mortar shall conform to specification No. B. 13 unless otherwise specified in the special provisions. Below 15 cm. below the finished ground level, the joints shall be struck flush while laying the masonry. The joints in the inside faces shall be raked if plaster is to be provided. Otherwise they shall be pointed.

Bd. H. 2. 4. *Item to include.*—According to specification No. B. 9. (k)12 and as above.

The rate for masonry shall include providing and fixing wooden plugs. The rate shall also include labour charge for fixing pipes, rawl plugs, fixtures, etc., separately provided, making grooves, rebates and chamfers, making arrangements for receiving door, window or other frames and their attachments and fixing and finishing them, making square or splayed jambs and sills in masonry and raking out joints for plastering. Pointing outside exposed faces and inside faces which are not to be plastered shall also be included.

Bd. H. 2. 5. *Mode of measurement and payment.*—According to specification No. B. 9. k. 13.

No deduction shall be made for the rebates or plugs or other fixtures. The deduction for openings of doors, windows, etc., shall be for the actual opening in the masonry exclusive of the plaster at the frames. If jambs of doors and windows and sills of windows, etc., are splayed, only the square openings as at the frames shall be deducted. No deduction shall be made for the parts of fixtures, frames of doors, windows, etc., embedded in the masonry. No deduction shall be made for ends of dissimilar materials each less than 500 sq. cm. in area. No deduction shall be made for opening up to 0.1 sq. m. in area. No deduction shall be made for chambers and rounding of corners nor anything extra paid for them.



अनुक्रमणिका
Table of Contents

Bd. H. 3. *Providing uncoursed rubble masonry of trap/granite/quartzite/gneiss in cement mortar 1:3 in basements with patent water proofing compound added to it including dewatering, scaffolding, pointing with cement mortar 1:3 or racking out joints when plastering is to be done and watering.*

Bd. H. 3. 1. *General.*—The item provides for the construction of water proof uncoursed rubble masonry in basements and shall comply with the specification No. Bd. H. 2 in all respects subject to the following:—

(*i*) The proportion of cement mortar shall be 1:3 up to 30 cm. (about 12″) above the maximum sub-soil water level or to any other height up to which waterproof masonry is to be provided.

(*ii*) Special care shall be taken to see that there are no voids in the masonry. The mortar contents of the masonry shall be 0.46 cu. m. to 0.48 cu. m. per cu. m. of masonry.

(*iii*) Patent waterproofiing compound such as 'Pudlo', 'Impermo', 'Cica', 'Acco-proof', approved by the Engineer shall be added in specified proportions according to the instructions of the Patentee. Waterproofiing compound shall also be added in the mortar to be used for pointing.

The contractor shall be responsible for the water-tightness of the basement masonry till one monsoon passes after the completion of the entire building.

If the waterproofing is found to be unsatisfactory the contractor shall have to carry out remedial measures at his own cost to obtain complete water-tightness.

Bd. H. 4. *Providing uncoursed rubble masonry of trap/granite/quartzite/gneiss stone in cement mortar 1: /lime mortar 1: in superstructure including pointing with cement mortar 1:3 on the outside and raking out joints when plastering is to be done/striking joints/points with cement mortar 1:3 when no plastering is to be done on the inside, watering and scaffolding.*

Bd. H. 4. 1. *General.*—The item provides for the construction of uncoursed rubble masonry in superstructure and shall generally comply with specification No. Bd. H. 2 fully and in addition as specified hereinafter.

The masonry shall be constructed for the number of floors as specified on the drawings.

The top of masonry for receiving sloping roofs, gables, etc., shall be finished to the same slope as that of the roof and the required height. Wall plates, lintels, sills, etc., in or on the walls shall be properly bedded and pointed. The ends of joints, beams, lintels, rafters, purlins, trusses, corbels, etc., shall be properly built in the masonry and joists neatly finished.

The gap if any, between the roofing and the wall shall be made up neatly with chips and mortar of the same proportion as is used in the masonry.
All these shall be included in the rate for masonry.

Anchors for the roof trusses, etc., shall be embedded in the correct positions and at the required levels in the masonry as it proceeds, anchors being paid under a separate item.

No deduction shall be made for the embedded ends of dissimilar materials like wall plates, purlins, rafters, battens and trusses up to 500 sq. cm. section in each case.

Bd. H. 5. *Providing random rubble masonry second sort of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: in plinth including dewatering, striking joints on unexposed faces and pointing with cement mortar 1:3 on exposed faces and watering.*

Bd. H. 5.1. *General.*—The item provides for the construction of random rubble masonry second sort in plinth and shall comply with the specification No. B. 9 (g) and in addition shall comply with the relevant stipulations specified in the specification No. Bd. H. 1.

Quoins shall have the same facing as the random rubble masonry facing. Finer dressing if required, shall be specified in the special provisions. They shall have uniform chisel drafts of 40 mm. (about 1½″) at the corner edge. Their side joints with masonry shall be vertical.

The inside face shall conform to uncoursed rubble masonry.

Cement pointing on the exposed faces shall be done up to 15 cm. (about 6″) below the finished ground level and shall conform to the specification No. B. 13. The rate for the item shall also include cement pointing for outer faces of external walls.

**Bd.H.10.**

Bd. H. 6. *Providing random rubble masonry second sort of trap/granite/quartzite/gneiss stone in cement mortar 1 : /lime mortar 1 : in external walls of plinth including with cement mortar 1 :3 on the outside, raking out joints when plastering is to be done/pointing with cement mortar 1 :3/striking joints when no pointing or plastering is to be done on the inside, watering and scaffolding.*

Bd. H. 6. 1. *General.*—The item provides for the construction of random rubble masonry second sort in superstructure and shall comply with the specification No. B. 9 (g) and in addition shall comply with relevant stipulations specified in the specification Nos. Bd. H 2 and Bd. H. 4.

Quoins shall have the same facing as the random rubble stone masonry with side joints with masonry vertical. Finer dressing if required shall be specified in the special provisions. Chisel drafts of 40 mm. (about 1½″) shall be provided at the corners.

The inside face shall conform to uncoursed rubble masonry when it is to be plastered.

Cement pointing shall conform to the specification No. B. 13 and the rate for the item shall include the cement pointing also.

Bd. H. 7. *Providing random rubble masonry first sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing dewatering, striking joints inside and pointing with cement mortar 1 : 3 outside and watering.*

Bd. H. 7. 1. *General.*—The item provides for the construction of random rubble masonry first sort in plinth and shall comply with the specification No. B. 9 (f). The faces of quoins shall have the same facing as the random rubble masonry first sort with side joints with masonry vertical. Finer dressing if required shall be specified in the special provisions. Chisel drafts of 40 mm. (about 1½″) shall be provided at the corner edge. The inside face of masonry shall conform to uncoursed rubble masonry. The joints on the inside face to be struck shall not exceed 16 mm. (about ⅝″). The item shall also comply with the relevant stipulations specified in the specification No. Bd. H. 1. Outside faces shall be pointed with cement mortar 1:3:

Bd. H. 8. *Providing random rubble masonry first sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1: in superstructure including pointing with cement mortar 1 : 3 and raking out joints on the inside when plastering is to be done, watering and scaffolding.*

Bd. H. 8. 1. *General.*— The item provides for the construction of random rubble masonry first sort in superstructure and shall comply with the specification No. B. 9 (f). The faces of quoins shall have the same facing as the random rubble masonry first sort with side joints with masonry vertical. Finer dressing if required shall be provided in the special provisions. Chisel drafts of 40 mm. (about 1½″) shall be provided at the corners. The inside face shall conform to uncoursed rubble masonry when it is to be plastered and the joints shall not exceed 16 mm. (about 5/8″). The joints shall be raked out for plaster. The item shall also comply with the relevant stipulations specified in the specification Nos. Bd. H. 2 and Bd. H. 4. Outside faces shall be pointed with cement mortar 1 : 3.

Bd. H. 9. *Providing coursed rubble masonry 3rd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in plinth including dewatering, striking joints on unexposed faces and pointing with cement mortar 1 : 3 on the exposed faces and watering.*

Bd. H. 9. 1. *General.*— The item provides for the construction of coursed rubble masonry 3rd sort for the plinth and shall comply with the specification No. B. 9 (j) and in addition shall comply with the relevant stipulations as specified in the specification No. Bd. H. 1.

Quoins shall have the same facing as the adjoining masonry with side joints with masonry vertical. If finer dressing is required, it shall be specified in the special provision. Chisel drafts of 40 mm. (about 1½″) shall be provided at the corners.

Cement pointing on the outside shall be done up to 15 cm. (about 6″) below finished ground level and shall conform to the specification No. B. 13. The rate shall include cement pointing.

Bd. H. 10. *Providing coursed rubble masonry 3rd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside and raking out joints when plastering it to be done and striking joints when no plastering is to be done on the inside watering and scaffolding.*

Bd. H. 10. 1. *General.*—The item provides for the construction of coursed rubble masonry 3rd sort in superstructure and shall comply with the specification No. B. 9 (j) and in addition shall comply with the relevant stipulations specified in the specification Nos. Bd. H. 2 and Bd. H. 4.

Quoins shall have the same facing as the adjoining masonry with side joints with masonry vertical. If finer dressing is required it shall be specified in the special provisions. Chisel drafts of 40 mm. (about 1½") shall be provided at the corners.

Cement pointing shall conform to the specification No. B. 13 and the rate for the item shall include cement pointing.

Bd. H. 11. *Providing coursed rubble masonry, 2nd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering.*

Bd. H. 11. 1. *General.*—The item provides for the construction of coursed rubble masonry, 2nd sort for the external walls of plinth and shall comply with the specification No. B. 9 (*i*) and in addition shall comply with the relevant stipulations specified in the specification No. Bd. H. 1.

Quoins shall have the same facing as the adjoining masonry with side joints with masonry vertical. Finer dressing if required shall be specified in the special provision. Their height shall be the full height of one or two courses as shown on the plans and directed by the Engineer. Chisel drafts of 40 mm. (about 1½") shall be provided at the corners.

Cement pointing shall be done as specified in Bd. H. 1 and shall conform to the specification No. B. 13 and the rate shall include cement pointing.

Bd. H. 12. *Providing coursed rubble masonry, 2nd sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside, raking out joints where plastering is to be done and striking joints when no plastering is to be done on the inside, watering and scaffolding.*

Bd. H. 12. 1. *General.*—The item provides for the construction of coursed rubble masonry, 2nd sort in superstructure and shall comply with the specification No. B. 9 (*i*) and in addition shall comply with the relevant stipulation specified in the specification No. Bd. H. 2 and Bd. H. 4. The inside face shall conform to uncoursed rubble masonry when it is to be plastered.

Quoins shall have the same facing as coursed rubble, 2nd sort masonry with side joints vertical. Finer dressing, if required shall be specified in the special provisions. Their height shall be the full height of one or two courses as shown on the plans and directed by the Engineer. Chisel drafts of 40 mm. (about 1½") shall be provided at the corners.

Cement pointing shall conform to the specification No. B. 13 and the rate for the item shall include cement pointing.

Bd. H. 13. *Providing coursed rubble masonry 1st sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering.*

Bd. H. 13. 1. *General.*—The item provides for the construction of coursed rubble masonry, 1st sort for the plinth and shall comply with the specification No. B. 9 (*h*) and in addition shall comply with the relevant stipulations specified in the specification No. Bd. H. 1. The inside face shall conform to uncoursed rubble masonry.

Quoins shall have the same facing as coursed rubble 1st sort masonry with side joints with masonry vertical. If finer dressing is required it shall be specified in the special provisions. Chisel drafts of 40 mm. ( about 1½") shall be provided at the corners.

Cement pointing shall be done up to 15 cm. ( about 6" ) below the finished ground level and shall conform to the specification No. B. 13. The rate for the item shall include cement pointing.

Bd. H. 14. *Providing coursed rubble masonry 1st sort of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1 : 3 on the outside and raking out joints on the inside when plastering is to be done, watering and scaffolding.*

Bd. H. 14. 1. *General.*—The item provides for the construction of coursed rubble masonry, 1st sort in superstructure and shall comply with the specification No. B. 9 (*h*) and in addition shall comply with the relevant stipulations specified in the specification Nos. Bd. H. 2 and Bd. H. 4.

**Bd.H.17.4.**

Quoins shall have the same dressing as coursed rubble, 1st sort masonry with side joints vertical. Finer dressing if required shall be specified in the special provisions. Chisel drafts of 40 mm. (about 1½") shall be provided at the corners when the stone is not chisel dressed.

The inside faces shall conform to uncoursed rubble masonry when plastering is to be done.

Cement pointing shall conform to the specification No. B. 13 and the rate for the item shall include cement pointing.

Bd. H. 15. *Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints inside and pointing with cement mortar 1 : 3 on the outside and watering.*

Bd. H. 15. 1. *General.*—The item provides for the construction of coursed rubble masonry for the plinth and shall comply with the specification No. B. 9 (*i*) for coursed rubble masonry, 2nd sort except that all stones on the outside face in each course shall be of the full height of the course. The item shall also comply with the relevant stipulations specified in the specification No. Bd. H. 1. The inside face shall conform to uncoursed rubble masonry.

Quoins shall have the same facing as coursed rubble masonry with side joints vertical. Finer dressing if required shall be specified in the special provisions. Chisel drafts of 40 mm. (about 1½") shall be provided at the corners.

Cement pointing shall be done up to 15 cm. (about 6") below finished ground level and shall conform to the specification No. B. 13. The rate for the item shall include cement pointing.

Bd. H. 16. *Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including with cement mortar 1 : 3 and raking out joints on the inside when plastering is to be done, watering and scaffolding.*

Bd. H. 16. 1. *General.*—The item provides for the construction of coursed rubble masonry in superstructure and shall comply with the specification No. B. 9 (*i*) for coursed rubble masonry, 2nd sort except that all face stones in each course shall be of the full height of the course on both faces but inside face shall conform to U. C. R. masonry when plastering is to be done. The item shall comply with the relevant stipulations specified in the specification Nos. Bd. H. 2 and Bd. H. 4.

Quoins shall have the same facing as coursed rubble masonry with side joints vertical. Chisel drafts of 40 mm. (about 1½") shall be provided at the corner edge. Finer dressing if required shall be specified in the special provisions.

Cement pointing shall conform to the specification No. B. 13 and the rate for the item shall include cement pointing.

Bd. H. 17. *Extra charges over C.R./C.R. 1st sort/C.R. 2nd sort masonry for providing face stones with—*

(*a*) *Rough tooled dressing.*
(*b*) *Chisel dressing.*
(*c*) *Close punched dressing.*
(*d*) *Fine tooled dressing.*

Bd. H. 17. 1. *General.*—The item refers to the provision of rough tooled chisel dressed close punched or fine tooled dressing to the faces of the C.R., C.R. 1st sort or C.R. 2nd sort stone masonry as mentioned in the item.

Bd. H. 17. 2. *Dressing.*—The stones in the face of the C.R., C.R. 1st sort or C.R. second sort masonry shall be further dressed to rough tooled, chisel dressed, close punched or fine tooled standard as mentioned in the item as specified in B. 9.3 (*a*), B. 9.3 (*b*), B. 9.3 (*c*) or B. 9. 3 (*d*), respectively. The quoins shall be chisel dressed or fine tooled as directed by the Engineer. The dressing shall be done before the stones are laid in the masonry. When the dressing is done as above, the bed top and vertical side joints of the stones shall be dressed to allow 3 mm. (about ⅛") joints for rough tooled dressing and 1.5 mm. (about 1/16") for other three types.

Bd. H. 17. 3. *Joints.*— The width of the joints shall be 3 mm. (about ⅛") for rough tooled dressing and 1.5 mm. (about 1/16") for the other three types of dressing.

Bd. H. 17. 4. *Item to include.*— (1) Dressing of the face stones of the C.R., C.R. 1st sort or C.R. 2nd sort masonry as specified in the item.

(2) All labour, use of tools, etc., required for carrying out the work satisfactorily.

Bd. H. 17. 5. *Mode of measurements and payment.*—The contract rate shall be for one sq. metre. The dimensions for the area shall be the same as the corresponding dimensions of the face of the C.R., C.R. 1st sort or C.R. 2nd sort masonry which has the dressed surface as above. The dimensions shall be measured correct up to two places of decimals of a metre and the area calculated correct up to two places of decimals of a sq. metre.

No deduction shall be made for opening up to 0.1 sq. m. or embedded parts, each measuring up to 500 sq. cm. For larger openings, actual openings shall be deducted and jambs, etc., if dressed, added.

Bd. H. 18. *Providing Ashlar fine tooled/close punched/chisel dressed masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in external walls of plinth including dewatering, striking joints and watering complete.*

Bd. H. 18. 1. *General.*—The item provides for the construction of Ashlar masonry with dressing mentioned in the item in plinth and other connected items up to plinth top level and shall comply with the specification No. B. 9 (*a*) fully and in addition as specified hereinafter. Where flooring is to be provided flush with the plinth, the inside offset of the plinth walls shall be kept below the outside offset by the depth of the flooring at the time of laying the masonry. Inside faces of plinth may be left undressed.

Verandah walls shall also be built with due regard to the slope to be given to the floors. Fixtures, plugs, etc., required to be provided shall be embedded while laying the masonry. Holes of the required size and shape shall be left in the masonry during construction alone for fixing pipes, service lines, passage of water, etc. After the service lines, pipes, etc., are fixed, the extra hollow left shall be filled with 1 : 3 cement mortar or 1 : 3 : 6 cement concrete and the face shall be neatly finished with matching stones. Iron and steel fixtures shall be embedded in 1 : 5 cement mortar without extra cost when the masonry is in lime mortar.

The heights of courses shall be 30 cm. (about 12″) unless other sizes are shown on the detailed drawings or mentioned in the special provisions. All the architectural features such as rebates, chamfers, grooves, mouldings, figures, arrangements of courses, etc., shown on the detailed drawings shall be faithfully reproduced in the stone without any blemish, chipping, etc. If any feature does not accurately conform to the detailed drawings or if there is any defect or damage to the stones, such stones shall be removed and replaced by stones of sound quality and workmanship.

Where mouldings, rebates, chamfers, recesses, holes, figures, etc., are provided, each stone shall be measured as the smallest rectangular dressed block from which the finished dressed stone with the above or other architectural features can be worked.

The rate includes provision of all the architectural features shown in the drawings.

No deduction shall be made for opening up to 0.1 sq. m. in area or for pipes or fixtures embedded in the masonry up to 500 sq. cm. in sectional area.

Bd. H. 19. *Providing Ashlar fine tooled/close punched/chisel dressed masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : in superstructure including striking joints, watering and scaffolding complete.*

Bd. H. 19. 1. *General.*—The item provides for the construction of Ashlar masonry with dressing mentioned in the item in superstructure and shall comply with specification No. B. 9 (*a*) fully and in addition as specified hereinafter.

Bd. H. 19. 2. *Construction.*—The masonry shall be constructed for the number of floors as specified on the drawings. The heights of courses shall be 30 cm. (about 12″) unless other sizes are shown in the detailed drawings or mentioned in the special provisions. All the architectural features such as rebates, chamfers, grooves, mouldings, figures, arrangement of courses, etc., shown on the detailed drawings shall be faithfully reproduced in stone without any blemish, chipping, etc. If any feature does not accurately conform to the detailed drawings or if there is any defect or damage to the stones, such stones shall be removed and replaced by stones of sound quality and workmanship. The frames of doors, windows and cupboards, fixtures, plugs, etc., shall be housed into the masonry at the correct level and location while laying only. If so shown on the drawings or specified in the special provisions, rebates shall be cut into the jambs to hold the frames.

Holes of the required size and shape shall be left in the masonry or holes carved in the stones during construction only as directed by the Engineer for fixing pipes, service lines, passage of water, etc. After the service lines, pipes, etc., are fixed, the extra hollow left in the hole shall be filled with 1 : 3 cement mortar or 1 : 3 : 6 cement concrete and the face shall be finished with matching stones. Holes shall also be cut in the sill stones to house the ends

of vertical scantlings of door frames where no sills are provided for the door frames. Wooden and heavy steel door and window frames shall be put up as the masonry is being built up. But for ordinary steel doors and windows, required openings for the frames, hold fasts, etc., shall be left in the wall and frames embedded later. Well seasoned teak wood plugs of the required size shall be embedded in the masonry as shown on the plans or directed by the Engineer. Frames, fixtures, etc., provided under separate items shall also be built in at the required positions. The top of the masonry for receiving sloping roofs, gables, etc., shall be finished to the required slope and the required height. All these items shall be included in the rate. Anchors of the roof trusses, etc., when required shall be embedded in the masonry as it proceeds, anchors themselves being paid under a separate item. Iron and steel fixtures shall be embedded in 1 : 5 cement mortar without extra cost when the masonry is in lime mortar.

Bd. H. 19. 3. *Mode of measurement and payment.—*

Where mouldings, rebates, chamfers, recesses, holes, figures, etc., are provided, each stone shall be measured as the smallest rectangular dressed block from which the finished dressed stone with the above or other architectural features can be worked.

The deduction for openings of doors, windows, etc., shall be for the actual opening in the masonry. If jambs of doors and windows and sills of clerestorey windows, etc., are splayed, only the unsplayed square openings as at the frames shall be deducted. No deduction shall be made for the parts of fixtures, frames, etc., embedded in the masonry. No deduction shall be made for openings up to 0.1 sq. m. in area. No deduction shall be made for the embedded ends of dissimilar materials like purlins, joists, beams, posts, girders, corbels, wall plates, rafters, trusses, etc., each up to 500 sq. cm. in section.

Bd. H. 20. *Providing Ashlar rough tooled/Ashlar Rack faced/Ashlar chamfered/Ashlar Block-in-course masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : / lime mortar 1 : in external walls of plinth including dewatering, striking joints and watering complete.*

Bd. H. 20. 1. *General.*—The item provides for the construction of Ashlar rough tooled/ Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course masonry as mentioned in the item for the plinth and shall comply with the specification Nos. B. 9.(*b*), B. 9.(*c*), B. 9.(*d*) or B. 9.(*e*). respectively, fully and in addition shall comply with the relevant stipulations laid down in the specification No. Bd. H. 18.

The dimensions shall be measured over the dressed edges. Bushings shall not be measured.

Bd. H. 21. *Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course masonry of trap/granite/quartzite/gneiss stones in cement mortar 1 : / lime mortar 1 : in superstructure including striking joints, watering, and scaffolding complete.*

Bd. H. 21. 1. *General.*—The item provides for the construction of Ashlar rough tooled/ Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course masonry as mentioned in the item for the superstructure and shall comply with the specification Nos. B. 9(*b*), B. 9(*c*), B. 9(*d*) or B. 9(*e*), respectively, and in addition shall comply with the relevant stipulations laid down in the specification No. Bd. H. 19.

If no recesses are required to be cut for housing door or window frames, chisel dressing for the width of the frames shall be done to obtain a good fit between the masonry and the frame.

The dimensions shall be measured over the dressed edges. Bushings shall not be measured.

Bd. H. 22. *Providing laterite stone masonry in cement mortar 1 : /lime mortar 1 : in foundations and plinth including dewatering, striking joints on the unexposed faces, pointing with cement mortar 1:3 on the exposed faces and watering complete.*

Bd. H. 22. 1. *General.*—The item provides for the construction of laterite stone masonry for the foundations and plinth and shall comply with the specification No. B. 9 (1) and in addition shall comply with the relevant stipulations laid down in specification No. Bd. H. 1.

Cement pointing with 1:3 cement mortar shall be done up to 15 cm. (about 6″) below the finished ground level on the exposed faces and shall conform to specification No. B. 13.

The rate for the item shall include cement pointing also.

Bd. H. 23. *Providing laterite stone masonry in cement mortar 1 : /lime mortar 1 : in superstructure including pointing with cement mortar 1:3 and raking out joints where plastering is to be done, watering and scaffolding complete.*

Bd. H. 23. 1. *General.*—The item provides for the construction of laterite stone masonry in the superstructure and shall comply with the specification No. B. 9 (1) and in addition shall comply with the relevant stipulations laid down in the specifications Nos. Bd. H. 2 and Bd. H. 4.

Cement pointing shall conform to specification No. B. 13 and the rate for the item shall include cement pointing. When plastering is provided, the joints shall be raked out to a depth not less than the width of the joints to afford bond for the plaster.

Bd. H. 24. *Providing Ashlar fine tooled/close punched/chisel dressed facing masonry of trap/granite/quartzite/gneiss stones — cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in plinth including dewatering, striking joints and watering complete.*

Bd. H. 24. 1. *General.*—The item provides for the construction of Ashlar facing of the type mentioned in the item in composite masonry with uncoursed rubble masonry or brick-work backing in the plinth. The backing shall be carried out and paid under a separate item.

Bd. H. 24. 2. *Construction.*—The Ashlar facing of the type specified in the item facing shall conform to the specification No. B. 9 (a) and the stipulations laid down in the specification No. Bd. H. 18 subject to the following :—

The beds and joints shall be fine tooled at least for the distance equal to the height of the course from the face and as shown in the drawings or specified in the item whichever is more. The extra length and backs of blocks may be left undressed provided the required joints in the face are obtained. Fine tooled, close punched or chisel dressed type dressing when specified shall conform to the specification No. B. 9.

No course shall be less than 20 cm. (about 8″) in height unless other heights are specified on the drawings. In case of brick-work backing, the height of the facing course shall be equal to an exact number of courses of brick-work including mortar joints. In case of uncoursed rubble stone masonry backing, the backing shall be carried up simultaneously on level with the facing.

For courses up to 25 cm. (about 10″) high, the length of the stretcher stones on face shall not be less than 35 cm. (about 14″).

For courses more than 25 cm. (about 10″) high, the length of stretcher stones on face shall not be less than $1\frac{1}{3}$ of the height of the course.

The thickness of stretcher stones inside the masonry shall not be less than the height of the course.

At least $\frac{1}{3}$ the length of each course shall be header stones tailing back into the work for minimum twice the height of course.

Bond stones shall be placed at an interval of about 1.8 m. (about 6′) in every course and shall extend from face right through the backing to the rear face for walls 70 cm. (about 2.5′) thick and less. For walls over 70 cm. (about 2.5′) thick, a line of bond stones lapping each other by at least 15 cm. (about 6″) shall run from the face to the rear face of backing. They shall be kept staggered with those in the courses below and above.

The thickness of the facing shall be as specified in the item.

The facing and the backing shall be constructed simultaneously.

Bd. H. 24. 3. *Mode of measurement and payment.*—According to specification Nos. B. 9(a) 8. and Bd. H. 18. Measurement of thickness of face work shall be limited to the thickness specified in the item even though the thickness dressed back true and square on the beds and joints may be more. One third more thickness shall be added to this specified thickness, for the header and bond stones.

The remaining thickness of the wall after deducting $1\frac{1}{3}$ of the specified thickness of facing from the full thickness of the composite masonry shall be paid separately as backing.

Bd. H 25. *Providing Ashlar fine tooled/close punched/chisel dressed facing masonry of trap/granite/quartzite/gneiss stones — cm. thick in cement mortar 1 : /lime mortar 1 : in composite masonry in superstructure including striking joints, watering and scaffolding complete.*

Bd. H. 25. 1. *General.*—The item provides for the construction of Ashlar facing of the type mentioned in the item in composite masonry with uncoursed rubble stone masonry or brick-work backing in the superstructure.

The backing shall be carried out and paid under a separate item.

अनुक्रमणिका
Table of Contents



**Bd.H.30.1.**

The Ashlar facing of the type mentioned in the item in superstructure shall comply with the specification No. B. 9(a) and the relevant stipulations of the specifications Nos. Bd. H. 24 and Bd. H. 19.

Bd. H. 26. *Providing Ashlar rough tooled/Ashlar rock faced/Ashlar block chamfered/Ashlar block-in-course facing masonry of trap/granite/quartzite/gneiss stone—cm. thick in cement mortar 1: /lime mortar 1: in composite masonry in plinth including dewatering, striking joints and watering complete.*

Bd. H. 26. 1. *General.*—The item provides for the construction of Ashlar facing of the type mentioned in the item in composite masonry with uncoursed rubble stone masonry or brick-work backing in the plinth.

The backing shall be carried out and paid under a separate item.

The Ashlar rough tooled/Ashlar rock faced, Ashlar chamfered and Ashlar block-in-course facing mentioned in the item shall conform to the specifications Nos. B. 9(b), B. 9(c), B. 9(d) or B. 9(e) respectively and to the relevant stipulations laid down in the specification No. Bd. H. 18 and the relevant stipulation of the specification No. Bd. H. 24.

Bd. H. 27. *Providing Ashlar rough tooled/Ashlar rock faced/Ashlar chamfered/Ashlar block-in-course facing masonry of trap/granite/quartzite/gneiss stones — cm. thick in cement mortar 1: /lime mortar 1: in composite masonry in superstructure including striking joints, watering and scaffolding complete.*

Bd. H. 27. 1. *General.*—The item provides for the construction of Ashlar facing of the type specified in the item in composite masonry with uncoursed rubble stone masonry or brick-work backing in the superstructure.

The backing shall be carried out and paid under a separate item.

The Ashlar rough tooled, Ashlar rock faced, Ashlar chamfered and Ashlar block-in-course facing in superstructure as mentioned in the item shall comply with the specification Nos. B. 9(b)/B. 9(c)/B. 9(d) and B. 9(e) respectively and the relevant stipulations of the specification Nos. Bd. H. 24 and Bd. H. 21.

Bd. H. 28. *Providing uncoursed rubble masonry backing of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: in composite masonry in plinth including dewatering, striking joints and watering complete.*

Bd. H. 28. 1. *General.*—The item provides for the construction of uncoursed rubble masonry backing in composite masonry in plinth. The uncoursed rubble masonry backing shall comply with the specification Nos. B 9 (k) and Bd. H. 1 and shall be subject to the following:—

The bond stones and headers from the facing Ashlar masonry shall be incorporated in the backing and no separate headers need be provided in the backing.

Stones shall be carefully selected and used with the rear face of the Ashlar to get a good bond and so as not to leave voids.

The backing shall be carried out simultaneously with the facing. The joints shall be struck.

The uncoursed rubble masonry backing shall paid for the thickness remaining after deducting the specified facing thickness increased by ⅓rd mentioned in Bd. H. 24 from the total thickness of the composite masonry.

Bd. H. 29. *Providing uncoursed rubble masonry backing of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: in composite masonry in superstructure including racking out joints for plastering, watering and scaffolding complete.*

Bd. H. 29. 1. *General.*—The item provides for the construction of uncoursed rubble masonry backing in composite masonry in superstructure. The uncoursed rubble masonry backing shall comply with the specification Nos. B. 9(k), Bd. H. 28 and relevant stipulations of specifications Nos. Bd. H. 2 and Bd. H. 4.

Bd. H. 30. *Providing Ashlar fine tooled/close punched/chisel dressed arching—cm. thick of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: including centering, scaffolding and watering.*

Bd. H. 30. 1. *General.*— The item provides for the construction of Ashlar arching of the type and thickness mentioned in the item in mortar as specified in the item including necessary centering, scaffolding and watering.

The Ashlar arching shall comply with the specification No. B. 9(a) subject to the following:



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. H. 30. 2. *Arch stones.*—The thickness of the arch shall be as specified in the item. The number, size and shape of stones in the arch shall be as shown on the drawing and/or directed by the Engineer. If not so shown, the stones shall not be less than 15 cm. (about 6″) on their least dimension. The length of the stones shall be of the full thickness of the wall or walls up to 45 cm. (about 18″) thick. For thicker walls, more than one stone may be used.

All the stones shall be of the same size except for the keystone which may be of different size and may also project beyond the facing of the arch.

Arches up to 60 cm. thickness shall be made up of stones of the full thickness of the arch. For greater thickness, the Engineer shall supply the full details of the arches for construction.

Bd. H. 30. 3. *Processing.*— The stones in the arch shall be dressed to conform to the drawings including the architectural features, if any, shown on the drawings.

The arch stones shall be cut and dressed to a full size template. The template shall be prepared from the full size arch elevation drawn on a level surface with perfect accuracy. The radial joints shall be dressed to conform to the face and to exact fit on beds. Chamfers shall be provided at the radial and intrados joints if so shown on the drawings. The extrados surface may be dressed to suit the requirements of the adjoining masonry. The joints shall be radial and the intrados and the extrados shall be concentric unless otherwise shown on the drawings.

Bd. H. 30. 4. *Centering.*— The centering and the forms shall conform to B. 6. 5. When cement mortar is used for the arch, the arch centering shall be struck only after the mortar is fully set and cured.

When lime mortar is used for the arch, the centering shall be slightly eased after 24 hours of laying the arch to enable the mortar joints to come into full bearing. After the joints fully get the bearing, the uprights shall be readjusted to bear the load. The centering shall be removed only after the mortar is fully set. In the case of segmental arches, the skew backs shall be laid first and the centering shall be eased only when the skew backs are fully set. In the case of other types of arches springing from a horizontal joint, the adjacent walls shall be built to about ⅔rd of the height of the arch before slackening centers.

Bd. H. 30. 5. *Construction.*—The stones shall be laid in a balanced manner from both the ends or skew backs to avoid distortion of the sofit. The keystones shall be fitted into its place and driven by heavy wooden mallets. The radial and other joints shall be of uniform width.

Bd. H. 30. 6. *Bad work.*—If the arch settles unduly or becomes unsightly or if the material and workmanship are bad and do not satisfy the specifications, the arch shall be removed and rebuilt by the contractor at his own cost.

Bd. H. 30. 7. *Item to include.*—According to B. 9(a).

The item shall also include providing, erection, easing and removal of centering. The skew backs shall also be included in the arch.

Bd. H. 30. 8. *Mode of measurement and payment.*—The length of the arch shall be the net mean of the length of extrados and intrados both are concentric. The thickness shall be depth of the arching. The width shall be the actual width limited to that shown in plan or as directed. Only the net volume of the arch shall be taken as the quantity of the arch. Chamfers however if any shall not be deducted.

The skew backs shall be measured net and included in the quantity of the arch.

If horizontal and vertical edges are provided for the arch stones at the extrados, the face area of each stone shall be measured net and the volume computed by multiplying by the width.

If keystones are projecting beyond the face of the arch, the net volume of the projecting portion shall be added to the arch volume.

Bd. H. 30(a). *Providing Ashlar fine tooled/close punched/chisel dressed/rough tooled flat arch cm. thick of trap/granite/quartzite/gneiss stones in cement mortar 1: / lime mortar 1: including centering, scaffolding and watering.*

Bd. H. 30(a). 1. *General.*—The item pertains to providing and construction of Ashlar masonry of the type specified in the item for flat arch in mortar of the specified type and proportion mentioned in the item including centering, scaffolding and watering.

अनुक्रमणिका
Table of Contents

**Bd.H.33.4.**

The flat arch shall conform to the pertinent particulars of the specification No. B. 9, B. 9(a) or B. 9(b) and Bd. H. 30 and in addition shall conform to the following:—

The arch shall consist of a horizontal course with radial joints or such other joints as directed by the Engineer. The size and shape of the flat arch and stones shall be shown on the drawings or directed by the Engineer.

Joggle joints if any shall fully conform to the details on the drawings or the instructions of the Engineer.

The measurement for the length of the arch shall include the end support stones having radial joint on one side. Measurements shall be net for the arch including the supporting blocks on each side.

Bd. H. 31. *Providing Ashlar rough tooled/Ashlar Rock faced/Ashlar chamfered/Ashlar Block-in-course arching ..... cm. thick of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: including centering, scaffolding and watering.*

Bd. H. 31. 1. *General.*—The item provides for the construction of Ashlar arching of the type specified in the item in mortar of the specified type and proportion including necessary centering, scaffolding and watering.

The Ashlar rough tooled, Ashlar Rock faced, Ashlar Chamfered and Ashlar Block-in-course arching shall conform to the specification Nos. B. 9(b), B. 9(c), B. 9(d) and B. 9(e) respectively and the stipulations of Bd. H. 30.

All the measurements shall be over the dressed edges. Chamfers if any, shall not be deducted. Bushings shall not be included in the measurements.

Bd. H. 32. *Providing laterite stone arching ..... cm. thick in cement mortar 1: / lime mortar 1: including pointing with cement mortar 1 : 3 centering, scaffolding and watering.*

Bd. H. 32. 1. *General.*—The item provides for the construction of laterite stone arching in mortar of the specified type and proportion including necessary centering, scaffolding, pointing and watering.

The laterite arching shall conform to the specification No. B. 9(1) and the stipulations of the specification No. Bd. H. 30. The pointing is included in the rate of the item and shall conform to the specification No. B. 13.

Bd. H. 33. *Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone sills of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: for doors and windows including scaffolding and watering.*

Bd. H. 33. 1. *General.*—The item pertains to providing and fixing cut stone door and window sills of the specified type of stone and dressing in mortar of the specified type and proportion mentioned in the item including necessary scaffolding and watering.

The stone work shall comply with the pertinent particulars of specification No. B. 9 and B. 9(a) or B. 9(b) as relevant.

Bd. H. 33. 2. *Materials.*—The stones shall be sound and free from seams, cracks or any other defects. All stones shall be of the same colour as far as possible and in as long lengths as normally obtainable. The size of the stone blocks shall be such that when fully dressed as specific stones of the shape and dimensions shown on the drawings shall be obtained.

The type and mix of mortar shall be as mentioned in the item and shall conform to B. 5(a) and B. 3(a) for cement and lime mortar respectively.

Bd. H. 33. 3. *Processing.*—The stones shall be fine tooled, close punched, chisel dressed or rough tooled as per the item on the exposed faces and joints and dressed correctly to the shapes and sizes shown in the drawings. The width of the sill shall be in one stone and the length of each stone shall not normally be less than its width.

The other embedded unexposed face of the stone block shall be dressed to suit the requirements of adjoining masonry or paving.

Bd. H. 33. 4. *Laying.*—The sill stones shall be laid full in mortar at the correct location and level. If the window sills are shown in the drawing to project beyond the wall and exposed to rains, drip moulding shall be provided in the underside of the outside projection.

The joints of the sills shall break joints with those in the masonry below. The joints in the sill stones shall not exceed 1.5 mm. when they are fine tooled, close punched and chisel dressed and 3 mm. when rough tooled. The joint of the sill stone with the adjacent masonry shall be neatly finished as specified for the masonry.

Bd. H. 33.5. *Item to include.*—According to specification No. B. 9. (a). 7.

Bd. H. 33. 6. *Mode of measurement and payment.*—According to specification No. B. 9(a). 8.

Bd. H. 34. *Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone corbels of trap/granite/quartzite/gneiss stones in cement mortar 1 : /lime mortar 1 : including scaffolding and watering.*

Bd. H. 34. 1. *General.*—The item pertains to providing and fixing cut stone corbels of the specified type of stone and dressing in mortar of the type and proportion mentioned in the wording of the item including scaffolding and watering. The stone work shall comply with the pertinent particulars of specification No. B. 9 and B. 9(a) or B. 9(b) as relevant.

Bd. H. 34. 2. *Materials.*—As per Bd. H. 33. 2.

Bd. H. 34. 3. *Processing.*—The corbel shall be of a single stone and the embedded portion shall not be less than 1.5 times the projecting lengths. The corbels shall be dressed to conform correctly to the shape and dimensions shown in the detailed drawings approved by the Engineer. The exposed faces shall be dressed as specified in the item.

The embedded unexposed beds and joints of the stone blocks shall be rough tooled and the back left undressed.

Bd. H. 34. 4. *Laying.*— The corbels shall be laid full in mortar at the correct position and level. The vertical joints shall break joints with those in the courses above and below and the junctions with the adjoining masonry shall be neatly finished as specified for the masonry.

The corbel shall not be loaded until it is fully set and sufficient masonry is constructed above.

Bd. H. 34. 5. *Item to include.*—As per B. 9(a).

Bd. H. 34. 6. *Mode of measurement and payment.*—The contract rate shall be for the number of corbel stone of specified shape and dimensions fully set in mortar in the correct position and level and finished in continuous corbelling the rate shall be per metre.

No deduction shall be made in the masonry for the embedded portion of the corbel.

Bd. H. 35. *Providing and fixing fine tools/close punched/chisel dressed/rough tooled cut stone coping ..... cm. wide and ..... cm. thick (about ... ..." × ... ...") of trap/granite/quartzite/gneiss stone in cement mortar 1 : /lime mortar 1 : including scaffolding and watering.*

Bd. H. 35. 1. *General.*— The item pertains to providing and fixing cut stone coping of the specified type of stone and dressing in mortar of specified type and proportion mentioned in the item including scaffolding and watering.

The coping shall conform to the pertinent particulars of specification No. B. 9 and B. 9 (a) or B. 9 (b) as relevant.

Bd. H. 35.2. *Materials.*—The stones shall be sound and free from seams, cracks or any other defects. All stones shall be of the same colour as far as possible. Mortar shall conform to the specification No. B. 5(a) or B. 3(a) for cement or lime mortar and the proportion shall be as indicated in the item.

Bd. H. 35. 3. *Processing.*—The coping shall be dressed to conform correctly to the shape and dimensions shown in the detailed drawings or as directed by the Engineer. The coping stones shall be of the full width and dressed as specified in the item on the exposed faces and their joints. The other unexposed faces of the stone blocks shall be rough tooled. The length of a coping stone shall not be less than 30 cm. (about 12"). The length of a closer shall not be less than 25 cm. (about 10").

Bd. H. 35. 4. *Laying.*—The coping stones shall be laid full in mortar and the joints with the masonry underneath shall be finished neatly as specified for the masonry. The joints in the fine tooled, close punched and chisel dressed coping shall be 1.5 mm. and those in the rough tooled coping shall be 3 mm.

The joints of the coping shall break joint with those in the masonry.

Bd. H. 35. 5. *Item to include.*—According to B. 9.(a).

Bd. H. 35. 6. *Mode of measurement and payment.*—According to specification No. B. 9(a). 8.

**Bd.H.37.4.**

The dimensions shall be measured square over all chamfers, throatings and mouldings. The contract rate shall be for one cu. m. It may be alternatively per running metre if mentioned in the abstract when the shape and dimensions of width and thickness are mentioned in the special provisions or shown in the drawings. The length shall be then measured along the centre line correct up to 5 mm.

Bd. H. 36. *Providing and fixing fine tooled/close punched/chisel dressed/rough tooled cut stone cornice/string course of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: . including scaffolding and watering.*

Bd. H. 36. 1. *General.*—The item pertains to providing and fixing cut stone cornice or string or course of the specified type of stone and dressing in mortar of the type and proportion mentioned in the item scaffolding and watering.

The stone work shall comply with the pertinent particulars of specification No. B. 9 and B. 9(a) or B. 9(b) as relevant.

Bd. H. 36. 2. *Materials.*—The stones shall be sound and free from seams, cracks or any other defects and be of uniform colour as far as possible. All stones shall be of the size indicated on the drawings and shall be embedded for at least 1.5 times the projecting length.

Bd. H. 36. 3. *Construction.*—The cornice and string course shall be dressed as specified in the item to conform correctly to size, shape, mouldings, etc., shown in the detailed drawings approved by the Engineer. The length of the stone on the face shall not normally be less than 30 cm. (about 12″). A closer shall not be less than 20 cm. (about 8″). The embedded length shall not be less than 1.5 times the projection.

The unexposed faces shall be tooled on beds and joints up to a distance not less than the projection to give the width of joint appropriate to the type of dressing and the rest shall be dressed to suit the requirement of the masonry in which it is embedded.

The joints in the cornice and string course shall break joint with those in the masonry above and below. The joints shall be 3 mm. for rough tooled dressing and 1.5 mm. with other types of dressing.

Bd. H. 36. 4. *Item to include.*—According to specification No. B. 9(a) 7.

The junctions with masonry shall be neatly finished as specified for the masonry.

Bd. H. 36. 5. *Mode of measurement and payment.*—The contract rate shall be for one running metre. The length shall be measured along the centre line of the projection. No deduction shall be made in the masonry for the embedded portion of stone. The length shall be measured correct up to 5 mm.

Bd. H. 37. *Providing and fixing fine tooled/close punched/chisel dressed/rough-tooled cut stone step of trap/granite/quartzite/gneiss stones in cement mortar 1: /lime mortar 1: including watering.*

Bd. H. 37. 1. *General.*—The item pertains to providing and fixing cut stone steps of the specified of stone and dressing in cement mortar of the type and proportion mentioned in the item including watering.

The cut stone step work shall conform to the pertinent particulars of specifications Nos. B. 9 and B. 9(a) or 9 (b).

Bd. H. 37. 2. *Materials.*—The stone shall be sound and free from seams, cracks or any other defects. All stones shall be of the same colour as far as possible. The stones shall be of the size and shape indicated on the detailed drawings approved by the Engineer. For lengths up to 70 cm., the step shall be made up of one stone only when these are available in the region: for lengths of more than 70 cm., the step may made up of more than one stone. But no stone shall be less than 30 cm. (about 12″).

Bd. H. 37. 3. *Construction.*—The cut stones shall be dressed as specified in the item and shall correctly conform to the size, shape, chamfers, nosing, etc., shown on the drawings.

The stone step shall be set in mortar of the type and proportion mentioned in the item. The joints in the stone steps shall be 3 mm. when dressing is rough tooled and 1.5 mm. with other types of dressing. The joints with adjoining masonry shall be neatly finished.

The unexposed face shall be tooled to give the required width of joints.

Bd. H. 37. 4. *Item to include.*—According to B. 9(a).

The uncoursed or other types of masonry in the hearting will not be included in this item but will be paid for separately.

Bd. H. 37. 5. *Mode of measurement and payment.*—The contract rate may be for one metre of each step of specified tread and rise or for one cu. m. as mentioned in the abstract. The length shall be measured correct up to two places of decimals of a metre. When the rate is for one cu. m., the dimensions shall be measured net up to two places of decimals of a meter and quantity calculated correct to three places of decimals of a cubic meter. If there are nosings, the dimensions shall be measured for the block of dressed stone of the least dimensions out of which the step can be cut. Overlaps at supports shall be measured full.

Backing shall be measured separately.

Bd. H. 38. *Providing fine tooled/close punched/chisel dressed/rough tooled — stone slab veneer facing — mm. thick set in cement mortar 1:3/1:4 to masonry with/without wrought iron hold fasts, pins, etc., including scaffolding and watering complete.*

Bd. H. 38. 1. *General.*—The item provides for the construction of stone slab veneer facing of the specified type of stone and dressing set in cement mortar of the specified proportion mentioned in the item to masonry including scaffolding and watering.

Pertinent particulars of the specification Nos. B. 9 and B. 9(a) or B. 9(b) as relevant shall apply to the facing.

Bd. H. 38. 2. *Materials.*—The veneer stone slabs shall be of the thickness as specified in the item. Their sizes shall be as shown on the drawings or directed by the Engineer and shall be dressed as specified in the item on the faces, beds and joints. The rear shall be left rough. The stone slabs shall be of the type mentioned in the item and shall be free from cracks, veins, unsightly spots and other defects.

Cement mortar of the specified proportion shall conform to the specification No. B. 5(a).

Wrought iron hold fasts and pins shall be as shown on the drawings or directed by the Engineer.

Bd. H. 38. 3. *Construction.*—The stone slabs shall be of the size as shown on the drawings or directed by the Engineer and the exposed faces, full beds and joints shall be dressed as specified in the item. The joints shall be cut square to the face and shall be at right angles to each other or as directed.

The facing shall be fixed in cement mortar truly in plumb and in perfect plane-straight or curved as shown on the plan, the bed being fully flushed with mortar. The joints shall be exactly vertical and horizontal. The joints shall not exceed 1.5 mm. for fine tooled/close punched/and chisel dressed work and 3 mm. for the rough tooled work. The stones shall break joint for about half the height of the course. Courses shall be as shown on the drawing and/or approved by the Engineer.

The facing and the backing shall be carried up simultaneously. Each course of facing shall be equal in thickness to an exact number of courses of brick work or rubble backing including their mortar joints. All face joints shall be full of mortar and the mortar shall be of the same colour as that of the stone. For obtaining coloured mortar suitable pigment approved by the Engineer shall be added to the mortar. Cement grout will be used for filling hollows as directed by the Engineer.

Adjacent slabs in successive horizontal courses shall be held together by wrought iron pins passing through holes drilled into the two slabs. These pins shall also be passed through the hole of the wrought iron hold fast forked at the back and anchored into the wall.

The hold fasts shall be countersunk in the joints of the slabs and shall not be seen on the face. The hold fasts shall be spaced about a metre apart subject to a minimum of one for each slab for each horizontal joint.

The facing shall be protected where necessary from the effects of sun, rain, etc., by suitable covering and continuously watered for 14 days.

Bd. H. 38. 4. *Item to include.*—(1) Veneer stone slabs, cement mortar, pins and hold fasts.

(2) Dressing of the stone slabs and setting them in cement mortar with hold fasts and pins including protection where necessary and grouting.

(3) Watering.

(4) All necessary labour, materials double scaffolding, use of equipment, tools and plant.

Bd. H. 38. 5. *Mode of measurement and payment.*—The contract rate shall be for one sq metre of facing of specified thickness, dressed, fixed and finished as specified.

**Bd.H.39.5.**

The dimensions shall be measured correct up to 5 mm. and the area calculated correct up to two places of decimals of a sq. metre. Backing shall be measured exclusive of the specified thickness of facing.

Ornamental skirtings, string courses, cornices and other mouldings required to be provided shall not be paid for separately unless otherwise provided. The dimensions of plane facing shall include all these.

Bd. H. 39. *Providing and fixing white — coloured Indian — mm. thick Mount Abu/Makrana/Chitore/Bhanslana/Jaisalmer/Baroda marble slab facing in cement mortar 1:3/1:4 to masonry with/without iron hold fasts, pins, etc., including scaffolding and watering complete.*

Bd. H. 39. 1. *General.*—The item provides for the construction of marble slab facing of the specified colour and thickness set in cement mortar of the specified proportion to masonry including scaffolding and watering complete.

Bd. H. 39. 2. *Materials.*—The marble slab shall be of the approved shade of Mount Abu, Makrana, Chitore, Bhanslana, Jaisalmeer, or Baroda variety as mentioned in the item and their size and thickness shall be as shown on the drawings and as approved by the Engineer. They shall be of selected quality, dense, uniform and homogeneous in texture and free from cracks or other structural defects. It shall have even and crystalline grains. The exposed face shall have no veins or unsightly stains and defects. They shall have a uniform milky white or coloured shade or patterns of colours approved by the Engineer. Samples shall be got first approved by the Engineer before collecting the slabs. The surface shall be fine polished and the sides machine cut, true, square and as required.

Cement mortar of the specified proportion shall conform to the specification No. B. 5(*a*). Coloured cement shall be used in the joints.

Wrought iron hold fasts and pins shall be as shown on the drawings or directed by the Engineer when provided.

Bd. H. 39. 3. *Construction.*—

When a single course of marble slabs is to be fixed, the slabs shall be fixed as follows :

Mortar pads of uniform width shall be struck on to the wall at close intervals and the marble slab shall be pressed on to them firmly. The remaining cavities if any shall then be filled with thin grout of cement mortar of the same proportion. The sound coming on gentle tapping of the slab will indicate if there are hollows. When the hollows cannot be filled with grout and the finished slab continues to give a hollow sound on tapping, the slab shall be removed and reset.

For facing of more than one course, the marble slabs shall be fixed in the same way as described above except that at the horizontal joints of the slabs, adjacent slabs shall be held together when provided in the item by a wrought iron pin passing through a hole drilled into the two slabs. This shall also be passed through the hole of the wrought iron hold fast forked at the back and anchored into the wall. The hold fast shall be countersunk into the joints of the slab. The hold fasts shall be located about a metre apart subject to a minimum of one for each slab for each horizontal joint.

The facing shall be fixed truly in plumb and in perfect line or curves as shown on the plans. The joints shall be exactly vertical and horizontal or as shown in the drawings. The joints shall not exceed 1.5 mm. The courses and joints shall be as shown on the drawings or approved by the Engineer.

The facing shall be finally polished and protected from effects of sun, rain, etc., by suitable covering and continuously watered for 14 days.

Bd. H. 39. 4. *Item to include.*—(1) Polished marble slabs of the required dimensions. cement mortar and pins and hold fasts when provided in the item.

(2) Fixing the marble slabs, in cement mortar and with pins and hold fasts when provided and curing.

(3) Polishing.

(4) All necessary labour, materials, double scaffolding, use of equipment, tools and plant.

Bd. H. 39. 5. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of completed facing.

The dimensions shall be measured correct up to 5 mm. and the area worked out correct up to 3 places of decimals of a sq. metre.

अनुक्रमणिका
Table of Contents



Ornamental skirting, string courses, cornices and other mouldings required to be provided shall not be paid for separately unless so provided. The dimensions of plane facing shall include all these.

Bd. H. 40. *Providing coursed rubble masonry, 1st sort pillars of trap/granite/quartzite/ gneiss stones in cement mortar 1 : /lime mortar 1 ; including pointing with cement mortar 1 : 3 scaffolding and watering.*

Bd. H. 40. 1. *General.*—The item provides for the construction of coursed rubble masonry pillars in mortar of the type and proportion mentioned in the item including pointing with cement mortar 1 : 3 scaffolding and watering. When the rates of width to thickness is 3 : 1 or less, the masonry will be classed as pillar masonry.

The item shall conform to the specification No. B. 9(h) in all respects. The pointing shall conform to B. 13.

Every course shall contain one header and the headers in consecutive courses shall be at right angles.

The dimensions shown in the drawings or estimate are only approximate and are liable to be changed. Such changes shall not entitle the contractor to extra claims.

Bd. H. 41. *Providing coursed rubble masonry of trap/granite/quartzite/gneiss stones in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering.*

Bd. H. 41. 1. *General.*—The item provides for the construction of coursed rubble masonry in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering.

The item shall conform to the specification No. Bd. H. 16 fully except that instead of the cement mortar, mud mortar shall be used.

Mud mortar shall comply with specification No. Bd. G. 17. 2.

Bd. H. 42. *Providing coursed rubble masonry IIIrd sort of trap/granite/quartzite/geniss stones in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering.*

Bd. H. 42. 1. *General.*— The item provides for the construction of coursed rubble masonry, IIIrd sort in mud mortar in superstructure including pointing with cement mortar 1 : 3, scaffolding and watering.

The item shall comply with the specification No. Bd. H. 10, fully except that instead of the cement mortar, mud mortar shall be used which shall be prepared as specified in the specification No. Bd. G. 17. 2.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. I. CONCRETE BLOCK MASONRY

*List of items of Concrete Block Masonry.*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. I. 1. | Providing in all positions 1 : 2 : 4 cement concrete hollow block masonry for walls as per detailed drawings or as directed, in cement mortar 1 :—, in the superstructure of buildings including scaffolding, striking joints, pointing with cement mortar 1 : 3, raking out joints when plastering is to be done and curing complete ... ... ... ... ... | 333 |
| Bd. I. 2. | Providing in all positions 1 : 2 : 4 cement concrete hollow block coping of size and shape as per detailed drawings or as directed, in cement mortar 1 :— including scaffolding, striking joints and watering complete ... ... ... ... | 334 |
| Bd. I. 3. | Providing in all positions 1 : 2 : 4 cement concrete hollow blocks, moulded to the shapes as shown in the detailed drawings, for string course and cornice in cement mortar 1 :— including scaffolding, striking joints and watering complete ... ... | 335 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. 1 CONCRETE BLOCK MASONRY

Bd. 1. 1. *Providing in all positions 1 : 2 : 4 cement concrete hollow block masonry for walls as per detailed drawings or as directed, in cement mortar 1 : in the superstructure of buildings including scaffolding, striking joints, pointing with cement mortar 1 : 3, raking out joints when plastering is to be done and curing complete.*

Bd. I. 1. 1. *General.*—The item provides for masonry with hollow cement concrete blocks in cement mortar in the superstructure of a building.

Bd. I. 1. 2. *Concrete Blocks.*—These shall be of 1 : 2 : 4 cement concrete mix and be of the hollow type and shall conform to I.S. 2185-1967. Unless otherwise directed, the dimensions of blocks shall be as specified in I.S. 2185-1967. If the exposed outside facing is to be made of a richer mix and/or is to be provided with architectural features, these features and mixes shall be specified in the special provisions or drawings. The surface to be plastered shall be kept somewhat rough to ensure good bond. Special shaped blocks shall be used for splayed jambs, cornice, etc. Sills may be precast or cast in situ but shall be solid. Lintels may be precast or cast in situ but shall be solid and reinforced. Sills, lintels and bed blocks will be paid for separately in plain cement concrete or R.C.C. items. Blocks or different dimensions shall not be allowed on the same work except when shown in the drawings or specially permitted by the Engineer.

Bd. I. 1. 3. *Cement mortar.*—Cement mortar shall conform to B. 5 a. The proportion of mix shall be as specified in the item.

Bd. I. 1. 4. *Scaffolding.*—This shall be as per B. 8. A. 3.

Bd. I. 1. 5. *Laying.*—All blocks shall be wetted with water before laying, but they shall be just moist while laying. They shall be laid in cement mortar to line, level and shapes shown on the plans, slightly pressed and thoroughly bedded in mortar. All joints shall be grouted with cement mortar in each course before another course is commenced. The thickness of joints shall be 10 mm. (about 3/8″) for I.S. size blocks and shall not exceed 6 mm. (about ¼″) for non I.S. size blocks. In all cases, thickness shall be uniform throughout.

All courses shall be laid truly horizontal and all vertical joints made truly vertical. Blocks shall break joint with those above and below for not less than ¼ their length. The joints should normally come over cross ribs of the lower blocks. For battered faces, bedding shall be at right angles to the face unless otherwise directed.

Care shall be taken during construction to see that edges of blocks are not damaged. Blocks shall not be cut.

Verticality of the walls and horizontality of the courses shall be checked very often with plumb bob and spirit level, respectively.

The masonry shall be constructed for the number of floors as specified on the drawings. The fixtures, plugs, frames of doors, windows and cupboards, etc., shall be built into the masonry while laying only. Holdfasts shall be built into the joints of the masonry during laying only and shall be of such shape as will fit into the joints. The iron and steel fixtures, plugs, etc., shall be laid in cement mortar 1:3. The ends of steel beams resting on masonry shall be built in with space for repainting when possible. If required to be embedded they shall be protected with a primary coat of red lead and a thick coat of tar or embedded in 1 : 2 : 4 cement concrete. Portions of timber scantlings in contact shall be painted with two coats of hot boiling coltar before fixing in masonry. Solid 1 : 2 : 4 cement concrete bed plates may be provided under the beams where necessary. The hollows in the blocks under the beam bearing shall be filled up with 1 : 3 : 6 cement concrete and compacted right from the bottom along with laying the blocks, 1 : 3 : 6 cement concrete filling in the hollows in the blocks under the beams and jamb blocks shall be included in the rate for hollow block masonry.

Holes, chases, sleeves, openings, etc., of the required size and shape shall be left in the masonry with special blocks while laying only, for fixing pipes, service lines, passage of water, etc. The dimensions of openings except with the use of special block shall be the whole numbers of blocks so that cutting of blocks is avoided. After the service lines, pipes, etc., are fixed, the extra hollow if left shall be built up with 1 : 3 : 6 cement concrete and neatly finished. The frames of wooden doors and windows and heavy steel door and window frames shall be built in with special blocks where indicated as the masonry is being laid. But ordinary steel doors and windows, the required openings for frames, holdfasts, etc., shall be left in the wall and frames embedded later.

For jambs, special jamb block shall be used. The jamb shall have one hollow nearest to the door opening filled in with 1 : 3 : 6 cement concrete.

अनुक्रमणिका
Table of Contents

**Bd.I.2.2.**

At the junction of main walls and cross walls and between walls of different heights 0.71 mm. thick ( 22 gauge ) corrugated metal ties, 25 mm. ( about 1" ) wide by 20 cm. ( about 8" ) long with 6 mm. ( about ¼" ) corrugations shall be used. A clear joint shall be kept between such walls and filled later with mastic on both sides.

The top of masonry shall be finished to the required slope when necessary with 1 : 3 : 6 solid cement concrete block. No hollows shall be left between the roof and the top of the wall. Anchors of the roof trusses, etc., shall be embedded in the masonry during laying only.

Fixtures, holdfasts, frames, anchors, pipes, templates, etc,, shall be paid under separate items.

Bd. I. 1. 6. *Pointing.*—The exposed parts of masonary shall be pointed with cement mortar 1:3 as specified in B. 13 for I.S. type blocks where joints are 10 mm. For other types of blocks with 6 mm. joints, the joints shall be struck while laying the masonry. If plaster is to be provided, the joints shall be raked out to a depth not less than the thickness of joints when the mortar is green. Plastering shall be paid under a separate item.

Bd. I. 1. 7. *Watering.*—The masonry work shall be continuously watered for 14 days after laying for curing in situ mortar and cement. The mortar shall not be allowed to dry any time during these days.

Bd. I. 1. 8. *Item to include.*—(1) Erecting and removing of scaffolding required for laying and finishing the masonry.

(2) Construction of the hollow concrete block masonry in cement mortar with required type of facing, to lines, levels, plumb, batter, curves and to any position or shape, to the height and depth as shown on the plans or as ordered by the Engineer including metal ties and mastic joints.

(3) Pointing with cement mortar for I. S. type blocks and striking joints for other types. The joints shall be raked when plastering is to be provided.

(4) Watering the masonry.

(5) Filling in with 1:3:6 cement concrete the hollows in the blocks, under beams and near jambs, and for anchors in the top course of blocks and 1:3:6 solid cement concrete blocks near sloping roof.

(6) Fixing of plugs, leaving holes for fixing pipes, etc., at required places, building in of holdfasts, doors and window frames forming chases and grooves.

(7) All labour, material and use of equipment necessary for the satisfactory construction of the masonry.

Bd. I. 1. 9. *Mode of measurement and payment.*—The contract rate shall be for one cubic metre of the masonry. The dimensions shall be measured correct up to a centimetre and the quantity worked out correct up to two places of demicals of a cubic metre. No deduction shall be made for the hollows in the blocks.

Deductions for openings of doors, windows, etc., shall be made for the actual square openings in the masonry at the frames although jambs, sills, etc., may be splayed. No deductions shall be made for the embedded portions of cornices, string courses, corbels, fixtures or frames, etc. Floor and roof slabs, lintels, chajjas, beams and sills embedded or fixed in the masonry shall be deducted. Cement concrete 1:3:6 for filling the hollows in blocks in jambs under beams, etc., shall be included in the rate.

No deduction shall be made for—

(1) ends of dissimilar materials like girders, lintel beams, joists, rafters, etc., up to 500 sq. cm. (about ½ sft.) in section, and

(2) opening up to 0.1 sq. m. (about 1 sft.) in face area.

Bd. 1. 2. *Providing in all positions 1:2:4 cement concrete hollow block coping of size and shape as per detailed drawings or as directed, in cement mortar 1 : including scaffolding, striking joints, and watering complete.*

Bd. I. 2. 1. The specifications pertain to present hollow concrete block coping over plinth, parapet or wall as per detailed drawings or as directed by the Engineer. The item shall generally comply with specifications given for item No. Bd. I. 1 subject to the following:—

Bd. I. 2. 2. *Concrete blocks.*—The blocks shall conform to I. S. 2185-1962 in all respects except for the sizes and shapes. The sizes and shapes of blocks shall be as per detailed drawings or as ordered by the Engineer.

Bd. I. 2. 3. *Laying.*— The coping shall be laid in the required places. The thickness of joints shall be uniform and not more than 3 mm. ($\frac{1}{8}$"). The joints shall be struck smooth while laying the masonry when the mortar is green.

Bd. I. 2. 4. *Mode of measurement and payment.*—As specified in Bd. G. 13.6. No deduction shall be made for the hollows in the blocks.

Bd. I. 3. *Providing in all positions 1 : 2 : 4 cement concrete hollow blocks moulded to the shapes as shown in the detailed drawings for string courses and cornices in cement mortar 1: including scaffolding, striking joints and watering complete.*

Bd. I. 3. 1. *General.*—The item refers to hollow concrete block cornices and string courses as per detailed drawings or as directed by the Engineer. The item shall generally comply with specifications given for item No. Bd. I. 1 subject to the following:—

Bd. I. 3. 2. *Concrete blocks.*—Concrete blocks shall conform to I. S. 2185-1967 in all respects, except for the sizes and shapes. The sizes and shapes of blocks shall be as per detailed drawings or as directed by the Engineer.

Bd. I. 3. 3. *Laying.*—The string courses and cornices shall be laid in the required places. The thickness of joints shall not exceed 3 mm. ($\frac{1}{8}$"). The joints shall be struck smooth when the mortar is green. Cornices and string courses shall be adequately protected against any damage during construction.

Bd. I. 3. 4. *Item to include.*—As per Bd. I. 1. 8. The rate shall include specially moulded blocks.

Bd. I. 3. 5. *Mode of Measurement and payment.*—As per Bd. G. 14. 6. No deductions shall be made for the hollow block cornice or string course in the hollow block masonry.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. J. WATERPROOFING

*List of items of Waterproofing*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. J. 1. | Providing and laying dampproof course for the basement including primer, bitumen binder, bitumen felts and cement mortar for fillets and grouting ... ... ... | 339 |
| Bd. J. 2. | Providing and laying damproof course ..... mm. thick 1:2:4 cement concrete layer and bitumen/Shahabad stones and bitumen using cement with waterproofing compound ... ... ... | 339 |
| Bd. J. 3. | Providing and applying bitumen layer at 2 kg. per square metre over the terrace structural slab including cleaning the surface for water-Proofing ... ... ... | 340 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. J. WATERPROOFING

Bd. J. 1. *Providing and laying damp-proof course for the basement including primer, bitumen binder, bitumen felts and cement mortar for fillets and grouting.*

Bd. J. 1.1. *General.*—The item pertains to the provision and laying of damp-proof course in basement including the primer, bitumen binder and bitumen felts.

Bd. J. 1. 2. *Materials.*—Primer shall be bituminous solution of suitable viscosity to be applied to the wall or floor surface to assist adhesion of the binding material.

Bitumen binder shall conform to I.S. 702-1961. The penetration of bitumen shall be limited to 40 when tested in accordance with I.S. 1203-1958.

The bitumen felts shall conform to I.S. 1322-1965 and shall be of the fabric specified in the special provisions. In the absence of such a mention, it shall be as specified in either paragraph 3.1.1. or 3.1.2 of I.S. 1322-1965.

The type and grade shall be as specified in the special provisions. If not so specified, it shall be as per paragraph 6.2 of I.S. 1609-1966.

Cement mortar 1:3 shall conform to B. 5(a).

Bd. J. 1.3. *Laying.*—The position of the damp-proof course shall conform to that shown in the drawings or as ordered by the Engineer. The provision of the damp-proof course shall conform to I.S. 1609-1960 in general.

The laying shall conform to paragraph 8 and paragraph 5 of I.S. 1609-1966. Unless otherwise specified in the special provisions, the waterproof coursing shall be of two layers of felt and shall conform to paragraph 6.2 of I.S. 1609-1966. Cement mortar fillets shall be laid in the corners.

Primer shall be applied before applying the first coat of binder. The binder shall be applied at a temperature of not less than 121°C (250°F).

In the case of an internal column, the damp-proof course shall be laid by extending the damp-proof course of the floor along the column face to half the depth of the skirting and covered over with skirting, laid in 1:3 cement mortar and well grouted.

The gap between the protecting masonry and bitumen felt shall be grouted with cement mortar 1:3.

Bd. J. 1.4. *Item to include.*—(1) Primer, binder, bitumen felt, cement mortar.

(2) Preparing surface, providing cement mortar filets, applying primer, binder coats, laying bitumen felt layers and grouting of cement mortar.

(3) All necessary labour, materials and use of tools and equipment for the satisfactory completion of the item.

B. J. 1.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. m. of net area covered by the damp-proof course ignoring laps. The measurement shall be for the area covered, dimensions being measured correct up to a cm and the area calculated correct up to two places of decimals of a sq. m.

Bd. J. 2. *Providing and laying damp-porrf course ..... mm. thick 1:2:4 cement concrete layer and bitunem/Shahabad stones and bitumem using cement with waterproofing compound.*

Bd. J. 2. 1. *General.*—The item pertains to the provision and laying of damp-proof course over the plinth including bitumen and Shahabad stones or bitumen and 1:2:4 cement concrete layer of specified thickness as mentioned in the item.

Bd. J. 2. 2. *Materials.*—Bitumen shall be blown type conforming to I.S. 702-1961 or bitumen conforming to I.S. 73-1961. The penetration of bitumen shall be limited to 40 when tested in accordance with I.S. 1203-1958.

The Shahabad flagstone shall be of thickness of the damp-proof course mentioned in the item and of the full width of the masonry and shall conform to Bd. M. 1.1.1. They shall have exposed edges finely dressed true and square.

Cement mortar 1:3 shall conform to B. 5(a) and shall be waterproofed with approved compound like Impermo, Accoproof.

Cement concrete 1:2:4 shall conform to B. 6 and approved waterproofing compound like Impermo. Accoproof added according to the manufacturers' instructions.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. J. 2.3. *laying.*—When 1:2:4 cement concrete is provided, layer of the specified thickness for the full width of the wall shall be provided at the plinth. This shall conform to B. 6. The forms shall be used to get the edges straight, even and vertical. The concrete shall be cured for 7 days after which it shall be allowed to dry.

When Shahabad flagstone is provided it shall be laid on a bed of 1:3 cement mortar mixed with the approved waterproofing compound and the joints also made with the same mortar. It shall be cured for 7 days and allowed to dry.

The damp-proof course shall be provided as shown in the drawing or as ordered by the Engineer.

After the concrete or mortar in Shahabad flagstone joints is cured and dry, surface under superstructure shall be cleaned with brushes and finally with cloth soaked in kerosene oil and hot bitumen applied uniformly all over so that no blank spaces are left anywhere. The temperature of the bitumen at the time of application shall not be less than 121°C (250°F).

The face of the masonry coming in contact with flooring on the inside shall be painted with bitumen.

Further work shall be started after the bitumen coat is fairly set.

Bd. J. 2.4. *Item to include.*—(1) Bitumen and waterproofed concrete or Shahabad stone, and waterproofed cement mortar 1:3 and bitumen.

(2) Laying waterproofed concrete or Shahabad stones in waterproofed mortar as provided and painting with bitumen.

(3) All necessary labour, materials and use of tools for completing the item satisfactorily.

Bd. J. 2.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. m. of top surface of concrete or Shahabad stone. The measurement shall be for the length and width corresponding to the length and width of the Shahabad slabs or cement concrete of the specified thickness and limited to the dimensions shown in the drawings or ordered by the Engineer. The dimensions shall be measured correct to two places of decimals of a metre and area worked out correct to two places of decimals of a sq. m.

Bd. J. 3. *Providing and applying bitumen layer at 2 kg. per sq. m. over the terrace structural slab including cleaning the surface for waterproofing.*

Bd. J. 3.1. *General.*—The item pertains to the provision and applying of a bitumen layer over the terrace structural slab for waterproofing.

Bd. J. 3.2. *Materials.*—Bitumen shall conform to Bd. J. 1. 2.

Bd. J. 3.3. *Application.*—The exposed slab surface shall be througtly cleaned, bitumen shall then be applied at the rate of 2 kg. per sq. m. at a temperature of not less than 121°C (250°F) evenly throughout and allowed to set before laying brickbat coba and flooring of china mosaic or other types.

Bd. J. 3.4. *Item to include.*—(1) Bitumen, cleaning the terrace and applying bitumen.

(2) All necessary labour, materials and use of tools.

Bd. J. 3.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. m.

The length and breadth shall be on the inside of the parapets and measured correct to a Cm and the area calculated correct up to two places of decimals of a sq. m. when parapet at the junction of the slab is also treated, the area so ordered and treated shall also be measured for payment.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. K. EXPANSION JOINTS

*List of items of expansion joints*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. K. 1. | Providing expansion joints in R.C.C. framed structure with—<br>(*a*) plain premoulded filler<br>(*b*) premoulded filler with copper strip and poured filler<br>(*c*) premoulded filler with copper strip, poured filler and lead flashing sheet.<br>(*d*) premoulded filler with copper strip and holdfasts ... | 343 |
| Bd. K. 2. | Providing expansion joints for R.C.C. slabs on load bearing wall of a building with—<br>(*a*) plain premoulded filler<br>(*b*) premoulded filler with copper strip, poured filler and lead flashing sheet ... ... ... | 344 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

## Bd. K. EXPANSION JOINTS

Bd. K. 1. *Providing expansion joints in R.C.C. framed structure with—*

(*a*) *Plain premoulded filler;*

(*b*) *premoulded filler with copper strip and poured filler;*

(*c*) *premoulded filler with copper strip, poured filler and lead flashing sheet; and*

(*d*) *premoulded filler with copper strip and holdfasts.*

Bd. K. 1.1. *General.*—The item provides for the expansion joints in R.C.C. framed structure for internal joints as well as for exposed joints including use of strips of asbestos cement sheets, teak wood plank strips, premoulded bituminous joint filler, copper strip, poured bituminous joint filler and lead flashing sheet.

Bd. K. 1.2. *Materials.*—Plain asbestos cement sheet shall be 6 mm. thick and the width of the strip shall be 15 cm. or as shown in the drawings. Teak wood plank strips shall conform to the specification No. A. 16. They shall be of the size shown in the drawings or as directed by the Engineer and be provided with plain or moulded face.

Premoulded bituminous joint filler shall conform to I.S. 1838—1961.

Copper sheet shall be 1.5 mm. thick and of required width with a U fold in the middle Copper strip shall have holdfasts soldered on to them at intervals of about 30 cm. or as shown in the drawings or mentioned in the special provisions where the embedded plate is not wide enough as in the case of columns or beams.

Lead flashing shall be 1.5 mm. thick.

Poured bituminous joint filler shall conform to I.S. 1834-1961.

Thick craft paper.

3 mm. diameter copper rods of 15 cm. length or as shown in the drawing for holdfasts.

Rawl plugs or such other fixtures for fixing battens.

Bd. K. 1.3. *Construction.*

Bd. K. 1.3.1 *Internal joints.*—(*i*) For the joint between twin internal beams of R.C.C. framed structures, a copper strip of 1.5 mm. thickness and width and shape shown on the plan shall be placed in the first beam such that one leg of the specified width is embedded in the beam and the U fold will come in the joint. Before casting of the second beam, premoulded bituminous joint filler of the thickness shown on the drawing or specified in the special provisions shall be placed below the copper strip to cover the full depth of the beam below and the concrete then cast. On curing of the beam, the gap above the copper strip shall be carefully cleaned without damaging the copper strip and filled with poured bituminous joint filler and neatly finished on top. The bottom shall be covered with teak wood plank strip of the width, thickness and shape specified on the plan. The plank strip shall be moulded or planed as shown on the plans and polished or painted to match the treatment of the beam as directed by the Engineer. The plank strip shall be fixed to one beam only by Rawl plugs or such other fixtures as explained in I.S. 1946—1961. The plank strip shall be free to slide over the other beam.

(*ii*) For the joint between twin internal columns of R.C.C. framed structures, concrete of the second column shall be placed after premoulded bituminous joint filler of the specified thickness and the full width of the joint is placed against the face of the first column. While finishing, the joint on each face shall be covered with a teak wood plank strip of the specified width, thickness and shape. The plank strip shall be planked or moulded as shown on the plans and polished or painted to match the column finish as directed by the Engineer. The plank strip shall be fixed as explained above to one column and free to slide over the other.

Bd. K. 1.3.2. *External joints.*—(*i*) The joint between the twin terrace beams shall be prepared in a manner similar to that of the internal joint except that raised concrete edge as shown on the drawing shall be provided, which shall be cast along with the slab and paid under the slab concrete. Copper plate shall be fixed in the raised edge. If shall be covered by lead flashing 1.5 mm. thick fixed to one slab with copper screws to the wooden blocks embedded in the concrete at intervals at the time of casting and free to slide over the other as shown on the drawing.

(*ii*) For the joints between the twin external columns, while casting the first column, a copper strip of 1.5 mm. thickness and width and shape shown on the plans shall be placed such that one leg of it shall be embedded into the column for the specified width and the

U fold will come in the joint. The copper strip shall be fixed with holdfasts of copper rods of specified diameter soldered to it at intervals of 30 cm. (about 12″) or as shown on the drawing before placing. Before casting the 2nd premoulded bituminous joint filler of the specified thickness shall be placed against the face of the 1st column along the inside of the copper plate to cover the remaining width of the column. After casting and curing of the twin columns, the external edges of the columns shall be neatly finished and the external gap of the joint may be concealed with asbestos sheet strip fixed and finished like the plank strip if so directed by the Engineer. The internal joint shall be concealed with a teak wood plank strip of the thickness, width and shape, planed or moulded and fixed as explained above for the internal joints of columns as shown on the plans and polished or painted to match the exterior finish as ordered by the Engineer.

Bd. K. 1.4. *Item to include.*—(1) All labour and materials required and use of tools for completing the item satisfactorily.

Bd. K. 1.5. *Mode of measurement and payment.*—Expansion joints requiring—

(*a*) plain premoulded filler ;

(*b*) premoulded filler with copper strip and poured filler ;

(*c*) premoulded filler with copper strip, poured filler and lead flashing sheet ; and

(*d*) premoulded filler with copper strip and hold fasts ;

shall be measured separately.

The contract rate shall be for one sq. metre of each of the four categories of expansion joints measured separately. The length and width shall be measured correct up to 5 mm. and limited to the dimensions shown on the plans. The width shall be full width of the concrete members at the joint.

The area shall be calculated correct up to two places of decimals of a sq. metre.

Bd. K. 2. *Providing expansion joints for R.C.C. slabs on load bearing wall of a building with—*

(*a*) *plain premoulded filler ;*

(*b*) *premoulded filler with copper strip, poured filler and lead flashing sheet.*

Bd. K. 2.1. *General.*—The item provides for the expansion joints in R.C.C. slabs on load bearing wall of a building for internal joints as well as for exposed joints including use of thick craft paper, premounded bituminous joint filler, copper strip and lead flashing sheet.

Bd. K. 2.2. *Materials.*—Premoulded bituminous joint filler shall conform to I.S. 1838 : 1961.

Lead sheet 1.5 mm. (about 1/16″) thick.

Copper strip of 1.5 mm. thickness and width required with a U fold in the middle.

Poured bituminous joint filler shall conform to I.S. 1834 : 1961.

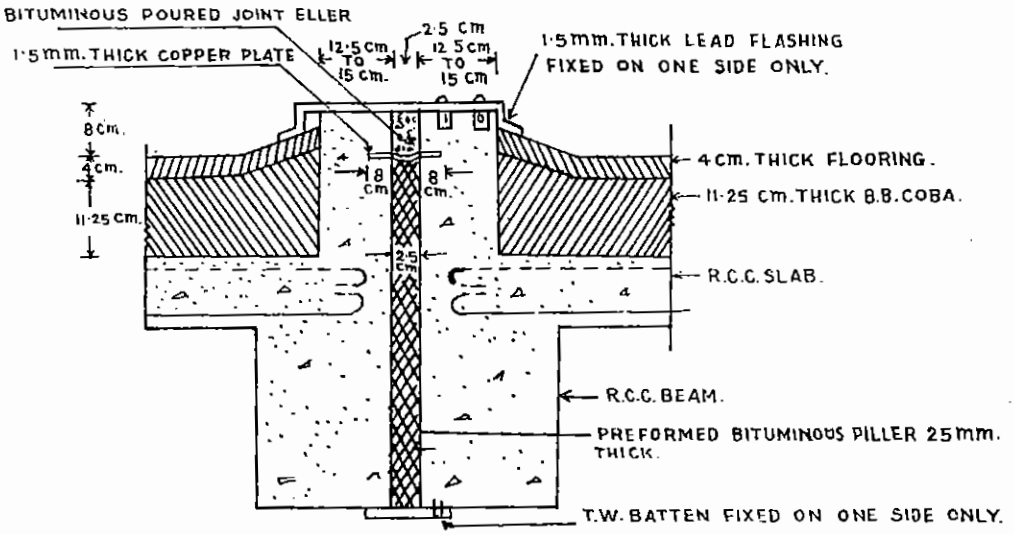
Thick craft paper.

Bd. K. 2. 3. *Construction.*

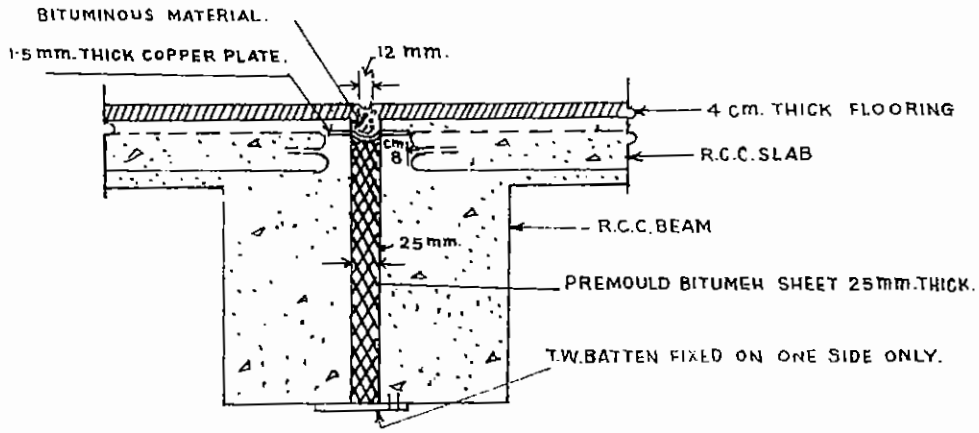
Bd. K. 2.3.1. *Internal joints.*—(1) For the joint between internal slabs on load bearing walls, the top of the wall shall first be finished smooth with 12 mm. thick 1 : 3 cement mortar and cured. Thick craft paper shall be spread to the full width of the wall on the smooth finish surface after curing and just before casting the first slab. After the first slab is cast, a premoulded bituminous joint filler of the specified thickness shows on the drawing and of the full depth of the slab shall be placed against the end of the first slab and the concrete of the adjoining slab cast against the joint filler. The top of the two slabs shall be finished smooth for the width required for the upper wall. Thick craft paper of the width of the wall shall be placed above the smoothened surface immediately before starting the construction of the wall above it.

Bd. K. 2.3.2. *External joints.*—(1) For the joints between terrace slabs supported on load bearing walls, the top of the wall to receive the slab ends shall be finished as in the case of internal joint including the craft paper. The ends of the slab along the joints shall be provided with a raised edge 15 cm.×20 cm. (about 6″×8″) or as shown in the plans to support the brickbat coba and finishing over it. The coba and finishing shall be raised slightly at the joint to enable the water to flow away from the joint. The raised concrete edge which shall be cast along with the slab shall be paid under slab concrete. While casting the 1st slab, copper strip of 1.5 mm. thickness and width and shape shown on the plans shall be placed such that one leg of the specified width is embedded in the raise edge of the slab and the

## EXPENSION JOINTS IN FRAMED STRUCTURES.




SECTION SHOWING
DETAILS OF EXPANSION JOINT AT TERRACE LEVEL
(AT BEAM)

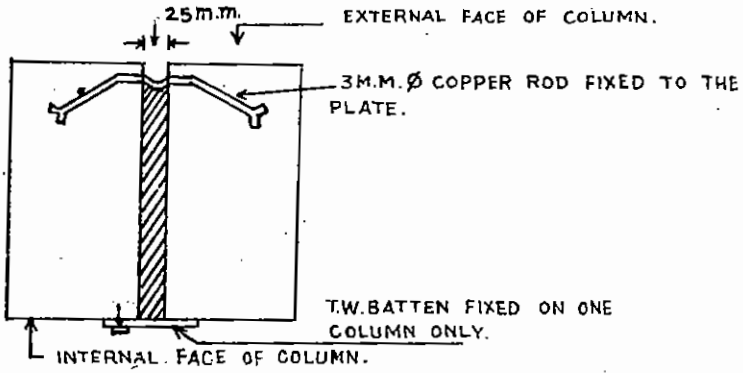



SECTION SHOWING
DETAILS OF EXPANSION JOINT AT FLOOR LEVEL.
(AT BEAM)

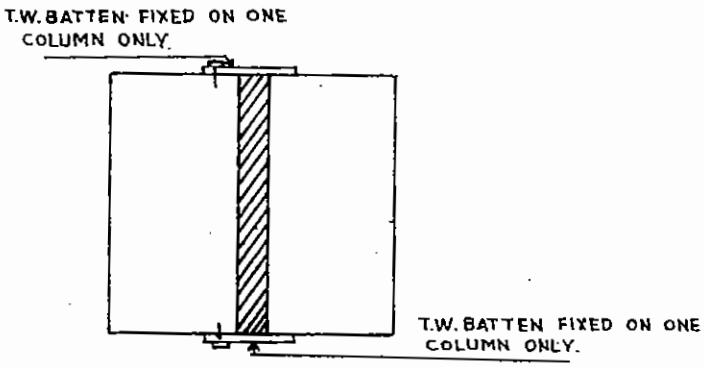
अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

## EXPANSION JOINT IN R.C.C. COLUMNS.

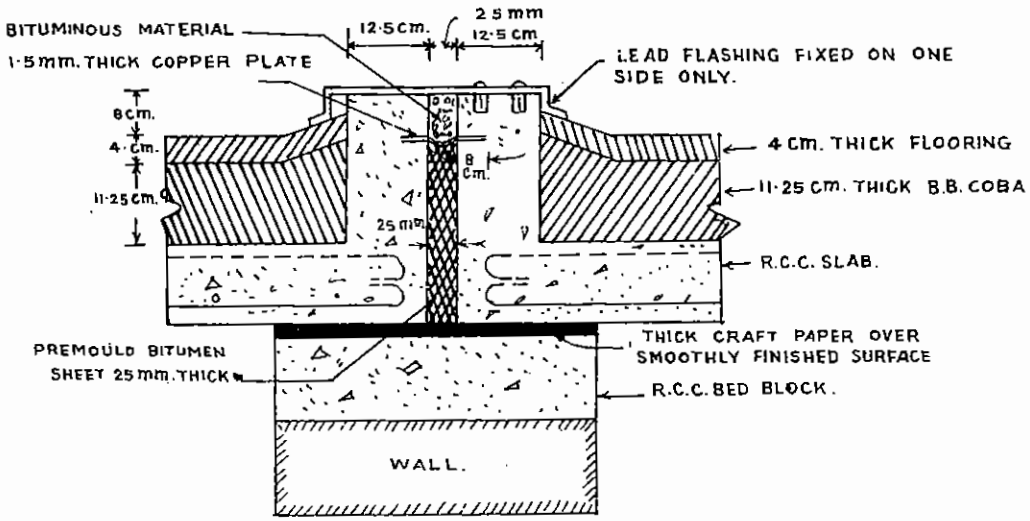



SECTION OF ENTERIOR COLUMNS.

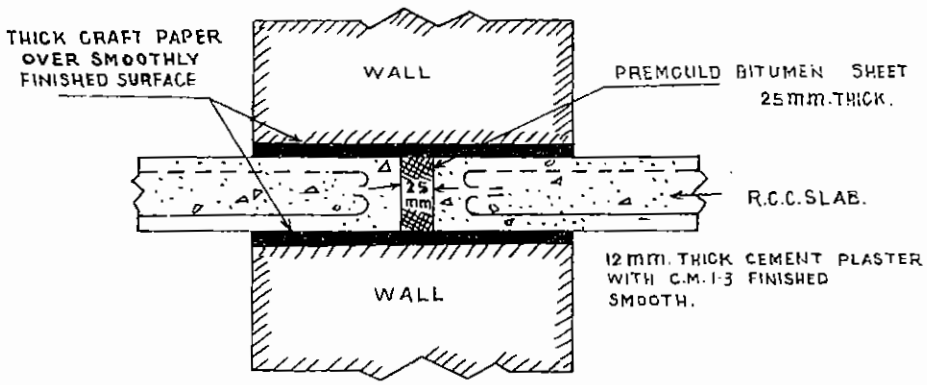



SECTION OF INTERIOR COLUMNS.

## EXPANSION JOINTS IN LOAD BEARING STRUCTURE.




SECTION SHOWING DETAILS OF
EXPANSION JOINT AT TERRACE LEVEL




SECTION SHOWING DETAILS OF
EXPANSION JOINT AT FLOOR LEVEL AT CENTRE
LINE OF WALL

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



U fold will come in the joint. Before casting the second slab premoulded bituminous joint filler of the specified thickness shall be placed below the copper plate to cover the full depth below and the second slab with raised edge then cast. The gap between the two slabs above the copper strip shall be filled with poured bituminous joint filler. The junction of the two slabs shall be covered with lead flashing 1.5 mm. thick fixed to one slab with copper screws to the wooden blocks embedded in the concrete at intervals at the time of casting and the lead flashing shall be free to slide over the other as shown on the drawing.

Bd. K. 2.4. *Item to include.*—(1) All labour and materials required and use of tools for completing the item satisfactorily as per specifications above.

Bd. K. 2.5. *Mode of measurement and payment.*—Expansion joints requiring—

(*a*) plain premoulded filler ; and

(*b*) premoulded filler with copper strip, poured filler and lead flashing sheet.

shall be measured separate. The contract rate shall be for one sq. metre of each of the two categories measured separately. The length and width shall be measured correct up to 5 mm. and limited to the dimensions shown on the plans. The width shall be fu'l width of the concrete members at the joint.

The sq metres shall be calculated correct up to two places of decimals.

---



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. L. PLASTERING AND POINTING

*List of items of Plastering and Pointing.*


| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd. L. 1. | Providing cemet plaster 6 mm. (about $\frac{1}{4}$") thick in a single coat in cement mortar 1 : with/without cement/neeru finish, to concrete surface in all positions including scaffolding and curing complete ... ... ... ... ... | 349 |
| Bd. L 2. | Providing cement plaster 12 mm. (about $\frac{1}{2}$") thick in single coat in cement mortar 1 : with/without cement/neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing complete ... ... ... ... ... | 350 |
| Bd L. 3. | Providing cement plaster 20 mm. (about $\frac{3}{4}$") thick in single coat in cement mortar 1 : with/without cement/neeru finish to stone masonry surfaces, in all positions including scaffolding and curing complete ... ... ... ... ... | 350 |
| Bd. L. 4. | Providing cement plaster 20 mm. (about $\frac{3}{4}$") thick in two coats in cement mortar 1 : with/without cement/neeru finish to concrete or brick surface, in all positions including scaffolding and curing complete ... ... ... ... ... | 350 |
| Bd. L. 5. | Providing cement plaster 25 mm. (about 1") thick in two coats in cement mortar 1 : with/without cement/neeru finish, to concrete, brick or stone surfaces, in all positions including scaffolding and curing complete ... ... ... ... | 350 |
| Bd. L. 6. | Providing cornices, coves, mouldings, ribs and architraves on walls and ceiling, in all positions in 1 : cement plaster 6 mm. to 40 mm. (about $\frac{1}{4}$" to $1\frac{1}{2}$") thick, as shown in the drawings or as directed by the Engineer in required number of coats, with/without cement/neeru finish including scaffolding and curing complete ... ... ... ... ... | 350 |
| Bd. L. 7. | Providing sand faced plaster in cement mortar using Kharsalia/ Kasaba or similar type of sand, in all positions including base coat, scaffolding, keeping the surface of the base coat rough to receive the sand faced treatment, finishing the surface by taking out grains and curing complete ... ... ... | 351 |
| Bd. L. 8. | Providing rough cast cement plaster with cement mortar in two coats to concrete, brick or stone masonry surfaces in all positions including scaffolding and curing complete ... ... ... | 351 |
| Bd. L. 9. | Providing rough cast cement plaster with cement mortar in two coats with coloured cement finish to concrete, brick or stone masonry surfaces, in all positions including scaffolding and curing complete ... ... ... ... ... | 352 |
| Bd. L. 10. | Providing neeru finish to plastered surfaces in all positions including scaffolding and curing complete ... ... ... | 352 |
| Bd. L. 11. | Providing stonecrete facing of approved colour and dressing in cement mortar to brick or stone masonry or concrete surfaces in all positions including scaffolding and curing complete ... | 352 |
| Bd. L. 12. | Providing lime plaster 12 mm. (about $\frac{1}{2}$") thick in 1 : lime mortar in one coat, to concrete or brick surface in all positions including scaffolding, finishing smooth in neeru and curing complete ... ... ... ... ... ... | 353 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd. L. 13. | Providing lime plaster 20 mm. (about $\frac{3}{4}$") thick in two coats in lime mortar 1 : to concrete or brick surfaces in all positions including scaffolding, finishing smooth in neeru and curing complete ... ... ... ... ... ... | 353 |
| Bd. L. 14. | Providing lime plaster 25 mm. (about 1") thick in 1 : lime mortar in two coats, to concrete, brick or stone surfaces, including scaffolding, finishing smooth in neeru and curing complete ... ... ... ... ... ... | 354 |
| Bd. L 15. | Providing pointing with cement mortar 1 : for stone masonry/brick work including scaffolding and curing complete | 354 |
| Bd. L. 16. | Providing tuck pointing with cement mortar 1 : for stone masonry/brick work including scaffolding and curing complete | 354 |
| Bd. L. 17. | Providing weathered pointing with cement mortar 1 : for stone masonry/brick work including scaffolding and curing complete ... ... ... ... ... ... | 354 |
| Bd. L. 18. | Providing Vee pointing with cement mortar 1 : for stone masonry/brick work including scaffolding and curing complete | 355 |
| Bd. L. 19. | Providing flush pointing with cement mortar 1 : for stone masonry/brick work including scaffolding and curing complete | 355 |
| Bd. L. 20. | Providing mud plaster 12 mm. (about $\frac{1}{2}$") thick to brick/20 mm. (about $\frac{3}{4}$") to stone surfaces including scaffolding and finishing complete ... ... ... ... ... ... | 355 |


अनुक्रमणिका
Table of Contents

## Bd. L. PLASTERING AND POINTING

Bd. L. 1. *Providing cement plaster 6 mm. (about ¼") thick in single coat in cement mortar 1 : with/without cement/neeru finish to concrete surfaces in all positions including scaffolding and curing complete.*

Bd. L. 1.1 *General.*—The item refers to provision of 6 mm. thick cement plaster to concrete surfaces and shall be carried out in conformity with specification No. B. 11 for cement plaster subject to the following additional specifications :—

Bd. L. 1.2. *Tools and accessories.*—Tools and accessories used in plaster work may advantageously conform to I.S. 1630-1960. All tools shall be cleaned by scraping and washing at the end of each day's work or after use. Metal tools shall be cleaned after each operation. All tools shall be examined to see that they are thoroughly cleaned before plastering is begun.

Bd. L. 1.3. *Programme of work in relation to plastering.*—The programming of other building operations before, during and after plastering, shall be according to the instructions contained in clause 4 of I.S. 1661-1960.

Bd. L. 1.4. *General precautions in plastering.*—All general precautions as specified in I.S. 1661-1960 clause 9, shall be taken and preparation of the background shall be done as laid down in I.S. 1661-1960 clause 13. Care shall be taken to see that other parts of the work or adjacent works are not damaged while plastering.

Bd. L. 1.5. *Plastering.*—Plaster of cement mortar shall be laid in with somewhat more than 6 mm. (about ¼") thickness and pressed and levelled with a wooden ruler to a finished thickness of 6 mm. Long straight edge shall be freely used to ensure a perfectly even surface. All corners and angles shall be perfectly plumb and soffits of arches true to the specified curve. All junctions of doors and windows and other frames shall be neatly finished. All architectural panelling, grooves, etc., to be shown in the thickness of the plaster shall be so worked. When cement or neeru finish is not specified, the external plaster shall be finished with wooden float to give a granular surface and internal plaster finished smooth with steel trowel.

For cement finishing, a coat of pure portland cement slurry (about 1.5 mm. thick) shall be applied to the plastered surface with a trowel while the first coat is still plastic. If neeru finish is specified then the surface shall be finished as per specifications for item No. Bd. L. 10. The total thickness of the plaster excluding the cement or neeru finish shall be 6 mm. (¼"). Watering for curing shall be started soon after the initial set of the surface material to avoid damage.

Bd. L. 1.6. *Item to including.*—As per B. 11. Plastering in all positions will be included in this item.

The item shall include rounding up of corners and angles, finishing of tops of dados and skirtings, junctions of roof and walls and neeru or cement finish when specified in the item. The plastering of brick cornices, brick copings and other brick mouldings shall not be measured nor paid for separately when included in the respective inclusive items of cornice, coping and moulding. Architectural cornices, mouldings, ribs, architraves and the like when prepared in plaster only of more than 6 mm. thickness shall be paid under separate items unless otherwise provided.

Bd. L. 1.7. *Mode of measurement and payment.*—As per B. 11.

For jambs, soffits, sills, etc., for openings, not exceeding 0.5 sq. m. each in area, ends of joists, beams, posts, girders, etc., not exceeding 500 sq. cm. each in area and opening not exceeding 3 sq. m. each, deductions and additions shall be made in the following manner :—

(*a*) No deductions shall be made for ends of joists, beams, posts, etc., not exceeding 500 sq. cm. and for openings not exceeding 0.5 sq. m. each and no addition shall be made for reveals, jambs, soffits, sills, etc., of these openings nor for finishing the plaster around ends of joists, beams, posts, etc.

(*b*) Deduction for openings exceeding 0.5 sq. m. but not exceeding 3 sq. m. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc., of these openings—

(*i*) when only one face is plastered no deductions shall be made,

(*ii*) when both faces of a wall are plastered with the same plaster, deduction shall be made for one face only for square openings without considering splays, if any,

(*iii*) when two faces of a wall are plastered with different plasters or if one face is plastered and other pointed, deduction shall be made from the plaster or pointing on the side of frames for doors, windows, etc., on which the width of reveal is less than that on the other side, but no deduction shall be made on the other side.

(*c*) In case of openings of area above 3 sq. m. each, deductions shall be made for the actual openings but jambs, soffits, and sills shall be measured and paid.

**Bd.L.6.2.**

Ceilings with projecting beams, shall be measured over beams, i.e., the plastered faces of beams shall be measured and added to the plastering on ceilings when plaster thicker than 6 mm. (about ¼") or special finish is to be provided. But finishing plaster up to 6 mm. thick for R. C. C. work shall not be paid for separately.

The measurements of lengths of wall plastering shall be taken between walls or partitions (the dimensions after plastering shall be taken) and from the top of floor or skirting to the top of the wall for height. Cornices or coves, if any, shall be measured separately and excluded from this item. Ribs and mouldings on ceilings and beams more than the thickness of the plaster shall be measured separately as for the cornice, etc., in plaster, deduction being made from the plastering for the area covered.

Sides of plasters, projections, etc., shall be added to the plaster on walls.

Bd. L. 2. *Providing cement plaster 12 mm. (about ½") thick in single coat in cement mortar 1: with/without cement/neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing complete.*

Bd. L. 2.1. *General.*—The specifications given for item No. Bd. L. 1 shall apply except that the thickness of the cement plaster excluding cement or neeru finish shall be 12 mm. (about ½") in one coat only.

Bd. L. 3. *Providing cement plaster 20 mm. (about ¾") thick in single coat in cement mortar 1: with/without cement/neeru finish to stone masonry surfaces, in all positions including scaffolding and curing complete.*

Bd. L. 3.1. *General.*—The specification for item No. Bd. L. 1, shall apply except that the thickness of the cement plaster excluding cement/neeru finish shall be 20 mm. (about ¾") in the coat only.

Bd. L. 4. *Providing cement plaster 20mm. (about ¾") thick in two coats in cement mortar-1: with/without cement/neeru finish to concrete or brick surfaces, in all positions including scaffolding and curing complete.*

Bd. L. 4.1. *General.*—The item shall comply with specification B. 11. b subject to the additional clauses Bd. L. 1.2, Bd. L. 1.3, Bd. L. 1.4 and the following:—

Bd. L. 4.2. *Finishing.*—When no finish is specified the plastered surface shall be rubbed well to an even plane with a wooden float for external surfaces and finished smooth with a steel trowel for internal surfaces.

When cement finish is specified, a coat of pure portland cement slurry 1.5 mm.(1/16") thick shall be applied to the plastered surface while the second coat is still fresh. If neeru finish is specified, then the surface shall be finished as per specification for item No. Bd. L. 10.

The thickness of the cement plaster shall be 20 mm. (about ¾") excluding cement or neeru finish.

Bd. L. 4.3. *Item to include.*—As per Bd. L. 1. 6.

The two coats and the finish as specified shall be included in the item.

Bd. L. 4.4. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 5. *Providing cement plaster 25 mm. (about 1") thick in two coats in cement mortar 1: with/without cement/neeru finish to concrete, brick or stone surfaces, in all positions including scaffolding and curing complete.*

Bd. L. 5.1. *General.*—The specifications for item Bd. L. 4, shall apply except that the thickness of the two coats of cement plaster excluding cement or neeru finish, if any, shall be equal to 25 mm. (about 1"). The first coat shall be 18 mm. and the second coat 7 mm. thick.

Bd. L. 6. *Providing cornices, coves, mouling ribs and architraves on walls and ceilings in all positions in 1: cement plaster 6 mm. to 40 mm. (about ¼" to 1½") thick, as shown in the drawings or as directed by the Engineer, in required number of coats with/without cement/neeru finish including scaffolding and curing complete.*

Bd. L. 6.1. *General.*—The item provides for cornices, coves, ribs, mouldings, architraves, etc., of cement plaster on walls and ceilings as per detailed drawings or as specified by the Engineer in required places when the cornices, mouldings, etc., are prepared only in plaster. The item shall be carried out in conformity with the relevant portions of specifications for 2 coat plaster given for item No. Bd. L. 5 and further coats if necessary subject to the following—

Bd. L. 6.2. When the cornice, string course, etc., are prepared with cut bricks and plaster they will be treated as brick work cornice, etc., and paid for the inclusive item.

Bd. L. 6.3. The mouldings of cornices, architraves, etc., as shown in the detailed drawings or directed by the Engineer shall be accurately reproduced in the plaster in required number of coats up to a maximum thickness of 40 mm in the correct positions and to exact dimensions and shapes and finished.

Bd. L. 6.4. *Item to include.*—As per B. 11 and shall include preparing the mouldings, etc., in plaster in the required number of coats to the designs and patterns shown in the drawings or directed by the Engineer.

Bd. L. 6.5. *Mode of measurement and payment.*—As per Bd. L. 1.7. The contract rate shall be for a unit of one square metre. Unless otherwise specified in the special provisions, length shall be measured at the middle of the width in vertical and horizontal surfaces on which the mouldings are provided. The width shall be similarly measured on the flat and not along the mouldings. The area shall be arrived at by multiplying length by the width. The dimensions shall be measured correct up to a cm. and the area worked out correct up to two places of decimals of a sq. m. The area of the underlying plaster covered by the mouldings, etc., shall be considered as part of the mouldings, architraves, etc., and shall not be included in the surrounding plaster.

Bd. L. 7. *Providing sand faced plaster in cement mortar using Kharsalia/Kasaba or similar type of sand, in all positions including base coat, scaffolding, keeping the surface of the base coat rough to receive the sand faced treatment, finishing the surface by taking out grains and curing complete.*

Bd. L. 7.1. *General.*—The item shall comply with the specification No. B. 11 in all pertinent particulars. In addition Bd. L. 1.2, Bd. L. 1.3, Bd. L. 1.4 and the following specifications shall also be complied with.

Bd. L. 7.2. *Base coat.*—The base coat plaster shall be of cement mortar 1:4. Waterproofing compound of approved make like Pudlo, Sika, Accoproof shall be added according to the maker's instructions to make the mortar waterproof. The plaster with this mortar shall be laid as specified in Bd. L. 2, with a thickness of 15 mm (about $\frac{5}{8}$″) for brick work and concrete surfaces, and 20 mm (about $\frac{3}{4}$″) for rubble stone masonry. Keys shall be formed on the surface by thoroughly combing it with wavy horizontal lines about 12 mm (about $\frac{1}{2}$″) apart and about 3 mm (about $\frac{1}{8}$″) deep when the mortar is still plastic.

The base coat shall be cured for not less than 2 days.

Bd. L. 7.3. *Sand Faced treatment.*—The cement mortar for sand faced plaster shall have washed Kharsalia or Kasaba or similar type of approved sand with slightly larger proportion of coarse material. The proportion of cement to sand shall be 1:4. The water is added gradually to make the mixture homogeneous. The thickness of finishing coat shall not exceed 8 mm (about 5/16″). After application, the surface should be finished with a wooden float lined with cork and tapped gently to retain a coarse surface texture. When the finishing coat has hardened, the surface shall be kept moist continuously for 14 days.

Bd. L. 7.4. *Item to include.*—As per relevant portion of Bd. L. 1.6. It shall also include the base coat and sand face treatment as above.

Bd. L. 7.5. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 8. *Providing rough cast cement plaster with cement mortar in two coats to concrete brick or stone masonry surfaces, in all positions including scaffolding and curing complete.*

Bd. L. 8.1. *General.*—The item refers to rough cast cement plaster. The specifications given in B. 11. b. shall apply with the addition of Bd. L. 1.2, Bd. L. 1.3, and Bd. L. 1.4, subject to the following:—

Bd. L. 8.2. *Base Coat.*—The first coat of plaster shall be of cement mortar of 1:4 mixed and applied according to the relevant provisions of I.S. 1661-1960 clause 14.1. The finished thickness of the first coat shall be 12 mm (about $\frac{1}{2}$″) for brick masonry or concrete surfaces and 15 mm. (about $\frac{5}{8}$″) for rubble stone masonry. The plaster shall be laid by throwing the mortar (by using a strong whipping motion), on the prepared surface with a trowel in a uniform layer, and pressed to form a good bond. The surface shall be roughened.

Bd. L. 8.3. *Second Coat.*—The second coat shall be the rough cast mixture consisting of aggregate which may vary in size from 5 to 8 mm. and may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand and aggregate shall be 1:1½:3. It shall be flung upon the first coat with large trowels to form an even protective coat. The second coat must be applied while the first coat is still soft and plastic. The work shall generally conform to clause 16.5 of I.S. 1661-1960. The thickness of the coat shall be about 12 mm. (about $\frac{1}{2}$″).

Bd. L. 8.4. *Item to include.*—As per relevant portion of Bd. L. 1.6. It shall include also the base coat and finishing rough cast plaster coat as above.

Bd. L. 8.5. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 9. *Providing rough cast cement plaster with cement mortar in two coats with coloured finish to concrete brick or stone masonry surfaces in all positions including scaffolding and curing complete.*

Bd. L. 9.1. *General.*—The item shall be carried out in the same way as item No. Bd. L. 8. Here high grade mineral pigment shall be mixed with ordinary cement in obtain the shade and tint as approved by the Engineer unless white cement with pigment of the required colour or coloured cement is ordered by the Engineer or specified in the special provisions.

Bd. L. 10. *Providing neeru finish to plastered surface in all positions including scaffolding and curing complete.*

Bd. L. 10.1.—*General.*—The specifications pertain to the provisions of neeru finish to plastered surfaces in building work.

Bd. L. 10.2. *Materials.*—Neeru shall conform to specifications A. 4.

Bd. L. 10.3. *Scaffolding.*—Scaffolding shall be as per B. 9.11.

Bd. L. 10.4. *Preparation of surface.*—The plaster surface shall be combed lightly with wire brushes or nails before it is completely set to form key for neeru. The undercoat shall be only damped evenly but not soaked before the application of neeru.

Bd. L. 10.5. *Application.*—Neeru shall be applied to the prepared and partially set but somewhat plastic surface with steel trowel to a thickness slightly exceeding 1.5 mm. (about 1/16″) and rubbed down to 1.5 mm (1/16″) thickness and polished to a perfectly smooth and even finish, working from top to bottom. While trowelling is going on, soap stone powder contained in thin muslin bags shall be dusted over the surface and worked in. Moistening shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury. Soaking of wall shall be avoided and only as much water as can be readily absorbed shall be used. The surface shall be kept sprinkled with water for 14 days.

Bd. L. 10.6. *Item to include—*

(1) Scaffolding, including erection and dismantling.

(2) Providing, storing and applying Neeru as specified above.

(3) Providing and dusting soapstone powder as specified above.

(4) Watering the surface for 14 days.

Bd. L. 10.7. *Mode of measurement and payment.*—As per Bd. L. 1.7.

When included in a plaster item itself as a finish, it will not be measured and paid separately, but will be included in the inclusive item.

Bd. L. 11. *Providing stonecrete facing of approved colour and dressing in cement mortar to brick or stone masonry or concrete surfaces in all positions including scaffolding and curing complete.*

Bd. L. 11.1. *General.*—The item refers to the provision of plastered surface similar to dressed stone masonry.

Bd. L. 11.2. *Materials cement.*—The cement shall be ordinary portland cement conforming to specification A. 2.

*Waterproofing materials.*—Waterproofing material shall be of approved quality like that of Sika, Accoproof, Pudlo, etc.

*Sand.*—Two types of sand shall be needed. For the first coat sand shall be of Kharsalia or similar type. It shall conform to I.S. 1542-1960, specifications for sand for plaster. But slightly larger proportion of coarser material may be used.

For second coat, crushed stone grit passing through I.S. sieve 480 shall be used for mortar. The stone which is crushed to obtain grit shall be of the type of stone masonry required to be simulated. This grit shall be graded down to dusting.

Bd. L. 11.3. *Preparation of the surface.*—According to B. 11.3.

Bd. L. 11.4. *Tools and accessories.*—According to Bd. L. 1.2.

अनुक्रमणिका
Table of Contents



Bd. L. 11.5. *Programme in relation to plastering.*—According to Bd. L. 1.3.

Bd. L. 11.6. *General Precautions.*—According to Bd. L. 1.4.

Bd. L. 11.7. *Plastering.*—This shall be done generally as specified in B. 11 subject to the following.

Bd. L. 11.7.1. *Base coat.*—The first coat applied shall be of cement mortar of 1.3 with the addition of an approved waterproofing compound such as Sika, Pudlo, Accoproof, etc. Thickness of this coat shall not exceed 12 mm. ($\frac{1}{2}$") for brick and 15 mm. (about $\frac{5}{8}$") for stone masonry. The surface of this coat shall be combed to provide a key for finishing coat.

Bd. L. 11.7.2. *Final coat.*—The base coat shall be cured for at least 48 hours and then allowed to dry out, before being again treated with water as in the case of original surface. The final coat shall be of a specially prepared mixture of ordinary cement or white cement with the required pigment blended with it or coloured cement and crushed stone sand of the required shade passing through I.S. sieve 480. The preparation of mix shall be 1 of coloured cement to 3 of crushed stone *grit* and applied to a finished thickness of 12 mm (about $\frac{1}{2}$"). It shall be pressed, levelled, trowelled and finished with a wooden float. The amount of earlier trowelling should be kept to a minimum. Excessive trowelling is a frequent cause of hair cracks and crasing. Floating shall therefore be carried out only after the final rendering has slightly dried out. The impressions of joints to the pattern shown in the drawings or as directed by the Engineer shall then be marked on the face of the topping by pressing a light string with a trowel.

Bd. L. 11.8. *Dressing.*—After the surface has been cured for about 48 hours and the surface has hardened sufficiently the face shall be dressed with fine chisels very carefully to give the appearance of chisel dressed stone with the required pattern of also dressed joints.

Bd. L. 11.9. *Item to include.*—As per B. 11 and as specified above.

The item shall also include the cost of water proofing material with cement and colouring pigment or coloured cement stonegrit and dressing the face and joints to the required pattern and type.

Bd. L. 11.9. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 12. *Providing lime plaster 12 mm (about $\frac{1}{2}$") thick in 1:...lime mortar in one coat to concrete or brick surfaces including scaffolding, finishing smooth in neeru and curing complete.*

Bd. L. 12.1. *General.*—The specification No. B. 12 shall apply with the addition of the following specifications.

Bd. L. 12.2. *Plastering.*—After the background is prepared as laid down in Bd. L. 1.4 the plaster shall be laid on with somewhat more than the required thickness, pressed and levelled with a wooden flat rule. The plaster shall be well pressed into the joints and the surface rubbed smooth with a wooden bar or plasterer's trowel, sprinkling just as much water as is necessary and well beaten with hand tappers to give a 12 mm (about $\frac{1}{2}$") thick plaster.

Bd. L. 12.3. *Finishing.*—The surface shall be finished with neeru as specified for item No. Bd. L. 10. The completed plaster shall be allowed to rest for 24 hours and then sprinkled with water at short intervals for 2 weeks.

Bd. L. 12.4. *Item to include.*—As per B. 12.10. The item shall also include finishing in neeru.

Bd. L. 12.5. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 13. *Providing lime plaster 20 mm (about $\frac{3}{4}$") thick in two coats in lime mortar 1.... to concrete or brick surfaces in all positions including scaffolding finishing smooth in neeru and curing complete.*

Bd. L. 13.1. *General.*—The specification No. B. 12 shall apply with the addition of Bd. L. 1. relevant parts of and the following specifications in addition.

Bd. L. 13.2. *Plastering.*—The first coat shall be laid as specified in item No. Bd. L. 12 with the difference that the thickness shall be 15 mm (about $\frac{5}{8}$"). Before the first coat sets, it must be well beaten with long thin lath until such beating makes no impression on the surface. The surface is to be left combed for bonding with the second coat.

The second coat shall be applied a day or two after the first coat has set, but the first coat shall not be allowed to dry. The second coat shall be laid on and pressed and levelled with a wooden bar to a thickness of 5 mm. (about 3/16"), rubbed smooth to give a total



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



thickness of 20 mm (about ¾") and polished and completed in one day. The polishing shall be continued till the plaster is quite dry and all the moisture which exudes from the plaster after completion shall be carefully wiped off with a fine cloth and the surface kept completely dry until the, exudation of moisture ceases. A sufficient number of plasterers shall be employed to complete a wall in one day.

Bd. L. 13.3. *Finishing.*—The surface shall be finished in neeru as specified for item Bd. L. 10.

Bd. L. 14. *Providing lime plaster 25 mm (about 1") thick in: lime mortar in two coats to concrete, brick or stone surfaces, including scaffolding, finishing smooth with neeru and curing complete.*

Bd. L. 14.1. *General.*—The specification No. B. 12 shall apply with the addition of Bd. L. 1, relevant part of and the following specifications.

Bd. L. 14.2. *Plastering.*—The first two coats shall be applied as described in specifications for item No. Bd. L. 13 except that second coat shall be applied 10 mm (about ⅜") thick.

Immediately after the second coat has been completed, the surface shall be finished with neeru as specified in item No. Bd. L. 10.

A sufficient number of plasterers shall be employed to complete a wall in one day. If the plaster is not quite dry the following morning, the process of polishing shall be continued until it is quite dry. All moisture shall be wiped off and the wall kept dry.

Bd. L. 14.3. *Item to include.*—As per B. 12.10. The item shall include plaster in two coats and also finishing in neeru.

Bd. L. 14.4. *Mode of measurement and payment.*—As per Bd. L. 1.7.

Bd. L. 15. *Providing pointing with cement mortar 1..... for stone masonry brick work including scaffolding and curing complete.*

Bd. L. 15.1. *General.*—The item shall comply with specification No. B. 13 in all respects. The following specifications shall also be applicable. When the type of pointing is not mentioned in the item, grooved pointing shall be done as in B. 13.

Bd. L. 15.2. *Raking out joints.*—Where the joints have not been raked out when the mortar is green the joints shall be chipped to the required depth (without damaging the brick work or stone masonry) thoroughly cleaned of all loose particles and washed before pointing is done. The raked joints shall be kept damp when cement mortar is being applied to them.

Bd. L. 15.3. *Colour.*—If colour is ordered by the Engineer to be added to the mortar to match the colour of stones, approved pigment of the required colour shall be added to the cement in the mortar.

Bd. L. 15.4. *Item to include.*—According to B. 13.

The rate shall include any colouring pigment used.

Bd. L. 15.5. *Mode of measurement and payment.*—As per Bd. L. 1.7 except that plastering is replaced by pointing.

Bd. L. 16. *Providing tuck pointing with cement mortar 1:—for stone masonry/brick work including scaffolding and curing complete.*

Bd. L. 16.1. *General.*—The specifications given for item No. Bd. L. 15 for cement pointing shall apply subject to the following changes:—

Bd. L. 16.2. *Pointing.*—The raked out joints shall be filled with mortar of the specified mix and required consistency and well pressed and rubbed smooth with the mortar projecting beyond the face of the masonry joint by half the thickness of the joint. The protruding strip of the pointing shall have its centre line coinciding with the centre line of the joint. The width of the protruding strip shall be equal to the specified thickness of the joint in the masonry or as directed by the Engineer. The width and depth of projection shall be uniform throughout. The junctions of horizontal and vertical joints shall be finished neatly. Where joints are not horizontal or vertical as in the case of U. C. R. masonry, the pointing shall be made along the centre line of actual joints to uniform width and depth as directed and the junctions of pointing made neatly. The mortar shall not spread over the adjoining stones.

Bd. L. 17. *Providing weathered pointing with cement mortar 1:—, for stone masonry/brick work including scaffolding and curing complete.*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. L. 17.1. *General.*—The item shall comply with specifications given for item Bd. L. 15 subject to the following:—

Bd. L. 17. 2. *Pointing.*—Mortar shall be pressed with the trowel along the upper edges of the horizontal joints slightly below the edges of masonry joints. The mortar shall not be struck back at the lower edge. The vertical joints in the masonry excluding horizontal joints, shall be pointed flush.

Bd. L. 18. *Providing Vee pointing with cement mortar 1: , for stone masonry/ brick work including scaffolding and curing complete.*

Bd. L. 18.1. *General.*—The item shall comply with specifications given for Bd. L. 15 subject to the following:—

Bd. L. 18.2. *Pointing.*—At the centre of the joint a V shaped groove shall be made with its width and depth equal to half the thickness of the joint.

Bd. L. 19. *Providing flush pointing with cement mortar 1:— for stone masonry/ brick work including scaffolding and curing complete.*

Bd. L. 19.1. *General.*—This item shall have to be carried out when joints are not struck while the masonry is being laid. The specifications given by Bd. L. 15 shall apply to this item except that instead of marking lines with a string and forming groove, etc., as per B. 13, the joints shall be kept flush with the face of joints in the masonry.

This item is included in the item of the masonry itself and no separate measurement or payment will be made for it except in repair work where this item may be provided independently.

Bd. L. 20. *Providing mud plaster 12 mm (about ½") thick to brick/20 mm (about ¾") thick to stone surfaces including scaffolding and finishing complete.*

Bd. L. 20.1. *General.*—The item refers providing mud plaster to brick or stone masonry surfaces.

Bd. L. 20.2. *Mud mortar.*—Mortar shall be prepared from none but well-tempered clay or brick earth free from vegetation, gravel and other rubbish. The clay is to be shifted fine and mixed with cowdung equal to 25 per cent. of its volume and chopped grass to the extent ordered by the Engineer. The earth shall be free from effloresecing salts and white ants. The mixture shall be soaked with water for 24 hours, well mixed with Phowrah and trodden and again flooded with water and left for a week or two without allowing it to dry.

Bd. L. 20.3. *Scaffolding.*—As per B. 9.11.

Bd. L. 20.4. *Preparation of surface.*—Stone and burnt brick surfaces to be plastered shall be prepared as described for cement plaster in B. 11. For sundried brick surfaces, the joints shall be raked up and the whole surface gently wetted before applying the plaster.

Bd. L. 20.5. *Application.*—Bud mortar shall be applied in two coats on the surface to be treated, well pressed and floated with wooden floats. Before the second coat is applied the first coats must be allowed to set but not to become dry. After having been floated, the second coat of plaster shall be allowed to dry. The cracks that open out during drying shall be filled with a mixture of cowdung and clay.

Bd. L. 20.6. *Finishing.*—The plaster shall then receive one coat of moderately liquid mixture made from equal parts of cowdung and finely powdered clay well mixed with water.

Bd. L. 20.7. *Item to include.*—(*i*) providing and removing scaffolding.

(*ii*) Preparing and storing the mud mortar.

(*iii*) Preparing the surface for receiving the plaster,

(*iv*) Applying the plaster,

(*v*) Finishing, as specified above and

(*vi*) All labour, material and devices to carry out the item as specified above.

Bd. L. 20.8. *Mode of measurement and payment.*—As per Bd. L. 1.7.

---

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. M. PAVING, FLOOR FINISHING AND DADO

*List of items of Paving, Floor Finishing and Dado.*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. M. 1. | Providing and laying rough Shahabad/Tandur/Kotah stone flooring 25 mm to 30 mm (about 1″ to 1¼″) thick and——cm. wide in plain/diamond pattern on a bed of sand 1 : 2 lime mortar/1 : 4 cement mortar including cement float for mortar bedding, cement pointing in mortar 1 : 3/striking joints, curing and cleaning complete ... ... ... ... | 363 |
| Bd. M. 2. | Providing and laying in all positions rough Shahabad/Kotah/Tandur stone flooring 12 mm to 20 mm (about ½″ to ¾″) thick and——cm wide in plain/diamond pattern, on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including cement float, striking joints/pointing in cement mortar 1 : 3, curing and cleaning complete ... ... ... ... | 364 |
| Bd. M. 3. | Providing and laying polished Shahabad/Tandur/Kotah stone flooring, 25 mm (about 1″) thick and——cm wide in plain/diamond pattern on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete ... ... | 364 |
| Bd. M. 4. | Providing and laying polished Shahabad/Tandur stone flooring 25 mm (about 1″) thick and——cm. wide in plain/diamond pattern with black polished Caddapa stone slabs for border or for any other approved design, on a bed of 1 : 2 lime mortar/1 : 4 cement mortar, including cement float, filling the joints with neat cement slurry, curing, polishing and cleaning complete ... ... ... ... | 364 |
| Bd. M. 5. | Providing and laying in required positions, skirting or dado of polished Shahabad/Tandur/Kotah stone slabs——mm. thick and——cm. wide on 1 : 2 lime plaster/1 : 4 cement plaster including cement float, filling joints with cement slurry, curing, rubbing, polishing and cleaning complete ... ... ... | 365 |
| Bd. M. 6. | Providing and laying Indian Patent stone flooring 40 mm/50 mm (about 1½″/2″) thick with 1 : 2 : 3 cement concrete laid to proper level and slope, in alternate bays, including compaction, filling joints, marking lines to give the appearance of tiles of 30 cm × 30 cm (1′ × 1′) or other sizes laid diagonally/square etc. finishing smooth (with extra cement) in any colour, as directed and curing complete ... ... ... ... | 365 |
| Bd. M. 7. | Providing and laying Indian Patent stone 40 mm/50 mm (about 1½″/2″) thick with 1 : 2 : 4 cement concrete laid to proper level and slope, in alternate bays including compaction, filling joints, marking lines to give the appearance of tiles of 30 cm × 30 cm (1′ × 1′) or other sizes laid diagonally or square, etc., finishing smooth (with extra cement) in any colour, as directed and curing complete ... ... ... | 367 |
| Bd. M. 8. | Providing and laying flooring of plain cement tiles of size—— cm. × —— cm. on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling joints with neat cement sturry, curing, polishing and cleaning without border/with border with patern cement tiles of——colour ... ... | 367 |
| Bd. M. 9. | Providing and fixing plain cement tiles for dado and skirting in required positions on plaster of 1 : 4 cement mortar including filling joints with neat cement slurry, curing, rubbing, polishing and cleaning complete ... ... ... ... | 367 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. M. 10. | Providing and laying plain coloured cement tiles of approved shade of blue/green/red colour for flooring in required positions on a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float, filling joints with neat cement slurry mixed with approved shade of pigment to match the colour of tiles, curing and machine polishing complete without border/with border and/or a pattern of——coloured tiles ... | 368 |
| Bd. M. 11. | Providing and fixing plain coloured cement tiles of approved shade of blue/green/red colour for dado and skirting in required positions, on plaster of 1 : 4 cement mortar including filling joints with neat cement slurry mixed with pigment to match the colour of the tiles, curing, rubbing and polishing complete ... ... ... ... ... | 368 |
| Bd. M. 12. | Providing and laying white glazed tiles 148.5 mm × 148.5 mm (about 6″×6″) in size and 8 mm/9.5 mm (about 5/16″/$\frac{5}{8}$″) thick for flooring in required positions laid on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, all specials required like round edge tiles, corner cups, etc., filling joints with neat white cement slurry, curing and cleaning complete ... ... ... ... ... | 369 |
| Bd. M. 13. | Providing and fixing white glazed tiles 148.5 mm × 148.5 mm (about 6″ × 6″) in size and about 6.6 mm (about $\frac{1}{4}$″) thick for dado and skirting in required positions on plaster of 1 : 4 cement mortar including all specials required like round corner tiles, angles, cups, etc., filling joints with white cement slurry, curing and cleaning complete ... ... ... | 370 |
| Bd. M. 14. | Providing and laying marble mosaic tiles of approved colour and pattern with white and coloured marble chips upto the maximum size of 6 mm/12 mm/20 mm for flooring in required positions, set on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling the joints with neat coloured cement slurry, curing, polishing and rubbing complete with/ without border and/or pattern of tiles of different colours and design as directed ... ... ... ... ... | 370 |
| Bd. M. 15. | Providing and fixing marble mosaic tiles of approved colour and pattern with white and coloured marble chips upto the maximum size of 6 mm/12 mm/20 mm for dado and skirting in required positions, on a bed of 1 : 4 cement plaster including filling joints with neat coloured cement slurry, curing, rubbing and polishing complete ... ... ... ... | 371 |
| Bd. M. 16. | Providing and laying white Makrana/.....coloured and veined Pepsu/Baroda marble slabs.....cm × .....cm (about .....″ × .....″) and ..... mm (about .....″) thick of approved quality, for flooring in required pattern, on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling joints with neat coloured cement slurry, curing, polishing and cleaning complete ... ... | 371 |
| Bd. M. 17. | Providing and fixing white Makrana/.....coloured and veined Pepsu/Baroda marble slabs .....cm × .....cm (about .....″ × .....″) and .....mm (about .....″) thick of approved quality, vein and colour, for dado and skirting, on 1 : 4 cement plaster including filling joints with neat coloured cement slurry, curing, polishing, rubbing and cleaning complete ... ... ... ... ... | 371 |


अनुक्रमणिका
Table of Contents

| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. M. 18. | Providing and laying in situ marble mosaic of 10 mm/6 mm (about 3/8″/¼″) thickness with white and coloured marble chips upto a maximum size of 6 mm/12 mm/20 mm, in coloured cement in suitable panels for flooring including under layer of 1 : 2 : 4 cement concrete Indian patent stone, aluminium/brass strips to form panels, levelling, compaction, curing, polishing, and cleaning complete ... ... | 371 |
| Bd. M. 19. | Providing and laying in situ marble mosaic dado and skirting 6 mm (about ¼″) thick with white and coloured marble chips in suitable panels on cement plaster 1 : 3 including aluminium/ brass strips for forming panel, rounding of corners and junctions with flooring and walls, curing, polishing and cleaning complete ... ... ... ... ... | 372 |
| Bd. M. 20. | Providing and laying in required positions flooring of tukada mosaic (broken mosaic tile pieces) of approved colour and pattern, set in a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement/coloured cement float, giving proper slopes, compaction, curing and finishing complete ... ... | 373 |
| Bd. M. 21. | Providing and laying in required positions flooring of broken china mosaic (broken pieces of china) of approved colour and pattern in a bedding of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, giving proper slopes, compaction, curing and finishing complete ... ... ... ... | 374 |
| Bd. M. 22. | Providing and laying polished Shahabad/Tandur/Kotah stone slabs 25 mm (about 1″) thick for treads and risers of steps and staircases, with rounded nosing for the treads on a bed of 1 : 4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete ... | 374 |
| Bd. M. 23. | Providing and laying plain cement tiles for treads and risers of steps and staircases, with nosing of treads moulded as per drawings or as directed, on a bed of 1 :4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete ... ... ... | 374 |
| Bd. M. 24. | Providing and laying plain coloured cement tiles of approved shade of blue/green/red colour, for treads and risers of steps and staircases with nosing of the treads moulded as per drawings or as directed, on a bed of 1 : 4 cement mortar including cement float, filling joints with neat coloured cement slurry to match the colour of the tiles, curing, polishing and cleaning complete ... ... ... ... ... | 374 |
| Bd. M. 25. | Providing and laying marble mosaic tiles of approved colour and pattern with white and coloured marble chips upto the maximum size of 6 mm/12 mm/20 mm for treads and risers of steps and staircases, with nosing for the treads moulded as per drawings or as directed, on a bed of 1 : 4 cement mortar including cement float, filling joints with neat coloured cement slury, curing, polishing and cleaning complete ... ... | 374 |
| Bd. M. 26. | Provinding and laying white Makrana/.....coloured and veined Pepsu/Baroda marble slabs .....mm thick of approved quality, colour and veins, for treads and risers of steps and staircases, on a bed of 1 : 4 cement mortar including rounded nosing for the treads, neat cement float, filling joints with coloured cement slurry to match the colour of the slabs curing, polishing and cleaning complete ... ... ... | 375 |

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. M. 27. | Providing and laying in situ, marble mosaic of the required colour and pattern for treads and risers of steps and staircases, including the under layer of cement mortar 1 : 2 for treads and 1 : 3 cement plaster for risers, levelling, compacting, curing, rubbing, polishing and cleaning complete ... ... | 375 |
| Bd. M. 28. | Providing sills of rough Shahabad/Tandur/Kotah stone .....mm to .....mm (about ....." to ....") thick, on a bed of 1 : 4 cement mortar including neat cement float, pointing with cement mortar 1 : 3, curing and cleaning complete ... | 375 |
| Bd. M. 29. | Providing sills of polished Shahabad/Tandur/Kotah stone/.....mm thick, on a bed of 1 : 4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete ... ... ... ... | 375 |
| Bd. M. 30. | Providing sills of precast marble mosaic tiles of approved colour and pattern with white and coloured marble chips upto the maximum size of 6 mm/12 mm/20 mm on a 12 mm thick bed of 1:4 cement mortar including neat cement float, joining with neat coloured cement slurry, curing, polishing and cleaning complete ... ... ... ... | 375 |
| Bd. M. 31. | Providing sills of white Makrana/coloured and veined Pepsu/ Baroda marble slabs of approved quality, colour and veins, .....mm (about .....") thick, on a bed of 1:4 cement mortar including neat cement float, filling joints with neat coloured cement slurry to match the colour of the slabs, curing, polishing and cleaning complete ... ... ... | 376 |
| Bd. M. 32. | Providing and laying in situ marble mosaic sills of the required colour and pattern including the under layer of 1 : 4 cement plaster, levelling, compacting, curing, rubbing, polishing and cleaning complete ... ... ... ... ... | 376 |
| Bd. M. 33(*a*). | Providing and laying precast polished chequered plain cement tiles of —cm × —cm size for flooring and treads in required positions on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete ... ... | 376 |
| Bd. M. 33(*b*). | Providing and laying precast polished chequered coloured cement tiles of approved shade of blue/green/red colour for flooring and treads in required position on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling joints with neat cement slurry mixed with approved shade of pigment to match the colour of tiles, curing and polishing complete ... ... ... ... | 376 |
| Bd. M. 33(*c*) | .Providing and laying polished chequered marble mossaic tiles of approved colour and pattern with white and coloured chips upto the maximum size of 6 mm/12 mm/20 mm for flooring and treads, in required positions set in a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling the joints with neat coloured cement slurry, curing, polishing and rubbing complete ... ... ... ... | 376 |
| Bd. M. 34. | Extra for providing chequers of approved pattern in cas-in-situ— (*a*) Indian patent stone flooring and treads ... ... (*b*) Marble mosaic flooring treads ... ... | 377 |
| Bd. M. 35. | Providing .....mm thick partitions of polished Tandur stone/ white/coloured marble slabs of approved shapes, quality, and colour for urinals, including cutting holes of required sizes in the appropriate places to receive pipes, etc., fixing in cement mortar 1 : 3 curing and cleaning complete .. ... | 377 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. M. 36. | Providing 15 cm (about 6") thick murum flooring including watering, ramming, finishing smooth and applying two coats of cowdung wash complete ..... ... ... | 378 |
| Bd. M. 37. | Providing pavement of trap/granite/quartzite/gneiss stone slabs of size .....cm × .....cm × .....cm (about ....." × ....." × .....") plain/diamond pattern, chisel dressed on face and set in cement mortar 1 : 4 including striking joints/ pointing with cement mortar 1 : 3 and curing complete ... | 378 |
| Bd. M. 38. | Providing pavement of trap/granite/quartzite/gneiss stone slabs of size .....cm × .....cm × .....cm (about ....." × ....." × ....."), plain/diamond pattern, rough tooled on face and set in cement mortar 1 : 4 including pointing with cement mortar 1 : 3 and curing complete ... ... ... | 379 |
| Bd. M. 39. | Providing pavement of trap/granite/quartzite/gneiss stone slabs of size .....cm × .....cm × .....cm (about ....." × ....." × .....") plain/diamond pattern, hammer dressed on the face and set in cement mortar 1:4 including pointing with cement mortar 1 : 3 and curing complete ... ... | 379 |
| Bd. M. 40. | Providing brick-on-edge paving with 1st/2nd class, I.S./conventional type burnt bricks in cement mortar 1 :.....including sand cushion, flat brick bedding, pointing with cement mortar 1 : 3 and curing complete ... ... ... ... | 380 |
| Bd. M. 41. | Providing and laying mastic asphalt flooring 15 mm (about $\frac{5}{8}$"); 20 mm (about $\frac{3}{4}$")/25 mm (about 1") thick, in all position, with proper slopes and matt/polished finish complete ... | 380 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. M. PAVING, FLOOR FINISHING AND DADO

Bd. M. 1. *Providing and laying rough Shahabad/Tandur/Kotah stone flooring, 25 mm to 30 mm (about 1″ to 1¼″) thick and — cm wide in plain/diamond pattern on a bed of sand 1 : 2 lime mortar/1 : 4 cement mortar including cement float for mortar bedding striking joints/ cement pointing in mortar 1 : 3, curing and cleaning complete.*

Bd. M. 1. 1. *Materials* :

Bd. M. 1. 1. 1. *Rough paving slabs.*—The flag stones specified in the item shall be got approved by the Engineer. At its thinnest part, no stone shall be thinner than 25 mm (about 1″). The flag stones shall be hard, sound, durable, resistant to wear rectangular in shape or square if directed by the Engineer and of the specified width. They shall have plain surface. Uniformity of size shall generally be maintained for the flags used in any one room. The stone flags shall be without any soft veins, cracks or flows and shall have a uniform colour. They shall have even natural surfaces free from broken flakes on top and shall be chiselled on edges to half its depth, true and square to ensure uniform width of joint. The evenness of the surface and edges of the slab shall not be marked by careless dressing of slabs and no patching up shall be allowed for the slabs. The edges shall be quite straight. The under face may be left as quarried. Samples of stone slabs to be used and their dressing shall be got approved by the Engineer and the slabs to be used shall conform to the approved sample.

Bd. M. 1. 1. 2. *Bedding.*—Cement mortar or line mortar for the bedding and cement mortar for pointing shall be of the proportion as specified in the item, Lime mortar, shall comply with and cement mortar shall comply with B. 5. a cement mortar may be used for the bedding only when lime mortar is not available. When sand bed is mentioned in the item, sand used shall be coarse and shall not contain more than 10 per cent of clay.

Bd. M. 1. 2. *Constructional Details.*

Bd. M. 1. 2. 1. *Bedding.*—The base of cement or lime concrete shall be laid and compacted to a reasonably true plain surface and to the required slopes and below the level of the finished floor to the extent of the thickness of the slabs and mortar bedding. Cement concrete or lime concrete bedding shall be paid under a separate item. Cement mortar for bedding may be mixed manually or by a mechanical mixer. Lime mortar shall be prepared in a mortar mill or pan. The amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that would interfere with the even bedding of the stones. Before spreading the mortar, the sub-floor or base shall be cleaned of all dirt, scum or laitance and of loose material and then well wetted without forming any pools of water on the surface. In case of R. C. C. floors, the top, shall be left a little rough. All points of level for the finished paving surface shall be marked out. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens only over so much area as will be covered with slabs within half an hour. The thickness of the mortar bedding shall not be less than 12 mm. (about ½″) not more than 25 mm. (about 1″). The required slope shall be given to the bed. When, sand bed is provided, sand shall be spread to give a thickness of about 12 mm. (½″).

Bd. M. 1. 2. 2. *Fixing stone slab.*—Before laying, the stone flags shall be thoroughly wetted with clean water. Neat cement grout of honey like consistency shall be spread on the mortar bed over as much area as could be covered with the slabs within half an hour. Cement grout shall be omitted when sand bed is provided. The specified type of stone flags shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope in the mortar bed. Each flag shall be gently tapped with a wooden mallet till it is firmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gentle tapping of the slabs, such slabs shall be removed and reset properly. The mason shall make the joints of uniform thickness and in straight lines. The joints shall be 6 mm. to 10 mm. (about ¼″ to ⅜″) thick and filled solidly with mortar for their full depth. The joints shall be struck smooth. But there shall be no smearing of mortar over the slabs. When pointing is to be done, the joints shall be raked out for not less than the width of the joints when the mortar is green. The flags shall be laid so as to give continuous parallel long joints with cross joints at right angles to them. The edges of the adjoining slabs shall be in one plane. Where the slabs cover open edges, of floor or window sills the edges shall be neatly rounded off. This shall be included in the rate.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.M.4.**

When diamond pattern paving is provided in the item, the slabs shall be square and laid to the diamond pattern with traingular shaped slabs to make up the edges. In plain pattern stones on each course shall break joint with those in the next.

Bd. M. 1. 2. 3. *Pointing.*—When pointing is to be done, the joints shall be pointed with cement mortar of the proportion mentioned in the wording of the item according to B. 13. If the slabs are smeared with mortar, they shall be cleaned immediately after pointing. When pointing is not specified joints shall be struck.

Bd. M. 1. 2. 4. *Curing.*—The flooring shall be kept well wetted with damp sand or water for fourteen days. It shall be kept undisturbed for at least seven days.

Bd. M. 1. 2. 5. *Cleaning.*—All flooring shall be thoroughly cleaned and handed-over clean and free from any mortar stains, etc.

Bd. M. 1. 3. *Item to include.*—The rate shall include.

1. All labour, materials and equipment, cleaning the sub-base, laying mortar bed and cement grout, or sand as specified fixing stone slabs specified above and making up the joints.
2. Any cutting and waste if required.
3. Cement pointing when included in the item.
4. Curing.
5. Cleaning the floor from all stains, etc.

Bd. M. 1. 4. *Mode of measurement and payment.*—The contract rate shall be per square metre of the floor area covered by the flooring of the specified type. All work shall be measured net. The length and width of the flooring shall be measured net between the faces of skirtings or dados or plastered faces of walls. Paving under the dado, skirting or plaster shall not be measured.

Bd. M. 2. *Providing and laying rough Shahabad/Kotah/Tandur stone flooring 12 mm to 20 mm (about ½" to ¾") thick and—cm. wide in plain/diamond pattern on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including cement float, striking joints/cement pointing in mortar 1 : 3, curing and cleaning complete.*

Bd. M. 2. 1. *General.*—The specifications given for item No. Bd. M. 1. shall apply subject to the following changes:—

Bd. M. 2. 2. Only rough Tandur stone shall be used for the paving.

Bd. M. 2. 3. Thickness of Tandur stone flags shall be 12 mm. to 20 mm. (about ½" to ¾"). It shall not be less than 12 mm (about ½") at its thinnest part.

Bd. M. 3. *Providing and laying polished Shahabad/Tandur/Kotah stone flooring, 25 mm (about 1") thick and—cm wide in plain/diamond pattern on a bed of 1:2 lime mortar/ 1 : 4 Cement mortar including cement float, filling joints with neat cement grout, curing, polishing and cleaning complete.*

Bd. M. 3. 1. *General.*—The specification for this item shall be the same as for item No. Bd. M. 1 except that—

(1) All the stone slabs shall be square in shape. The dimensions shall be 24.85 cm × 24.85 cm., 29.85 cm × 29.85 cm or other dimensions as specified in the special provisions or directed by the Engineer. Tolerance in thickness shall be ± 3 mm.

(2) The exposed surface of the specified stone flags shall be machine polished to a smooth, even and true plane and the edges machine cut square and to the required shape when necessary. Samples shall be got approved by the Engineer who will keep them in his office for reference.

(3) The thickness of joints shall not exceed 1.5 mm.

(4) Joints shall be grouted with neat cement slurry.

(5) When the bedding and joints of the flooring have completely set, the surface shall be machine polished to give a smooth, even and true plane to the floor and thoroughly cleaned.

Bd. M. 4. *Providing and laying in all positions polished Shahabad/Tandur/Kotah stone flooring 25 mm (about 1") thick and—cm wide in plain/diamond pattern with black processed Caddapa stone slabs for borders or for any other approved design on a bed of 1:2 lime mortar/1:4 cement mortar including cement float, filling the joints with neat cement grout, curing, polishing and cleaning complete.*

अनुक्रमणिका
Table of Contents

Bd. M. 4. 1. *General.*—The specifications for item No. Bd. M. 3. shall apply for this item also subject to the following.

Bd. M. 4. 2. Stone slabs of the Caddapa type shall generally conform to specification Bd. M. 1. 1. 1. regarding the material but shall be black in colour. They shall be machine polished and machine cut and fixed as specified in Bd. M. 3. The Caddapa stone slabs shall be used with Shahabad or kotah or Tandur slab flooring to form border strip or any other approved pattern as per drawing or as directed by the Engineer and the whole floor satisfactorily machine polished.

Bd. M. 4. 3. *Item to include.*—As per Bd. M. 3.

The item shall also include the cost of providing and laying the polished Caddapa stone slabs in the flooring to the required pattern.

Bd. M. 4. 4. *Mode of measurement and payment.*—According to Bd. M. 1. 4.

Measurements for the floor shall be taken for the flooring inclusive of Caddapa stones.

Bd. M. 5. *Providing and laying in the required positions skirting or dado of polished Shahabad/Tandur/Kotah stone slabs,———mm thick and——cm wide on lime plaster 1:2/ cement plaster 1:4 including cement float, filling joints with cement slurry, curing, rubbing, polishing and cleaning complete.*

Bd. M. 5. 1. *Materials.*—Same as for Bd. M. 3. except that thickness of the slabs shall be as mentioned in the item.

Bd. M. 5. 2. *Constructional Details.*

Bd. M. 5. 2. 1. *Lime or Cement plaster.*—The backing for skirting shall be lime or cement plaster as mentioned in the item 12 mm to 20 mm thick and this plastering shall be done as specified in B. 11 for cement plastering and B. 12 for lime plastering respectively in a single coat.

Bd. M. 5. 2. 2. *Fixing the skirting or dado.*—This shall be done entirely in the same manner as for cement tiles specified in I.S. 1443-1959. Thickness of joints shall not exceed 1:5 mm. Final polishing may be done by rubbing. The top of skirting or dado shall be jointed neatly with the plaster above as directed.

Bd. M. 5. 3. *Joint.*—The joints between the two slabs shall be filled with neat cement grout of appropriate consistency.

Bd. M. 5. 4. *Item to include.*—(1) Background plastering.

(2) Providing and fixing the slabs including cutting etc.

(3) Jointing with cement grout and joining the top edge to plaster neatly.

(4) Curing.

(5) Final polishing by rubbing.

(6) Cleaning.

(7) All labour, materials, and use of equipment to carry out the item as specified above.

Bd. M. 5. 5. *Mode of measurement and payment.*—As per Bd. M. 9. 6.

Bd. M. 6. *Providing and laying Indian Patern stone flooring 40 mm/50 mm (about 1½"/2") thick, with 1:2:3 cement concrete laid to proper level and slope, in alternate bays including compaction, filling joints, marking, lines to give the appearance of tiles of 30 cm×30 cm (12"×12") or other sizes laid diagonally or square etc., finishing smooth (with extra cement) in any colour as directed and curing complete.*

Bd. M. 6. 1. *Materials—Cement concrete.*—The cement concrete shall generally conform to specification No. B. 6 for ordinary concrete. The coarse aggregates shall be carefully selected, sufficiently-tough and hard stone pieces broken in a manner that will provide particles of approximately cubical shape affording good interlocking. Elongated or thin flake-like fragments should be avoided. The maximum size of coarse aggregate shall be 12 mm (about ½"). The fine aggregate shall consist of property graded particles.

The proportion of mix shall be 1:2:3. The least amount of mixing water that will produce a workable mix and will allow finishing without excessive trowelling shall be used. Generally a water cement ratio of 0.5 should suffice.

For large works mechanical mixing may be resorted to.

Bd. M. 6. 2. *Laying.*—(1) Before placing the concrete flooring, the sub-grade shall be passed by the Engineer. The sub-grade for the concrete floor shall be a bedding of lime concrete or cement concrete or brickbat concrete of sufficient thickness properly executed as per specifications, under a separate item in the tender. The sub-grade in all cases shall be formed to proper levels and slopes, well compacted and cured. The top surface shall be kept slightly rough. Any slope required to be provided in the floor is to be given to the sub-grade. The formwork shall be as per B. 6. 5. The sub-grade shall be paid separately.

(2) The surface of the sub-grade shall be cleaned of all loose materials and moistened immediately before laying the concrete floor. The concrete flooring shall be laid in alternate bays not exceeding 6 sqm. (about 64 sft.) each. The edge of each panel into which the floor is divided should be supported by flat bars of steel or wood duly oiled to prevent stickings. Their depth shall be the same as that proposed for the finished floor as mentioned in the item. The bars should be removed before filling in the adjoining panels. At least 48 hours shall elapse before the concreting in the adjacent bays is commenced.

(3) The concrete shall be laid immediately after mixing. While being placed the concrete shall be vigorously sliced and spaded with suitable tools to prevent formation of voids or honey comb pockets. The concrete shall be brought to the specified levels by means of a heavy straight edge resting on the side forms and drawn ahead with a sawing motion in combination with a series of lifts and drops alternating with small lateral shifts. While concreting the adjacent bays care shall be taken to ensure that the edges of previously laid bays are not broken by careless or hard tamping. Immediately after laying the concrete, the surface shall be inspected for high or low spots and any needed correction made up by adding or removing the concrete. After striking off the surface to the required grade, it shall be compacted with a wooden float. The blows shall be fairly heavy in the beginning but as consolidation takes place, light rapid strokes shall be given to complete the ramming. The floating shall be followed by steel trowelling after the concrete has hardened sufficiently to prevent excess of fine material from working to the surface. The finish shall be brought to a smooth and even surface free from defects and blemishes and tested with straight edges. No dry cement or mixture of dry cement and sand shall be sprinkled directly on the surface of the concrete to absorb moisture or to stiffen the mix. After the concrete has been thoroughly rammed and has dried sufficiently to allow the rendering to be worked up, surface shall be rendered with a thin coat of 1 : 1 cement mortar with fine sand and uniformly floated. If so directed by the Engineer, approved mineral colour pigment conforming to Appendix B of I. S. 459-1962 shall be added to the cement mortar to give the required colour and shade to the flooring. When the cement mortar rendering is sufficiently stiff, lines shall be marked on it with strings or by any other device to give the appearance of tiles 30 cm × 30 cm or of any other size laid diagonally or square as directed by the Engineer. The junctions of floor and walls shall be rounded off if so directed without any extra payment.

(4) After the concrete in the bays has set, the joints of the panels shall be filled with cement cream or with suitable bitumastic compound as shown on the drawings or directed by the Engineer.

(5) Vertical edge of the bays shall be neatly marked on the surface of the concrete with a pointed trowel after filling the joints.

Bd. M. 6. 3. *Finishing.*—When the rendering is somewhat stiff, neat cement may be sprinkled on sparingly through a pepper pot on the surface and rubbed lightly to give smooth polished ordinary cement coloured surface. If coloured flooring is required by the Engineer the approved coloured cement or cement mixed with the required shade of approved pigment shall be used. Surface shall be protected from direct sun when it is green.

Bd. M. 6. 4. *Curing.*— Curing shall start on the next day after finishing and shall be continued for 14 days.

Bd. M. 6. 5. *Item to include.*—The rate shall include all labour, materials, tools and equipment, for cleaning and preparing the sub-surfaces, formwork, providing concrete of the specified mix, compacting, rendering, using colouring pigment when required, marking lines on the surface, finishing and curing as specified above.

Bd. M. 6. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the flooring of the specified thickness. The linear dimensions shall be measured net between plastered walls or skirting correct up to 2 places of decimals of a metre and area worked out correct up to two places of decimals of a square metre.

Bd. M. 7. *Providing and laying Indian Patent stone 40 mm×50 mm (about 1½"/2") thick with 1:2:4 cement concrete laid to proper level and slope, in alternate bays including compaction, filling joints, marking lines to give the appearance of tiles of 30cm ×30 cm. (12"× 12") or other sizes laid diagonally or square etc. finishing smooth (with extra cement) in any colour as directed and curing complete.*

Bd. M. 7. 1. *General.*—The specification for this item shall be the same as for item Bd. M. 6, except that the proportion of concrete shall be 1:2:4 instead of 1:2:3.

Bd. M. 8. *Providing and laying flooring of plain cement tiles of size cm× cm on a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float, filling joints with neat cement slurry, curing, polishing and cleaning without border/with border/with pattern of cement tiles of colour.*

Bd. M. 8. 1. *General.*—The item provides for flooring of plain cement tiles with or without coloured cement tile borders as mentioned in the wording of the item.

Bd. M. 8. 2. *Materials*:—

Bd. M. 8. 2. 1. *Plain cement tiles.*—Plain cement tiles shall be of general purpose type. These shall conform to I. S. 1237-1959 in respect of constituent materials, manufacture, shape and dimensions, tolerances, wearing layer, colour and appearance, general quality of tiles, strength, resistance to wear, water absorption and tests etc. The size of the tile shall be one of the following as approved by the Engineer, 19.85 cm.×19.85 cm., 29.85 cm.×29.85 cm., 24.85 cm.×24.85 cm., 20 cm.×20 cm., 25 cm.×25 cm., 30 cm.×30 cm. If there is a doubt about the quality of tiles, they shall be tested and the cost of the tests borne as specified in I. S. 1237-1959. Samples of tiles shall be got approved by the Engineer, who shall keep them in his office for reference. The supply shall conform to the samples.

Bd. M. 8. 2. 2. *Plain coloured cement tiles for border and design.*—Coloured cement tiles shall also comply with I. S. 1237-1959 having the colour facing as mentioned in the wording of the item.

Bd. M. 8. 2. 3. *Mortar.*—As for item Bd. M. 1. 1. 2.

Bd. M. 8. 3. *Bedding.*—Bedding shall conform to I. S. 1443-1959 Code of practice for laying and finishing of cement concrete flooring tiles.

Bd. M. 8. 4. *Laying, curing, polishing, finishing and cleaning.*—Polishing, finishing etc., shall conform to I. S. 1443-1959. Polishing shall be done by machine to a smooth and plane surface. When a border of coloured tiles is included in the item, the tiles of the specified colour shall be laid in one tile width all round near the border. If a pattern of coloured tiles is to be provided it shall be mentioned in the special provisions and/or shown in the drawings. The joints of the plain tiles shall be filled with neat cement slurry and of coloured tiles with coloured cement slurry. Cleaning of the whole floor shall be done according to I. S. 1443-1959. The flooring shall be kept wet for 14 days.

Bd. M. 8. 5. *Item to include.*—(*i*) Cleaning the base and laying the bedding mortar and levelling.

(*ii*) Providing and fixing the tiles in neat cement float on the bedding mortar.

(*iii*) When plain coloured cement tile border is included in the item, border of one tile of the specified colour shall be provided unless other patterns are specified in the item or shown in the drawings.

(*iv*) Filling the joints of tiles with neat cement or coloured cement slurry as necessary.

(*v*) Curing.

(*vi*) All labour, materials, and use of tools for carrying out the item as specified above.

Bd. M. 8. 6. *Mode of measurement and payment.*—This shall be the same as for item Bd. M. 1. Coloured border or pattern when mentioned in the item, shall be included in the rate.

Bd. M. 9. *Providing and fixing plain cement tiles for dado and skirting in required positions on plaster of 1:4 cement mortar including filling joints with neat cement slurry, curing, rubbing, polishing and cleaning complete.*

Bd. M. 9. 1. *General.*—The item refers to provision of dado and skirting of plain cement tiles, for walls.

Bd. M. 9. 2. *Materials.*—Plain cement tiles, mortar and cement shall be the same as for item Bd. M. 8.

Bd. M. 9. 3. *Plastering.*—After preparing the wall to be plastered as specified in B. 11 plastering shall be done as indicated in I. S. 1443-1959, para. 13.

Bd. M. 9. 4. *Fixing, curing, polishing and cleaning.*—These shall be done entirely as per I. S. 1443-1959. Polishing may be done by hand. But a smooth surface and fine polish shall be obtained. Jointing shall be done in neat cement slurry. The plaster at the upper edge of the dado shall be finished neatly as directed by the Engineer.

If doors, windows or other openings are located within the dado area, the sills, jambs, angles etc., shall be provided with tiled dado including special tiles where necessary. The tiling shall be kept wet for 14 days.

Bd. M. 9. 5. *Item to include.*—(*i*) Background plastering.

(*ii*) Providing and fixing the tiles including all special tiles and finishing edges with plaster cutting and waste.

(*iii*) Jointing the tiles with cement slurry.

(*iv*) Curing.

(*v*) Polishing and cleaning the dado and skirting.

(*vi*) All labour, materials, use of tools and equipment for carrying out the item as specified above.

Bd. M. 9. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the net area actually covered by the dado or skirting tiles including special tiles on walls, jambs, sills etc., if necessary. All work shall be measured net. The length of the dado face shall be measured net between its face edges at the ends excluding overlap. The width of the face shall be measured between the top of dado or skirting and the top of flooring. The dimensions shall be measured correct up to two places of decimals of a metre and the area worked out correct up to two places of decimals of a square metre. Teak wood cover mouldings if provided shall be paid separately.

Bd. M. 10. *Providing and laying plain coloured cement tiles of approved shade of blue/green/red colour for flooring in required positions, on a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float, filling joint with neat cement slurry mixed with approved shade of pigment to match the colour of tiles, curing and machine polishing complete without border/with border and/or a pattern of ..... coloured tiles.*

Bd. M. 10. 1. *General.*—The item refers to provision of flooring with cement tiles of approved colour as mentioned in the item and shall comply with I. S. 1443-1959.

Bd. M. 10. 2. *Materials.*—These shall be the same as for item Bd. M. 8 except that all the tiles shall have facing of the colours mentioned in the item. Pigment to be mixed shall conform to Appendix B of I. S. 459-1959. Coloured cement shall be of standard and approved make.

Bd. M. 10. 3. *Bedding, Laying, Curing, Polishing, Finishing and Cleaning.*—These shall be in conformity with Bd. M. 8 subject to the following:—

(*i*) The joints of tiles shall be filled with neat cement slurry mixed with pigment of suitable colour or coloured cement slurry so as to match with the colour of the tiles.

(*ii*) When a border or pattern with cement tiles of different colours is included in the item, tiles of specified colours shall be laid along with the other tiles to conform to the required design.

Bd. M. 10. 4. *Item to include.*—As per Bd. M. 8. 4, but using cement tiles of the specified colours. The item shall also include the cost of the pigment to be used for the joints or coloured cement and different coloured borders or pattern if included in the item.

Bd. M. 10. 5. *Mode of measurement and payment.*—As per Bd. M. 1.

Bd. M. 11. *Providing and fixing plain coloured cement tiles of approved shade of blue/green/red colour for dado and skirting in required positions, on plaster of 1 : 4 cement mortar including filling joints with neat cement slurry mixed with pigment to match the colour of the tiles, curing, rubbing and polishing complete.*

Bd. M. 11.1. *General.*—The item provides for dado and skirting with cement tiles of approved colour as mentioned in the item.

Bd. M. 11. 2. *Materials.*—These shall be the same as for Bd. M. 10. 2.

Bd. M. 11. 3. *Plastering.*—According to Bd. M. 9. 3.

अनुक्रमणिका
Table of Contents



Bd. M. 11. 4. *Fixing, Curing, Polishing, Finishing and Cleaning.*—This shall be entirely as per I. S. 1443-1959. Polishing may be done by hand but a smooth and fine polish shall be obtained. The jointing of the tiles shall be done with cement slurry mixed with an approved pigment or coloured cement slurry to match the colour of the tiles. The tiling shall be kept wet for 14 days.

Bd. M. 11. 5. *Item to include.*—As per Bd. M. 9. 5 but using the tiles of specified colours. The item shall also include the cost of pigment or coloured cement to be used for the joints.

Bd. M. 11. 6. *Mode of measurement and payment.*—As per Bd. M. 9. 6.

Bd. M. 12. *Providing and laying white glazed tiles 148.5 mm×148.5 mm (about 6"×6") in size and 8 mm/9.5 mm (about 5/16"/3/8") thick for flooring in required positions, laid on a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float, all specials required like round edge tiles, corner cups etc., filling joints with neat white cement slurry, curing and cleaning complete:*

Bd. M. 12. 1. *Materials—Tiles.*—White glazed tiles including specials shall be of the approved make and quality and shall conform to I. S. 777-1961 in all respects. Samples of tiles shall be got approved by the Engineer, who will keep them in his office for verification as to whether the materials brought for use conform to the approved samples.

Bd. M. 12. 1. 2. *Mortar.*—As per Bd. M. 1. 1. 2.

Bd. M. 12. 1. 3. *White Cement.*—This shall be of approved quality and make.

Bd. M. 12. 2. *Mortar bedding.*—The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in the preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed, the base shall be cleaned of all dirt, scum or laitance and loose materials and then well wetted without forming any pools of water on the surface. The mortar shall then be evenly and smoothly spread over the base by the use of screed battens to proper level or slope. The thickness of the bedding shall not be less than 12 mm (about $\frac{1}{2}$") or more than 20 mm (about $\frac{3}{4}$") in any one place. The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles.

Bd. M. 12. 3. *Fixing tiles.*—The tiles before laying shall be soaked in water for at least 2 hours. Tiles which are fixed in the floor adjoining the wall shall be so arranged that the surface of the round edge tiles shall correspond to the skirting or dado. Neat cement grout of honey like consistency shall be spread over the bedding mortar just to cover so much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints shall be kept as close as possible and in straight lines. The joints between the tiles shall not exceed 1.5 mm (about 1/16") wide. The joints shall be grouted with a slurry of white cement. After fixing the tiles finally in an even plane, the flooring shall be covered with wet saw dust and allowed to mature undisturbed for 14 days.

Bd. M. 12. 4. *Cleaning.*—After the tiles have been laid in a room or the day's fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor shall be covered with oilfree dry saw dust which shall be removed only after completion of the construction work and just before the floor is occupied.

Bd. M. 12. 5. *Item to include.*—The rate shall include all labour, materials, tools and equipment required for the following operations to carry out the item as specified above:—

(1) Providing and laying the bedding mortar and levelling.

(2) Providing and fixing the tiles including round edges, cornercups etc., in neat cement float over the bedding.

(3) Grouting the joints of the tiles with white cement slurry.

(4) Curing.

(5) Cleaning the floor.

Bd. M. 12. 6. *Mode of measurement and payment.*—Same as for Bd. M. 1.



अनुक्रमणिका
Table of Contents

**Bd.M.14.3.**

Bd. M. 13. *Providing and fixing white glazed tiles 148.5 mm×148.5 mm (about 6″×6″) in size and 6.5 mm (about ¼″) thick for dado and skirting in required positions, on plaster of cement mortar 1:4 including all specials required like round corner tiles, angles, cornercups etc., and filling joints with white cement slurry, curing and cleaning complete.*

Bd. M. 13. 1. *Materials.*—Same as for item Bd. M. 12 except that the thickness of the tiles shall be 6.5 mm (about ¼″).

Bd. M. 13. 2. *Plastering.*—Cement plaster of about 12 mm (about ½″) for brick walls and 20 mm (about ¾″) for stone masonry walls shall be applied to the part of the wall where dado or skirting is to be fixed as per specification No. B. 11. The proportion of mortar shall be as mentioned in the item.

Bd. M. 13. 3. *Fixing tiles.*—Dado or skirting work shall be done only after fixing tiles on the floor. The white glazed tiles shall be soaked in water for at least 2 hours before being used for skirting or dado work. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back of tiles shall be covered with a thin layer of neat cement paste and the tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from the bottom of wall upwards without any hollows in the bed or joints. Each tile shall be fixed as close as possible to the one adjoining. The tiles shall be joined with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar to that all tile faces are in one vertical plane. The joints between the tiles shall not exceed 1.5 mm (about 1/16″) in width and they shall be uniform. While fixing tiles in dado work, care shall be taken to break joints vertically. After fixing the dado, skirting etc., they shall be kept continuously wet for 14 days.

If doors, windows or other openings are located within the dado area, the sills, jambs, angles etc., shall be provided with white glazed tiles and appropriate specials according to the foregoing specification and such tiled area shall be measured net along with the dado.

Bd. M. 13.4. *Cleaning.*—After the tiles have been fixed the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting work shall be washed thoroughly clean.

Bd. M. 13. 5. *Item to include.*—The rate shall include all labour, materials, tools and equipment required for the following operations to carry out the item as specified above:—

(1) Plastering.
(2) Fixing the tiles including all angles, etc., after applying neat cement paste.
(3) Jointing the tiles with white cement slurry.
(4) Curing.
(5) Cleaning the dado and skirting.

Bd. M. 13. 6. *Mode of measurement and payment.*—Same as for item No. Bd. M. 9.

Bd. M. 14. *Providing and laying marble mosaic tiles of approved colour and pattern with white and coloured marble chips up to the maximum size of 6 mm/12mm/20 mm, for flooring in, required positions set in a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float filling the joints with neat coloured cement slurry, curing, polishings and rubbing complete with/without border and/or pattern with tiles of different colours and design as directed.*

Bd. M. 14. 1. *General.*—The item refers to provision of marble mosaic tiled flooring. The specifications will be similar to those for Bd. M. 10 for plain coloured cement tiled flooring except that terrazo tiles shall be used with or without borders and/or patterns with tiles or different colours and designs as shown on the drawings or directed by the Engineer instead of plain coloured cement tiles. Specifications for terrazo tiles shall be as under.

Bd. M. 14. 2. *Marble mosaic tiles.*—These shall be terrazo cement tiles of the colour and pattern as approved by the Engineer with chips of the sizes mentioned in the wording of the item and shall conform to I. S. 1237-1959. The sizes of the tiles shall be one of the following approved by the Engineer. 19.85 cm × 19.85 cm. 19.85 cm × 29.85 cm. 24.85 cm × 24.85 cm, 20 cm×20 cm, 25 cm×25 cm, 30 cm×30 cm. The tiles shall be of the colours to suit the design of the floor. A few specimen of the tiles to be used approved by the Engineer, shall be deposited by the contractor in the office of the Engineer for reference.

Bd. M. 14. 3. *Item to include.*—As per specifications for item Bd. M. 10 but using marble mosaic tiles of the required pattern and colour. Rate shall include borders and patterns of different coloured marble mosaic tiles.

Bd. M. 14. 4. *Mode of measurement and payment.*—As per specifications for Bd. M. 1.

Bd. M. 15. *Providing and fixing marble mosaic tiles of approved colour and pattern with white and coloured marble chips up to the maximum size of 6 mm/12 mm/20 mm, for dado and skirting in required positions on a bed of lime plaster 1 : 2 /cement plaster 1 :4 including filling joints with neat coloured cement slurry, curing, rubbing and polishing complete.*

Bd. M. 15.1. *General.*—The item refers to provision of marble mosaic tiled dado and skirting and shall generally conform to specifications for Bd. M. 11 except that marble mosaic tiles shall be used instead of plain cement tiles. Marble masaic tiles shall comply with specification for item No. Bd. M. 14.

Bd. M. 15.2. *Item to include.*—As specified for item No. Bd. M. 11 using marble mosaic tiles of the specified colour and pattern.

Bd. M. 15.3. *Mode of measurement and payment.*—As specified for item No. Bd. M. 9.

Bd. M. 16. *Providing and laying white Makrana/coloured and veined Pepsu/Baroda marble slabs.....cm × .....cm (about....." × .....") and.....mm (about.....") thick of approved quality for flooring, in required pattern on a bed of 1 : 2 lime mortar/ 1 : 4 cement mortar including neat cement float, filling joints with neat coloured cement slurry, curring polishing and cleaning complete.*

Bd. M. 16.1. *General.*—The item refers to provision of flooring of Indian marble slabs of white or other approved colour and pattern and shall conform to specification for item No. Bd. M. 3 except that the marble slabs as specified below shall be used instead of polished flag stones. They shall be laid to the pattern shown in the drawings or directed by the Engineer.

Bd. M. 16.2. *Marble slabs.*—These shall be of the type mentioned in the item and of the colour and quality approved by the Engineer. Slabs shall be hard, dense, uniform and homogenous in texture. They shall have even crystalling grain, and free from defects and cracks. The surface shall be machine polished to an even and perfectly plane surface and edges machine cut true and square. The rear face shall be rough enough to provide a key for the mortar.

No slab shall be thinner than the specified thickness at its thinnest part. The dimensions of the slabs shall be as specified in the item. A few specimen of finished slabs to be used shall be deposited by the contractor in the office of the Engineer for reference.

Bd. M. 16.3. *Item to include.*—As per specifications for item No. Bd. M. 4 using marble slab of the required colour and type of veins and laid to the pattern shown in the drawings or directed by the Engineer.

Bd. M. 16.4. *Mode of measurement and payment.*– As per specifications for item No. Bd. M. 8.6.

Bd. M. 17. *Providing and fixing white Makrana/.....coloured and veined Pepsu/Baroda marble slabs.....cm × .....cm (about....." × .....") and .....mm (.....") thick, of approved quality veins and colour for dado and skirting on 1 : 4 cement plaster including filling joints with neat coloured cement slurry, curing, rubbing, polishing and cleaning complete.*

Bd. M. 17.1. *General.*—The item shall comply with specifications given for item No. Bd. M. 15 execept that marble slabs conforming to Bd. M. 16.2 shall be used in place of marble mosaic tiles.

If bigger sized marble slabs of a height of more than one metre are to be used in more than one course for dado or vencer, they shall be fixed according to Bd. H. 39.

Bd. M. 18. *Providing and laying* in situ *marble mosaic of 10 mm/6 mm (about 3/8"/¼") thickness with white and coloured marble chips up to a maximum size of 6 mm/12 mm/20 mm in coloured cement in suitable panels for flooring including under layer of 1 : 2 : 4 cement concrete, Indian Patent stone, aluminium/brass strips to form panels, levelling, compaction, curing, polishing rubbing and cleaning complete.*

Bd. M. 18.1. *General.*—The item refers to provision of marble mosaic for flooring in two layers, the under layer being laid as Indian Patent stone and the top layer made of marble mosaic of white and/or coloured chips in coloured cement laid *in situ,* compacted, polished, rubbed, finished and cleaned. The item shall be carried out in conformity with I.S. 2114-1962, Code of Practice for laying *in situ,* terrazo floor finish, subject to the following.

अनुक्रमणिका
Table of Contents



**Bd.M.19.5.**

Bd. M. 18.2. *Under layer of cement concrete.*—The under layer shall be laid as described in the specification for item No. Bd. M. 7 but no finishing shall be done to make the surface smooth. The compacted thickness of the concrete under layer shall be 30 mm (about 1⅛") for 10 mm top layer and 34 mm (about 1¼") for 6 mm top layer. This layer shall be laid to the required level and grade divided with aluminium or brass strips into panels not exceeding 2 m square. The longest side of any panel should not exceed 2 m. The top surface of concrete in the under layer shall be kept sufficiently rough to form a key to the top layer.

Bd. M. 18.3. *Marble chips.*—As per I. S. 2114-1962. The marble chips shall be of uniform size of 3 mm (about ⅛") and down gauge for 6 mm top layer and 6 mm (about ¼") and down gauge for 10 mm top layer. They shall be of approved quality and colour and shall be machine crushed. They shall be free from foreign matter, dust etc.

Bd. M. 18.4. *Aluminium* or *Brass strips.*—Thickness of these dividing strips shall not be less than 1.5 mm (about 1/16") and the width shall be equal to the depth of the total flooring.

Bd. M. 18.5. *Laying the top layer.*—As per I. S. 2114-1962.

Bd. M. 18.6. *Junctions and corners.*—The junctions of floor and wall, dado or skirting shall be rounded off to a uniform radius if ordered without any extra payment.

Bd. M. 18.7. *Finishing.*—As per I. S. 2114-1962. Normally polishing shall be done by machine. Hand polishing shall be done if so specified in the special provisions or permitted by the Engineer in writing. A smooth polish shall be obtained in either case.

After the floor is completely dry a hot mixture of turpentine and bee's wax (4 : 1 by wt.) shall be applied to the surface and rubbed with clean cotton waste. The rubbing must be continued until the floor ceases to be sticky.

The floor shall be kept covered and damp till it is properly set and given final finish and protected from traffic of all kinds and damage from other sources by the contractor at his own cost.

Bd. M. 18.8. *Item to include.*—The rate shall include all the labour, materials, tools and equipment required for the following operations for carrying out the item :—

(1) Providing and laying 1 :2 : 4 cement concrete under layer in panels and roughening the top surface.
(2) Providing and fixing aluminium or brass strips.
(3) Mixing the ingredients of terrazo mix and laying it as specified above.
(4) Finishing the flooring as specified above, and curing.

Bd. M. 18.9. *Mode of measurement and payment.*—As per Bd. M. 1.4.

Bd. M. 19. *Providing and laying* in situ *marble mosaic dado and skiriting 6 mm (about ¼") thick with white and coloured marble chips in suitable panels, on cement plaster 1:3 including aluminium/brass strips for forming panels, rounding of corners and junctions with flooring and walls, polishing and cleaning complete.*

Bd. M. 19.1. *General.*—The item refers to provision of dado and skirting in two layers, the underlayer being laid as plaster and the top layer with marble chips in coloured cement laid *in situ*. The item shall be carried out in conformity with I:S:2114-1962, Code of Practice for laying *in situ* Terrazo floor finish, subject to the following.

Bd. M. 19.2. *Plastering.*—The plaster of 1:3 cement mortar with approved waterproofing compound shall be applied to the wall surface where dado or skirting is to be placed and shall be carried out as specified in B. 11. The thickness of the plaster shall be 12 mm (about ½") for brick and concrete faces and 20 mm (about ¾") for stone faces. The surface of the plaster shall be kept rough to form a key for the finishing layer of marble chips in coloured cement.

Bd. M. 19.3. *Marble chips.*—These shall be the same as given for item No. Bd. M. 18 except that chips shall be 3 mm and down gauge.

Bd. M. 19.4. *Dividing strips.*—These shall be of aluminium or brass as specified and not less than 1.5 mm (about 1/16") in thickness. Their width shall be as required for dado and plaster. They shall be fixed in the plaster when it is green.

Bd. M. 19.5. *Laying the finishing layer.*—This also shall be as for item No. Bd. M. 18. The thicknes of the finished top layer shall not be less than 6 mm (about ¼"). The finished surface shall be absolutely vertical or to the slopes and/or curves as shown in the drawings or directed by the Engineer. Instead of rollers, trowels shall be used. Polishing may be by

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



hand if suitable machine is not available. But the surface shall be polished smooth and made even and plaint with clain exposure of chips. Junction and corners shall be treated as for item No. Bd. M. 18.

Bd. M. 19.6. *Finishing.*—This also shall be done as for item No. Bd. M. 18.

Bd. M. 19.7. *Item to include.*—The rate shall include all the labour, materials, tools and equipment required for the following operations for carrying out the item :—

(1) Applying the plaster and roughening the surface.

(2) Providing and fixing aluminium or brass strips.

(3) Mixing the ingredients of terrazo mix and laying it as specified above.

(4) Finishing the dado or skirting and curing as specified above.

Bd. M. 19.8. *Mode of measurement and payment.*—Same as for item No. Bd. M. 9.

Bd. M. 20. *Providing and laying in the required positions flooring of tukda mosaic (broken mosaic the pieces) of approved colour and pattern set in a bed of 1 : 2 lime mortar/1 : 4 cement mortar including neat cement float/coloured cement float, giving proper slopes, compaction, curing and finishing complete.*

Bd. M. 20.1. *General.*—The item refers to the provision of tukda mosaic surface (broken mosaic tile pieces) set in cement mortar or, lime mortar well compacted and finished and laid in the required positions with ordinary or coloured cement float as mentioned in the item.

Bd. M. 20.2. *Materials.*—(1) *Broken mosaic pieces.*—These shall be obtained from broken marble mosaic tiles of approved shade and manufacture and conforming to I. S. 1257-1959. The sizes of pieces should be suitable to obtain the correct pattern of flooring as shown on the drawings or as directed by the Engineer.

(2) *Cement.*—Cement in cement float shall be ordinary or coloured as specified in the item.

(3) *Mortar.*—Cement mortar shall conform to specification B. 5. a. and lime mortar if specified shall conform to B. 3. a.

Bd. M. 20.3. *Mortar bedding.*—Cement or lime mortar bedding shall be laid as described for item No. Bd. M. 8, the thickness of bedding being about 20 mm (about $\frac{3}{4}$″). The base concrete shall have been laid to the required slopes shown on the drawings or directed by the Engineer under a separate item.

Bd. M. 20.4. *Fixing tukada mosaic pieces.*—These pieces shall be thoroughly wetted before fixing them. Ordinary or coloured cement grout as required of honey like consistency shall be spread over the mortar bedding when the mortar is still plastic. In this cement float, mosaic tile pieces shall be fixed piece by piece to the pattern as required. The fixing shall be done by keeping the joints between the pieces as thin as possible. The flooring shall be laid to correct level and slopes and compacted by striking the surface with hand thappies and straight screed tamper. The grout shall cream up to the surface. The junctions of the flooring and the parapet wall shall be rounded and the flooring shall be extended up the wall for 15 cm (about 6″). After the flooring has been laid or the day's fixing work is completed that surplus cement grout that may have come out of the joints on compacting shall be cleaned off. The flooring laid shall be kept moist and allowed to mature undisturbed for 10 days to allow the bedding and flooring to set properly. After this the surface shall be polished with a machine. Light traffic may be allowed thereafter. The surface shall not be used for heavy traffic for at least 14 days.

Bd. M. 20.5. *Cleaning.*—Once the floor has set and is polished it shall be carefully washed clean and dried. When dry, the floor shall be covered with oilfree dry saw dust which shall be removed only after the construction work is completed.

Bd. M. 20. 6. *Item to include.*—The rate shall include all labour, materials, tools, and equipment required for the following operations to carry out the item as specified above :—

(1) Laying the mortar bedding and levelling.

(2) Fixing the tukda mosaic in ordinary or coloured cement float on the bedding to the required pattern and compacting.

(3) Curing.

(4) Polishing and cleaning the floor.

अनुक्रमणिका
Table of Contents

Bd. M. 20.7. *Mode of measurement and payment.*—Same as per item No. Bd. M. 1.4.

The length and breadth shall be measured along the rounding up to the top of the edge of the flooring, overlaps at the corners being neglected.

Bd. M. 21. *Providing and laying in required positions flooring of broken china mosaic (broken pieces of china) of approved colour and pattern in a bedding of lime mortar 1 : 2/ cement mortar 1 : 4 including neat cement float giving proper slopes, compaction curing and finishing complete.*

Bd. M. 21. 1. *General.*—The specifications for this item shall be the same as for item No. Bd. M. 20 except that the broken pieces shall be of china of approved colour and manufacture and the china mosaic floor shall not be polished.

Bd. M. 22. *Providing and laying polished Shahabad/Tandur/Kotah stone slabs, 25 mm (about 1") thick for treads and risers of steps and staircases with rounded nosing for the treads on a bed of 1:4 cement mortar including cement float, filling joints with cement slurry, curing, polishing and cleaning complete.*

Bd. M. 22. 1. *General.*—The item refers to the laying of polished Shahabad, Tandur or Kotah stone slabs as mentioned in the item for treads and risers of steps and staircases. The slabs for the treads shall be laid as specified for item No. Bd. M. 3. and those for risers shall be as specified for item No. Bd. M. 5 subject to the following:—

The nosing of the treads shall be rounded as directed. As far as possible the slabs for the treads shall be in the longest lengths available. Final polishing may be done by hand when it cannot be done with the usual polishing machines.

Bd. M. 22. 2. *Item to include.*—As specified for Bd. M. 3 and Bd. M. 5. The rate shall also include rounding of the nosing of treads when so shown in the drawing or directed by the Engineer. Polishing after laying may be done by hand. Landings shall be considered as part of flooring.

Bd. M. 22. 3. *Mode of measurement and payment.*—The contract rate shall be per square metre of the slabs laid in position. The dimensions shall be measured net for the exposed lengths and widths of riser and tread slabs, correct up to 2 places of decimals of a metre and the area worked out correct up to two places of decimals of a square metre. Overlap shall not be measured. The width of tread shall be measured as if the rounded nosing was square.

Bd. M. 23. *Providing and laying plain cement tiles for treads and risers of steps and staircases, with nosing of treads moulded as per drawings or as directed, on a bed of 1:4 cement mortar including cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete.*

Bd. M. 23. 1. *General.*—The item refers to the laying of plain cement tiles for treads and risers of steps and staircases. The tiles for the treads shall have rounded nosing and shall be laid as specified for item No. Bd. M. 8. and those for the risers shall be as specified for item No. Bd. M. 9 subject to the same stipulations as specified in Bd. M. 22.2 for nosing, polishing etc., and Bd. M. 22. 3 for measurement etc. The dimensions of tiles shall be such as to be suitable for the particular treads and risers.

Bd. M. 24. *Providing and laying plain coloured cement tiles of approved shade of blue/ green/red colour for treads and risers of steps and staircases with nosing of the tread moulded as per drawings or as directed, on a bed of 1:4 cement mortar including cement float, filling joints with neat coloured cement slurry to match the colour of tiles, curing, polishing, and cleaning complete.*

Bd. M. 24. 1. *General.*—The item refers to the laying of plain coloured cement tiles for treads and risers of steps and staircases and shall be carried out as per item. Bd. M. 23 except that the tiles shall be plain coloured cement tiles of approved shade as mentioned in the item instead of plain cement tiles and grouting of joints shall be done in coloured cement slurry.

Bd. M. 25. *Providing and laying marble mosaic tiles of approved colour and pattern with white and coloured marble chips 6 mm/12 mm/20 mm for treads and risers of steps and staircases with nosing of the treads moulded as per drawings or as directed, on a bed of 1 : 4 cement plaster including neat cement float, filling joints with neat coloured cement slurry to match the colour of tiles. curing, polishing and cleaning complete.*

Bd. M. 25. 1. *General.*—The item provides for laying of marble mosaic tiles for treads and risers of steps and staircases. The tiles for the treads shall have rounded nosing and shall be laid as specified for item No. Bd. M. 14. Laying of risers shall be as specified for item No. Bd. M. 15 subject to the stipulations as given in Bd. M. 22. 2 for nosing, polishing etc., and Bd. M. 22. 3 for measurement. The dimensions of tiles shall be such as to be suitable for the particulars treads and risers.

Bd. M. 26. *Providing and laying white Makrana—coloured and viened Pepsu/Baroda marble slabs——mm thick of approved quality, colour and veins, for treads and risers of steps and staircases on a bed of 1 : 4 cement mortar including rounded nosing for the treads neat cement float, filling joints with coloured cement slurry to match the colour of the slabs, curing, polishing and cleaning complete.*

Bd. M. 26. 1. *General.*—The item provides for laying marble slabs for treads and risers of steps and staircases. The laying for the treads shall be as specified for item No. Bd. M. 16 and that for the risers shall be as specified for Bd. M. 17 subject to the stipulations as specified in Bd. M. 22. 2 for nosing, polishing etc., and Bd. M. 22. 3 for measurement. The slabs shall be in the longest length normally available.

Bd. M. 27. *Providing and laying in situ marble mosaic af the required colour and pattern for treads and risers of steps and staircases including the underlayer of cement mortar 1:2 for tread and 1:3 cement plaster for risers, levelling, compacting, curing, rubbing, polishing and cleaning complete.*

Bd. M. 27. 1. *General.*—The item provides for laying *in situ*, of marble mosaic top layer of 10 mm thick on 20 mm thick underlayer of 1:2 cement mortar with excess of coarse sand for treads and top layer of 6 mm thick on 1:3 cement plaster for risers of steps and staircases. The laying for the treads shall be as specified for item No. Bd. M. 18 and that for the risers shall be as specified for the item No. Bd. M. 19 subject to the stipulations given in Bd. M. 22. 2 for nosing polishing etc., and Bd. M. 22. 3 for measurement.

Bd. M. 28. *Providing sills of rough Shahabad/Tandur/Kotah stones slab.....mm to .....mm (about .....") to (.....") thick on a bed of 1:4 cement mortar including neat cement float pointing with cement mortar 1:3 curing, and cleaning complete.*

Bd. 28. 1. *General.*—The item refers to providing sills of Shahabad/Tandur or Kotah stone slabs as specified in the item for windows etc. The specifications given for item Bd. M. 1. shall fully apply, subject to the following:—

Bd. M. 28. 2. The slabs shall be uniform in thickness and be preferably of one stone and at least as long as can be procured. The outside edges shall be rounded or square as shown in the drawings or directed by the Engineer. The projection of the sill beyond each edge of the splayed jamb shall be uniform for all windows and shall not normally exceed 2 cm. There shall be no gap between the sill and the frame.

Bd. M. 28. 3. *Mode of measurement and payment.*—The contract rate shall be per sq. m of the sill area. The dimensions shall be measured overall including all the embedded portions limited to those shown on the drawings or directed by the Engineer in writing. The length shall not be more than 2 cm beyond each splayed jamb at the ends. The dimensions shall be measured correct up to a cm and the area worked out correct up to 2 places of decimals of a square metre. No beductions shall be made for ends of sills embedded in the jambs. The rounded edges shall be measured square including the rounding.

Bd. M. 29. *Providing sills of polished Shahabad/Tandur/Kotah stones ..... mm thick on a bed of 1 : 4 Cement mortar including neat Cement float, filling joints with neat Cement slurry, curing, polishing and cleaning complete.*

Bd. M. 29. 1. *General.*—The item refers to providing sills of polished Shahabad, Tandur or Kotah stone slabs mentioned in the item for windows etc. The item shall comply with relevant specifications given for item No. Bd. M. 28. 2 and Bd. M. 28. 3 and the following:—

As far as possible sills of windows shall be in one piece. The outer edges of sills of windows shall be rounded when so shown in the drawings or directed by the Engineer. Measurements shall be taken as if the edges were square including the rounding.

Bd. M. 30. *Providing sills of precast marble mosaic tiles of approved colour and pattern with white and coloured chips up to a maximum size of 6 mm/12 mm/20 mm on 12 mm thick bed of 1 : 4 cement mortar including neat cement float, joining with neat coloured cement slurry, curring, polishing and cleaning complete.*

Bd. M. 30. 1. *General.*—The item refers to providing precast marble mosaic tile sills for windows etc. The item shall comply with specifications given for item No. Bd. M. 14 subject to the relevant stipulations in Bd. M. 28.

Bd. M. 31. *Providing sills of white Makrana/..... coloured and veined Pepsu/ Baroda marble slabs of approved quality, colour and veins..... mm (about .....") thick on a bed of 1:4 cement mortar including neat cement float, filing joints with neat coloured cement slurry to match the colour of the slabs, curing, polishing and cleaning complete.*

Bd. M. 31. 1. *General.*—The item refers to the provision of sills of marble for windows etc. The item shall comply with specifications given for item No. Bd. M. 16 subject to the relevant stipulations in Bd. M. 28. The outside edges of sills of windows shall be rounded when so shown in the drawing or directed by the Engineer. The mortar bedding shall be just sufficiently thick to give an even bedding.

Bd. M. 32. *Providing and laying in situ marble mosaic sills of the required and pattern including the under layer of 1:4 cement mortar, levelling, compacting, curing, rubbing and polishing complete.*

Bd. M. 32. 1. *General.*—The item refers to cast *in situ* sills of marble mosaic for windows etc. The item shall comply with specifications given for item No. Bd. M. 18 subject to the following:—

(1) The underlayer of Indian patent stone shall be omitted and only 1:4 cement mortar bed of about 10 mm to 20 mm thickness shall be provided.

(2) The marble chips to be used shall be of white and coloured marble, of the same size as are used in the flooring. If dado is provided, the size of the chips shall be the same as those in the dado. The thickness of top layer for sills shall be 10 mm (about 3/8").

(3) Aluminium or brass strips shall be omitted, when the longest dimension is less than 2 m.

(4) The edge of the sill shall be rounded.

(5) The sills *in situ* shall be measured net for the exposed area of marble mosaic.

Bd. M. 33 (*a*). *Providing and laying precast polished chequered cement tiles, of..... cm×.....cm size for flooring and treads in required positions on a bed of 1:2 lime mortar/ 1:4 cement mortar including neat cement float, filling joints with neat cement slurry, curing, polishing and cleaning complete.*

Bd. M. 33 (*a*). 1. *General.*—The item refers to providing and laying polished cement tiles of the specified size with chequers of approved pattern, for flooring and treads of steps. The specifications for item Bd. M. 8 shall apply for flooring and the specifications given for item Bd. M. 23 shall apply for treads with the difference that chequered tiles shall be used instead of smooth ones. The polishing shall be done by hand only, without damaging the chequers as specified in I. S. 1443-1959. Machine polishing shall not be done.

Bd. M. 33 (*b*). *Providing and laying precast polished chequered coloured cement tiles of approved shade of blue/green/red colour for flooring and treads in required position on a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float, filling joints with neat cement slurry mixed with approved shade of pigment to match the colour of tiles, curing and polishing complete.*

Bd. M. 33 (*b*). 1. *General.*—The item refers to providing and laying polished coloured cement tiles of approved colour and with chequers of approved pattern for flooring, landings and treads of steps. It shall be carried out according to specification No. Bd. M. 33 (*a*) except that chequered tiles shall be of the specified colour.

The specifications for Bd. M. 10 shall apply for flooring and specification for item Bd. M. 24 shall apply for treads, with the difference that chequered tiles shall be used instead of smooth ones. Also polishing shall be done by hand only without damaging the chequers. Machine polishing shall not be done.

Bd. M. 33 (*c*). *Providing and laying polished chequered marble mosaic tiles of approved colour and pattern with white and coloured chips up to the maximum size of 6 mm/12 mm/ 20 mm for flooring and treads in required positions set in a bed of 1:2 lime mortar/1:4 cement mortar including neat cement float, filling the joints with neat coloured cement slurry, curing, polishing and rubbing complete.*

Bd. M. 33 (*c*). 1. *General.*—The item refers to providing and laying chequered marble mosaic tiles of approved colour and pattern with chips of the sizes mentioned in the wording of the item for flooring and treads of steps.

The specifications for item Bd. M. 14 shall apply for flooring and specifications for item Bd. M. 25 shall apply for treads with the difference that chequered tiles, shall be used instead of smooth ones. Also polishing shall be done by hand only without damaging the chequers. Machine polishing shall not be done.

Bd. M. 34. *Extra for providing chequers of approved pattern in* cast-in-situ—

(*a*) *Indian Patent stone flooring and treads and*

(*b*) *Marble mosaic flooring and treads.*

Bd. M. 34. 1. *General.—The item refers to the additional rate to be paid for providing chequers of approved pattern for cast-in-situ floors or treads of steps of* (*a*) *Indian Patent stone and* (*b*) *Marble mosaic.*

Bd. M. 34. 2. *Laying.*—The flooring for both types shall be laid-*in-situ* as described under the specifications for the respective item. But after compacting and smoothening the flooring and when the flooring it still plastic, chequers of approved pattern shall be impressed on the top of the flooring. To get the chequered impressions of uniform depth and pattern a suitable device which will give the approved pattern should be used. Impress of lines on the Indian Patent stone flooring to represent tiles shall be included in the item of the Indian Patent stone and shall not be paid under this item. Polishing shall be done by hand only, taking care not to damage the chequers. Curing etc., shall be done as specified for each type.

Bd. M. 34. 3. *Item to include.*—The additional rate is for providing chequers of approved pattern in the course of laying cast in situ floors.

Bd. M. 34. 4. *Mode of measurement and payment.*—According to Bd. M. 1. 4. only the actual area provided with chequered design shall be measured for this item.

Bd. M. 35. *Providing—mm thick partitions of polished Tandur stone/white/coloured marble slabs of approved shapes, quality and colour for urinals including cutting holes of required sizes in the appropriate places to receive pipes etc., fixing cement mortar 1 : 3, curing and cleaning complete.*

Bd. M. 35. 1. *Materials.*

Bd. M. 35. 1. 1. *Stone slabs.*—Polished Tandur or white or coloured marble slabs as mentioned in the item shall be of the approved colour as directed by the Engineer. Polished Tandur slabs shall comply with specifications given in Bd. M. 3 and marble slabs shall comply with specification in Bd. M. 16.1. The slabs shall be polished on both sides. The Tandur or marble stone slabs shall be of the shape and size as shown on the drawings or as directed by the Engineer and shall be uniform thickness. The exposed edges of the slabs shall be rounded unless otherwise directed by the Engineer.

Bd. M. 35. 1. 2. *Cement mortar.*—This shall be of the specified proportion and shall conform to B. 5.a.

Bd. M. 35. 2. *Fixing.*—Before fixing holes of appropriate size shall be cut into the slabs in the appropriate positions to receive any pipes etc. The partition slabs shall be fixed securely in wall and/or flooring in the required positions in cement mortar 1:3. To get a firm grip, the slab shall be embedded in the wall and/or flooring for a depth not less than 25 mm (about 1″). Grouting of the joints shall be done in neat ordinary, white or coloured cement to match the adjoining surface.

Bd. M. 35. 3. *Curing.*—The mortar shall be cured for 14 days.

Bd. M. 35. 4. *Cleaning.*—The partition slabs shall be cleaned with water and all mortar droppings or stains etc., removed.

Bd. M. 35.5. *Item to include.*—(1) Providing at the site polished stone slabs of the specified type, size, shape and thickness.

(2) Fixing the partition including cutting holes etc., as described above.

(3) Curing.

(4) Cleaning.

(5) All labour, material and tools to carry out the item as specified above.

अनुक्रमणिका
Table of Contents



**Bd.M.37.3.**

Bd. M. 35. 6. *Mode of measurement and payment.*—The contract rate shall be for one sq. metre of the slab. Dimensions shall be measured for the exposed slabs only correct to two places of decimals of a metre and area calculated correct to two places of decimals of a sq. metre. Curved shapes shall be measured square. For the least rectangular slab from which the curved shape can be obtained. Embedded portions shall not be measured.

Bd. M. 36. *Providing 15 cm thick (about 6") murum flooring including watering, ramming finishing smooth and applying two coats of cowdung wash complete.*

Bd. M. 36. 1. *General.*—The item refers to provision of murum flooring 15 cm thick in the required positions as directed by the Engineer.

Bd. M. 36. 2. *Murum.*—Good granular murum only shall be used. The murum shall not contain any vegetation or hard substances like big size stones etc.

Bd. M. 36. 3. *Laying the flooring.*—The filling if any up to about 15 cm below the proposed floor level shall be dug out and compacted so that the hollow thus created shall be 15 cm deep. It shall be filled as follows:—

Murum shall be laid evenly in the space and watered thoroughly for a day. When the whole mass has become saturated it shall be trampled thoroughly. Then the surface shall be fairly levelled and left to dry somewhat for a day. Thereafter it shall be thoroughly compacted and beaten with hand rammers to a uniform level about 2 to 3 cm below the required level. It shall then be allowed to dry for 2 or 3 days.

Then another layer of very good murum mixed with chopped grass shall be placed slightly proud of the required level, watered and beaten exactly like the first layer to get the correct level required. The surface is then allowed to dry for two days and rubbed smooth with smooth rubbing stones.

Bd.M. 36. 4. *Finishing.*—The flooring shall be finished with two coats of cowdung wash and rubbed smooth.

Bd. M. 36. 5. *Item to include.*—The item shall include—

(1) providing the murum, required,
(2) Preparing the bed and laying the floor as described above,
(3) Finishing with cowdung wash and rubbing,
(4) All labour, material and tools required for carrying out the item specified.

Bd. M. 36. 6. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the flooring. The dimensions shall be measured correct up to two places of decimals of a metre and area worked out correct up to two places of decimals of a square metre.

Bd. M. 37. *Providing pavement of trap/granite/quartzite/gneiss stone setts of size—cm × —cm × —cm (about—" × —" × —") plain/diamond pattern and chisel dressed on face and set in cement mortar 1 : 4 including striking joints pointing with cement mortar 1 : 3 and curing complete.*

Bd. M. 37. 1. *General.*—The item provides for pavement of stone setts of the dimensions as mentioned in the item. The following specifications shall apply:—

Bd. M. 37. 2. *Materials.*

Bd. M. 37. 2. 1. *Stone setts.*—The stone setts shall be of the hardest procurable variety of the specified type of stone with good resistance to wearing and weathering and of durable quality available in the region. The stone shall conform to the specifications given for building stones in A.5. The sizes of stone setts in a pavement shall be uniform and the dimensions shall be those specified in the item. For diamond cut pavement the stones shall be square or rectangular on top face as approved by the Engineer, of regular and equal size and laid in courses at an angle of 45° with the wall. The sides of the diamond cut stones shall not normarry be less than 30 cm (about 12") unless otherwise specified in the item. Tringular stones shall be used at the edges.

Bd. M. 37.2.2. *Cement mortar.*—This shall be of specified mix and shall conform to specification No. B.5.a.

Bd. M. 37.3. *Dressings.*—The stones shall be flat and chisel dressed on the wearing sur- square for at least half the depth from the face. Stones with chipped edges shall not be square for at least half the depth from the face. Stones with chipped edges shall not be allowed to be used.



अनुक्रमणिका
Table of Contents

Bd. M. 37.4. *Laying.*—The stone sett paving shall be laid on a firm subgrade of concrete. Before laying the paving the subgrade shall be cleaned of all loose material and well wetted. The subgrade shall be paid under a separate item. The stone shall be laid evenly and firmly flush in 1:4 cement mortar bedding.

The joints shall be filled and finished with mortar and grout. There shall be no hollows left in the bed or the joints. The stone setts shall be laid to required level and slope in parallel courses with their longest side at right angles to the longest side of the whole paving. The setts forming each course shall be of the same width and depth. The stones shall be laid to break joints at least ¼th of their length and preferably ½ their length. When diamond cut pavement is specified the sett stones shall be laid diagonally at 45° or as directed. The ends of stone setts laid diagonally where they abut against straight courses or wall shall be cut to the required shape. There shall be no hollows in the joints or beds.

The sett stones shall be fixed in position and struck with wooden mallets. Any stone sinking below the general level shall be removed and replaced.

Bd. M. 37.5. *Joints.*—Thickness of joints shall not exceed 6 mm. (about ¼"). The joints shall be struck smooth while the setts are being laid. If not so done, they shall be raked2 out to a depth of not less than the thickness of the joint before the mortar has set. They shall be filled with cement mortar 1:3 pressed and troweiled smooth. Pointing shall be done if so specified in the item.

Bd. M. 37.6. *Curing.*—The work shall be cured for 14 days and handed over perfectly clean and free from mortar stains, etc.

Bd. M. 37.7. *Item to include.*—(1) Providing the stone setts of the required dimensions and shapes.

(2) Dressing the setts.

(3) Cleaning the subgrade and laying the setts as specified above in cement mortar.

(4) Striking joints or pointing.

(5) Curing and cleaning.

(6) All labour, material and use of the tools required to carry out the item satisfactorily.

Bd. M. 37.8. *Mode of measurement and payment.*—This shall be as per Bd. M. 1.

Bd. M. 38. *Providing pavement of trap/granite/quartzite/gneiss stone slabs of size—cm × —cm × —cm (about —" × ....." × .....") plain/diamond pattern, rough tooled on face and set in cement mortar 1:4 including pointing with cement mortar 1:3 and curing complete.*

Bd. M. 38.1. *General.*—The item refers to stone slab paving of the dimensions as mentioned in the item with rough tooled dressing for the stone top faces. The specifications given in Bd. M. 37 shall apply subject to the following changes:—

Bd. M. 38.2. *Dressing.*—The dressing shall not be chisel dressed as in Bd. M. 37.3. The slab shall be rough tooled on the face and the side joints shall be dressed true and square for the top 2.5 cm (about 1") only.

Bd. M. 38.3. *Laying.*—As in Bd. M. 37.4. The joints shall be 8 mm (5/16") thick.

Bd. M. 38. 4. *Pointing.*—The joints shall be raked out when the mortar is green and pointed with cement mortar 1:3 according to specifications No. B. 13.

Bd. M. 39. *Providing pavement of trap/granite/quartzite/gneiss stone slabs of size..... cm. × ..... cm. × ..... cm (about ——" × ....." × .....") plain/diamond pattern... hammer dressed and set in cement mortar 1:4 including pointing with cement mortar 1:3 and curing complete.*

Bd. M. 39. 1. General.—The item refers to hammer dressed stone slab paving of the size as mentioned in the item. The specifications given for item No. Bd. M. 37 shall apply subject to the following changes:—

Bd. M. 39.2. *Dressing.*—The faces shall be only hammer dressed with bushing up to 12 mm (about ½") and the side joints shall be dressed true up to 12 mm (about ½") from the top.

Bd. M. 39.3. *Laying.*—As in Bd. M. 37.4. The joints shall be mm (⅜") thick.

Bd. M. 39.4. *Pointing.*—According to Bd. M. 38.4

Bd. M. 40. *Providing brick-on-edge paving with 1st/2nd class I.S./conventional type burnt bricks in cement mortar including sand cushion, flat brick bedding, pointing, with cement mortar 1:3 and curing complete.*

Bd. M. 40.1. *General.*—The item provides for burnt brick-on-edge paving with I. S. or conventional type bricks of 1st or 2nd class as mentioned in the item.

Bd. M. 40.2. *Materials.*

Bd. M. 40.2.1. *Bricks.*—Bricks shall be of 1st or 2nd class of I. S. or conventional type as mentioned in the item. Bricks for top course shall be selected well burnt bricks of good colour and shape.

Bd. M. 40.2.2. *Cement mortar.*—The cement mortar shall be of the specified mix and shall conform to B.5.A.

Bd. M. 40.2.3. *Sand.*—Sand for cushion shall conform to specification A.7. Clay up to 10 per cent. may be permitted.

Bd. M. 40.3. *Laying.*—Before laying the paving bricks subgrade shall be prepared by excavating the filling to the depth necessary and thoroughly compacted after watering. If the prepared bed is loose at the time of laying the sand cushion, it shall be levelled, watered and compacted and the rate for paving shall include all such preparation. A layer of sand 20 mm thick shall be spread uniformly over this area, levelled, watered and compacted. On this, a course of brick shall be laid flat with 10 mm joints and the joints grouted with 1:5 cement mortar.

Bricks shall be thoroughly soaked in water before laying.—Next, bricks shall be laid on edge on the first course of flat bricks. They shall be laid flush on a bed of cement mortar 1:5 without leaving any hollows in parallel rows, breaking bond or in herring bone bond as directed. The paving joints shall not exceed 10 mm (about $\frac{3}{8}$") in thickness the joints shall be filled with mortar without leaving any hollow. After the paving is laid and when the mortar is still green the joints shall be raked out to a depth of not less than their thickness.

Bd. M. 40.4. *Pointing and curing.*—Paving shall be pointed with cement mortar 1:3 as specified in B. 13. The paving shall be cured for 10 days.

Bd. M. 40.6. *Item to include.*—(1) Providing bricks of the specified type and class and mortar of the specified type and mix.

(2) Laying the brick on edge paving as specified including preparing the bed, laying the sand cushion and flat brick bedding.

(3) Cement pointing, curing and finishing.

(4) All labour, material and tools required for carrying out the item satisfactorily.

Bd. M. 40. 7. *Mode of measurement and payment.*—As per item Bd. M. 1.

Bd. M. 41. *Providing and laying mastic asphalt flooring 15 mm (about $\frac{5}{8}$")/20 mm (about $\frac{3}{4}$")/25 mm (about 1") in thick in required positions with proper slopes and matt/polished finish complete.*

Bd. M. 41.1. *General.*—The item refers to providing mastic asphalt flooring of thickness as mentioned in the item. The item shall be carried out in conformity with I. S. 1196-1968. Code of Practice for laying mastic asphalt flooring subject to the following:—

Bd. M. 41.2. *Preparation of subfloors.*—The subfloor shall be cleaned and levelled before the flooring is laid. If necessary, a thin coat of mastic asphalt or an underlay may have to be laid to level up the irregularities in the surface or for other purpose. In such cases, underlay, thin mastic asphalt, under coat, etc., shall be paid for separately. The thickness of the wearing mastic asphalt coat shall be as specified in the item.

Bd. M. 41. 3. *Item to include.*—(1) Preparing the subfloor by cleaning, etc., for laying mastic asphalt.

(2) Laying the mastic asphalt flooring.

(3) Finishing the surface of the flooring to matt or polished finish as mentioned in the item.

(4) All materials, labour and equipment required to carry out the item satisfactorily.

Bd. M. 41.4. *Mode of measurement and payment.*—According to Bd. M. 1.4.

अनुक्रमणिका
Table of Contents



## Bd. N. WOOD FINISHES

*List of items of Wood Finishes*


| ITEM NO. | ITEM | | PAGE |
|---|---|---|---|
| Bd. N. 1.1. | Oiling | ... | 383 |
| Bd. N. 1.2. | Waxing | ... | 383 |
| Bd. N. 1.3. | French Polish | ... | 383 |
| Bd. N.1.4. | Varnishing | ... | 384 |
| Bd. N. 1.5. | Oilpainting | ... | 384 |
| Bd. N. 1.6. | Coal Tarring | ... | 384 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. N. WOOD FINISHES

Bd. N. 1. *General.*—The following specifications are for different types of finishes that are usually employed for various items of wood work:—

The following specifications shall apply to all the items of wood finishes from Bd. N.1.1. to Bd. N. 1.6:—

*Test for finishing materials.*—The contractor may be required to produce the manufacturers' certificate regarding the standard of the materials when it is issued by the manufactures. If there is a doubt about the quality, the Engineer may order the materials to be tested as per the relevant I. S. If the finishing material does not satisfy the test, the contractor shall bear the cost of the tests. If the test results prove satisfactory, the Department shall bear the cost of the tests.

*Mode of measurement and payment.*—No separate measurement and payment will be made for finishing of the woodwork by any of the methods described. The cost of finishing shall be included in the rate of item of the wood work as also all materials, labour, scaffolding, etc., required.

When the item is to be carried out as an independent item the mode of measurement shall be as per Bd. O. 1.

Bd. N. 1.1. *Oiling.*—For oil coating of wood work not exposed to the weather, either sweet oil or double boiled linseed oil shall be used as directed by the Engineer.

*With double boiled linseed oil.*—A mixture of 3 parts by weight of double boiled linseed oil, 1 part by weight of turpentine and 1 part by weight of bees' wax shall be prepared. The oil and wax shall be heated in a vessel over a slow fire till the wax is melted. After the mixture has cooled, turpentine shall be added.

*With sweet oil.*—Mixture of equal parts of common vinegar, country sweet oil and turpentine shall be used.

Oiling shall be done as far as possible in dry weather. Before oiling the surface of wood works shall be thoroughly cleaned and prepared as described in specification B. 21.b and B.21.c for new and old wood work respectively. Care shall be taken to see that all the knots are killed and all cracks and holes are plugged neatly with putty. The knots shall be cut out to a slight depth and the holes cleaned free from dust and filled in with wood putty which is made as follows:—On a piece of wood say, 20 cm×15 cm (about 8″×6″) and on the side where cross grains appear, a small quantity of glue size is gently poured and the surface is scraped with the edge of a fine carpenter's chisel. Very fine powder mixes with glue and a stiff paste is formed. The holes and cracks shall be filled with this wood putty and when dry, it shall be rubbed down with a carpenter's file and smoothened with sand paper, so that the knots or holes do not show and the whole surface presents a uniform appearance.

The oil shall be applied evenly and properly with brushes of the best quality. Sufficient interval of time shall be allowed before the 2nd coat is applied to allow the first coat to dry. For old wood work one coat and for new wood work, two coats shall be applied.

The work after completion shall not be patchy or sticky to the touch. No hair or other material shall be allowed to stick on the oil coat.

Bd. N. 1.2. *Waxing.*—A mixture of Bee's wax and turpentine in proportion of 2:1 by weight, shall be used. The wax is melted and added to the turpentine, mixed well and allowed to cool.

The surface of wood work shall be prepared as for oil painting before waxing. The wood work shall be smeared with the mixture and allowed to remain overnight so that the mixture may soak into the pores of the wood. In the morning the superfluous wax shall be wiped off and the surface rubbed up with a soft flannel to a fine polish.

Bd. N. 1.3. *French Polish.*—French polish to be used shall comply with I. S. 348-1968 in the requirements of quality and methods of test.

Before french polish is applied, the surface of wood work shall be prepared in the same manner as for painting described in specification No. B. 21 (*b*). The wood to be polished should be first painted with a filler composed of 1 part of writing mixed with 0.53 part of methylated spirit. After drying, it should be finely sandpapered.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.N.1.6.**

On the wood work thus treated, a thin coat of french polish shall be applied and allowed to day. After drying, the surface shall be lightly rubbed with a fine sandpaper prior to the second and third coats. The surface shall show an even polished surface and be approved by the Engineer.

Bd. N. 1.4. *Varnishing.*

*Varnish.*—Varnishes to be used shall comply with I.S. 337-1964, 338-1964, 339-1964 and 342-1952, 347-1952 and 524 of 1968, 525-1968, as may be relevant for the particular item, the choice of the standard depending on the use of varnish whether for undercoating finishing, acid resisting, filling, etc. The methods of tests for these shall be as per I. S. 197 of 1952.

*Preparation of surface.*—Wood work to be varnished shall be finished smooth with plane and shall not show cuts where shavings have broken off or the plane has jumped. It shall then be rubbed smooth with medium and fine sand paper. In no case, sand paper shall be rubbed across the grains, as in this case, even the finest mark will show when the work is finished.

*Knotting.*—This shall be done as is done for painting according to specification No. B. 21. (b).

*Stopping.*—The surface of the wood shall be stopped with hot weak glue size so as to close up the pores and when dry the surface should be again well sandpapered.

*Varnishing.*—As far as possible, the varnish shall be applied in dry weather. Varnish shall be applied in very thin coats with special fine haired varnishing brushes (and not with ordinary paint brushes). Before applying the first coat (after stopping) the wood surface shall be rubbed down lightly with a fine sandpaper, taking care to rub along the grain and to leave the colour even. When the Engineer orders a single coat only, the varnish shall comply with I. S. 337-1964, 346-1952, and 347-1952 and I. S. 524 and 525 of 1968, reference to standard depending on the colour and type of finishing desired. If two or three coats of varnish are specified, the first coat shall be rubbed down with fine sandpaper and then second and third coats applied. In this the under-coat shall be the varnish complying with I. S. 338 and 339 of 1964, reference to the standard depending on the undercoating desired by the Engineer.

Bd. N. 1. 5. *Oilpainting.*—This shall be done as specified in B. 21. b.

Bd. No. 1. 6. *Coal Tarring*—

*Tar.*—Tar shall be thinned with kerosene or common country spirit in the proportion of 1 part of kerosene to 4 parts of tar or 1 part of country spirit to 16 parts of tar, 220 gms. of unslaked lime shall be added to 1 litre of tar (about 2 lbs. of unslaked lime to 19 gallons of tar) to prevent its running. The mixture shall be heated nearly to boiling point.

*Application.*—The mixture shall be applied to the wood surface as hot as possible with brushes as in painting. Coaltar used shall not be less than 500 gms/sq. metre (about 10 lb. 100 sft.) of the wood surface

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. O. OIL PAINTING

*List of items for Oil painting*


| ITEM No. | ITEM | PAGE |
|---|---|---|
| Bd. O. 1. | Providing and applying 1/2/3 coats of lead/zinc base oil paint/ bituminous paint of approved colour and shade to new wood work and fibre boards including preparing the surface, knotting, scaffolding if necessary and primer coat complete ... | 387 |
| Bd. O. 2. | Providing and applying 1/2/3 coats of lead/zinc base oil paint/ bituminous paint of approved colour and shade to old wood work and fibre boards including scaffolding if necessary, preparing the surface and priming coat complete ... ... | 388 |
| Bd. O. 3. | Providing and applying 2/3 coats of lead/zinc base oil paint/bituminous paint of approved colour to new structural steel work and iron work in buildings including scaffolding if necessary cleaning and preparing the surface by solvent degreasing and derusting by manual scraping/mechanically by sand blasting/ shot blasting/flame cleaning/chemical methods and primer coat complete ... ... ... ... ... | 388 |
| Bd. O. 4. | Providing and applying 2/3 coats of aluminium paint of approved make to new structural steel work in buildings and workshops including scaffolding if necessary, cleaning and preparing the surface by sovlent degreasing and derusting by manual scrapping/ mechanically by sand blasting/shot blasting/flame cleaning/ chemical methods and primer coat complete ... ... | 389 |
| Bd. O. 5. | Providing and applying 2/3 coats of synthetic enamel paint of approved colour to new structural steel work in buildings, including scaffolding if necessary, cleaning and preparing the surface by solvent degreasing and derusting by manual scraping/ mechanically by sand blasting/shot blasting/flame cleaning/ chemical methods and primer coat complete ... ... | 389 |
| Bd. O. 6. | Providing and applying 2/3 coats of oil paint of approved colour to the old steel work and iron work in buildings including scaffolding if necessary and preparing the surface complete ... | 390 |
| Bd. O. 7. | Providing and applying 2/3/4 coats of oil paint of approved colour and shade to plastered surfaces including scaffolding if necessary, preparations of the surface and priming coat complete ... | 390 |
| Bd. O. 8. | Providing and applying water proof cement paint of approved manufacture and of approved colour to the plastered surfaces including scaffolding if necessary and preparing the surface complete ... ... ... ... ... | 390 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. O. OIL PAINTING

Bd. O. 1. *Providing and applying 1/2/3 coats of lead/zinc base oil paint/bituminous paint of approved colour and shade to new wood work and fibre boards including preparing the surface, knotting, scaffolding, if necessary, and primer coat complete.*

Bd. O. 1. 1. *General.*—The item shall be carried out in conformity with specification No. B. 21. b subject to the following :—

(1) Knotting shall be done by any one of the methods in B. 21. b as approved by the Engineer.

(2) The number of finishing coats shall be as mentioned in the item in addition to the priming coat.

(3) The paint for finishing coats shall be of the shade and colour as approved by the Engineer.

(4) Each coat shall cover the area to be painted completely and shall comprise of crossing across the grain and laying off along the grain.

Bd. O. 1. 2. *Item to include.*—The rate for the item shall include all labour, materials and use of tools necessary to carry out the following operations :—

(1) Supplying the approved oil paints for priming and finishing coats.

(2) Preparing the surfaces including knotting for receiving the primer and finishing coats.

(3) Scaffolding including its erection and dismantling.

(4) Application of primer coat as specified.

(5) Application of finishing coats of paint.

(6) Protecting the painted surface till dry.

Bd. O. 1. 3. *Mode of measurement and payment.*—The contract rate shall be per unit of one square metre of painted surface. The linear dimensions shall be measured correct up to 2 places of decimals of a metre. The area shall be worked out correct up to 2 places of decimals of a square metre.

If uneven areas are to be painted, their equivalent plain areas shall be worked out as given below :—

| Serial No. | Description of work | How measured | Multiplying factor for area |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 1 | Panelled or framed and braced ioinery for doors windows, partitions etc. | Measured flat (not girthed) including chowkat or frame. Edges, frames, cleats, etc., shall be deemed to be included in the item. | 1⅛ (for each side). |
| 2 | Battened, ledged and braced or battened, braced and framed or plane planked, doors, windows, partitions etc. | Measured flat (not girthed) including chowkat or frame. Edges, frame, cleats, etc. shall be deemed to be included in the item. | 1⅛ (for each side). |
| 3 | Flush doors etc. .. .. | Measured flat (not girthed) including chowkat or frame. Edges, frame, cleats, etc. shall be deemed to be included in the item. | 1 (for each side). |
| 4 | Fully glazed or gauzed doors, windows partitions etc. | Measured flat (not girthed) including chowkat or frame. Edges, frame, cleats, etc. shall be deemed to be included in the item. | 1/2 (for each side). |
| 5 | Part panelled and part glazed or gauzed doors, windows, partition etc. | Measured flat (not girthed) including chowkat or frame. Edges, frame, cleats, etc. shall be deemed to be included in the item. | 1 (for each side). |

अनुक्रमणिका
Table of Contents

| Serial No. | Description of work | How measured | Multiplying factor for area |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 6 | Fully venetianed or louvered doors, windows, partitions etc. | Measured flat (not girthed) including chowkat or frame. Edges, frame cleats, etc. shall be deemed to be included in the item. | 1½ (for each side). |
| 7 | Weather boarding .. .. | Measured flat (not girthed) supporting framework shall not be measured separately. | 1½ (for each side). |
| 8 | Boarding with cover fillets and match boarding. | Measured flat (not girthed) .. | 1½ (for each side). |
| 9 | Trellis work one-way or two-way. | Measured flat overall, no deduction shall be made for open spaces (supporting members shall not be measured separately). | 2 (for painting all over). |
| 10 | Guard bars, balustrades, X P. M. partitions and cages, gates, gratings, railings, grills etc. with wooden or other frames. | Measured flat overall, no deduction shall be made for open spaces (supporting members shall not be measured separately). | 1 (for painting all over both sides). |
| 11 | Gates and open palisade fencing including, standards, braces, rails, stays, etc. with wooden or other frames. | Do. (*See* note)* .. | 1 (for painting all over both sides). |
| 12 | Carved or enriched work .. | Measured flat .. .. .. | 2 (for each side). |
| 13 | A. C. Corrugated sheets .. | Measured flat (not girthed) .. | 1·14 (for each side). |

**Note.*—The height shall be taken from the bottom of the lowest rail, if the palisades do not go below it (or form the lower end of palisades, if they project below the lowest rail, up to the top of palisade) but not up to the top of standards, if they are higher than the palisades.

All other work shall be measured net on all visible painted surfaces.

Bd. O. 2. *Providing and applying 1/2/3 coats of lead/zinc base oil paint bituminous paint of approved colour and shade to old wood work and fibre boards including scaffolding if necessary, preparing the surface and priming coat complete.*

Bd. O. 2. 1. *General.*—The item shall be carried out in conformity with specifications No. B. 21. c. subject to the following :—

(1) The number of finishing coats shall be as mentioned in the item.

(2) The paint for finishing coats shall be of shade and colour as approved by the Engineer.

Bd. O. 2. 3. *Item to include.*—Same as for item No. Bd. O. 1.

Bd. O. 2. 4. *Mode of measurement and payment.*—Same as for item No. Bd. O. 1.

Bd. O. 3. *Providing and applying 2/3 coats of lead/zinc base oil paint bituminastic paint of approved colour, to the new structural steel work and iron work in buildings including scaffolding of necessary, cleaning and preparing the surface by solvent degreasing and derusting by manual scroping/mechanically by sand blasting/shot blasting/flame clearing/chemical methods and primer coat complete.*

Bd. O. 3. 1. *General.*—The item shall be carried out in conformity with specification No. B. 21. a subject to the following :—

(1) The degreasing shall be done by either proprietory brands of solvent cleaners approved by the Engineer or by mineral turpentine or petroleum and other petroleum solvents like trichloroethylene or alkali solutions or detergents as directed by the Engineer.

(2) Derusting shall be done by the methods as mentioned in the wording of the item.

(3) Primer coat shall be of red lead paint conforming to I. S. 102/1962. Primer coat shall be applied only after completely drying the surface to be painted but immediately after cleaning. The contractor shall adhere to the time schedule given by the paint manufacturer regarding application of primer coat.

(4) Under coating and puttying shall be done if necessary and the Engineers orders.

(5) The finishing shall be done with specified paint of the colour and shade approved by the Engineer. The number of finishing coats shall be as mentioned in the item. The paint shall conform to relevant Indian Standard.

Bd. O. 3. 2. *Item to include.*—The rate shall include all labour, materials, equipment and use of tools for carrying out the following operations :—

(1) Supplying the red lead oil paint and the finishing oil paints.
(2) Scaffolding if necessary including erecting and dismantling.
(3) Cleaning and preparation of the surface.
(4) Application of primer coat.
(5) Under coating and puttying if necessary.
(6) Application of finishing coats of paint.
(7) Protecting the painted surface till dry.

Bd. O. 3. 3. *Mode of measurement and payment.*—The contract rate shall be per square metre of the painted surface. The linear dimensions shall be measured correct up to 2 places of decimals of a metre. The area shall be worked out correct up to 2 places of decimals of a square metre.

Areas of uneven surfaces shall be converted into equivalent plain areas as given below :—

| Serial No. | Description of work | How measured | Multiplying factor for area |
|---|---|---|---|
| (1) | (2) | (3) | (4) |
| 1 | Guard bars, balustrades, grills, grates, gratings and railing, XPM partitions and cages including frames. | Measured flat, overall no deduction shall be made for open spaces. Supporting members shall not be measured separately. | 1 (for painting all over both sides). |
| 2 | Gates and open palisade fencing including standards, braces, rails, stays, etc. including frames. | Do.* (*See* note) .. | 1 (for painting all over both sides). |
| 3 | Girders, stanchions, trusses .. | Measured flat for the net surfaces painted. No increase shall be made for rivet heads. | .. |
| 4 | G. I. or black corrugated sheets | Measured flat (not girthed) .. | 1·14 (for each side). |

*Note.—The height shall be taken from the bottom of the lowest rail if the palisades do not go below it (or from the lower end of palisades, if they project below the lowest rail) up to the top of palisades, but not up to the top of standards, if they are higher than the palisades.

Bd. O. 4. *Providing and applying 2/3 coats of aluminium paint of approved make to new structural steel work in buildings and workshops including scaffolding if necessary, cleaning and preparing the surface by solvent degreasing and derusting by manual scraping/mechanically by sand blasting/shot blasting/flame cleaning/chemical methods and primer coat complete.*

Bd. O. 4. 1. *General.*—The specifications and mode of measurement for this item shall be the same as for item No. Bd. O. 3. subject to the following :—

The finishing coats shall be of aluminium paint which shall conform to I.S. 2339-1963

The numbers of coats shall be as mentioned in the item.

Bd. O. 5. *Providing and applying 2/3 coats of synthetic enamel paint of approved colour to new structural steel work in buildings, including scaffolding if necessary, cleaning and preparing the surface by solvent degreasing and derusting by manual scrapping/mechanically by and blasting/shot blasting/flame cleaning/chemical and primer coat complete.*

Bd. O. 5. 1. *General.*—The specifications and mode of measurement for this item shall be the same as for item No. Bd. O. 3. subject to the following :—

The finishing shall be done with the number of coats of synthetic enamel paint of approved colour conforming to I. S. 2932-1964 as mentioned in the item.

Bd. O. 6. *Providing and applying 2/3 coats of oil paint of approved colour to the old steel work and iron work in buildings including scaffolding if necessary and preparing the surface complete.*

Bd. O. 6. 1. *General.*—The item shall comply with specifications given in B. 21. (a) subject to the following :—

(1) For the repainting necessitated due to any specific reason the relevant instructions given in clause 8.3 of I.S. 1447 (Part I)-1966 shall be followed.

(2) Primer of red lead paint shall be applied in one coat after complete cleaning.

(3) The finishing shall be done with the paint of the colour and shade approved by the Engineer. The number of finishing coats shall be as mentioned in the item. The paint used shall conform to the relevant Indian standard.

Bd. O. 6. 2. *Item to include.*—The rate shall include all labour, material and use of equipment necessary to carry out following operations :—

(1) Supplying the oil paints for primer and finishing coats.

(2) Scaffolding including erecting and dismantling.

(3) Cleaning and preparing the surface as specified for repainting as in B. 21a.

(4) Application of primer.

(5) Applying finishing coats.

(6) Protecting the painted surface till dry.

Bd. O. 6. 3. *Mode of measurement and payment.*—This shall be as per item Bd. O.3.

Bd. O. 7. *Providing and applying 2/3/4 coats of oil paint of approved colour and shade to plastered surfaces including scaffolding if necessary, preparation of the surface and priming coat complete.*

Bd. O. 7. 1. *General.*—The item shall comply with the specification B. 21. subject to the following :—

(1) The primer shall be applied in one coat.

(2) The finishing shall be done with the number of coats of oil paint of approved colour and shade as mentioned in the item. The paint shall conform to the relevant Indian Standard.

Bd. O. 7. 2. *Item to include.*—The rate shall include all labour, materials and use of tools necessary to carry out the following operations :—

(1) Supplying the oil paints for primer and finishing coats.

(2) Scaffolding including erection and dismantling.

(3) Cleaning and preparing the surface for receiving the paint.

(4) Applying the primer.

(5) Applying the finishing coats as specified.

(6) Protecting the painted surface till dry.

Bd. O. 7. 3. *Mode of measurement and payment.*—As given in Bd. L. 1. 7 shall apply Bd. L. 6. 5 for cornices, mouldings, ribs and architraves on walls and ceilings.

Bd. O. 8. *Providing and applying waterproof cement paint of approved manufacture and of approved colour to the plastered surfaces including scaffolding if necessary and preparing the surface complete.*

Bd. O. 8. 1. *Cement paint.*—The waterproof cement paint shall be of approved manufacture and it shall be of approved colour and shade. The contractor shall bring them to the site in original airtight containers with seals intact.

अनुक्रमणिका
Table of Contents



Bd. O. 8. 2. *Brushes.*—The brushes to be used shall be as specified by the manufacturer of the oil paint and they shall be got approved by the Engineer.

Bd. O. 8. 3. *Scaffolding.*—Scaffolding if necessary shall be double and as specified in B. 9. 11.

Bd. O. 8. 4. *Preparatory work.*—The surface to be painted shall be prepared as specified by the manufacturer of the paint. The surface shall be thoroughly cleaned free from dirt, dust etc., by brushing and washing down with clean water. Any grease, oil paint, or any other foreign material shall be removed by approved methods.

Lime wash and water bound distemper, shall be thoroughly removed by washing, brushing and if necessary, the accumulated coats of old paint shall be removed by thoroughly brushing or scraping and washing and a clean even surface obtained.

Rough cast and pebble dash surface shall be thoroughly brushed and washed to remove dirt and dust.

**Bd. O. 8. 5.** *Mixing the paint.*—The dry cement paint shall be thoroughly mixed with clean fresh water so as to produce paint of required consistency which for normal work shall be that of ordinary paints. In mixing and application, the contractor must follow the manufacturer's instructions. Paint for the application by brush shall be strained through paint strainer. The paint shall be kept stirred and used within the specified time. Hardened or damaged paint shall not be used.

Bd. O. 8. 6. *Application.*—The paint shall be applied by means of brushes and in the manner specified by the manufacturer. The number of coats shall be as mentioned in the wording of the item. When more than one coat is ordered, subsequent coats shall be applied after the preceding coat is properly cured and has thoroughly hardened, inspected and approved, and as per manufacturer's specifications.

Absorbant surfaces shall be evenly damped so as to give even suction. In dry weather, freshly painted surfaces shall be kept damp for at least 2 days and protected from direct sun.

Bd. O. 8. 7. *Item to include.*—The rate shall include all labour, materials, and use of tools to carry out the following operations:—

(1) Supplying and mixing the paint as specified.
(2) Scaffolding including erection and dismantling.
(3) Preparation of the surface before painting.
(4) Application of paint as specified.
(5) Curing and protecting the painted surface.

Bd. O. 8. 8. *Mode of measurement and payment.*—As per **Bd. O.**

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. P. COLOUR-WASHING, WHITE-WASHING AND DISTEMPERING

*List of items for colour-washing, white-washing and distempering.*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd. P. 1. | Providing and applying white-wash in 1/2/3 coats on old/new plastered or masonry surfaces and asbestos cement sheets including scaffolding and preparing the surface by brushing and brooming down complete ... | 395 |
| Bd. P. 2. | Providing and applying colour-wash of approved colour and shade 1/2/3 coats to new surfaces including scaffolding, brushing and brooming down and 2 coats of white-washing as base coat complete ... | 396 |
| Bd. P. 3. | Providing and applying colour-wash of approved shade and colour in 1/2/3 coats to old surfaces which are to be recoloured including scaffolding, brushing and brooming down, one coat of white-wash as base coat complete ... | 396 |
| Bd. P. 4. | Providing and applying washable distemper of approved colour and shade to old and new surfaces, in 1/2/3 coats, including scaffolding, preparing the surface to receive the priming coat and finishing coats complete ... | 397 |
| Bd. P. 5. | Providing and applying washable oil-bound distemper of approved colour and shade to old and new surfaces in 1/2/3 coats including scaffolding, preparing the surface to receive the priming and finishing coats complete ... | 397 |
| Bd. P. 6. | Providing and applying, plastic emulsion paint of approved quality, colour and shade to old new surfaces in 2/3 coats including scaffolding, preparing the surface to receive the paint and applying putty complete. ... | 398 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. P. COLOUR-WASHING, WHITE-WASHING AND DISTEMPERING

Bd. P. 1. *Providing and applying white-wash in 1/2/3 coats on old/new plastered or masonry surfaces and asbestos cement sheets including scaffolding and preparing the surface by brushing and brooming down complete.*

Bd. P. 1. 1. *General.*—The item refers to white-washing over old and new concrete, stone masonry brick or plastered surfaces and asbestos cement sheets.

Bd. P. 1. 2. *White-wash.*—White-wash shall be prepared from fresh burnt white stone lime or shell lime. This lime shall be of class C type as given in specification No. A. 1. Surkhi lime or lime of equivalent quality may be used. The lime shall be dissolved in a tub with sufficient quantity of water (about 4.5 litres/kg. of lime) and the whole well and thoroughly mixed and stirred until it attains the consistency of thin cream. The wash shall be taken out in small quantities and strained through a clean course cloth. Alternatively read-were. whiting complying with I. S. 63-1964 may also be used. Clean gum dissolved in hot water shall then be added in suitable proportion of 2 gm. of gum arabic to a litre of lime or whiting (2 ozs. of gum arabic to 1 cft. of lime) to prevent the white-wash coming off easily when rubbed. Rice size may be used instead of gum.

Bd. P. 1. 3. *Scaffolding.*—This may be double or single according to requirement and shall conform to B. 9. 11. If ladders are used, pieces of old gunny bags or cloth rags shall be tied on their tops to avoid damage or scratches to the wall. Proper stage scaffolding shall be erected when white-washing ceiling. The contractor shall be responsible for accidents if any take place.

Bd. P. 1. 4. *Preparation of surface.*—The surface shall be prepared by removing all mortar dropping and foreign matter and thoroughly cleaned with wire or fibre brush or other means as may be ordered by the Engineer to produce an approved clean and even surface. All loose pieces and the scales shall be scraped off and holes stopped with mortar. In case where the surface have been previously colour-washed the old colour-wash must be entirely removed before the white-wash is applied. In the case of surfaces which have once been white-washed, the old loose white-wash shall be broomed down. In case, the loose white-wash cannot be removed by brooming, the Engineer may order scraping of the surface.

After cleaning the surface as specified above, the unwanted nails shall be removed and all nail holes, cracks and crevices stopped with mortar similar in composition to the surface to be stopped. The mortar should be cured.

Bd. P. 1. 5. *Application of white-wash.*—On the surface so prepared, the white-wash shall be laid. Each coat shall be laid on with a brush. The first stroke of the brush shall be from the top downwards, another from bottom upwords over the first stroke, and similarly, one stroke from the right and another from the left over the first brush before it dries. This will form one coat. Each coat must be allowed to dry and shall be subject to inspection before the next coat is applied. When dry, the surface shall show no signs of cracking. It shall present a smooth and uniform finish free from brush marks and it should not come off easily when rubbed with a finger.

No portions in the surface shall be left out initially, to be patched up later on.

For new work. the white washed surface shall present a smooth and uniform finish.

For old work, patches and repairs shall be white washed first. Thereafter, the whole surface shall be white washed with the required number of coats.

Doors, windows, floors and other articles of furniture, etc., shall be protected from being splashed upon. Splashing and droppings if any, shall be removed and the surfaces cleaned.

Bd. P. 1. 6. *Item to include.*—The rate shall include all labour, materials, equipment and devices to carry out the following operations:—

(1) Scaffolding including erection and removal.

(2) Providing and preparing the white wash.

(3) Preparing the surface for white wash including the scaffolding.

(4) Applying the white wash in required number of coats as specified above and prior white washing of repaired patches.

Bd. P. 1. 7. *Mode of measurement and payment.*—At specified in Bd. L. 1.7, Bd. L. 6.5, shall apply for cornices, string courses, mouldings, ribs, architraves on walls and ceilings.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.P.3.4.**

Bd. P. 2. *Providing and applying colour wash of approved colour and shade in 1/2/3 coats to new surfaces, including scaffolding, brushing and brooming down and 2 coats of white washing as base coat complete.*

Bd. P. 2. 1. *General.*—The item refers to providing and applying of approved colour wash to surfaces which were not given any finishing earlier.

Bd. P. 2. 2. *Materials.*

Bd. P. 2. 2. 1. *White wash for base coat.*—This shall be prepared as described in Item No. Bd. P. 1.

Bd. P. 2. 2. 2. *Colour wash.*—This is prepared by adding necessary colouring matter of approved make to the white wash which has been stained. The colour shall be as approved by the Engineer. For all colour wash, a sample must first be applied, allowed to dry and approved by the Engineer before the work proceeds. It should be noted that sample of colour looks much paler than when precisely the same shades are applied to large surfaces such as the walls of a room. Care must be taken to mix sufficient colour wash to complete the whole surface to be treated, otherwise it is almost impracticable to obtain exactly the same shade of colour in two successive mixtures. Sufficient gum or rice size should be added to prevent the colour wash coming off when rubbed with fingers.

Bd. P. 2. 3. *Preparation of surfaces.*—The surfaces shall be prepared by brooming down, brushing or other means as may be ordered by the Engineer. The surface shall be thoroughly cleaned down and freed from all foreign matter before the base coat is applied.

Bd. P. 2. 4. *Sub-base.*—Sub-base of two coats of white wash shall be applied as specified in Item No. Bd. P. 1.

Bd. P. 2. 5. *Application of colour wash.*—The colour wash shall be applied over the base coat. It shall be applied in the same way as white wash. The number of coats shall be as mentioned in the item, each coat being applied after the earlier coat has dried.

Care must be taken that the workmen keep the mixture constantly stirred, while putting it on, otherwise the colouring matter will settle and the work will be uneven, patchy and streaky. The contractor must ensure an even colour throughout. Patchy or streaky work shall be rejected and reexecuted at the contractor's cost.

Bd. P. 2. 6. *Item to include.*—The rate shall include all labour, materials, and devices to carry out following operations:—

(1) Providing and preparing white wash and colour wash.
(2) Scaffolding including erection and removal.
(3) Preparation of the surface to receive the colour wash.
(4) Applying the sub-base.
(5) Applying the colour wash in specified number of coats.

Bd. P. 2. 7. *Mode of measurement and payment.*—This shall be as for item No. Bd. P. 1.

Bd. P. 3. *Providing and applying colour wash of approved colour and shade in 1/2/3 coat to old surfaces which are to be recoloured including scaffolding, brushing and brooming down, one coat of white-wash as base coat complete.*

Bd. P. 3. 1. *General.*—The item refers to providing and applying colour wash of approved colour to old surfaces which are to be recoloured or refinished.

Bd. P. 3. 2. *Materials.*—These shall be as for item No. Bd. P. 2.

Bd. P. 3. 3. *Preparation of surface.*—The surface shall be prepared by brooming down and brushing or scraping. The old colour shall be washed off. The prepared surface shall be approved by the Engineer before the sub-base is applied.

Bd. P. 3. 4. *Sub-Base.*—One coat of white wash shall be applied as specified in Item No. Bd. P. 1.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. B. 3. 5. *Application of colour wash.*—This shall be done in the same way as for Item No. Bd. P. 2.

Bd. P. 3. 6. *Item to include.*—Same as for item No. Bd. P. 2.

Bd. P. 3. 7. *Mode of measurement and payment.*—This shall be as for item No. Bd. P. 1.

Bd. P. 4. *Providing and applying washable distemper of approved colour and shade to old and new surfaces, in 1/2/3 coats, including scaffolding, preparing the surface to receive the priming and finishing coats complete.*

Bd. P. 4. 1. *Distemper.*—Washable distemper of approved make, colour and shade shall be used. It shall conform to I. S. 427-1965. Approved quality distemper like Shalimar, Lakaki or of equivalent type shall be used.

Bd. P. 4. 2. *Scaffolding.*—This may be double or single as per Bd. P. 1. 3.

Bd. P. 4. 3. *Preparing the surface.*—The surface to be distempered shall be cleaned and all cracks, holes and surface defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand-papered smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distempering is commenced. In the case of walls newly plastered, special care shall be taken to see that it is completely dry before any treatment is attempted.

For the old surface which had earlier been distempered, the surface shall be cleaned of grease, dust etc. The flakings of previous coatings if any, shall be taken off. All cracks, holes and surface defects shall be repaired with gypsum and allowed to set hard and then sand papered smooth and wiped clean. But in case the surfaces are coloured or white washed, the wash must be removed thoroughy first.

Bd. P. 4. 4. *Priming coat.*—The priming coat shall be applied over the completely dry surface in the manner recommended by the makers in the case of patent distempers. When no priming coat is specified by the manufacturer a finely powdered chalk mixed with a thin solution of glue shall be applied to prepare a good, hard background, the coating when dry being rubbed as clean and smooth as possible.

Bd. P. 4. 5. *Application of distemper.*—The instructions of the makers shall be followed regarding preparation of the surface and application of priming and finishing coats. Distemper shall not be mixed in a larger quantity than is actually required for a day's work. Hot water should be used to prepare the mixture. Distempers shall be applied in dry weather with a broad stiff brush in long paralled strokes. The treated surface shall be allowed to dry and harden. The next coat of distemper shall be laid on in exactly the same manner as the first one but only after the earlier coat laid has thoroughly dried. The number of coats of distemper to be applied shall be as mentioned in the item. The brushes used should never be allowed to rest on the bristles and after the use they should be carefully and thoroughly cleaned.

Bd. P. 4. 5. 6. *Item to include.*—The rate shall include all labour, materials, equipments and tools for carrying out the following operations:—

(1) Providing the primer and distemper and mixing the distemper.
(2) Scaffolding.
(3) Preparing the surface to receive the priming and finishing coats.
(4) Applying the priming coat.
(5) Applying the distemper as specified above in the number of coats mentioned in the item.

Bd. P. 4. 7. *Mode of measurement and payment.*—Same as for item No. Bd. P. 1.

Bd. P. 5. *Providing and applying washable oil bound distemper of approved colour and shade to old and new surfaces in 1/2/3 coats, including scaffolding, preparing the surface to receive the priming and finishing coats complete.*

Bd. P. 5. 1. *General.*—The specifications for this item shall be the same as for item No. Bd P. 4. except that washable oil bound distemper of the approved shade of colour conforming to I. S. 428-1969, shall be used after applying priming coat of petrifying liquid or other primer as may be recommended by the manufacturers of the distemper.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.P.6.7.**

Bd. P. 6. *Providing and applying plastic emulsion paint of approved quality, colour and shade to old and new surfaces in 2/3 coats, including scaffolding, preparing the surface to receive the paint and applying putty complete.*

Bd. P. 6. 1. *General.*—The item refers to painting the old and new plastered surfaces, with plastic emulsion paint.

Bd. P. 6. 2. *Plastic Emulsion.*—Plastic emulsion shall be of the approved manufacture like that of Jenson Nicholson, Asian Paints, Shalimar Paints, etc., or of equivalent quality. The colour and shade of the emulsion shall be as approved by the Engineer.

Bd. P. 6. 3. *Scaffolding.*—As for Bd. P. 1.

Bd. P. 6. 4. *Preparing the surface.*—This shall be done as per manufacturer's specifications. If no specifications are furnished by manufacturer then instructions in Bd. P. 4. 3. shall be followed.

Bd. P. 6. 5. *Painting.*—Procedure of painting with plastic emulsion shall be as specified by the manufacturer. When no specifications are furnished, following specifications, shall generally apply.

Add about 50 per cent water to plastic emulsion paint. Mix thoroughly and then strain through a cloth. Brush the paint on wall. Allow to dry properly. On this, putty prepared by mixing whiting and plastic emulsion paint shall be filled whenever necessary in holes and depressions and rubbed dry and touched up with plastic emulsion paint.

For the second coat add about 15—20 per cent water and give a coat by brush. For the third coat if and when specified, the same procedure shall be followed. No brush marks shall be seen.

Bd. P. 6. 6. *Item to include.*—The rate shall include all labour, material and tools required to carry out following operations:—

(1) Providing the plastic emulsion paint and whiting.
(2) Scaffolding.
(3) Preparing the surface to receive the paint.
(4) Applying the paint as specified above.

Bd. P. 6. 7. *Mode of measurement and payment.*—As per Bd. P. 1.

अनुक्रमणिका
Table of Contents

Bd. Q. WOOD WORK

*List of items of Wood Work*


| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd.Q. 1 | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) planking.....mm ( ") thick for flooring planed on one side/both sides, tongued and grooved including scaffolding, if necessary, french polishing/varnishing/oiling/oil-painting complete ... ... ... | 403 |
| Bd.Q. 2. | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) joists and girders in timber floors of single, double or framed type including scaffolding, if necessary, varnishing/oiling/oil-painting complete ... ... | 404 |
| Bd.Q. 3. | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) plank ceiling .....mm (.....") thick, planed on the under side, tongued and grooved including scaffolding, if necessary, varnishing/oiling/oil-painting complete ... ... ... ... ... | 405 |
| Bd.Q. 4. | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) framed collar beam/king post/queen post truss, with all iron work including scaffolding, if necessary and oiling/oil-painting complete ... ... ... | 406 |
| Bd.Q. 5. | Providing and fixing country teak wood/jungle wood (.....species) common rafters, purlins and purlin cleats, hip rafters, jack rafters, ridges, wall plates, post plates and posts for roofing, etc., including scaffolding, if necessary, all iron work and oiling/oil-painting complete ... ... | 407 |
| Bd.Q. 6. | Providing and fixing country teak wood/jungle wood (.....species) toway trellis work, with battens or laths .....cm × .....cm (....." × ....") and .....cm × .....cm (....." × ....") openings including frame of .....cm × .....cm (....." × ....") vertical and horizontal scantling, oiling/oil-painting complete ... ... | 408 |
| Bd.Q. 7. | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) balustrade as per detailed drawings and design including housing at ends and french polishing/varnishing/oiling/oil-painting complete ... ... | 408 |
| Bd.Q. 8. | Providing and constructing superior Indian/country teak wood hand rail of given section as per detailed drawings or as directed by the Engineer, including varnishing/french polishing-oil-painting complete ... ... ... ... | 409 |
| Bd.Q. 9. | Providing and constructing superior Indian/country teak wood staircase, as shown upon detailed drawings or as directed with cut/close strings, treads, risers, brackets, trimmers, carriage bearers, underside boarding, glue blocks, curtail steps, winders, newels, landings including all fittings, iron work and varnishing/oiling/french polishing/oil-painting the exposed wood work complete ... ... ... ... | 409 |
| Bd.Q. 10. | Providing and fixing superior Indian/country teak wood architraves and skirting .....mm thick in the required position and of the size shown in the drawings including all mouldings, rough grounds, Rowl plugs, if necessary and finishing with varnish/french polish/waxing/oil-painting complete | 410 |

अनुक्रमणिका
Table of Contents

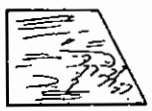



| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd.Q. 11. | Providing and fixing superior Indian/country teak wood pelmet boxes of section .....mm × .....mm (....." × ....") with planks .....mm thick to door and window frames including brass/wooden curtain rod, bracket and finishing the wood-work with varnishing/oiling/french polishing/oil-painting complete ... ... ... ... ... | 411 |
| Bd.Q. 12. | Providing and fixing superior Indian/country teak wood/jungle wood (of.....species) picture rail .....mm × .....mm (....." × ....") moulded as per drawings or as directed by the Engineer, securing to the wall surfaces after plastering is done including finishing with oil-painting/oiling/varnish-ing complete ... ... ... ... ... | 412 |
| Bd.Q. 13. | Providing and fixing wooden shelf of country teak wood/jungle wood (.....species) plank 30 cm/45 cm wide with wooden brackets, without/with fillet, including all fixtures, oil paint-ing/oiling complete ... ... ... ... | 412 |
| Bd.Q. 14. | Providing and fixing superior Indian teak wood wall cupboards of .....cm × .....cm× .....cm (....." ×....." × .....") with teak wood shelves .....mm ( × .....") thick and ..... in number including frame and fully panelled/fully glazed first class shutters with brass fixtures and fastening and finishing the wood work with varnish/french polish complete ... ... | 413 |
| Bd.Q. 15. | Providing and fixing country teak wood wall cupboard of .....cm × .....cm × .....cm (....." × ....." × .....") with teak wood frame and shelves .....mm (.....") thick and..... in number with plain planked shutters including iron fixtures and fastenings, finishing the wood work with oil-painting/ oiling complete ... ... ... ... | 414 |
| Bd.Q. 16. | Providing and fixing superior Indian/country teak wood/jungle wood (.....species) plank casing .....mm (.....") thick to R. S. J.'s., etc., including mouldings, if any, scaffolding, if necessary, oiling/varnishing/painting complete ... ... | 414 |
| Bd.Q. 17. | Providing and fixing .....mm thick first class Burmah/superior Indian teak wood plank lining to walls and pillars, without/ with skirting and cornice as per drawings including necessary rough grounds. Rowl plugs, iron work and finishing the exposed wood work with varnish/fresh polish/waxing complete ... ... ... ... ... | 414 |
| Bd.Q. 18. | Providing and fixing decorative teak plywood veneer lining .....mm thick with backing of country teak wood frame work of battens fixed to walls and pillars without/with skirting and/or cornice as per drawings including necessary rough grounds, Rowl plugs, iron work and finishing exposed wood work with varnish/french polish/waxing complete ... | 415 |
| Bd.Q. 19. | Providing and fixing country teak wood/jungle wood (.....species) eaves boards .....cm wide and 20 mm/25 mm thick, plain/ decorative type including scaffolding and painting complete ... | 416 |
| Bd.Q. 20. | Providing and fixing country teak wood/jungle wood (.....species) eaves plate of size 10 cm (about 4") wide 12 mm/20 mm (about $\frac{1}{2}$"/$\frac{3}{4}$") thick, including scaffolding and painting complete ... ... ... ... ... | 416 |
| Bd.Q. 21. | Providing and fixing country teak wood/jungle wood (..... species) barge board ..... cm wide and 20 mm/25 mm thick plain/ decorative type including scaffolding and painting complete | 417 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

# JOINERY



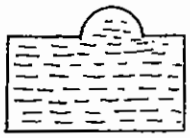
BEVELLED



CHAMFERED



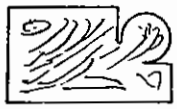
ROUNDED



COCK BEAD



BEAD & QUIRK



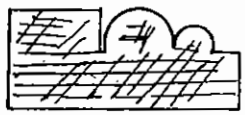
BEAD & DOUBLE QUIRK



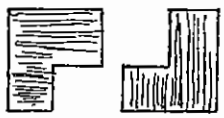
DOUBLE BEAD



SINGLE TORUS



DOUBLE TORUS

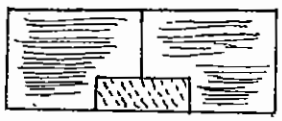


REBATE

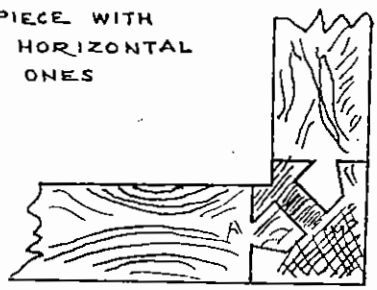


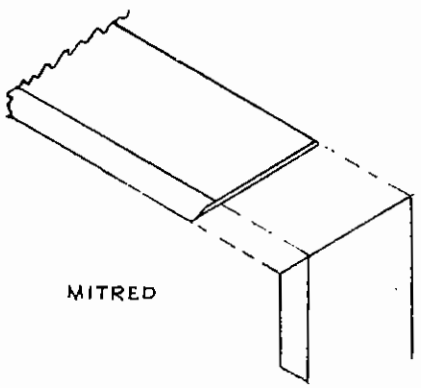
GROOVE & TONGUE

REBATE & FILLET

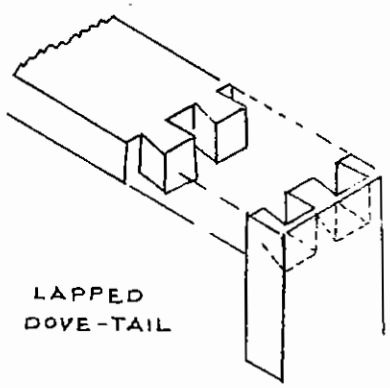


JOINT OF A VERTICAL PIECE WITH TWO HORIZONTAL ONES





MITRED



LAPPED DOVE-TAIL

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| SERIAL NO. | ITEM | PAGE |
|---|---|---|
| Bd.Q. 22. | Providing and fixing country teak wood/jungle wood (..... species) bullies including all iron work, scaffolding, if necessary and oiling for— | ... 418 |
| | (*a*) Common rafters of .....mm diameter. | |
| | (*b*) Purlins of .....mm diameter. | |
| | (*c*) Ridges of .....mm diameter. | |
| | (*d*) Hip and valley rafters of .....mm diameter. | |
| | (*e*) Jack rafters of .....mm diameter. | |
| | (*f*) Wall plates of .....mm diameter. | |
| | (*g*) Post plates of .....mm diameter. | |
| | (*h*) Posts of .....mm diameter. | |
| Bd.Q. 23. | Providing and fixing country teak wood/jungle wood (.....species) bullies for collar truss/king post truss of .....metre span as per drawing or as directed by the Engineer including hoisting, scaffolding, if necessary and oiling complete with— | ... 419 |
| | (*a*) Principal rafters of .....mm. diameter. | |
| | (*b*) King post and struts of .....mm. diameter. | |
| | (*c*) Tie member of .....mm. diameter. | |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. Q. WOOD WORK

Bd.Q. *General wood work.*—In addition to the specification B.20 for 'General wood work' the following clauses shall also be applicable in carrying out the items of wood work in this group :—

*Timber.*—Timber to be used shall be Burmah teak wood, superior Indian teak wood, country teak wood or junglewood as mentioned in the item.

*Burmah teak wood.*—This shall be teak wood from Burmah forests imported into India. It shall be uniform in substance, generally straight in fibre, free from large or dead knots, flaws, shakes, or blemishes of any kind. The colour shall be uniform throughout. There shall be not fewer than 6 growth rings per inch width. It shall be capable of being easily worked upon and taking very fine polish. The timber should be well-seasoned before cutting into scantlings.

*Superior Indian teak wood.*—This shall be teak wood more or less similar to Burmah teak wood but extracted from the Indian forests in Malabar or round about Ballarshah. Dandeli and Bulsar. Other Indian teak wood similar to these varieties shall also be classed under superior Indian teak wood. In this timber, no individual live knot shall be more than 25 mm (1″) in diameter. The aggregate area of all knots shall not exceed 1 per cent. of the area of the piece.

*Country teak wood.*—This teak wood comprises local teak varieties inferior to the above teak wood and may be used for second class works or where the wood work is to be painted. These may be available, in local forests. These varieties may not have their grains as straight as the superior Indian teak wood. The slope of grain, however, shall not exceed 1 in 8. No individual knot shall be more than 45 mm (1½″) in diameter and aggregate area of all the knots shall not exceed 1½ per cent. of the area of the piece. There shall not be less than 4 growth rings per inch width. Country teak wood may not take as fine polish as Burmah or superior Indian teak wood.

*Jungle wood.*—Jungle wood to be used shall be of the species mentioned in the item A list of jungle wood species, the timber from which could be used for temporary construction, is given in A. 16.

*Joinery.*—Standard joints shall be made as shown on the sketches.

*Waste.*—Any cutting and waste of timber that may be incidental in carrying out an item shall not be paid for extra, but shall be included in the rate for the item.

*Finishing.*—Wood work with Burmah and superior Indian teak wood shall generally be finished with french polishing, waxing or varnishing. It shall not generally be painted. The country teak wood may be finished with oiling or painting. The jungle wood may be finished with painting or oiling.

*Protection.*—Where wood work is likely to remain exposed to sun or inclement weather, it shall be protected by covering it with gunny cloth tied to the members or these members shall be coated with a thin coat of mud mixed with cowdung wash.

Bd. Q. 1. *Providing and fixing superior Indian/country teak wood/jungle wood (..... species) planking .....mm thick for flooring planed on one side/both sides, tongued and grooved including scaffolding if necessary, french polishing/varnishing/oiling/oil painting complete.*

Bd. Q. 1 1. *Timber.*—Timber planks supplied shall be of superior Indian or country teak wood or jungle wood of the species specified in the item. It shall be well seasoned and shall conform to specification A.16 for timber. The thickness of planking mentioned in the item shall be the finished thickness of the planking. The width and length of the planks shall be suitable for the size of the room where flooring is to be constructed and the general design of the timber flooring. Generally 10 cm to 15 cm (4″ to 6″) wide planks could be used. But they shall all be of the same width.

Bd. Q. 1. 2. *Construction.*—The construction shall follow the specification given for general wood work in B. 20 Scaffolding if necessary shall be as per B. 9. 11.

The planking shall be planed on the exposed surface on one or both sides as the case may be. Side joints shall be tongued and grooved or rebated as directed by the Engineer.

अनुक्रमणिका
Table of Contents

**Bd.Q.2.2.**

Heading joints shall be rebated and fixed neatly and shall rest upon the joist below and shall break joint with one another. All joints shall be neat and close.

The boards shall be jammed together as they are being laid by flooring cramps. Each board shall be screwed in position by two 6 cm (about 2″) screws to each of the joist below. Brass screws shall be used for superior Indian teak planks and iron screws for country teak or jungle wood planks.

The heads of all screws shall be countersunk and the exposed faces of boards then planed quite smooth.

Bd. Q. 1. 3. *Finishing.*—The wood work shall be finished by french polishing or varnishing or oiling or oil-painting as mentioned in the item. The oiling, varnishing and french polishing shall be done as specified in specification Bd. N. If oil painting is specified, it shall be done as specified in B. 21. (b). The finishing coats of paint shall be 2 in number and shall be of the colour and shade approved by the Engineer.

Bd. Q. 1. 4. *Item to include.*—The rate shall include all labour, materials, use of equipment, scaffolding, ladders and tools for carrying out the following operations:—

(1) Supplying the planks of the specified type and dimensions and brass or iron screws.

(2) Cutting, planing, jointing and fixing the planking for the wooden flooring as specified including necessary cutting and waste.

(3) Finishing the wood work as specified.

Bd. Q. 1. 5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one square metre of the net area of boarding, wrought and laid as specified. The thickness of the wrought and planed boarding shall be that mentioned in the item, no further allowance being made for planing. The linear dimensions shall be measured correct up to 1 cm. between skirting, dado or plastered surfaces of walls, the extra width and length in rebates, tongues, etc., being ignored. The area shall be worked out correct up to 2 places of decimals of a square metre.

Bd. Q. 2. *Providing and fixing superior Indian/country teak wood/jungle wood (..... species) joists and girders in timber floors of single, double or framed type including scaffolding if necessary, varnishing/oiling/oil painting, etc., complete.*

Bd. Q. 2. 1. *Timber.*—Timber joists shall be of the species of wood mentioned in the item. It shall be well seasoned and shall conform to specification A. 16 for timber. The sizes of joists and girders shown on the drawing shall be the finished sizes after planing. The sizes shall be changed if so directed by the Engineer in writing and there shall be no extra claim of the contractor on this account. The joists and girders shall be of suitable lengths required for the purpose.

Bd. Q. 2. 2. *Construction.*—The construction shall follow the specification for general wood work in B. 20 scaffolding, if necessary, shall be as per B. 9. 11.

(*a*) *In single floors.*—Unless otherwise shown in the drawing or directed by the Engineer the bridging joists shall be kept at 30 cm. apart centre to centre. The joists shall rest on wall plates and their ends shall be nailed, cogged or notched on to the wall plates on which they rest. When the bridging joists exceed 3 metres (about 10′) in length, they shall be strutted apart at intervals of about 2 metres (about 6′) by simple pieces of board 2.5 cm. (about 1″) thick and of their full depth fitted in between the joists at right angles to them or by herring boning with strips of wood 5 cm × 2.5 cm (2″ × 1″). Care shall be taken that the free circulation of air is allowed round the ends of bridging joists and along the inner side of the wall plates to which they are secured.

(*b*) *Double flooring.*—Here the bridging joists are supported on binder joists. Binder joists shall be placed at a spacing shown on the drawings or directed by the Engineer. If it can be avoided, they should not be placed immediately over window or door openings; but if this is unavoidable, they should rest on strong wall plates or templates long enough to distribute the weight well over the piers (length shall not be less than a metre) or on stone corbels fixed in walls.

When laid on templates in the wall, care shall be taken to secure a free circulation of air around the end.

(*c*) *Framed floor.*—In framed floor, the binding joists are framed into the girders generally by double tusk tenons. The ends of binding joists shall be supported by iron stirrups. Girders shall not be apart more than 3 metres (about 10′).

(*d*) *General.*—All the joists, girder or binders shall be placed in such a manner that the whole floor is given a camber of 1 in 320 at the centre.

Where there are fire places in the room or flues in the wall, no joists should be placed in the masonry for the full width of the chimney breast. The ends of the joists should be carried by a trimming joist placed ½ metre (about 2′) away from the chimney breast and supported by 2 joists which are outside the chimney breast. The space between the trimmer and chimney breast shall be covered by stone flags or reinforced slabs.

Bd. Q. 2. 3. *Finishing the wood work.*—For embedded parts finishing shall be done with hot coal tar as specified in B.20. For exposed parts which shall be planed quite smooth, varnishing, oiling or oil-painting shall be done as mentioned in the item. The oiling or varnishing shall be done as per Bd.N. The oilpainting shall be done as per specification No. B.21.b. The finishing coats of oil paint shall be 2 in numbers and shall be of colour and shade approved by the Engineer.

Bd. Q. 2. 4. *Item to include.*—The rate shall include all labour materials, use of equipment, scaffolding, ladders and tools for carrying out the following operations:—

(1) Providing the cut sizes of joists and girders of the required species and dimensions and iron work.

(2) Cutting, planing, jointing and fixing the joists and girders as specified above including any strutting and iron work including cutting and waste.

(3) Coal tarring the embedded part and oiling or oil-painting exposed wood work.

Bd. Q. 2. 5. *Mode of measurement and payment.*—As per B.20.1.2. The contract rate shall be for a unit of one cubic metre of the wood work wrought and fixed including the joists, strubs, binder, joists girders, etc. The dimensions shall be limited to those shown in the drawings or ordered by the Engineer. The cross-sectional dimensions shall be measured net for wrought and planed sizes no allowance being made for planing. The dimensions or cross-section shall be measured correct up to 2 mm. The length shall be measured up to two places of decimals of a metre adding tenons, etc., at joints. The quantity shall be worked out correct up to 3 places of decimals of a cubic metre.

Bd. Q. 3. *Providing and fixing superior Indian/country teak-wood/jungle wood (..... species) plank ceiling ..... mm. (.....") thick planed on the under side tongued and grooved including scaffolding if necessary, varnishing/oiling/oil-painting complete.*

Bd. Q. 3. 1. *Timber.*—Timber planks shall be of the species specified in the item and shall conform to specification A.16 for timber. The thickness of the planking mentioned in the item shall be that obtained after planing. Generally the width shall be between 80 mm. to 150 mm. (3″ to 6″); but they shall all be of the same width. The planks shall be planed smooth on the underside and beaded or bevelled at the edges as may be ordered.

Bd. Q. 3. 2. *Construction.*—The construction shall follow the specification No. B. 20 for general work wood. The scaffolding if required shall be as per B. 9. 11.

In purlin rafter construction, the planks, are fixed on the purlin rafters, leaving the main roof timber exposed to view. In the common rafter construction, the ceiling shall be fixed to the rafter or to the underside of the ceiling joists screwed to the underside of the tie beams of trusses unless otherwise ordered.

In purlin rafter construction, the planks shall be laid on purlin rafters continuously from ridge to eaves. Over these, battens and roof coverings shall be laid. In case of galvanised corrugated iron sheet roof covering with planks ceilings, teak planking shall be screwed to the underside of the purlins extending from under the ridge to the walls forming thus an airchamber of the full depth of the purlins between the planking and the roof covering above.

The planks shall be laid truly parallel to the wall and shall be fixed with brass screws of the proper length when superior Indian teak planking is used. Iron screws shall be used for country teak or jungle wood planking. The screw heads shall be countersunk. The headings joints shall be rebated and shall rest on purlins, joists or rafters and shall break joint. The side joints shall be tongued and grooved and the edges beaded or bevelled as ordered by the Engineer. All joints shall be close and neat. The planks shall, however, not be forced up too much against one another before being fixed.

Bd. Q. 3. 3. *Finishing.*—The wood work shall be finished by varnishing, oiling or oil painting as mentioned in the item. Varnishing or oiling shall be done as specified in Bd. N. If oil painting is specified, it shall be as per specifications No. B. 21.b. The finishing coats of oil paint shall be 2 in number and shall be of the colour and shade approved by the Engineer. The unexposed top surface of planking shall be given a thin coat of coal tar as would be readily absorbed by the wood and will not bleed through the joints to the underside.

Bd. Q. 3. 4. *Item to include.*—The rate shall include all labour, materials, use of equipment, scaffolding, ladder and tools for carrying out following operations:

(1) Supplying the planks of the specified species and thickness in uniform widths and required lengths.

(2) Preparing the ceiling planks by planing, beading, jointing, etc., and fixing as specified including scaffolding, if necessary, screws, cutting and waste.

(3) Finishing the wood work with oiling or varnishing or oil painting as mentioned in the item.

Bd. Q. 3. 5. *Mode of measurement and payment.*—As for item No. Bd. Q. 1.

Bd. Q. 4. *Providing and fixing superior Indian/country teak-wood/Jungle wood (.....species) framed collar beam/king post/queen post truss, with all iron work including scaffolding if necessary and oiling/oil painting complete.*

Bd. Q. 4. 1. *General.*—The item refers to wood work in timber trusses like collar beam, king post or queen post trusses.

Bd. Q. 4. 2. *Timber scantling.*—The wood to be used shall be of the species mentioned in the item. The wrought scantling sizes shall be as given in the standard table for different members of the truss for different spans or as per detailed design and drawings or as directed by the Engineer. The timber shall comply with specification A.16 for timber.

Bd. Q. 4. 3. *Construction.*—The construction shall follow the specification B.20 for General wood work. The scaffolding if necessary shall be as per B.9.11.

The framing and trussing shall be done in the best possible manner. All necessary mild steel ties, straps, bolts, screws, etc., shall be fitted as shown on the standard drawings or as ordered by the Engineer. No beam or member shall be scarfed or jointed unless so shown on the drawings or ordered by the Engineer. The joints shall be mortice and tenon or tusk and tenon or as shown on standard drawings and shall be fitted together accurately in a workmanlike manner. Each member of the truss shall be in one full length unless otherwise permitted.

In constructing trusses, a full sized truss shall be marked on a level platform. From this templates of all tenons, mortices, scarfs, etc., shall be made to ensure all trusses being accurate and of the required size. Trusses shall be carefully hoisted and stayed in true position till built in or secured with bolts, holdfasts, purlins, or other connecting members. The trusses shall be fixed on wooden templates or 1 : 2 : 4 cement concrete bed blocks which shall be paid for separately. The trusses supporting galvanised corrugated sheet or absestos cement sheet roofing shall be anchored by bolting them down in the masonry with 20 mm. rods. The spacing of trusses shall be as given in standard tables or drawings.

Bd. Q. 4.4. *Finishing.*—The wood work shall be finished with oiling or oil painting as mentioned in the item. Oiling shall be done as specified in Bd.N.

The oil painting shall be done as per specifications B.21.b with 2 coats (finishing) paint of approved colour and shade.

Bd. Q. 4. 5. *Item to include.*—The rate shall include all labour, materials, use of tools, scaffolding and ladders to carry out following operations :—

(1) To supply scantlings of the specified species and dimensions.

(2) Preparing and planing the truss members and jointing and framing them together to form the truss after cutting and waste as necessary on the ground.

(3) Hoisting, erecting and fixing the truss in position, including scaffolding, if necessary.

(4) Finishing the wood work with oil painting or oiling as specified in the item.

Bd. Q. 4. 6. *Mode of measurement and payment.*—As per B.20.12.

The contract rate shall be per cubic metre of the wood work in the truss. The measurement of members of roof truss shall each be taken to their full over all finished dimensions including all tenons, laps, etc. The length shall be measured correct upto a centimetre and the cross sectional dimensions correct upto the nearest 2 mm. The quantity shall be worked out correct upto 3 places of decimals of a cubic metre. Alternatively the rate may be per truss of the specified span and scantlings of standard dimensions.

Bd. Q. 5. *Providing and fixing country teak wood/jungle wood (.....species) common rafters, purlins and purlin-cleats, hiprafters, jack rafters, ridges, wall plates, post plates and posts for roofing, etc., including scaffolding, if necessary, all iron work and oiling/oil painting complete.*

Bd. Q. 5. 1. *Timber scantlings.*—Timber used shall be of the species mentioned in the item and shall comply with specification A.16. The sizes of scantlings for principal rafters, purlins, purlin cleats, common rafters, ridges, hiprafters, jackrafters, wall plates, postplates and posts shall be as given in the standard tables or drawings for different spans, and shall be wrought and planed to finished sizes, no minus tolerance being permitted. Rounding and beading to the edges of any item shall be done if ordered by the Engineer without extra cost. The Engineer may order any changes in the dimensions of scantlings in writing and the changed sizes shall be adopted without any extra claim for the change in size.

Bd. Q. 5. 2. *Construction.*—The construction shall follow the specification No. B. 20 for "General wood work". The scaffolding if necessary shall be as per B. 9. 11.

*Common rafters.*—Common rafters shall be fixed at central distances apart not exceeding 45 cm. (about 18") or as directed by the Engineer. They shall generally be in one continuous length from ridge to eaves or atleast in greatest lengths procurable. They shall be slightly notched to fit the purlin and notched and nailed to the wall plates near their lower ends. In the case of verandah roof coverings, the tops of common rafters, shall be secured to the wall plates laid in the wall and not merely built into it. This shall be done as per standard drawings or as directed by the Engineer.

*Purlins and purlin cleats.*—Purlins shall be in the greatest lengths procurable. They shall be scarfed together, wherever necessary, immediately above the principal rafters of the truss on which the ends rest. They shall be secured in position by purlin blocks. Purlin spacing shall be as given in the drawings or as directed by the Engineer. Cleats prepared to the required shape shall be spiked on to the principal rafter or housed in it.

*Ridge.*—Ridges form the abutments for the heads of common rafters which are spiked to them. In the case of king post truss roof, the ridge board shall be held in position by slotting the head of the kingpost. In case there are no end trusses, the ridge shall be supported on a template over the masonry and secured to it. In case of queen post truss the ridge board shall be supported over the joint of extenders of principal rafters. Ridges shall be only spiked on to them.

*Hip rafters and valley rafters.*—Hip and valley rafters shall about against and be spiked to the ridge board. They shall be continuous over the wall plate and secured to it by notching and nailing and they shall be terminated at eaves board. In the case of hipped roofs, to prevent a portion of the weight coming on nails, the hiprafters shall be fixed a little lower and the purlins should rest on them as they do in the case of jack rafters. The space left between the top of hip rafters and the ceiling or the bottom of the common rafters should be filled up with packing pieces.

*Jack rafters.*—Jack rafters shall have one end against the valley or hiprafters. In the case of hip rafters, the jack rafters shall be continuous over the wall plate and terminate at the eaves board. In the case of valley rafters, the jack rafters shall be spanned between the valley rafters and the ridge board. At both ends it shall be secured by spiking.

*Wall plates.*—Wall plates shall be fixed to the top of wall and along it in the position shown on the standard drawings or as directed by the Engineer. The wall plates shall be securely fastened to the wall by 15 mm ($\frac{5}{8}$") diameter anchor bolts with 45 cm. (1'-6") length embedded in the wall with plate washers at their ends at intervals of 150 cm. (5 ft.) Templates or detached wall plates shall also be placed on walls where trusses, purlins, post plates, ridges, etc., rest on the walls.

अनुक्रमणिका
Table of Contents



**Bd.Q.7.5.**

*Postplates and posts.*—Postplates and timber posts shall be of the sizes shown on the drawings. If these posts do not rest on the plinth walls, they shall be provided with individual foundations which shall be paid for separately. Postplates shall have the same width as the posts and shall be connected to the post with standard joint. The common rafters shall be fixed to the postplates by notching about 3 cms. into the common rafters or fixing iron knee straps between the posts plate and common rafters over them, and using bolts. *The standard drawings will illustrate these connections.*

Bd. Q. 5. 3. *Finishing.*—The wood work shall be finished with oiling or oil painting as mentioned in the wording of the item. The oiling shall be done as specified in specification Bd. N.

Painting if ordered shall be done as per specification No. B. 21(b). The finishing coats shall be 2 in number and shall be of approved colour and shade.

Bd. Q. 5. 4. *Item to include.*—The rate shall include all labour, materials and use of scaffolding, ladders and tools necessary to carry out the following operations:—

(1) Providing the necessary scantlings.

(2) Preparing, planing, jointing and fixing the different wrought members of timber including wall plates in their respective positions as described above, with scaffolding if necessary.

(3) Finishing by oiling or oil painting.

Bd. Q. 5. 5. *Mode of measurement and Payments.*—This shall be as for item Bd. Q. 2.

Bd. Q. 6. *Providing and fixing country teak wood/jungle wood (.....species) two way trellies work with battens or laths cm.×... cm. and cm.× cm. ( " × ") openings including frame or vertical cm.× cm. ( " × ") and horizontal scantlings, oiling/oil painting complete.*

Bd. Q. 6. 1. *General.*—The item refers to wooden trellis work not used as partition. But the specifications given for item Bd. T. 66 shall apply fully to this item also.

Bd. Q. 7. *Providing and fixing superior Indian/country teak wood/jungle wood (..... species) balustrade as per detailed drawings and design including housing at ends and french polishing/varnishing/oiling/oil painting complete.*

Bd. Q. 7. 1. *General.*—The item refers to the wooden balusters which are used for verandah, staircases or other places.

Bd. Q. 7. 2. *Timber.*—Timber for balusters shall be teak wood or jungle wood of the species mentioned in the item and shall conform to specification A. 16.

Bd. Q. 7. 3. *Construction.*—The construction shall follow the specification B. 20 for "General wood work". The balusters shall have pattern, shape and dimensions as shown in detailed drawings or as directed by the Engineer after planing and working. The spacing of the balusters shall be as shown on the drawings or as directed by the Engineer. Generally in a staircase balustrade, there shall be two balusters for each step of a cut string and in close string, clear spacing shall not exceed 10 cm. Balusters shall be tenoned to close strings and hand rails and dovetailed to treads of cut strings, the return moulding of tread being planted, mitred with returned end and covering the dovetail. They shall be fixed vertical.

Bd. Q. 7. 4. *Finishing.*—The wooden balusters shall be finished with french polishing or varnishing or oiling or oilpainting in 2 coats of paint of approved colour as mentioned in the item. This shall be done as specified in Bd. N. and B. 21(b).

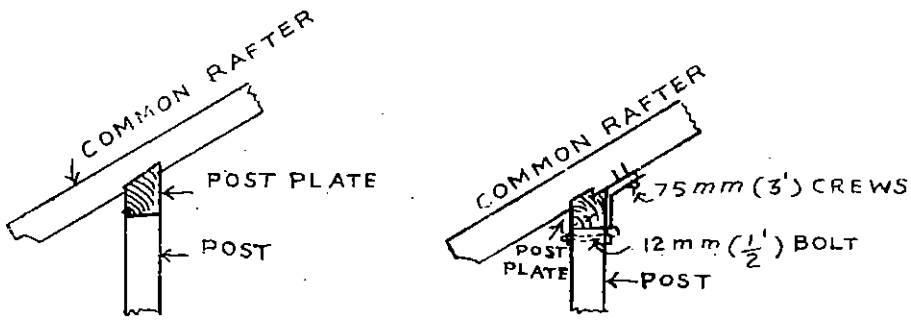
Bd. Q. 7. 5. *Item to include.*—The rate shall include all labour, materials and use of tools to carry out following operations:

(1) Preparing and supplying the timber balusters to shape and size as per design and drawings. Frame if provided shall be paid for separately under wood-work.

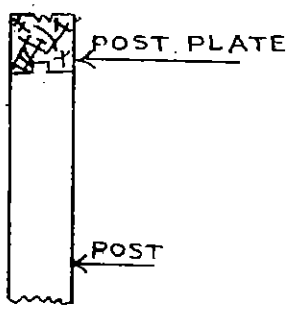
(2) Fixing the balusters as specified.

(3) Finishing.

अनुक्रमणिका
Table of Contents




TWO TYPES OF CONNECTIONS
OF POST, POST PLATE & COMMON RAFTER




JOINT BETWEEN POST & POST PLATE

अनुक्रमणिका
Table of Contents



Bd. Q. 7. 6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the clear area within which the balusters are fixed. In case of staircase, the length along sloped portion shall be measured clear between newels and midway across the balustrade and the height shall be measured at right angles to the slope between bottom of hand rail and the top of bottom member to which the baluster is fixed. In case of verandah balustrade, the length shall be clear between the sides of the frame in which the balusters are fixed. The height of baluster shall be clear between the bottom of the hand rail and top of bottom frame of balustrade. The dimensions shall be measured correct up to a cm. and the area worked out correct up to two places of decimals of a sq. m. The rate shall include all cutting and waste. The bottom member and hand rail shall be paid separately.

Bd. Q. 8. *Providing and constructing superior Indian/country teak wood hand rail of given section as per detailed drawing or as directed by the Engineer, including varnishing/french polishing/oilpainting complete.*

Bd. Q. 8. 1. *General.*—The item refers to the wooden hand rail for staircase, verandah, etc.

Bd. Q. 8. 2. *Timber.*—Timber for hand rail shall be superior Indian Teak wood or country teak wood as mentioned in the item and shall comply with specification A. 16.

Bd. Q. 8. 3. *Construction.*—The construction shall follow the specification B. 20 for "General wood work". The hand rail shall be moulded, shaped and finished to dimensions and slope as shown on drawings or as directed by the Engineer. The railing shall be secured to the newels, posts and to the top of balusters, grillwork or jali as the case may be with joints, grooves, screws and clamps as directed by the Engineer.

The railing shall follow the inclination of the stairs (in case of staircase) rising more rapidly over the narrow ends of winders than over the full width rectangular treads. It should be slightly higher on the level than it is when inclined. The cross section and moulding of the hand rail shall conform to the drawings or direction of the Engineer. In geometrical staircase, the hand rail is required to wind in order that its cross section may be normal to the stairs while rising and simultaneously following the lateral bends. All wreaths and scrolls shall be set out as per drawings or as directed.

Railing shall be joined in lengths with plain butt joints, dowelled and held together by hand rail bolts and clamps.

Bd. Q. 8. 4. *Finishing.*—The superior Indian teak wood work shall be varnished or french polished as in Bd. N. and the country teak wood shall be painted with 3 coats of oil paints of approved colour as specified in B 21 (*b*).

Bd. Q. 8. 5. *Item to include.*—The rate shall include all labour, materials, and use of tools required to carry out the following operations:—

(1) Preparing and providing the wooden hand rail and fixing it in required places including cutting and waste.

(2) *Finishing.*

Bd. Q. 8. 6. *Mode of measurement and payment.*—The contract rate shall be per running metre of the hand rail. The length shall be measured along the top centreline of the hand rail and it shall be measured net between end supports or newels correct upto a cm.

Bd. Q. 9. *Providing and constructing superior Indian/country teak wood staircase, or shown on detailed drawings or as directed with cut/close strings, treads, risers, brackets, trimmers, carriage bearers, underside boarding, glue blocks, curtail steps, winders, newels, landings including all fittings, iron work and varnishing/oiling/french polishing/oil painting the exposed wood work complete.*

Bd. Q. 9. 1. *Material—*

*Timber.*—Timber shall be teakwood as mentioned in the item and it shall comply with specification A. 16 in all respects.

*Iron work.*—Screws and clamps shall be standard ones.



अनुक्रमणिका
Table of Contents

Bd. Q. 9. 2. *Construction.*—The construction shall be as per specification B. 20 for "General wood work" and I. S. 1634-1960, Code of practice for Design and Construction of wood stairs. The following shall be the additional specifications.

The finished dimensions of the different members shall be as per detailed drawings supplied. If detailed drawings are not supplied, the following instructions shall generally be followed. The treads shall be 28 cm. (11″) and riser 15 cm. (6″). All risers shall be of the same height throughout. Treads also shall generally be of the same width except for winders. In case of winding stairs the width of tread is taken at a point 45 cms. from the face of the string of the narrow end of the steps. The risers shall be 37 mm. ($1\frac{1}{2}$″) thick tongued and grooved at top and bottom into treads which shall be 45 mm ($1\frac{3}{4}$″) thick with moulded nosings along the fronts and returns. Treads and risers shall each be in one piece in width unless specially permitted in writing by the Engineer to use two pieces.

The risers and treads shall be housed into the strings and supported by wedges or the strings shall be cut to receive the risers and treads. Here, thin brackets shall be planted on outer strings and one edge of the string shall be mitred to riser for effect. Strings shall be of finished dimensions 35 cm.×7.55 cm. (14″×3″). Unless other sizes shown in the drawings.

*Hand rails and balusters.*—The hand rail and balustrade shall be paid under a separate item.

*Landing.*—Boardings of the landing shall have the same thickness as the treads of the steps. The construction shall be as specified in item. No. Bd. Q. 1. The landing shall have nosing for steps. The supporting joists shall be paid under separate item in Bd. Q. 2.

*Soffits.*—If so shown on the drawings, the soffits shall be boarded with 20 mm ($\frac{3}{4}$″) thick planks framed with V joints or tongued and grooved.

*Curtail.*—The bottom steps shall be finished with proper curtail, if so directed.

Bd. Q. 9. 3. *Finishing.*—The exposed wood work of superior Indian teak shall be finished by varnishing or french polishing and country teak wood by oiling or oilpainting as mentioned in the item. Varnishing, oiling or french polishing shall be done as specified in Bd. N. Oil-painting if mentioned shall be done as specified in B. 21. b. The finishing coats shall be 2 in number and shall be of the colour approved by the Engineer.

Bd. Q. 9. 4. *Item to include.*—The rate shall include all labour, materials and use of equipment, scaffolding, ladders and tools to carry out following operations:—

(1) Providing timber scantlings to suit the members shown on drawings or as directed by the Engineer.

(2) Planing, jointing and construction of the staircase (except balusters and hand rail) including all joinery, iron work, fittings, etc., as shown in drawings and as specified above and cutting and waste.

(3) Finishing the wood work, as specified.

Bd. Q. 9. 5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one square metre of the tread and winder area. Projection of rounded nosing shall be added. The landing area shall be added to the tread areas. Supporting joists and posts shall be paid separately under wood work *vide* item Bd. Q. 2.

Bd. Q. 10. *Providing and fixing superior Indian country teak wood architraves and skirting mm. thick in the required position and of the size shown in the drawings including all mouldings as per drawing, rough grounds, Rawl plugs if necessary and finishing with varnish/french polish/oil painting complete.*

Bd. Q. 10. 1. *General.*—The item refers to the providing and fixing of wooden architraves and skirting of superior Indian teak wood or country teak wood.

Bd. Q. 10. 2. *Timber.*—Superior Indian teak wood or country teak wood as mentioned in the item conforming to A. 16 shall be used.

Bd. Q. 10. 3. *Construction.*—The construction shall follow specification B. 20 for "General wood work".

अनुक्रमणिका
Table of Contents



The architraves and skirting shall be of the sections shown in the detailed drawings and as mentioned in the item and shall be moulded as shown in the drawings or as directed by the Engineer. They shall be fixed with iron screws. If they are required to be fixed to brick-work, rough grounds shall be first fixed into the brick work. On these, the architraves or skirting shall be screwed. If they are to be fixed to the concrete then they shall be fixed with lead Rawl plugs and screws.

Bd. Q. 10.4. *Finishing.*—The skirting and architraves shall be finished on the exposed surface as per the wording of the item and a thin coat of hot coaltar on the unexposed side. Care shall be taken to see that only such thin coat of tar is applied as per specification Bd. N. as will be absorbed by the wood without causing bleeding with rise of temperature. Country teak wood shall be finished with 2 coats of oil-paint of approved colour.

Bd. Q. 10. 6. *Item to include.*—The rate for the item shall include all labour, materials and use of scaffolding, ladders, tools, necessary to carry out following operations:—

(1) Providing timber scantlings for skirting, architraves and for rough grounds if necessary as specified.

(2) Preparing, moulding and fixing the skirting and architraves in position as specified.

(3) All necessary iron work, screws, rough grounds and lead Rawl plugs.

(4) Finishing.

Bd. Q. 10.6. *Mode of measurement and payment.*—As per B. 20. 12. The contract rate shall be for a unit for one square metre of the area covered by architraves and skirting. The dimensions shall be measured net correct up to a cm. and the area worked out correct up to 2 places of decimals of a square metre. The width shall be measured flat, i.e., along the surface against which architrave or skirting rests and not girthed along the curved surface of the mouldings. No addition shall be made for overlaps, rebates, etc., in the joints.

Bd. Q. 11. *Providing and fixing superior Indian/country teak wood pelmet boxes of section.....mm. × ..... mm. (..... "× .....") with planks .....mm. thick to door and window frames including brass/wooden curtain rod, bracket and finishing the wood work with varnishing/oiling/french polishing/oil-painting complete.*

Bd. Q. 11.1. *Timber.*—The timber for pelmet boxes shall be of teak wood as mentioned in the item and shall comply with specification A. 16 in all respects. The planks shall be of specified thickness.

Bd. Q. 11.2. *Construction.*—The construction shall follow the specification B. 20 for "General wood work".

The size of the pelmet mentioned in the item shall be the finished one after planing. The pelmet shall be moulded as shown in the drawings and fixed to the door or window. The side members shall be housed into the door or window frame with tusk and tenon joint. The side members shall be dovetailed with central horizontal member. It shall be provided with 20 mm. wooden curtain rod or 12 mm. brass tube as mentioned in the item fixed with brackets.

Bd. Q. 11.3. *Finishing.*—The wood work exposed shall be finished with varnish, french polish or oiling as per specification Bd. N. Oil-painting shall be done with 2 finishing coats of oil-paint of approved colour and shade according to B. 21 (b) when oil-painting is included in the item.

Bd. Q. 11.4. *Item to include.*—The rate for item shall include all labour, material and use of tools to carry out the following operations:—

(1) Preparing and supplying wooden pelmet boxes and brass or wooden curtain rod with bracket.

(2) Fixing the pelmet box and curtain rod in the required position.

(3) Finishing the wood work.

Bd. Q. 11.5. *Mode of measurement and payment.*—The contract rate shall be per number of pelmet of specified dimensions.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.Q.13.2.**

Bd. Q. 12. *Providing and fixing superior Indian/country teak wood/jungle wood of..... species, picture rail .....mm × .....mm (.....″ × .....″) moulded as per drawings or as directed by the Engineer securing to the wall surfaces after plastering is done including finishing with oil-painting/oiling/varnishing complete.*

Bd. Q. 12. 1. *General.*—The timber shall be teak wood or jungle wood as mentioned in the item and shall comply with specification A. 16. The battens shall be of sufficient size so that picture rail of specified size and shape could be cut out of it and moulded.

Bd. Q. 12.2. *Construction.*—The construction shall follow the specification B. 20 for "General wood work".

The picture rails shall be moulded as per detailed drawings or as directed by the Engineer and finished smooth. If they are required to be fixed to brickwork, rough grounds shall be first fixed into the brickwork on which they will be screwed. If they are to be fixed to concrete then they shall be fixed with lead Rawl plugs and screws.

Bd. Q. 12.3. *Finishing.*—The exposed wood work shall be smooth and finished with oiling/varnishing/oil-painting in 2 coats of approved colour. The oiling/varnishing shall be done as per Bd. N. The oil-painting shall be done in two finishing coats of approved colour and shall be done as per B. 21. b.

Bd. Q. 12.4. *Item to include.*—The rate shall include all labour, materials and use of tools required to carry out the following operations:—

(1) Providing scantlings of timber of required sizes.

(2) Shaping and fixing the picture rail with all fixtures like rough grounds. Rawl plugs, screws, etc., as specified.

(3) Finishing as specified.

Bd. Q. 12.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one running metre of the rail. The length shall be measured net correct upto a cm. without considering laps and joints.

Bd. Q. 13. *Providing and fixing wooden shelf of country teak wood/jungle wood of .....species plank 30 cm/45 cm. wide wooden brackets, without/with fillet, including all fixtures, oil-painting/oiling complete.*

Bd. Q. 13.1. *Timber.*—Timber to be used shall be country teak wood or jungle wood of the species mentioned in the item.

Bd. Q. 13.2. *Construction.*—The construction shall follow the specification B. 20 for "General wood work".

The finished dimensions of the plank and brackets shall be as per drawings. If drawings are not supplied following finished dimensions shall be adopted for different members. Planks shall be 30 cm. × 25 mm. for 30 cm. wide shelf and 45 cm. × 40 mm. for 45 cm. wide shelf. Teak wood scantlings 5 cm. × 5 cm. and of sufficient length to cover the width of the shelf with an additional length of not less than 20 cm. for embedment in the wall shall be used for the supports. They shall be provided at intervals of 1.5 to 2 m. Planks 30 cm. wide shall be in one piece. If the shelf is wider than 30 cm. two planks may be used for the width. If so shown in the drawings, sloping struts and vertical wooden pieces (erecting the wood) or the same section as the supports shall be fixed to the wall and the supports. As far as procurable, the length shall be in one piece. When planks are used in two pieces in width they shall be joined with a 12 mm. rebate.

The planks shall be planed smooth on both sides and shall have straight edges and plain surfaces. The planks shall be screwed to the supports. The other lower edge of the planks shall be rounded. The exposed surfaces of the supports, etc., shall be planned smooth. The embedded portion of the supports shall be coal tarred.

When fillets are provided, fillets 12 mm. thick and of a width equal to the thickness of the plank plus 12 mm. shall be screwed to the edge of the plank shelf in front with screws and shall project 12 mm. above the plane surface. The plank edge shall not be rounded but the top edge of fillet shall be rounded.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. Q. 13.3. *Finishing.*—The wood work shall be finished with 2 finishing coats of oil-paints of approved colour and shade, as per specifications B. 21 b. when painting is included in the item.

Oiling, if specified shall be done as per Bd. N.

Bd. Q. 13.4. *Item to include.*—The rate shall include all labour, material and use of tools for (1) supply of planks, supports, fillets, iron screws, paint or linseed oil and coal tar. (2) Preparing and fixing the wooden supports and planks for shelf, (3) Finishing.

Bd. Q. 13.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one sq.m. of the top plank area. When fillets are provided the length and width shall be measured flat to include thickness of fillets. The dimensions shall be measured Correct up to a cm. and area worked out correct up to 2 places of decimals of a square metre.

Bd. Q. 14. *Providing and fixing superior Indian teak wood wall cupboards of .....cm. × .....cm. × .....*cm. (*.....*" × *.....*" × *.....*") *with teak wood shelves .....mm (.....*") *thick and ..... in number including frame and fully panelled/fully glazed first class shutters with brass fixtures and fastening and finishing the wood work with varnish/french polish complete.*

Bd. Q. 14.1. *General.*—The item pertains to the provision of teak wood wall cupboard with the clear inside dimensions of the frame as mentioned in the item. The face opening shall be the clear unrebated opening in the frame. The depth shall be the dimension between the back of the cupboard and the front shutter. There shall be no planks at the back or the sides, which shall be of masonry only.

Bd. Q. 14.2. *Timber.*—Type of teak wood as mentioned in the item shall comply with specification A. 16. The finished dimensions of all members of the cupboard shall be as per details in drawings. Sizes of timber frame and shutters shall be the same as are specified for door or window of similar size, in Bd. T.

Bd. Q. 14.3. *Construction.*—The specification B. 20 for General wood work shall be followed in the construction.

The joinery of the wood-work shall be as per detailed drawings or as directed by the Engineer. The brass fixtures shall be as approved by the Engineer.

The door shutters shall be fully panelled or fully glazed first class as mentioned in the item. The sizes shall be as per drawings. The specifications for corresponding shutters given in the group of Bd. T. for doors or windows shall apply. The fixtures and fastenings also shall be as per the corresponding items in the windows and they shall be of brass. Approved brass lock shall be fixed into the central style.

The number of teak wood shelves shall be as shown on the drawings. The shelves shall be supported on 40 cm. × 25 mm. T. W. batten nailed to the sides of the cupboard and embedded in masonry. The backside of the cupboard shall be made up of burnt brick masonry in 1:6 cement mortar or 1:5:10 cement concrete. The back and sides of the cupboard shall be plastered, finished and painted in the same manner as the wall around the cupboard. Masonry, concrete, plastering, finishing and painting of surface other than wooden will be paid for separately.

Bd. Q. 14.4. *Finishing.*—The wood-work shall be finished by varnishing french-polishing as per Bd. N.

Bd. Q. 14.5. *Item to include.*—The rate shall include all labour, material and use of tools required for following operations:—

(1) Supplying the superior teak scantlings and planks, of glass panes, brass fixtures, screws, etc.

(2) The construction of cupboards as specified including all necessary fixtures, shutters, frame, shelves, and supports as specified.

(3) Finishing.

Bd. Q. 14.6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the clear unrebated opening in the door frame of the cupboard. The dimensions shall be measured for the clear unrebated opening in the door correct up to a cm. and area worked, out correct up to 2 places of decimals of a square metre.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.Q.17.3.**

Bd. Q. 15. *Providing and fixing country teak wood wall cupboards of .....cm.×..... cm.× .....cm. (....."×....."×.....") with teak wood frame and shelves .....mm. (.....") thick and ..... in number with plain planked shutters including iron fixtures and fastenings, finishing the wood-work with oil-painting/oiling complete.*

Bd. Q. 15.1. *General.*—The specifications given for item Bd. Q. 14 shall apply except for the following changes:—

(1) Only country teak wood shall be used.

(2) The door shutters shall be plain planked and they shall be as specified for corresponding item in Bd. T.

(3) The fixtures shall be of iron only.

(4) Finishing shall be done with oiling or oil-painting as specified in the item. Oiling shall be done according to Bd. N. and oil-painting according to B. 21 (b).

Bd. Q. 16. *Providing and fixing superior Indian/country teak wood/jungle wood of (.....species) plank casing .....mm. (.....") thick to R. S. J's, etc., including mouldings, if any, scaffolding if necessary, oiling/varnishing/oil painting complete.*

Bd. Q. 16.1. *Timber.*—Timber shall be from sperior Indian or country teak wood as Jungle wood of the species mentioned in the item. It shall conform to specification No. A.16. The planks after planing on exposed sides shall be of thickness mentioned in the wording of the item. When planks are to be used in more than one width for each side, they shall be of uniform width.

Bd. Q. 16.2. *Scaffolding.*—This, if necessary, shall be as per B. 9. 11.

Bd. Q. 16.3. *Fixing.*—The planks shall be tongued and grooved or rebated with close joints. The casing shall be secured strongly to the part which is to be encased. For this, a framework of teak wood battens 5 cm.×2.5 cm. shall be fixed around the rolled steel joist so that planks could be screwed to them. Planks shall be in one length when procurable. The corner edges of planks shall be moulded or rounded as shown in drawings or ordered by the Engineer. All fixing shall be done by iron screws.

Bd. Q. 16.4. *Finishing.*—The wood-work of casing shall be finished with oil-painting in 2 coats as per B 21.b. or oiling or varnishing if included in the item shall be done as per specification Bd. N.

Bd. Q. 16.5. *Item to include.*—The rate shall include all labour, materials and use of scaffolding and ladders, tools necessary out the following operations:—

(1) Providing planks and battens of suitable sizes.

(2) Hoisting the planks and battens, if necessary and fixing them in the required places with all fixtures, etc., after planing them.

(3) Finishing the wood-work as specified above.

Bd. Q. 16.6. *Mode of measurement and payment.*—The contract rate shall be for a unit of one square metre of the net area of planking excluding overlaps rounding if any measured squared. The dimensions shall be measured correct up to a cm. and the area calculated up to 2 places of decimals of a square metre.

Bd. Q. 17. *Providing and fixing .....mm. thick first class Burmah/superior Indian teak wood plank lining to walls and pillars without/with skirting and cornice as per drawings including necessary rough grounds, Rawlplugs, iron-work and finishing the exposed wood-work with varnish/french-polish/waxing complete.*

Bd. Q. 17.1. *General.*—The item refers to providing and fixing of Burmah or superior Indian teak wood lining with or without skirting and cornice as mentioned in the item to the walls and pillars in required places.

Bd. Q. 17.2. *Timber.*—All exposed timber shall be Burmah or superior Indian Teak wood as mentioned in the item. Grounds and inside framing should be of country teak. All timber shall conform to A. 16.

Bd. Q. 17.3. *Construction.*—The construction shall follow the specification B. 20 for General wood work.

अनुक्रमणिका
Table of Contents

The lining shall be of superior Burmah or Indian teak boards with grain of the approved pattern and of the finished thickness as mentioned in the item. They shall be of uniform width and shall be in one piece for the full length. The exposed faces shall be planed to a smooth finish. The joints shall be tongued and grooved or rebated as shown on the drawings or directed by the Engineer. The wall linings shall be fixed with brass screws to horizontal battens fixed to rough grounds embedded in masonry or by lead Rawl plugs and screws to the concrete surface. The sizes and mouldings of the cornice and skirting shall be as provided in the drawing or directed by the Engineer and shall be fixed in the same manner to prevent a workmanlike and decorative appearance.

Bd. Q. 17.4. *Finishing.*—The exposed wood work shall be finished with french-polishing, varnishing or waxing as mentioned in the item and according to specification Bd. N. The countersunk screw heads shall be finished over so as to unobtrusive. The inside wood-work in contact with masonry shall be painted with thin layer of hot coal tar.

Bd. Q. 17.5. *Item to include.*—The rate for the item shall include all labour, materials and use of tools, scaffolding and ladders to carry out the following operations:—

(1) Providing timber scantlings, boards, rough grounds or lead Rawl plugs, screws, etc., as specified.

(2) Preparing, planing, moulding, and fixing the lining, skirting and cornice as specified above with screws, battens, rough grounds or lead Rawl plugs.

(3) Finishing.

Bd. Q. 17.6. *Mode of measurement and payment.*—The contract rate shall be for a unit of one square metre of the actual wall area covered by the lining, skirting and cornice. The dimensions shall be measured flat and net along the wall up to a cm. and the area worked out correct up to 3 places of decimals of a square metre.

Bd. Q. 18. *Providing and fixing decorative teak plywood veneer lining.....mm. thick, with backing of country teak wood frame work of battens fixed to walls and pillars, without/with skirting and/or cornice as per drawings including necessary rough grounds Rawl plugs, iron work and finishing the exposed wood work with varnish/french polish/waxing.*

Bd. Q. 18.1. *General.*—The item refers to provision of decorative teak plywood veneer with or without skirting and/or cornice as mentioned in the item on country teak wood batten frame work to walls and pillars in required places.

Bd. Q. 18.2. *Timber.*—Timber for rough ground and battens shall be country teak wood. Planking for skirting and cornice shall be of superior Indian teak wood or decorative teak veneer with moulding as shown in the drawings or ordered by the Engineer. All timber shall conform to A. 16.

Bd. Q. 18.3. *Plywood.*—The teak plywood for decorative veneer shall be of the thickness mentioned in the item and shall conform to I. S. 1328 : 1958 and shall be of the pattern approved by the Engineer.

Bd. Q. 18.4. *Construction.*—The construction shall follow the specification B. 20 for General wood work. Country teak wood battens 12 mm. × 25 mm. at 30 cm. centres vertically and horizontally shall be nailed to rough grounds embedded in the brick work or fixed to concrete surface with lead Rawl plugs and screws.

The decorative plywood veneer shall then be fixed to the frame of battens with brass screws with their heads countersunk and finished over in the required plane and in a workmanlike manner.

Cornices and skirting of the size and shapes as shown on drawings or ordered by the Engineer shall be fixed in the same manner to present a workmanlike and decorative appearance.

Bd. Q. 18.5. *Finishing.*—The covered wood work in contact with masonry shall be finished with a coat of hot coal tar. The facing of lining shall be finished as mentioned in the item with varnishing, french polishing or waxing as per Bd. N.

अनुक्रमणिका
Table of Contents



**Bd.Q.20.2.**

Bd. Q. 18.6. *Item to include.*—The rate for the item shall include all labour, materials and use of tools, scaffolding and ladders required to carry out the following operations:—

(1) Supplying the country teak battens, rough grounds or lead Rawl plugs, screws, decorative plywood veneer boards skirtings and cornices as specified.

(2) Preparing and fixing the frame work to rough grounds or Rawl plugs and fixing the decorative lining, skirting and cornice as specified above to the frame work.

(3) Finishing.

Bd. Q. 18.7. *Mode of measurement and payment.*—As for Bd. Q. 17.

Bd. Q. 19. *Providing and fixing country teak wood/jungle wood (..... species) eaves boards.....cm. wide and 20 mm/and 25 mm thick plain/ decorative type including scaffolding and painting complete.*

Bd. Q. 19.1. *Materials.*

(1) *Timber.*—Boards shall be of teak or jungle wood as mentioned in the item and shall conform to specification A. 16. The plank shall be in one full width.

(2) *Paint.*—Paint shall be as per specification A. 17. It shall be of approved colour and shade.

(3) *Fastenings.*—All fastenings like nails, screws shall be as approved by the Engineer.

Bd. Q. 19.2. *Scaffolding.*—As per B.9.11.

Bd. Q. 19.3. *Constructional Details.*—The wood work shall be carried out according to specification detailed in B.20. The thickness of eaves board after planing shall be as specified in the item and the finished width shall be as mentioned in the item Decorative shapes if mentioned in the item shall be as shown on the drawings or as directed by the Engineer. The lower edge of the plain boards shall be rounded.

2. The eaves board shall be securely fixed to the rafters or to the eaves purlin as the case may be with nails and screws. Joints in lengths shall be rebated.

3. The eaves boards shall be painted as per specifications in B.21 with 2 finishing coats of paint, the colour of paint being as approved by the Engineer.

Bd. Q. 19.4. *Item to include.*—The rate shall include all labour, materials and tools, required to carry out the following operations :—

(1) Providing, erecting and removing the scaffolding and ladders necessary for satisfactory completion of the item.

(2) Providing and fixing the eaves board with plain or decorative shapes as mentioned in the item.

(3) Painting.

Bd. Q. 19.5. *Mode of measurement and payment.*—The contract rate shall be per running metre of the net length of the eaves board of the specified width extra length that joints being ignored. The measurement shall be taken correct up to two places of decimals of a metre along the centre line of the board.

Bd. Q. 20. *Providing and fixing country teak wood/jungle, wood (——— species) eaves plate of size 10 cm. (about 4") wide, 12 mm./20 mm. (about $\frac{1}{2}$"/$\frac{3}{4}$") thick, including scaffolding and painting complete.*

Bd. Q. 20.1. *Materials.*

1. *Timber.*—Teak wood or Jungle wood shall be as mentioned in the item and shall conform to specification A.16.

2. *Paint.*—The paint shall conform to specification A.17. It shall be of approved colour.

3. *Fastening.*—All fastenings like screws, and nails shall be of iron and as approved by the Engineer.

Bd.Q.20.2. *Scaffolding.*—As per B.9.11.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. Q. 20.3. *Constructional Details*:

(1) *Woodwork.*—The woodwork shall be carried out according to specifications detailed in B.20. The thickness of the eaves plates shall be 12 mm ($\frac{1}{2}$") or 20 mm ($\frac{3}{4}$") as specified in the item and width 10 cm. (4") after planing.

(2) The eaves plate shall be securely fixed to the eaves board with nails and screws.

(3) The eaves plates shall be painted as per specifications in B.21.b with two finishing coats oil paint of approved colour.

Bd. Q. 20.4. *Item to include.*—The rate shall include all labour, materials and tools to carry out following operations :—

(1) Providing, erecting, and removing the scaffolding and ladders necessary for the execution of the item.

(2) Providing and fixing the eaves plates as specified above.

(3) Painting.

Bd. Q. 20.5. *Mode of measurement and payment.*—The contract rate shall be per running metre of the eaves plate. The length shall be measured net correct up to two places of decimals of a metre, extra at joints being ignored.

Bd. Q. 21. *Providing and fixing country teak wood/jungle wood (.....species) barge board ———cm wide and 20 mm./25 mm. thick plain/decorative type including scaffolding and painting complete.*

Bd. Q. 21.1. *Materials*:

(1) *Timber.*—Teak wood or jungle wood shall be as mentioned in the item and shall conform to specification A.16.

(2) *Fastenings.*—The fastenings like nails and screws shall be of iron and as approved by the Engineer.

(3) *Paint.*—Paint shall be as per A.17; it shall be of approved colour.

Bd. Q. 21.2. *Scaffolding.*—As per B.9.11.

Bd. Q. 21.3. *Constructional Details*:

(1) *Woodwork.*—The woodwork shall be carried out according to specifications detailed in B.20. The thickness of a barge board after planing on outside shall be as specified and the finished width shall be as mentioned in the item. Any decorative shapes of the boards if mentioned in the item shall be as per drawings or as directed by the Engineer. The lower edges of the plain boards shall be rounded.

(2) The barge boards shall be securely fixed to the ridge pieces, common rafters and purlins with nails and screws. The barge board shall be about 5 cm. to 6 cm. (2" to $2\frac{1}{2}$") higher than the eaves board for single layer of country tiles and about 12.5 cm. to 15 cm. (5" to 6") higher for a double layer of country tiles so as to cover the end row of tiling. In mangalore type tiled roof, its top shall cover the sides of tiles.

(3) The barge boards shall be painted as per specification B.21.b, with two coats of approved shade of paint.

Bd. Q. 21.4. *Item to include.*—The rate shall include all labour, materials and tools to carry out the following operations :—

(1) Providing, erecting and removing the scaffolding and ladders necessary for execution of the item.

(2) Providing and fixing barge board with decorative shape when mentioned in the item.

(3) Painting.

Bd. Q. 21.5. *Mode of measurement and payment.*—The contract rate shall be per running metre of the net length of the barge board of the specified width and thickness, extra at joints being ignored. The measurement shall be taken correct up to two places of decimals of a metre along the centre line of the board.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.Q.22.5.**

Bd. Q. 22. *Providing and fixing country teak wood/jungle wood (.....species) bullies including all iron work, scaffolding if necessary and oiling for—*

(a) *Common rafters of————mm. diameter.*

(b) *Purlins rafters of————mm. diameter.*

(c) *Ridge————mm. diameter.*

(d) *Hip and valley rafter of————mm. diameter.*

(e) *Jack rafters of————mm. diameter.*

(f) *Wall plates of————mm. diameter.*

(g) *Postplates————mm. diameter.*

(h) *Posts of————mm. diameter.*

Bd. Q. 22.1. *General.*—The item refers to the wood work with bullies for different components of roofs and supports detailed in the item. The diameter of bully for each member shall be as mentioned in the item. The diameter of a bully shall be taken as the average of the diameter at both ends.

Bd. Q. 22.2. *Materials*:

1. *Bullies.*—All bullies shall be from the species mentioned in the item. They shall be reasonably straight and sound without bark. All buttresses, remnants of branches and large knots must be trimmed flush with the bole of the bullies. The bullies shall be free from spongy, brittle, flaky or brushy condition. They shall also be free from borer holes, splits, rot, twists, etc. There shall be no sudden reduction of diameter. Sun-crack more than 2 mm. deep if more than ½ a metre in length shall not be permitted. The bullies for any member shall be of the mean diameter as mentioned in the item.

2. *Iron work.*—All nails, spikes, straps, clamps, bolts, nuts, etc., shall be as approved by the Engineer.

Bd. Q. 22.3. *Scaffolding.*—As per B.9.11.

Bd. Q. 22.4. *Construction.*—The construction shall follow the specification B.20 for General wood work.

*Common rafters.*—The common rafters shall be fixed at central distances apart not exceeding 45 cm. (18") or as directed by the Engineer. The bullies for common rafters shall as far as possible, be in continuous lengths from ridge to eaves or at least in greatest length procurable. They shall be nailed to the ridge, slightly notched to fit the purlin and nailed, and notched and nailed to the wall plates near their lower ends. In the case of verandah roof covering, the tops of common rafters shall be secured to the wall plates laid in the wall and not merely built into it. This shall be done as per standard drawings or as directed by the Engineer.

*Purlins.*—These shall be as described in item Bd. Q.5. except that bullies shall be used instead of sawn scantlings.

*Ridge.*—As for item Bd.Q.5. except that bully is used in place of sawn ridge board.

*Hiprafter and valley rafter.*—As for item Bd.Q.5. except that bullies shall be used instead of sawn scantlings.

*Jack rafter.*—As for item Bd.Q.5 except that bullies are under in place of sawn scantlings.

*Wall plates.*—Wall plates shall be fixed to the top of wall and along it in the position shown on standard drawing or as directed by the Engineer.

*Post plates and posts.*—Bullies for post plates and posts shall be of the sizes as per item. If these posts do not rest on plinth walls they shall be provided with individual foundations which shall be paid for separately. Bully for the post plate shall be connected to the post by using iron strap and bolts or nails. The common rafter shall be fixed to the post plate by slight notching into the common rafter and nailing.

Bd.Q.22.5. *Finishing.*—Bullies shall be oiled as per Bd.N.



अनुक्रमणिका
Table of Contents

Bd. Q. 22.6. *Item to include.*—The rate shall include all labour, material and use of tools, scaffolding required to carry out the following operations :—

(1) Supplying at site the bullies of required species of timber and size.

(2) Fixing the bullies for various purposes as per the item and as specified including cutting and waste.

(3) Oiling.

Bd. Q. 22.7. *Mode of measurement and payment.*—The contract rate shall be per running metre of the bully fixed in position. The bullies of different diameters shall be grouped and measured separately. The lengths shall be measured net correct up to a cm. not taking into account overlaps at joints.

Bd. Q. 23. *Providing and fixing country teak wood/jungle wood (.....species) bullies for collar truss/king post truss of————metre span as per drawings or as directed by the Engineer including hoisting, scaffolding if necessary, and oiling complete with (a) Principal rafter of ————mm. diameter, (b) King post and truss of————mm. diameter, (c) Tie member of ————mm. diameter.*

Bd. Q. 23.1. *General.*—The item refers to providing, jointing, hoisting and fixing of collar or king post roof truss of bullies in the required positions. The truss shall be framed with timber bullies for different members of average diameters as given in the wording of the item.

Bd. Q. 23.2. *Materials.*—These shall be as for item Bd.Q.22.

Bd. Q. 23.3. *Scaffolding.*—As per B.9.11.

Bd. Q. 23.4. *Construction.*—The truss shall be constructed with bullies of specified diameters. The truss members shall be assembled on the ground as per drawings or directed by the Engineer. The connections between members shall be made with nails, bolts and mild steel straps. Trusses shall be carefully hoisted and stayed in true position in the required place till built up. The part of truss in contact with masonry shall be coaltarred. Spacing of trusses shall be as per drawings or as directed by the Engineer.

Bd. Q. 23.5. *Finishing.*—The truss members shall be finished with oiling as specified in Bd. N.

Bd. Q. 23.6. *Item to include.*—The rate shall include all labour, materials and use of tools, scaffolding, ladders, etc., required to carry out the following operations:—

(1) Supplying the bullies of the required diameters, and iron screws, straps, etc.

(2) Preparing the truss, as specified and hoisting it and placing it in required places including scaffolding if necessary and all iron work.

(3) Finishing.

Bd. Q. 23.7. *Mode of measurement and payment.*—The contract rate shall be per number of truss.

अनुक्रमणिका
Table of Contents



## KING ROOF POST TRUSSES

DESIGNED LOAD
DEAD LOAD—130 kg./sq. m. (= 27 lbs./□′)
WIND LOAD—50 kg./sq.m. (= 10 lbs./□′) pressure on
WIND ward side and 50 kg./sq. m. suction on leeward side.
**(For Double Tiled Roofs).**

| Span in metres. | TIE BEAMS | | | PRINCIPALS | | | KING POSTS | | | STRUTS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. |
| 3·0 | 3·8 | 72 | 72 | 1·8 | 72 | 97 | 1·2 | 72 | 122 | 0·9 | 72 | 72 |
| 3·5 | 4·3 | 72 | 72 | 2·0 | 72 | 97 | 1·3 | 72 | 122 | 1·0 | 72 | 72 |
| 4·0 | 4·8 | 72 | 72 | 2·3 | 72 | 97 | 1·4 | 72 | 122 | 1·2 | 72 | 72 |
| 4·5 | 5·3 | 72 | 72 | 2·6 | 72 | 97 | 1·6 | 72 | 122 | 1·3 | 72 | 72 |
| 5·0 | 5·8 | 72 | 72 | 2·9 | 72 | 97 | 1·7 | 72 | 122 | 1·5 | 72 | 72 |
| 5·5 | 6·3 | 72 | 72 | 3·2 | 72 | 122 | 1·9 | 72 | 122 | 1·6 | 72 | 72 |
| 6·0 | 6·8 | 72 | 72 | 3·5 | 72 | 122 | 2·0 | 72 | 122 | 1·8 | 72 | 72 |
| 6·5 | 7·3 | 72 | 72 | 3·8 | 72 | 122 | 2·2 | 72 | 122 | 1·9 | 72 | 72 |
| 7·0 | 7·8 | 97 | 97 | 4·1 | 97 | 122 | 2·3 | 97 | 122 | 2·1 | 97 | 72 |
| 7·5 | 8·3 | 97 | 97 | 4·3 | 97 | 122 | 2·4 | 97 | 122 | 2·2 | 97 | 72 |
| 8·0 | 8·8 | 97 | 97 | 4·6 | 97 | 122 | 2·6 | 97 | 122 | 2·3 | 97 | 72 |

अनुक्रमणिका
Table of Contents

## KING POST ROOF TRUSSES

DESIGNED LOAD
DEAD LOAD—130 kg./sq. m. (=27 lbs./□')
WIND LOAD—50 kg./sq. m. (=10 lbs./□') pressure on
WIND ward side and 50 kg./sq. m. suction on leeward side.

SCANTLINGS OF PRINCIPALS, PURLINS ETC., (For Double Tiled Roofs)

| Span in metres | PRINCIPALS | | | | PURLINS | | | | COMMON RAFTERS | | | | RIDGES | | | | HIP RAFTERS | | | JACK RAFTERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | At 0·5 m Apart | | At 9·4 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm |
| | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | | | | | | |
| 3·0 | 72 | 72 | 72 | 97 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·0 | 72 | 122 | .. | .. | .. |
| 3·5 | 72 | 72 | 72 | 97 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·4 | 72 | 122 | .. | .. | .. |
| 4·0 | 72 | 72 | 72 | 97 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·7 | 72 | 147 | .. | .. | .. |
| 4·5 | 72 | 72 | 72 | 97 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 172 | 4·1 | 72 | 147 | .. | .. | .. |
| 5·0 | 72 | 72 | 72 | 97 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 4·5 | 72 | 172 | .. | .. | .. |
| 5·5 | 72 | 97 | 72 | 122 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 4·9 | 72 | 172 | 3·5 | 72 | 172 |
| 6·0 | 72 | 97 | 72 | 122 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 5·3 | 72 | 172 | 3·8 | 72 | 172 |
| 6·5 | 72 | 97 | 72 | 122 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 5·7 | 97 | 172 | 4·2 | 97 | 172 |
| 7·0 | 97 | 97 | 97 | 122 | 97 | 147 | 122 | 147 | 72 | 97 | 72 | 97 | 72 | 147 | 72 | 172 | 6·1 | 97 | 197 | 4·5 | 97 | 197 |
| 7·5 | 97 | 97 | 97 | 122 | 97 | 147 | 122 | 147 | 72 | 97 | 72 | 97 | 72 | 147 | 72 | 172 | 6·5 | 97 | 197 | 4·7 | 122 | 197 |
| 8·0 | 97 | 97 | 97 | 122 | 97 | 147 | 122 | 147 | 72 | 97 | 72 | 97 | 72 | 172 | 72 | 197 | 6·9 | 122 | 197 | 4·9 | 122 | 197 |



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## QUEEN POST ROOF TRUSSES

DESIGNED LOAD
DEAD LOAD—130 Kg./sq.m. (= 27 Lbs./□′)
WIND LOAD—50 Kg./sq. m. (= 10 Lbs./□′)
pressure on wind ward side and 50 Kg./sq. m. suction on leeward side.

**Scantlings of Teak Wood Trusses 3 Metres apart**

**(Double Tiled Roofs) slope 30° (with horizontal)**

| Span Metres | TIE BEAMS | | | PRINCIPALS | | | KING POSTS | | | STRUTS | | | STRAINING BEAMS | | | STRAINING SILLS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length Metres | Breadth mm. | Depth mm. | Length Metres | Breadth mm. | Depth mm. | Length Metres | Breadth mm. | Depth mm. | Length Metres | Breadth mm | Depth mm. | Length Metres | Breadth mm. | Depth mm. | Length Metres | Breadth mm. | Depth mm. |
| 9·0 | 3 *Nos.* 3·6 | 97 | 122 | 3·7<br>2·1 | 97<br>97 | 122<br>122 | 2·0 | 97 | 147 | 1·9 | 72 | 72 | 3·3 | 97 | 147 | 3·3 | 97 | 72 |
| 10·0 | 3·9 | 97 | 122 | 4·3<br>2·3 | 97<br>97 | 197<br>172 | 2·2 | 97 | 147 | 2·1 | 72 | 72 | 3·6 | 97 | 147 | 3·6 | 97 | 72 |
| 11·0 | 4·2 | 122 | 147 | 4·6<br>2·5 | 122<br>122 | 172<br>147 | 2·4 | 122 | 147 | 2·3 | 97 | 72 | 3·9 | 122 | 147 | 3·9 | 122 | 72 |
| 12·0 | 4·5 | 122 | 147 | 5·0<br>2·7 | 122<br>122 | 197<br>172 | 2·6 | 122 | 147 | 2·5 | 97 | 72 | 4·2 | 122 | 147 | 4·2 | 122 | 72 |

अनुक्रमणिका
Table of Contents

## QUEEN POST ROOF TRUSSES

DESIGNED LOAD
DEAD LOAD—130 kg./sq. m. (=27 Lbs./□′).
WIND LOAD—50 kg./sq. m. (=10 Lbs./□′).
Pressure on wind ward side and 50 kg./sq. m. suction on leeward side.

**Scantlings of Principals, Purlins etc. for Double Tiled Roofs**

| Spans Metres | PRINCIPALS | | | | PURLINS | | | | COMMON RAFTERS | | | | RIDGES | | | | HIP RAFTERS | | | JACK RAFTERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | At 0·5 m Apart | | At 0·4 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | | | | | | |
| | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | Length | Breadth | Depth | Length | Breadth | Depth |
| 9·0 | 97 | 122 | 97 | 172 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | | | | | | |
| 10·0 | 97 | 147 | 97 | 197 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 197 | The hip and jack rafters should be trussed. Size of rafters will depend on trussing employed. The jack rafters should be increased in number for spans of 11 and 12 metres. | | | | | |
| 11·0 | 97 | 172 | 122 | 197 | 97 | 147 | 122 | 147 | 72 | 97 | 72 | 97 | 72 | 147 | 72 | 197 | | | | | | |
| 12·0 | 97 | 172 | 123 | 197 | 97 | 147 | 122 | 172 | 72 | 97 | 72 | 97 | 72 | 172 | 72 | 197 | | | | | | |



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Scantlings of double tiled**

| Span Metre | Verandah post | Post Plates | | | Principals | | |
|---|---|---|---|---|---|---|---|
| | | post 2·5 m c/c | post 2·7 m c/c | post 3·0 m c/c | post 2·5 m c/c | Post 2·7 m c/c | Post 3·0 m c/c |
| | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm |
| 1·5 .. .. | 97×97 | 97×97 | 97×122 | 97×147 | .. | .. | .. |
| 1·8 .. .. | 97×97 | 97×97 | 97×122 | 97×147 | .. | .. | .. |
| 2·0 .. .. | 97×122 | 97×122 | 97×147 | 97×147 | .. | .. | .. |
| 2·3 .. .. | 97×122 | 97×122 | 97×147 | 97×147 | .. | .. | .. |
| 2·5 .. .. | 122×122 | 122×122 | 122×147 | 122×147 | 97×147 | 97×147 | 97×172 |
| 2·8 .. .. | 122×122 | 122×122 | 122×147 | 122×147 | 97×147 | 97×147 | 97×172 |
| 3·0 .. .. | 122×122 | 122×122 | 122×147 | 122×172 | 97×172 | 97×197 | 97×197 |
| 3·3 .. .. | 122×122 | 122×122 | 122×147 | 122×172 | 97×172 | 97×197 | 97×197 |
| 3·5 .. .. | 122×122 | 122×122 | 122×147 | 122×172 | 97×197 | 97×197 | 97×197 |
| 3·8 .. .. | 122×122 | 122 122 | 122×147 | 122×172 | 97×197 | 122×197 | 97×197 |
| 4·0 .. .. | 122×122 | 122×147 | 122×147 | 122×172 | 122×197 | 122×197 | 122×197 |

**Scantlings of Single**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1·5 | .. | .. | 97×97 | 97×122 | 97×122 | 97×122 | .. | .. | .. |
| 1·8 | .. | .. | 97×97 | 97×122 | 97×122 | 97×122 | .. | .. | .. |
| 2·0 | .. | .. | 122×97 | 97×122 | 97×122 | 97×147 | .. | .. | .. |
| 2·3 | .. | .. | 122×97 | 97×122 | 97×122 | 97×147 | .. | .. | .. |
| 2·5 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×147 | 97×172 | 97×172 |
| 2·8 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×172 | 97×172 | 97×172 |
| 3·0 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×172 | 97×172 | 97×197 |
| 3·3 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×172 | 97×172 | 97×197 |
| 3·5 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×172 | 97×197 | 97×197 |
| 3·8 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 97×172 | 97×197 | 97×197 |
| 4·0 | .. | .. | 122×122 | 122×122 | 122×122 | 122×147 | 122×197 | 122×197 | 122×197 |

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Varandah Roofs** **(Slope 30°)** **(with horizontal)**

| Principals strutted alternative arrangement | | | Purlins | | | | | Hip rafters strutted alternative arrangement | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Principals | | | Struts | Principals 2·5 m c/c | Principals 2·7 m c/c | Principals 3·0 m c/c | Hip Rafters | Hip Rafters | Struts | Common Rafters |
| Post 2·5 m c/c | Post 2·7 m c/c | Post 3·0 m c/c | | | | | | | | |
| mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm | mm × mm |
| .. | .. | .. | .. | .. | .. | .. | 72 × 97 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 122 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 122 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 147 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | 97 × 122 | 97 × 122 | 97 × 147 | 72 × 172 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | 97 × 122 | 97 × 122 | 97 × 147 | 72 × 172 | .. | .. | 47 × 72 |
| 97 × 122 | 97 × 147 | 97 × 172 | 72 × 97 | 97 × 122 | 97 × 147 | 97 × 147 | 97 × 197 | 72 × 172 | 72 × 97 | 47 × 72 |
| 97 × 122 | 97 × 147 | 97 × 172 | 72 × 97 | 97 × 122 | 97 × 147 | 122 × 147 | 97 × 197 | 72 × 172 | 72 × 97 | 47 × 72 |
| 97 × 147 | 97 × 147 | 97 × 172 | 72 × 97 | 97 × 122 | 97 × 147 | 122 × 147 | 97 × 197 | 72 × 197 | 72 × 97 | 47 × 72 |
| 97 × 147 | 97 × 147 | 97 × 172 | 72 × 97 | 97 × 122 | 97 × 147 | 122 × 147 | 97 × 197 | 72 × 197 | 72 × 97 | 47 × 72 |
| 97 × 172 | 97 × 197 | 97 × 197 | 97 × 97 | 97 × 147 | 122 × 147 | 122 × 147 | 122 × 247 | 72 × 197 | 97 × 97 | 72 × 97 |

**or Mangalore tiled roof (Slope of roof 30°) (with horizontal)**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| .. | .. | .. | .. | .. | .. | .. | 72 × 97 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 97 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 122 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | .. | .. | .. | 72 × 122 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | 97 × 122 | 97 × 122 | 97 × 122 | 72 × 147 | .. | .. | 47 × 72 |
| .. | .. | .. | .. | 97 × 122 | 97 × 122 | 97 × 122 | 97 × 197 | .. | .. | 47 × 72 |
| 72 × 147 | 72 × 147 | 72 × 172 | 72 × 97 | 97 × 122 | 97 × 122 | 97 × 147 | 97 × 197 | 72 × 147 | 72 × 72 | 47 × 72 |
| 72 × 147 | 72 × 147 | 72 × 172 | 72 × 97 | 97 × 122 | 97 × 122 | 97 × 147 | 97 × 197 | 72 × 147 | 72 × 72 | 47 × 72 |
| 72 × 147 | 72 × 147 | 72 × 172 | 72 × 97 | 97 × 122 | 122 × 122 | 122 × 122 | 97 × 197 | 72 × 172 | 72 × 97 | 47 × 72 |
| 72 × 147 | 72 × 147 | 72 × 172 | 72 × 97 | 97 × 122 | 122 × 122 | 122 × 122 | 97 × 197 | 72 × 172 | 72 × 97 | 47 × 72 |
| 72 × 147 | 72 × 172 | 72 × 197 | 72 × 97 | 97 × 122 | 122 × 122 | 122 × 122 | 122 × 197 | 72 × 197 | 72 × 97 | 47 × 72 |



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**KING POST ROOF TRUSSES (Mangalore Tiled Roofs) Slope 30° (with horizontal)**
**Scantlings of Principals, Purlins etc., for Mangalore Tiled Roofs.**

DESIGNED LOAD

DEAD LOAD—130 Kg./Sq. m (=27 Lbs/□′)
WIND LOAD—50 Kg./Sq. m. (=10 Lbs./□′)
Pressure on wind ward side and 50 kg./sq. m.
suction on leeward side

| Span in Metre | TIE BEAMS | | | PRINCIPALS | | | KING POST | | | STRUTS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm |
| 3·0 | 3·8 | 72 | 72 | 1·8 | 72 | 97 | 1·2 | 72 | 122 | 0·9 | 72 | 47 |
| 3·5 | 4·3 | 72 | 72 | 2·0 | 72 | 97 | 1·3 | 72 | 122 | 1·0 | 72 | 47 |
| 4·0 | 4·8 | 72 | 72 | 2·3 | 72 | 97 | 1·4 | 72 | 122 | 1·2 | 72 | 47 |
| 4·5 | 5·3 | 72 | 72 | 2·6 | 72 | 97 | 1·6 | 72 | 122 | 1·3 | 72 | 47 |
| 5·0 | 5·8 | 72 | 72 | 2·9 | 72 | 97 | 1·7 | 72 | 122 | 1·5 | 72 | 47 |
| 5·5 | 6·3 | 72 | 72 | 3·2 | 72 | 97 | 1·9 | 72 | 122 | 1·6 | 72 | 47 |
| 6·0 | 6·8 | 72 | 72 | 3·5 | 72 | 97 | 2·0 | 72 | 122 | 1·8 | 72 | 47 |
| 6·5 | 7·3 | 72 | 72 | 3·8 | 72 | 97 | 2·2 | 72 | 122 | 1·9 | 72 | 47 |
| 7·0 | 7·8 | 72 | 97 | 4·1 | 72 | 122 | 2·3 | 72 | 122 | 2·1 | 72 | 72 |
| 7·5 | 8·3 | 72 | 97 | 4·3 | 72 | 122 | 2·4 | 72 | 122 | 2·2 | 72 | 72 |
| 8·0 | 8·8 | 72 | 97 | 4·6 | 72 | 122 | 2·6 | 72 | 147 | 2·3 | 72 | 72 |



अनुक्रमणिका
Table of Contents

## SCANTLING OF PRINCIPALS, PURLINS ETC., FOR MANGALORE TILED ROOFS

### KING POST ROOF TRUSSES

DESIGNED LOAD
DEAD LOAD—130 Kg./Sq. m. (= 27 Lbs./□′)
WIND LOAD—50 Kg. /Sq. m. (= 10 Lbs./□′)
pressure on windward side and 50 kg./Sq. m. suction on leeward side.

| Span in Metres | PRINCIPALS | | | | PURLINS | | | | COMMON RAFTERS | | | | RIDGES | | | | HIP RAFTERS | | | JACK RAFTERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trusses 2·5 m. Apart | | Trusses 3·0 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | 0·5 m Apart | | 0·4 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm |
| | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | | | | | | |
| 3·0 | 72 | 97 | 72 | 97 | 72 | 122 | 97 | 122 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·0 | 72 | 97 | .. | .. | .. |
| 3·5 | 72 | 97 | 72 | 97 | 72 | 122 | 97 | 122 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·4 | 72 | 97 | .. | .. | .. |
| 4·0 | 72 | 97 | 72 | 97 | 72 | 122 | 97 | 122 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 3·7 | 72 | 97 | .. | .. | .. |
| 4·5 | 72 | 92 | 72 | 97 | 72 | 122 | 97 | 122 | 47 | 72 | 47 | 72 | 72 | 122 | 72 | 147 | 4·1 | 72 | 122 | .. | .. | .. |
| 5·0 | 72 | 97 | 72 | 97 | 97 | 122 | 122 | 122 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 4·5 | 72 | 122 | .. | .. | .. |
| 5·5 | 72 | 97 | 72 | 97 | 97 | 122 | 122 | 122 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 4·9 | 72 | 122 | 3·5 | 72 | 147 |
| 6·0 | 72 | 97 | 72 | 97 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 5·3 | 72 | 147 | 3·8 | 72 | 172 |
| 6·5 | 72 | 97 | 72 | 97 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 5·7 | 72 | 147 | 4·2 | 72 | 172 |
| 7·0 | 72 | 122 | 72 | 122 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 6·1 | 72 | 172 | 4·5 | 97 | 197 |
| 7·5 | 72 | 122 | 72 | 122 | 97 | 147 | 122 | 147 | 72 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 6·5 | 72 | 197 | 4·7 | 97 | 197 |
| 8·0 | 72 | 122 | 72 | 122 | 97 | 147 | 122 | 147 | 72 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | 6·9 | 97 | 197 | 4·9 | 97 | 197 |



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## QUEEN POST ROOF TRUSSES

### Scantlings of Teak Wood Trusses 3 Metres Apart
(Mangalore Tiled Roofs)

DESIGNED LOAD

DEAD LOAD—130 Kg./Sq. m.(=27 Lbs./□')

WIND LOAD—50 Kg./Sq. m.(=10 Lbs./□')
pressure on wind ward side and 50 kg./Sq. m.
suction on leeward side.

| Span Metres | TIE BEAMS | | | PRINCIPALS | | | KING POST | | | STRUTS | | | STRAINING BEAMS | | | STRAINING SILLS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Length Metres | Breadth mm | Depth mm | Length Metres | Breadth mm | Depth mm | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. |
| | | 3 *Nos.* | | | | | | | | | | | | | | | | |
| 9·0 | 3·6 | 97 | 97 | 3·7<br>2·1 | 97<br>97 | 147<br>122 | 2·0 | 97 | 122 | 1·9 | 72 | 72 | 3·3 | 97 | 122 | 3·3 | 97 | 72 |
| 10·0 | 3·9 | 97 | 97 | 4·3<br>2·3 | 97<br>97 | 147<br>122 | 2·2 | 97 | 122 | 2·1 | 72 | 72 | 3·6 | 97 | 122 | 3·6 | 97 | 72 |
| 11·0 | 4·2 | 97 | 122 | 4·6<br>2·5 | 97<br>97 | 172<br>147 | 2·4 | 97 | 122 | 2·3 | 97 | 72 | 3·9 | 97 | 122 | 3·9 | 97 | 72 |
| 12·0 | 4·5 | 122 | 122 | 5·0<br>2·7 | 122<br>122 | 172<br>147 | 2·5 | 122 | 147 | 2·5 | 97 | 72 | 4·2 | 122 | 147 | 4·2 | 122 | 72 |

अनुक्रमणिका
Table of Contents

## QUEEN POST ROOF TRUSSES

**Scantlings of Principals, Purlins, etc. (for Mangalore tiled roof.)**

| Span Metres | PRINCIPALS | | | | PURLINS | | | | COMMON RAFTERS | | | | RIDGES | | | | HIP RAFTERS | | | JACK RAFTERS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | At 0·5 m Apart | | At 0·4 m Apart | | Trusses 2·5 m Apart | | Trusses 3·0 m Apart | | | | | | | |
| | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | B mm | D mm | Length Metres. | Breadth mm. | Depth mm. | Length Metres. | Breadth mm. | Depth mm. |
| 9·0 | 97 | 122 | 97 | 147 | 97 | 122 | 97 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | | | | | | |
| 10·0 | 97 | 147 | 97 | 147 | 97 | 122 | 122 | 147 | 47 | 72 | 47 | 72 | 72 | 147 | 72 | 172 | The hip rafters and jack rafters should be trussed. Size of rafters will depend on trussing employed. The jack rafters should be increased in number for spans of 11 and 12 metres. | | | | | |
| 11·0 | 97 | 147 | 97 | 172 | 97 | 122 | 122 | 147 | 47 | 97 | 47 | 72 | 72 | 147 | 72 | 172 | | | | | | |
| 12·0 | 97 | 172 | 122 | 172 | 97 | 122 | 122 | 147 | 72 | 97 | 47 | 97 | 72 | 147 | 72 | 172 | | | | | | |



अनुक्रमणिका
Table of Contents

## Bd. R. ROOFING AND CEILING

*List of items for Roofing and Ceiling*


| ITEM No. | ITEM | PAGES |
|---|---|---|
| Bd.R.1. | Providing and fixing Mangalore tiled roofing with Class AA/A tiles including securing the last course of tiles near the eaves, fixing 50 mm×25 mm/45 mm×25 mm horizontal teak wood/Jungle wood battens and oiling the battens complete (excluding ridge and hiptiles) ... ... ... ... ... ... | 433 |
| Bd.R.2. | Providing and fixing Mangalore tiled roofing with class AA/A tiles including securing the last course of tiles near the eaves, fixing country teak wood/jungle wood, sloping battens, fixing country teak wood/jungle wood horizontal battens over the sloping battens, all iron work and coal tarring the battens complete (excluding ridge and hip tiles) ... ... ... ... | 434 |
| Bd.R.3. | Providing and fixing Mangalore type ridge and hip tiles of Class AA/A including scaffolding if necessary, pointing with coloured cement mortar/Lime mortar and curing complete ... | 434 |
| Bd.R.4. | Providing and fixing country tiled roofing with single/double layer of tiles including teak wood/jungle wood (.....species) horizontal battens without/with sloping battens, all iron work, scaffolding if necessary and oiling and coal tarring the battens (excluding hip or ridge tiles) ... ... ... ... ... | 435 |
| Bd.R.5. | Providing and fixing corrugated galvanized iron sheets of ..... B.W.G., for roofing with/without wind ties including fastening with galvanised iron screws and bolts and lead washers complete | 436 |
| Bd.R.6. | Providing and fixing plain zinc sheeting over the ridge, hip or valley for galvanized corrugated iron sheet roofing including all fastenings with galvanised iron screws and bolts and lead washers, as per drawings complete ... ... ... ... ... | 437 |
| Bd.R.7. | Providing and fixing 6 mm./7 mm. (¼"/9/32") thick asbestos cement corrugated sheet roofing including galvanised iron J or L hook bolts, galvanised iron and bituminous washers, galvanised iron cramp bolts and nuts complete ... ... ... ... | 437 |
| Bd.R.8. | Providing and fixing 6 mm/7 mm (¼"/9/32") thick asbestos cement semicorrugated sheet roofing including galvanised iron J or L hook bolts and galvanised iron and bituminous washers, galvanised iron cramp bolts and nuts complete ... ... ... | 438 |
| Bd.R.9. | Providing and fixing 6 mm/7 mm (¼"/9/32") thick asbestos cement ridge capping for roofing including galvanised iron hook bolts, galvanised iron and bituminous washers, galvanised iron cramp bolts and nuts complete ... ... ... ... | 439 |
| Bd.R.10. | Providing and fixing valley gutters of 18/20/22B.W.G. plain galvanised iron sheets 120 cm (4'-0") wide without/with country teak wood/jungle wood ( species) planking 20 mm/12 mm thick including coal taring and oiling/oil painting the wood work complete ... ... ... ... ... ... | 439 |
| Bd.R.11. | Providing and fixing glass tiles of Mangalore type at required places in a Mangalore tiles roof including scaffolding is necessary ... | 440 |
| Bd.R.12. | Providing and fixing skylights of cm × cm size in single/double country tiled roofing in required places including scaffolding if necessary ... ... ... ... ... | 440 |

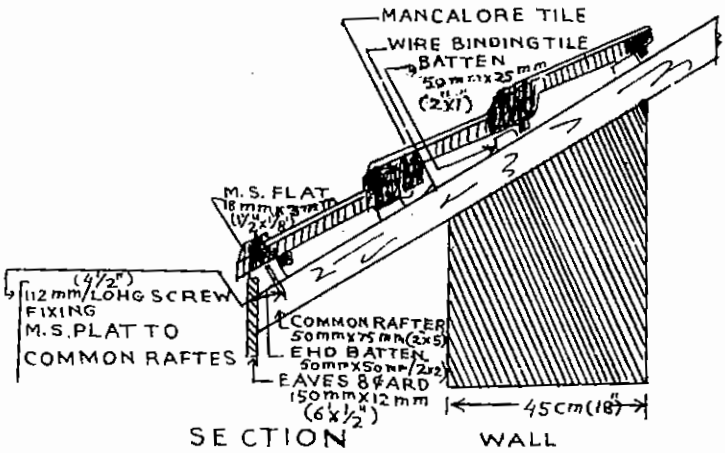
अनुक्रमणिका
Table of Contents



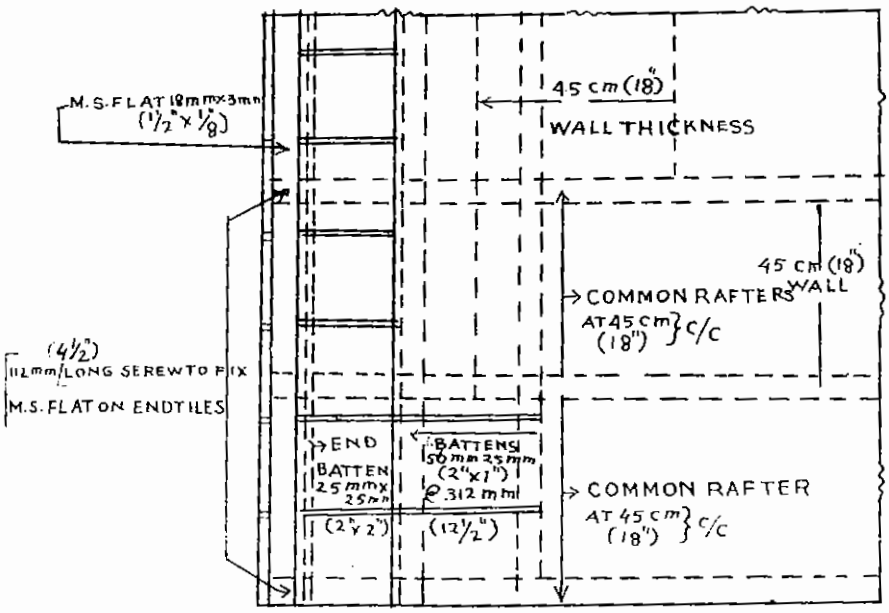

| ITEM No. | ITEM | PAGES |
|---|---|---|
| Bd.R.13. | Providing and fixing Mangalore pattern cowl ventilator tiles in the required places in a Mangalore tiled roof including scaffolding if necessary ... ... ... ... ... | 441 |
| Bd.R.14. | Providing and fixing asbestos cement cowl ventilators in asbestos cement sheet roofing at required places, including all fixing accessories and scaffolding if necessary ... ... ... | 441 |
| Bd.R.15. | Providing and fixing cloth ceiling in required places without/with country teak wood beadings, without/with frame-work of country teak wood battens including all iron work and varnishing the exposed woodwork and white washing the cloth complete ... | 441 |
| Bd.R.16. | Providing and fixing false ceiling of plain asbestos cement sheets 6 mm/7 mm (¼"/9/32") thick without/with country teak wood beadings, without/with frame-work of country teak wood battens, including scaffolding if necessary, all iron work and painting the A. C. Sheets and painting/varnishing the beading ... ... | 442 |
| Bd.R.17. | Providing and fixing false ceiling of Hardboard sheets ..... mm. ( ") thick without/with frame-work of country teak wood battens including scaffolding if necessary, all iron work, painting and varnishing the wood work complete ... ... | 443 |
| Bd.R.18. | Providing and fixing false ceiling of mm ( ") thick boards of fibrous plaster of Paris including scaffolding if necessary, frame-work of teak wood battens, all architectural work like mouldings, cornices, coves, domes, cups etc. as per detailed drawings and painting complete (excluding the mild steel suspenders and runners) ... ... ... ... | 443 |
| Bd.R.19. | Providing and fixing false ceiling of mm ( ") thick accoustic boards of approved make, with shape and sizes as per drawings including scaffolding if any, frame-work of teak battens, all screws and fastenings and fishing complete ... ... | 444 |


अनुक्रमणिका
Table of Contents

# DETAILS SHOWING ARRANGEMENT OF FIXING MANGALORE TILED ROOF AT EAVES-BOARD END WITH WIND-TIE




SECTION




PLAN

अनुक्रमणिका
Table of Contents



## Bd. R. ROOFING AND CEILING

The general specification given for items in Bd.Q "General wood work" shall apply to all items of wood work occurring in 'Bd.R. Roofing and Ceiling'.

Bd.R.1. *Providing and fixing Mangalore tiled roofing with Class AA/A tiles including securing the last course of tiles near the eaves, fixing 50 mm.×25 mm./45 mm.×25 mm. horizontal teak wood/Jungle wood battens and oiling the battens complete (excluding ridge and hiptiles).*

Bd.R.1.1. *Materials* :—

(1) *Mangalore Pattern tiles.*—These shall conform to I.S. 654-1957 for class AA or class A type tiles as mentioned in the item. Samples of the tiles to be provided shall be got approved by the Engineer and all tiles to be supplied shall conform to those samples.

(2) *Battens.*—Battens shall be sawn true to line, width and thickness from teakwood or jungle wood as mentioned in the item. Timber to be used shall conform to specification A.16. The size of the batten shall be 50 mm.×25 mm. (about 2″×1″) or 45 mm.×25 mm. (about $1\frac{3}{4}$″×1″) as mentioned in the item.

(3) *Iron work.*—All mild steel flats, bars, nails, bolts and nuts, binding wire, etc. to be used in the work shall be of standard type and brushed over with linseed oil and with coal tar when embedded in masonry. Binding wire shall conform to A.15. The mild steel flats shall be in required lengths and 40 mm.×3 mm. ($1\frac{1}{2}$″×$\frac{1}{8}$″) in size and mild steel bars shall be of 10 mm. ($\frac{3}{8}$″) diameter.

Bd.R.1.2. *Preliminary requirements.*—Before taking up the work of fixing battens, it shall be verified that the trusses, ridges, hiprafters, valley rafters, jack rafters, purlins, common rafters, wall plates, ceiling planks, etc. are fixed true to line, levels and slopes so that ridges and eaves shall be perfectly straight and horizontal and hips straight and uniformly sloping as shown in the plans or directed by the Engineer and that the tiled surface will be regular plane surfaces, without any wraping, twist or uneveness. Any defects shall be rectified before fixing battens.

Bd.R.1.3. *Construction* :—

1. *Fixing battens.*—The battens of the size mentioned in the item shall be fixed to the upper surface of the rafters or to the top of ceiling planks at 31.75 cm. (about $12\frac{1}{2}$″) between the top edges of successive lines of batten with iron nails. The lowest battens i.e., those nearest to the eaves should be fixed about 25 cm. (10″) from one immediately above and should have double the ordinary thickness.

When fixed on common rafters, the under faces of battens and edges shall be planed smooth before fitting up. All joints in the battens shall come only over the rafters or other supports. The lines of top edges of battens shall be perfectly straight and parallel to the eaves on each face of the roof slope and to the walls.

2. *Laying tiles.*—Tiles shall be laid fair and square and breaking joint i.e., left channel of the upper tile shall lie in the right of that below and shall fit properly one to another the "catches" resting fully against battens. Tiles shall be laid from eaves towards ridge. The finished top surface of the tiled roof shall be in uniform planes from ridge to eaves. The eaves line and the ridge line and all intermediate lines of tiles in each surface shall be perfectly straight, horizontal and parallel to each other. The tiles at hips and valleys shall be cut to the required shapes to enable the ridge and hiptiles to be fixed properly. The tiles at the end of gable and eaves or other exposed parts such as over verandah with no ceiling boards or ceiling tiles, where they are liable to be lifted and blown off by the wind shall be tied with 1.22 mm. wire underneath to the battens. In addition, wind ties consisting of steel flat of size 40 mm. × 3 mm. or 10 mm. ($\frac{3}{8}$″) diameter steel rod shall be provided near the eaves with necessary arrangement of fixing the same through the mangalore tiles to the common rafters by means of screws or hooks at every alternate rafter as indicated in the standard sketch or directed by the Engineer.

The lowest layer of tiles at the eaves shall have cut edges instead of rounded edges if so directed by the Engineer. Half tiles shall be used at the sloping ends to give straight edge to the roof.

3. *Drip moulding.*—A drip moulding of stone or brick plastered over properly and throated shall be provided where a roof finishes against a wall as shown on drawings or as directed by the Engineer. The tiles must finish watertight under the moulding. Where no drip moulding is provided as flashing of lead or zinc sheet may be provided. Drip moulding and flashing will be paid for separately but finishing of the tiles under the drip moulding with cement mortar shall be included in the item.



अनुक्रमणिका
Table of Contents

Bd.R.1.4. *Oiling.*—The exposed surface of the battens shall be oiled with one coat of linseed oil as directed by the Engineer. Portions of battens embedded in masonry shall be coated with coal tar.

Bd.R.1.5. *Item to include.*—(1) Providing, erecting and removing scaffolding, ladders, etc. as necessary for execution of the item.

(2) Providing and fixing the battens, including labour, materials and devices as specified above, cutting and waste.

(3) Providing and fixing the mangalore pattern tiles including cutting and waste and securing the last course of the tiles near the eaves as per specifications above.

(4) Oiling the battens, etc. as specified above.

Bd.R.1.6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the actual area of roofing completely finished. The area shall be measured net without any laps. Openings, sky lights, etc. up to 0.4 sqm. shall not be deducted and where applicable no cutting for forming such openings shall be measured. The linear dimensions shall be measured flat from edge to edge of tiled roof and area worked out correct up to two places of decimals in metre and squaremetre respectively. Portions of roof covered by ridge or hiptiles shall be included in the measurement of this item.

Bd.R.2.—*Providing and fixing Mangalore tiled roofing with class AA/A tiles including securing the last course of tiles near the eaves, fixing country teak wood/jungle wood sloping battens, fixing country teak wood/jungle wood horizontal battens over the sloping battens, all iron work and coal tarring the battens complete (excluding ridge and hiptiles).*

Bd.R.2.1. *General.*—This type of construction shall be used over planked ceiling where the rainfall is high and there is a chance of leakage through the joints of the ceiling planks due to obstruction of horizontal battens. This type of construction shall also be used when mangalore tiles are to be provided over galvanised corrugated iron sheeting. The specifications for this item shall be the same as for item No. Bd.R.1. subject to the following:—

(1) In case of plank ceiling below, battens 25 mm.×12 mm. (about 1″×½″) horizontal battens 50 mm.×25 mm. (2″×1″) at 31.75 cm. (about 12½″) apart shall be fined slopewise 75 cm. (about 2′-6″) apart on plank ceiling and over them shall be fixed to serve as catches for the tiles as laid down in specification No. Bd.R.1. The battens shall be coal tarred.

(2) In case of galvanised corrugated steel sheeting below, sloping battens of size 40 mm. × 40 mm. (1½″ × 1½″) shall be laid about 75 cm. centres over the ridges of corrugations and securely screwed through the sheets into the purlins below. Horizonal battens 50 mm. × 25 mm. (2″ × 1″) shall be fixed over the sloping battens at 31.75 cm. (12½″) apart with nails as in Bd.R.1.

Providing and fixing of galvanised corrugated iron steel sheeting or plank ceiling shall be paid for separately.

Bd.R.2.2. *Item to include.*—As in Bd. R. 1. The battens fixed slopewise shall also be included in the rate for the item. Battens shall be coal tarred.

Bd.R.2.3. *Mode of measurement and payment.*—As in Bd. R. 1. and shall include the sloping battens also.

Bd.R.3. *Providing and fixing Mangalore type ridge and hiptiles of class AA/A including scaffolding if necessary pointing with coloured cement mortar/lime mortar and curing complete.*

Bd.R.3.1. *Materials* :

(1) *Mangalore pattern ridge and hiptiles.*—These shall conform to I.S. 1464: 1959 for class AA or class A type tiles as mentioned in the item.

(2) Mortar shall be cement mortar 1:3 or lime mortar 1:1½ complying with specifications B.5.a or B.3.a respectively. The pigment of red ochre of the type approved by the Engineer shall be added to the mortar in such proportion as to make it resemble the colour of the tiles.

(3) *Hooks.*—Hooks for holding the hip and ridge tiles when necessary shall be of mild steel flats 25 mm. × 6 mm. (1″ × ¼″) bent to shape and with a sharp end on one side for inserting into the hip rafter or holes for nailing them down.

Bd.R.3.2. *Construction.*—Before fixing the tiles, they shall be fully soaked in water for 4 hours. Hip and ridge tiles shall be set dry with joints pointed with mortar, the whole being made perfectly secure and watertight. The end tiles of the ridge or hip shall be laid full in mortar and secured by curved hooks at the end of hips as ordered by the Engineer. The hook shall be fixed to the hip rafter. The mortar shall be cured for at least 7 days.

Bd.R.3.3. *Item to include.*—(1) Providing, erecting and removing scaffolding and ladders, etc. necessary for the execution of the item.

(2) Providing and fixing Mangalore type ridge and hip tiles including pointing, mild steel flat, fixing, cutting and waste if necessary.

(3) All labour, materials and use of equipment for satisfactory completion of the item as specified above.

(4) Curing.

Bd.R.3.4. *Mode of measurement and payment.*—The contract rate shall be per metre of the net length ridge and hip tiles excluding laps. The linear measurement shall be taken correct up to 2 places of decimals of a metre.

Bd.R.4. *Providing and fixing country tiled roofing with single/double layer of tiles including teak wood/jungle wood (..... species) horizontal battens without/with sloping battens, all iron work, scaffolding if necessary and oiling and coal tarring the battens (excluding hip or ridge tiles).*

Bd.R.4.1. *General.*—The item refers to providing and fixing roof covering with a single or double layer of country tiles, with or without sloping battens. The sloping battens shall be used if tiling is to be done over galvanised iron corrugated sheet or teak planking.

Bd.R.4.2. *Materials.*—(1) The country tiles shall be of a uniform colour and shall be well burnt. They shall show a fine grained, uniform and dense structure, on fracture and shall be free from lumps of lime, laminations, cracks, soluble salts, or other defects which may impair their shape, strength, durability or usefulness. Tiles shall give a ringing note when struck together. The tiles shall be 25 cm. (10″) long, 12 mm. (½″) thick with 80 mm. (3¼″) diameter at large end and 75 mm. (3″) for small end unless other sizes are approved by the Engineer. The tiles shall generally be of uniform size throughout. Tiles shall be so turned as to allow an overlap of about 5.00 cm. (2″). After 24 hours' immersion in water, absorption by weight shall not exceed 20 per cent. of the dry weight of tile.

(2) *Timber battens.*—These shall be of timber of the species mentioned in the item. Horizontal battens shall be of the finished size 50 mm. × 12 mm. (2″ × ½″) and vertical sloping battens 40 mm. × 40 mm. (1½″ × 1½″). All timber shall comply with specification A.16.

(3) *Iron work.*—All nails, screws, etc., shall be as approved by the Engineer.

Bd.R.4.3. *Construction*—(1) *Wood work.*—The wood work shall generally conform to specification B.20. The horizontal battens shall be 50 mm. × 12 mm. (2″ × ½″) in section. Each batten shall be at least as long as to cover four common rafters. The battens shall be secured to the common rafters or sloping battens if provided, by nailing. The clear distance between the battens shall be 5 cm. (2″). If so mentioned in the item, sloping battens 40 mm. × 40 mm. (1½″ × 1½″) shall be provided and nailed to the teak planking below at 45 to 50 cm. centres or in case of corrugated galvanised steel sheets below, sloping battens shall be fixed over the ridges of corrugations, with screws. Horizontal battens then shall be nailed to the sloping battens. Teak plank and galvanised steel sheets if provided underneath the battens shall be paid for separately.

(2) *Laying.*—The tiles shall be laid in single or double layer as mentioned in the item.

The tiles shall be laid to fit one into the other. Each tile shall project about 2.5 cm. (1″) beyond the batten. Each tile shall have on overlap of at least 5.0 cm. (2″) over the other. The tiles at the eaves shall be secured by a batten 40 mm. × 25 mm. (1½″ × 1″) properly levelled and fixed with 6 mm. (¼″) bolts and nuts to the rafters. The tiles near the ridge shall abut tight against the ridge. The tiles at hips and valleys shall be set in such a way as to enable proper fixing of hip and ridge tiles.

अनुक्रमणिका
Table of Contents



**Bd.R.5.2.**

The second layer if included in the item shall be laid in the same manner as the first layer.

(3) *Drip moulding.*—This shall be as for item Bd. R. 1.

(4) *Oiling.*—The battens where exposed shall be oiled with one coat of linseed oil as per Bd. N. Battens embedded in masonry shall be coal tarred.

Bd. R. 4.4. *Item to include.*—The rate for the item shall include all labour, materials and tools required to carry out the following operations :—

(1) Providing, erecting and removing scaffolding, ladders, etc., as necessary for the execution of the item.

(2) Providing and fixing the battens, horizontal and sloping if included.

(3) Providing and fixing country tiles including securing the last course of tiles near the eaves.

(4) Oiling the wood work where exposed and coal tarring where embedded.

Bd. R. 4.5. *Mode of measurement and payment.*—As for item Bd. R. 1.

Bd. R. 5. *Providing and fixing corrugated galvanised iron sheets of—B.W.G. for roofing with/without wind ties including fastening with galvanised iron screws and bolts and lead washers complete.*

Bd. R. 5.1. *Materials*—(1) *Corrugated galvanised iron sheets.*—These sheets shall conform to I.S. 277—1962 in all respects. The gauge of the sheets to be used shall be as mentioned in the item. The sheets shall be uninjured in carriage and handling either by the rubbing of zinc coating or otherwise. They shall have clean and bright surfaces and shall be free from dents, bends, holes, rust or white powdery deposit.

(2) *Fastenings.*—Bolts shall be of the galvanised iron, lead washers, galvanised iron screws and washers shall be as approved by the Engineer.

Bd. R. 5.2. *Constructional details.*—(1) Sheets shall be laid on the roof with a tap of not less than 15 cm. (6″) at the ends and of two corrugations at the sides. The laying shall be started from the side opposite that of the prevalent winds in the monsoon.

(2) *Drilling.*—The holes for screws or bolts shall be drilled (not punched) from the inside towards outside about 23 cm. (9″) apart or as directed by the Engineer on the sides and at every second corrugation on the ends, care being taken that all holes shall occur in the ridge of the sheet on the outside as laid, in a uniform pattern.

(3) The sheets shall be joined together with galvanised iron 6 mm. ($\frac{1}{4}$″) diameter bolts and lead washers as shown on the drawings or as directed by the Engineer. The galvanised iron bolts shall be used with 'limpet' washers and nuts must be on the inside of the roof. The bolts and screws shall always be placed along the outside ridge of the corrugations as laid. As the overlap extends over two corrugations, these bolts shall be placed zigzag so that the end of each of the two overlapping sheets shall be drawn tightly one against the other. Horizontal joints of the sheets shall be also joined together by means of bolts or screws, and washers, the screws or bolts being placed, normally on each alternate corrugation ridge.

(4) *Laying the sheets.*—The sheets shall be carefully set on the purlins and fastened to them by galvanised iron bolts and limpet washers, screws or other fasteners as may be approved by the Engineer. These screws or bolts are to be evenly placed two per sheet horizontally and in the same line in the direction of the slope over each purlin. The bolt holes must be slightly larger (about 1.5. mm) than the diamater of the bolt. These holes must be covered by lead washers fitting tight to the shank of the bolts and extending 12 mm. ($\frac{1}{2}$″) all round the hole.

The sheets shall be neatly cut to the required shapes to fit the angle of the roof at hips and valleys.

All bolts, screws, etc., shall be set in white lead. They shall be tightened and drawn closely and the heads spread evenly and equally. When included in the item wind ties consisting of flat iron bar 50 mm.×6 mm. (2″×$\frac{1}{4}$″) shall be fixed above the eaves of the roof, the ties being bolted or screwed down to the rafter in the same way as the sheets are fastened to the purlins. Slot holes will be cut in the wind-ties to allow of expansion and contraction due to variation of temperature where necessary.

अनुक्रमणिका
Table of Contents

Bd. R. 5.4. *Item to include.*—All labour, materials and tools to carry out following operations :—

(1) Providing, erecting and removing any scaffolding ladders, etc., necessary for the execution of the item.

(2) Providing corrugated galvanised iron roofing sheets, cutting them where necessary, screwing and bolting them and fastening the sheets to the purlins, including any cutting and waste and wind ties when provided in the item.

Bd. R. 5.5. *Mode of measurement and payment.*—This shall be the same as for item Bd. R. 7.

Bd. R. 6. *Providing and fixing plain zinc sheeting over the ridge, hip or valley for galvanised corrugated iron sheet roofing including all fastenings with galavanised iron screws and bolts and lead washers complete.*

Bd. R. 6.1. *Materials.*—(1) The ridge, valley and hip shall be of zinc sheets of 20 B.W.G. These sheets shall be uninjured in transit or handling. They shall have clean and bright surfaces and shall be free from dents, bends and holes.

(2) *Fastening.*—Bolts shall be of the best galavanised iron. Lead washers, galavanised iron screws and washers shall be as approved by the Engineer.

Bd. R. 6.2. *Constructional details.*—These shall be as per specifications for item No. Bd. R. 5. subject to following :—

The ridge, valley and hip zinc sheets in suitable lengths shall be bent or curved to the radius as shown on drawings or as directed by the Engineer without damage to the sheets in the process of bending. They shall be laid with 30 cm. (12″) lap on each side. The sheets shall be securely fastened down to wood work immediately below in such a way as to prevent the rain driving under them.

Bd. R. N.4. *Item to include.*—As per specifications for item No. Bd. R. 5 except that plain zinc sheets shall be used after bending them to shape.

Bd. R. 6.4. *Mode of measurement and payment.*—The contract rate shall be per running metre of the ridge, hip or valley covered by the sheeting as specified above. The measurement shall be taken net (ignoring overlaps) correct up to 2 places of decimals of a metre.

Bd. R. 7. *Providing and fixing 6 mm/7 mm (¼″/9/32″) thick asbestos cement corrugated sheet roofing including galvanised iron J or L hook bolts, galvanised iron and bituminous washers, galvanised iron cramp bolts and nuts complete.*

Bd. R. 7.1. *Materials*—(1) *Asbestos cement sheets.*—Asbestos cement sheets shall be corrugated type of approved manufacture and conforming to I.S. 459-1962. The thickness of sheets shall be 6 mm. (¼″) or 7 mm. (9/32″) as mentioned in the item. They shall be free from cracks, deformities or other defects and damage.

(2) *Fixing Accessories.*—All fixing accessories shall be of galvanised iron and shall be machine made. Hook bolts, cramp bolts and coach screws shall be of galvanised iron and 8 mm. (5/16″) in diameter. Each bolt or screw shall be provided with one bitumen impregnated asbestos felt under washer and one galvanised iron washer. Coach screws for fixing sheets through wood work shall be normally 11 cm. to 12.5 cm. (4½″ to 5″) long. Hook and crank bolts shall be of required length where single sheet is to be fixed or where 2 sheets overlap or where ridge or other accessories are to be fixed with the sheet. Galvanised iron seam bolts shall be used in stitching ridges, corner pieces, finials, etc.

Bd. R. 7.2. *Storage and Handling.*—The asbestos corrugated sheets shall be handled and stored every carefully in the best possible manner so as not to injure the sheets in any way. All damage caused due to careless transport, handling or storing shall be borne by the contractor. The sheets shall be stacked on wooden battens laid on firm and level ground. When they are stacked for any length of time, they shall be stored under cover.

Bd. R. 7.3. *Construction details.*—The instructions given by the manufacture for the construction of roofing with asbestos cement sheets shall be followed. In the absence of these instructions following specifications shall apply. All instructions given in appendix A of I.S. 459-1962 shall be followed.

**Bd.R.8.**

(1) *Laps.*—The end horizontal laps shall not be less than 15 cm. (6″) for roof having pitches of 21½° or more. For flatter roof and normal pitch roof in positions of severe exposure, the end laps shall be increased as instructed by the Engineer. The end laps may also be varied slightly to suit the spacing of the purlins.

The sheets shall be laid with side lap of half a corrugation starting the laying from the side opposite that of prevalent winds in monsoon.

(2) *Overhang.*—Free overhang at eaves shall in no case be more than 38 cm. (15″).

(3) All sheets shall be laid with their smoother side on top.

(4) *Mitres.*—Where 4 corners of sheets overlap, two of them must be mitred (cut), cutting being done with ordinary saw.

(5) *Laying.*—The sheets shall be laid from left to right starting at the eaves. The first sheet shall be laid uncut but the remaining sheets in the bottom row will have the top left hand corner and the bottom right hand corner cut with the exception of the first sheet in each row which will have only the bottom right hand corner cut, and the last sheet in each row which will have only top left hand corner cut. The last or top row sheet will have the bottom right hand corner cut with the exception of the last sheet which shall be laid uncut. If the sheets are laid from right to left, the whole procedure shall be reversed. The mitre described above is necessary to provide a snug fit where four sheets meet at a lap. It is cut from a point 15 cm. (6″) (whatever the length of the end lap may be) up to the vertical side of the sheet to a point 5 cm. (2″) along the horizontal edge. Cutting shall be done with a wood saw.

Sheet shall be cut to suit the angles of the hips and valleys accurately. Sheets may be cut to the required length if uncut lengths are not suitable.

The fastenings shall be provided as shown on drawings or as directed by the Engineer. Holes shall be drilled on the outside ridges 3 mm. larger thtn the diameter of the fixing bolts. Holes shall never be punched. One bolt is required on the ridge on each side of lap. The nuts of hook bolts, crank bolts or heads of coach screws should bear on a galvanized iron washer which in turn shall be bedded on an approved type of bitumen washer. The screws or bolts shall be tightened just sufficient only to seat the bitumen washers properly over the corrugations. If they are tightened too much the sheets are likely to be damaged.

Roof ladders or light planks should be used to prevent any damage to the sheets when fixing them.

(6) *Cracked sheets.*—All sheets and accessories found to be cracked after fixing shall be replaced by new ones. The cracked sheets so removed may be salvaged by the contractor by cutting into smaller but sound lengths where ordered. Nothing extra shall be paid for such work.

Bd. R. 7.4. *Item to include.*—The rate for the item shall include all labour, materials and tools necessary to carry out following operations :—

1. Providing, erecting and removing any scaffolding ladder, etc., necessary for execution of the item as specified above.

2. Providing and fixing the A. C. sheets with all the necessary accessories, fixtures, etc., as specified above including cutting and waste.

Ridge capping when provided shall be paid separately. It shall not be paid under this item.

Bd. R. 7.5. *Mode of measurement and payment.*—The contract rate shall be per square metre of the net roof area covered by the A. C. sheets from top of ridge to the eaves. Overlaps and cutting to shape of sheets shall be covered by the net roof area and no extra shall be added for them.

The linear dimensions shall be measured flat (not girthed) and the area worked out correct up to 2 places of decimals of a metre and a square metre respectively.

No deduction shall be made for opening up to 0.4 sq. m. each for sky lights, etc., and no cutting for forming such opening shall be measured.

Bd. R. 8. *Providing and fixing 6mm/7mm (¼″/9/32″) thick asbestos cement semicorrugated sheet roofing including galvanised iron L or J hook bolts and galavanised iron and bituminous washers, galvanised iron cramp bolts and nuts complete.*

Bd. R. 8.1. *General.*—The specifications for this item shall be the same as for item No. Bd. R. 7. subject to the following:—

Bd. R. 8.2. *Materials.*—A C. sheets shall be of the semi-corrugated type of the approved manufacture and conforming to I.S. 459-1962. The thickness of sheet shall be as mentioned in the item.

Bd. R. 8.3. *Constructional details.*—(*i*) *Laps*—All semi-corrugated sheets shall have one end marked "TOP" on the smoother side of the sheet. The smooth surface should be on top and top end must always point towards the ridge. The sheets shall be laid with a side lap of one corrugation, the left hand small corrugation of each sheet being covered by the right hand large corrugation of the next sheet.

(*ii*) *Laying.*—These sheets shall be laid from right to left starting from the eaves. The first sheet shall be laid uncut but the remaining sheets in the bottom row will have the top right hand corner cut or mitred. The sheets in the second and other intermediate rows shall have both the top right hand corner and bottom left hand corner cut with the exception of the first sheet in each row which shall have only the bottom left hand corner cut and the last sheet in each row which shall have only the top right hand corner cut. The last or top row sheets shall have the bottom left hand corner cut with the exception of the last sheet which shall be laid uncut.

Bd. R. 9. *Providing and fixing 6 mm/7 mm (¼"/9/32") thick asbestos cement ridge capping for roofing including galvanised iron hook bolts, galvanised iron and bituminous washers, galvanised iron cramp blots and nuts complete.*

Bd. R. 9.1. *General.*—The specifications for this item shall be the same as for item No. Bd. 7 subject to the following:—

Bd. R. 9.1.1. Special shaped ridge pieces of A. C. sheets shall be used to fit the roofing sheets snugly. The radius of curvature over the ridge being as per drawing or as directed by the Engineer. If necessary, the ridge shall be adjustable and in two pieces with the required overlapping length.

Bd. R. 9.2. *Mode of measurement and payment.*—The contract rate shall be per metre of the net length of Asbestos Cement ridge capping sheets ignoring overlap. The liner dimensions shall be measured correct up to 2 places of decimals of a metre.

Bd. R. 10. *Providing and fixing valley gutters of 18/20/22 B.W.G. plain galvanised iron sheets 120 cm (4'-0") wide without/with country teak wood/jungle wood ( species) planking 20mm /12 mm thick including coal tarring and oiling/oil painting the wood work complete.*

Bd. R. 10. 1. *Materials*—(1) *Galvanised iron sheets.*—The galvanised iron plain sheet for valley gutters in roofiing shall conform to I.S. 227/2107/2108-1962 in all respects. The sheets shall be of the gauge as mentioned in the item and 120 cm (4'-0") wide.

2. *Timber planks.*—When included in the item timber for plank shall comply with specification A. 16 and shall be of the species and finished thickness mentioned in the item.

3. *Fastenings.*—Fastenings of screws and nails shall be as approved by the Engineer or as shown on drawings.

4. Coal tar, linseed oil. etc., shall be as specified in Bd. N.

Bd. R. 10.2. *Constructional details*—(1) *Woodwork.*—When planking is included in the item, the wood work shall comply with specification B. 20. The plank shall be 7.5 cm to 15 cm (3" to 6") wide but shall be uniform in width in each case. The thickness of plank shall be as mentioned in the item. They shall be joined with rebated joints. The plank shall be fixed along the valley rafter, to the common rafters or purlins with nails and screws. Two coats of coal tar shall be applied to the upper surface of plank and the underside shall be oiled as per Bd. N. or oil-painted to suit the adjoining work as per B. 21. (b).

(2) Galvanised iron sheets 120 cm (4'-0") wide shall extend 45 cm (1'-6") under the tiles on both the side. The sheets shall be fixed on the planks or battens as the case may be. The depth of trough shall not be less than 10 cm (4") at the centre. The sheets shall be

अनुक्रमणिका
Table of Contents



carried 7.5 cm (3″) into the wall if there be one and set with cement mortar. The laps on the slopes shall be 30 cm (1′-0″). The sheets shall be laid over the battens and not under them. In the case of tiled roof two battens 50 mm×25 mm (2″×1″) each shall be fixed over the galvanised iron sheets 15 cm (6″) away from the central line of the valley on either side to keep the tiles and mortar from falling into the gutter.

Bd. R. 10.3. *Item to include.*—(1) Providing, erecting and removing scaffolding, it necessary for the execution of the item.

(2) All materials and labour required for providing and fixing the planking when included in the item and galvanised iron sheet as specified above.

(3) Painting the top surface of planks with tar and underside with oil or oil-painting.

Bd. R. 10.4. *Mode of measurement and payment.*—The contract rate shall be per running metre of the valley covered. The length shall be measured net along the centre up to 2 places of decimals of a metre ignoring the overlaps.

Bd. R. 11. *Providing and fixing glass tiles of Mangalore type at required places in a Mangalore tiled roof including scaffolding if necessary.*

Bd. R. 11.1. *Glass tile.*—The glass tile shall be of Mangalore pattern of standard dimensions without any cracks, blow-holes or other defects.

Bd. R. 11. 2. *Fixing.*—The glass tiles shall be fixed in the same manner as the mangalore pattern tiles, in the required places as shown on drawings or as directed by the Engineer.

Bd. R. 11.3. *Item to include.*—The rate for the item shall include all labour, materials and scaffolding or ladders if necessary, for providing and fixing the glass tiles in places shown in the drawings or directed by the Engineer.

Bd. R. 11.4. *Mode of measurement and payment.*—The contract rate shall be per number of glass tile fixed.

No deduction shall be made in the roofing for these glass tiles so long as the area of glass tiles in each position is less than 0.4 square metre.

Bd. R. 12. *Providing and fixing skylights of cm.× cm. size in single/double country tiles roofing in required places including scaffolding if necessary.*

Bd. R. 12.1. *General.*—The item pertains to the provision and fixing skylights in roofs having country tiles. The size of the skylight shall be the clear opening in galvanised iron sheet frame.

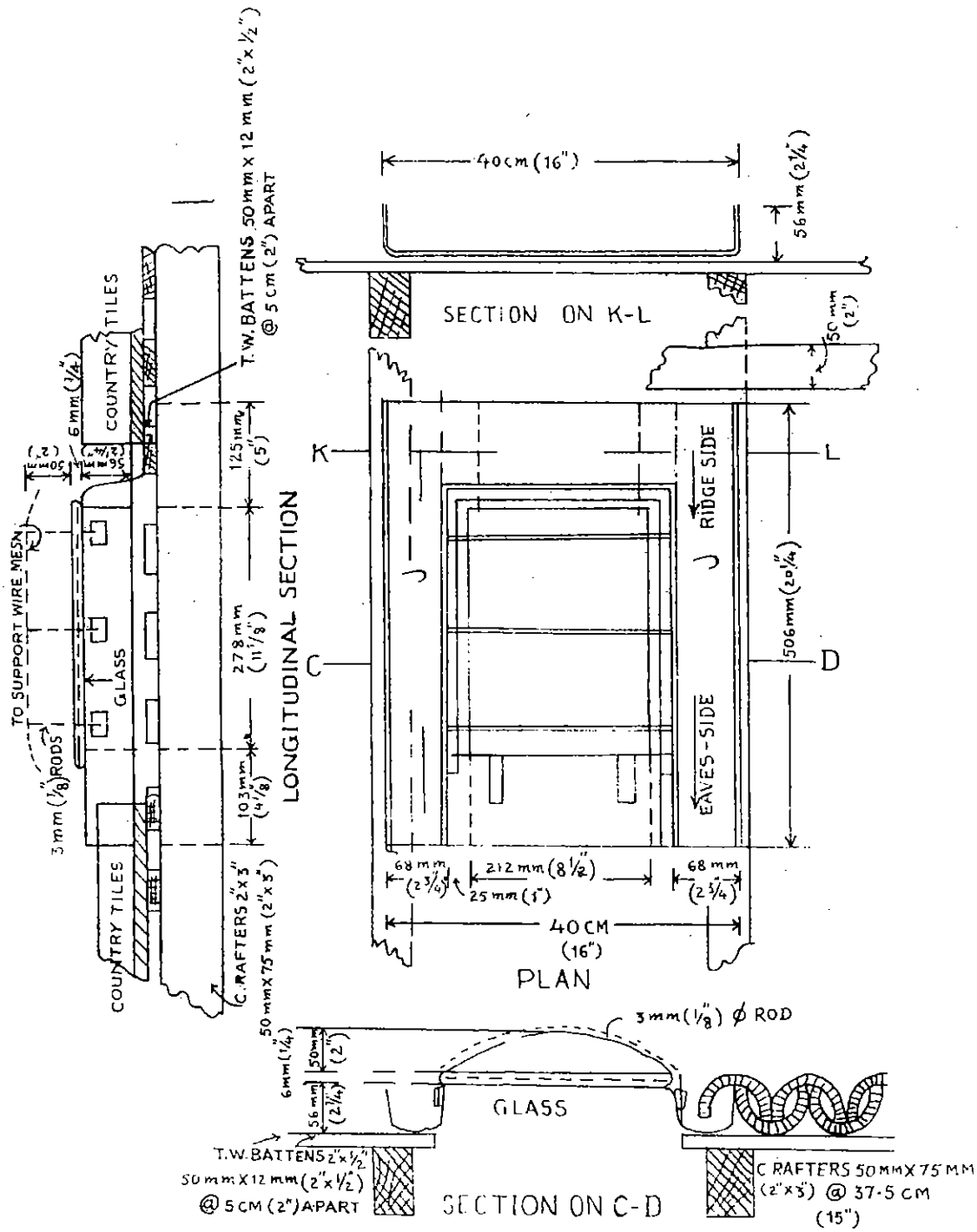
Bd. R. 12.2. *Skylight.*—For single country tiling, skylights shall be made from 20 gauge plain galvanised iron sheet as shown in the standard sketch. Wire netting is provided over the glass pane as shown. For double tiles, this design will have to be suitably modified by increasing the depth of the channel arm on the glass side. The dimensions may be varied to suit the requirements. Any convenient length may be used but the width will have to suit the rafters spacing. The glass panes shall be of obscured glass.

Bd. R. 12.3. *Fixing.*—The skylights shall be fixed in the roof in the required places as shown on drawings or as directed by the Engineer. The skylight shall be fixed in such a way that the two side channels come over the common rafters and the whole skylight is thus supported. The battens directly under the glass are cut away between the two rafters. The tiles at higher end overlap the skylight at the upper end while the central raised portion of the skylight of its lower end will overlap the lower tiles at lower end. The corners of galvanized iron frame at skylight shall be properly soldered.

Bd. R. 12.4. *Item to include.*—The rate for the item shall include all labour, materials and scaffolding or ladders necessary to provide and fix the skylight as specified above including cutting and waste.

Bd. R. 12.5. *Mode of measurement and payment.*—The contract rate shall be per number of the skylight of the specified dimensions. No deduction for the skylights shall be made so long as the net area (clear opening in the frame) of each skylight is less than 0.4 square metre. Deduction for skylights shall be made in the roof when clear area of each skylight is more than 0.4 square metre.

अनुक्रमणिका
Table of Contents


T.W. BATTENS 50 mm x 12 mm (2" x ½")
@ 5 cm (2") APART
COUNTRY TILES
6 mm (¼")
125 mm (5")
278 mm (11⅛")
103 mm (4⅛")
TO SUPPORT WIRE MESH
3 mm (⅛") RODS
GLASS
C. RAFTERS 2"x3"
50 mm x 75 mm (2"x3")
COUNTRY TILES
LONGITUDINAL SECTION
40 cm (16")
56 mm (2¼")
SECTION ON K-L
50 mm (2")
K
L
C
D
RIDGE SIDE
EAVES-SIDE
506 mm (20¼")
68 mm (2¾")
212 mm (8½")
25 mm (1")
68 mm (2¾")
40 CM (16")
PLAN
3 mm (⅛") ϕ ROD
6 mm (¼")
50 mm (2")
56 mm (2¼")
GLASS
T.W. BATTENS 2"x½"
50 mm x 12 mm (2"x½")
@ 5 cm (2") APART
SECTION ON C-D
C RAFTERS 50 MM X 75 MM
(2"x3") @ 37·5 CM
(15")

# SKY – LIGHT

अनुक्रमणिका
Table of Contents



Bd. R. 13. *Providing and fixing Mangalore pattern cowl ventilator tiles in the required places in a Mangalore tiled roof including scaffolding if necessary.*

Bd. R. 13.1. *Ventilator Tile.*—This shall be the mangalore pattern cowl ventilator tile of standard shape and size.

Bd. R. 13.2. *Fixing.*—The ventilator tiles shall be fixed in the Mangalore tiled roof in the required places in the same way as other ordinary standard type Mangalore tiles as directed by the Engineer.

Bd. R. 13.3. *Item to include.*—The rate for the item shall include all labour, materials and scaffolding or ladder if necessary for providing and fixing the ventilator tile.

Bd. R. 13.4. *Mode of measurement and payment.*—The contract rate shall be per number of the ventilator tiles provided and fixed in place. No deduction shall be made in the roofing measurements for these ventilator tiles.

Bd. R. 14. *Providing and fixing asbestos cement cowl ventilators in asbestos cement sheet roofing at required places including all fixing accessories and scaffolding if necessary.*

Bd. R. 14.1. *Ventilator of A. C. sheets.*—The asbestos cement cowl ventilators shall be of the standard size and shape and approved by the Engineer. Their margins on all sides shall be of such shape and dimensions as to fit properly into the asbestos cement roofing sheets to which they are to be fixed.

Bd. R. 14.2. *Fixing accessories.*—These shall be as mentioned for item Bd. R. 7.

Bd. R. 14.3. *Fixing.*—Ventilators shall be fixed in the required places with the same fixing accessories as are used for the asbestos cement sheet roofing. The fixing shall be done as specified for item Bd. R. 7.

Bd. R. 14.4. *Item to include.*—The rate for the item shall include all labour, materials, accessories and ladders or scaffolding for providing and fixing ventilators of A. C. sheets including all cutting and waste.

Bd. R. 14.5. *Mode of measurement and payment.*—The contract rate shall be per number of ventilator.

No deduction shall be made in the roofing measurements on account of these ventilators.

Bd. R. 15. *Providing and fixing cloth ceiling in required places without/with country teak wood beadings, without/with frame work of country teak wood battens including all iron work and varnishing the exposed woodwork and white washing the cloth complete.*

Bd. R. 15.1. *General.*—The item refers to providing and fixing of cloth ceiling in required places, shown on drawings or as directed by the Engineer, with or without teak wood frame work and teak beadings. The cloth shall be nailed to the underside of the wooden frame work.

Bd. R. 15.2. *Materials*—(1) *Battens.*—Battens shall be of country teak wood, which shall conform to A. 16. The finished sizes of battens for framework shall be 75 mm × 65 mm (3″ × 2½″) unless other sizes are shown on the drawings. They shall have a perfectly straight edge and face to which the cloth will be attached. Other sides may be left rough. if beadings are to be provided, batten for beads shall be of finished size 45 mm × 12 mm. (1½″ × ½″). They shall be planed and beaded as directed by the Engineer.

(2) *Cloth.*—Cloth for the ceiling shall be stout dungree cloth.

(3) *Iron work.*—All iron work like nails, screws, etc., shall be of standard commercial type and approved by the Engineer.

Bd. R. 15.3. *Construction and finishing.*—The cloth shall be nailed to the underside of the framework. The framework of teak battens 75 mm × 65 mm (3″ × 2½″) shall be fixed to wooden blocks let into the walls and firmly screwed to the underside of the beams or to ceiling joists where ceiling joists are use. The battens shall form square or oblong panels



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



not more than 1.5 metres (about 5') in length on any side. If so required in the item, teak wood beads of battens 45 mm×12 mm (1½"×½") planed and moulded shall be fixed under the cloth ceiling to form panels. The beads shall be screwed over the cloth to the framework above for panels and all round the wall with iron screws not farther apart than 15 cm (6") or as directed by the Engineer. The teak beadings shall be varnished as per Bd. N. The cloth shall be white washed.

Bd. R. 15.4. *Item to include.*—The rate for the item shall include all labour, materials and use of tools, scaffolding or ladders to carry out the following operations:—

(1) Preparing and supplying the cloth and timber scantlings for framework and beadings if so required by the wording of the item and iron work.

(2) Fixing teak frame, and the cloth ceiling and beads as per the item.

(3) White-washing the cloth and varnishing beads.

Bd. R. 15.5. *Mode of measurement and payment.*—As for item Bd. R. 16.

Bd. R. 16. *Providing and fixing false ceiling of plain asbestos cement sheets 6 mm/7 mm (¼"/9/32") thick without/with country teak wood beadings, without/with framework of country teak wood battens, including scaffolding if necessary, all iron work and painting the A. C. sheets and painting/varnishing the beadings.*

Bd. R. 16.1. *General.*—The item refers to providing and fixing ceiling of plain asbestos sheets with or without teak wood beadings as per the item, in required places, screwed to teak wood framework. The teak wood framework of battens shall be either included in the item or paid separately as per the wording of the item.

Bd. R. 16.2. *Materials*—(1) *Plain asbestos cement sheets.*—These shall be of the approved manufacture and in standard sizes not less than 1 metre square and not more than 2 metre square. The thickness of the sheets shall be as per the item. As far as possible, all the sheets shall be of the same size.

(2) *Battens.*—If the battens for framework are included in the item, they shall be of country teak wood and of size 75 mm×65 mm (about 3"×2½"). All timber shall conform to A. 16. If beadings are to be provided battens for beads shall be of finished size 45 mm×12 mm (about 1½"×½").

(3) *Iron work.*—All iron work like nails, screws, etc., shall be of the standard commercial type and approved by the Engineer.

Bd. R. 16.3. *Fixing the ceiling.*—If included in the item the framework of wooden battens 75 mm×65 mm shall be firmly fixed on the underside of the tie-beams of the trusses of ceiling joists which are to support the ceiling. The spacing of the battens, shall not exceed 60 cm (about 2'). The battens shall be so arranged as to provide panels of uniform size or shape as far as possible.

The A. C. sheets shall be laid truly parallel or perpendicular to the walls and shall be fixed to the battens with iron screws. The joints shall be neat and close and the sheets shall not be forced up against one another. In case of a flat roof above, it may be necessary to suspend the ceiling of asbestos cement sheets with the help of iron rods of required lengths, fixed in and suspended from the R.C.C. slabs. The iron rods shall be paid for separately. If the item includes wooden beadings, they shall be provided with planed and woulded battens of finished size 45 mm×12 mm. Beads shall be fixed to the pattern shown in the drawings or as directed by the Engineer. Fixing of beadings shall be done with 5 cm screws. The spacing of screws shall not exceed 30 cm (12"). Overlap of beadings shall be mitred at junctions.

Bd. R. 16.4. *Finishing.*—The visible surface of the sheets of the ceilings, shall be painted with approved shade of oil paint in 2 coats. The beading shall be varnished or painted as directed by the Engineer.

Bd. R. 16.5. *Item to include.*—The rate for the item shall include all labour material, use of tools and scaffolding or ladder to carry out following operations:—

(1) Providing the plain A. C. Sheets and wooden batten if included in the item.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(2) Fixing the ceiling with framework and beadings of included in the wording of item including iron work cutting and waste.

(3) Finishing.

Bd. R. 16.6. *Mode of measurement and payment.*—The contract rate shall be per square metre of the net area covered by the ceiling. No extra measurement of overlaps if any shall be taken. The dimensions shall be measured correct up to 2 places of decimals of a metre and area worked out correct up to 2 places of decimals of sq. m

Bd. R. 17. *Providing and fixing false ceiling of Hardboard sheets mm. ( ") thick without/with framework of country teak wood batten including scaffolding if necessary, all iron work, painting and varnishing the wood work complete.*

Bd. R. 17.1. *General.*—The item refers to providing and fixing false ceiling of hardboards of approved manufacture, colour and design. The teak wood framework of battens shall be included if mentioned in the item. Otherwise it will be paid for separately. The specifications given for item Bd. R. 16 shall generally apply except that hardboard shall be used instead of A. C. sheets. The instructions of the manufacturers shall be followed in handing and fixing the boards.

Bd. R. 18. *Providing and fixing false ceiling of mm. ( ") thick boards of fibrous plaster of paris including scaffolding if necessary, framework of teak wood battens, all architectural work like mouldings, cornices, coves, domes, cups, etc., as per detailed drawings and painting complete (excluding runners and mild steel suspenders).*

Bd. R. 18.1. *General.*—The item refers to providings and fixing false ceiling of precast fibrous plaster of paris boards fixed on teak battens which is turn are fixed to teak wood runners, suspended from the roof with mild steel suspenders and fixed at required heights to the shapes and patterns shown in the detailed drawings.

Bd. R. 18.2. *Materials*—(1) *Boards of fibrous plaster of paris.*—These shall be manufactured out of plaster of paris of approved make with a thin layer of jute fibre in the centre of the board. The thickness of the boards shall be as given in the item. Unless other sizes are shown in the detailed drawings, the boards may generally be about 0.75 m×1.25 m (about 2′×5′) in size except for closers and for mouldings, domes, cups, etc. The flat, curved, moulded or other shapes of the boards shall be as per the detailed drawings.

(2) *Teak wood battens.*—The battens shall be of country teak wood conforming to A. 16 and shall be 75 mm×65 mm (3″×2½″) in size.

(3) *Screws.*—All iron and brass screws and iron clamps shall be of the standard commercial type and shall be approved by the Engineer.

Bd. R. 18.3. *Fixing.*—The ceiling shall be fixed in places and at levels and to shapes shown on the detailed drawings. The boards of plain rectangular or moulded or curved shapes like domes, cups, cornices shall be fixed in specified places as per drawings. The boards shall be fixed on to the teal. wood batten frame by means of brass screws. The screws shall be driven through drilled holes in the board face and sunk 3 mm (⅛″) for the heads at about 30 cm (12″) centres or as directed and the screws heads shall be hidden by spotting them with plaster of paris paste trowelled neatly and flush with wooden trowels. The joints between the boards shall be flush and filled with paste of plaster of paris or V notched or given any architectural treatment shown in the detailed drawings.

The battens to which the boards are fixed shall be fixed to teak wood runners by iron screws. The runners may be 1.2 metre (about 4′) centre to centre or as directed crosswise and will be supported from roof or slab with mild steel suspenders. The runners and suspenders shall be paid for separately and shall not be included in the item.

Bd. R. 18.4. *Finishing.*—The underside and visible surfaces of the boards shall be finished with 3 coats of spray painting in approved shade. The wood work shall be finished with one coat of solignum before fixing the boards.

Bd. R. 18.5. *Item to include.*—The rate for the item shall include all labour, materials, use of tools and scaffolding or ladders necessary for carrying out the following operations:—

(1) Supplying fibrous plaster of paris boards in shapes and sizes as required.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(2) Supplying teak wood batten and screws.

(3) Preparing and fixing the framework of battens and fixing the false ceiling including cutting and waste.

(4) Finishing.

Bd. R. 18.6. *Mode of measurement and payment.*—As for item Bd. R. 16. The measurement shall be taken flat (not girthed) ignoring, overlaping, mouldings, cornices, cups, etc.

Bd. R. 19. *Providing and fixing false ceiling of mm. ( ") thick accoustic boards of approved make with shape and sizes as per drawings including scaffolding if any, framework of teak battens, all screws and fastenings and finishing complete.*

Bd. R. 19.1. *General.*—The item refers to providing and fixing of false ceiling or accoustic boards, in required places, heights, and shapes as shown in the drawings or as directed by the Engineer.

Bd. R. 19.2. *Materials—Accoustic boards.*—These boards shall be of standard approved make. The thickness of the boards shall be as mentioned in the item. The sizes and shapes of the boards shall be as shown in the drawings.

Screws.—All brass and iron screws shall be of standard commercial type and shall be approved by the Engineer.

*Battens.*—The battens shall be country teakwood conforming to A. 16. The battens shall shall be 75 mm×65 mm (3"×2½") in size, unless other sizes are specified by the manufacturer and approved by the Engineer.

Other fixing materials shall be as per manufacturer's instructions:

Bd. R. 19.3. *Fixing and finishing.*—The teak battens and the runners shall be fixed and supported as for item Bd. R. 18. The boards shall be fixed to the battens as per manufacturer's instructions. The finishing of the false ceiling shall be also done as per manufacturer's instructions and specifications.

The teak wood runners and iron suspenders shall be paid for separately.

Bd. R. 19.4. *Item to include.*—The rate for the item shall include all labour, materials, use of tools and scaffolding or ladders if necessary to carry out the following operations:—

(1) Supplying the accoustic boards in required sizes and shapes and teak batten and fastening materials.

(2) Fixing the battens and ceiling cutting and waste.

(3) Finishing the false ceiling.

Bd. R. 19.5. *Mode of measurement and payment.*—As for item Bd. R. 16. Measurements shall be taken flat (not girthed) from end to end ignoring all overlaps, mouldings, etc.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. S. GLAZIER'S WORK


| ITEM NO. | ITEM | | PAGE |
|---|---|---|---|
| Bd. S. 1. | General | ... | 447 |
| Bd. S. 2. | Glass | ... | 447 |
| Bd. S. 3. | Putty | ... | 447 |
| Bd. S. 4. | Mastic | ... | 447 |
| Bd. S. 5. | Fixing | ... | 447 |
| Bd. S. 6. | Item to include | ... | 448 |
| Bd. S. 7. | Mode of measurement and payment | ... | 448 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. S. GLAZIER'S WORK

Bd. S. 1. *General.*—The specifications shall cover the glazier's work including the types of glasses, putty, methods of fixing the glass in wooden or steel frames, partitions, etc.

Bd. S. 2. *Glass.*—All glass shall be of the best quality, free from specks, bubbles, smokes, veins, air holes, blisters and other defects. The kind of glass supplied by the contractor shall be as mentioned in the item or in the special provisions or as shown on the detailed drawings. The thickness of glass panes shall be uniform. The specifications for different kinds of glasses shall be as under:

Bd. S. 2. 1. *Sheet Glass.*—This shall be patent flattened sheet glass of the best quality, weighing 7.5 kg. per sq. m. (about 24 oz/s.ft.) up to 60 cm.×60 cm. (about 24″×24″) panes. For panes larger than 60 cm.×60 cm. and up to 80 cm.×80 cm. (about 30″×30″) the glass weighing not less than 8.75 kg./sq. m. (about 28 oz./sq. ft.) shall be used. For bogger panes up to 90 cm.×90 cm. (about 36″×36″) glass weighing not less than 11.25 kg./sq. m. (about 36 oz./sq. ft.) shall be used. Sheet glass for glazing and framing purposes shall conform to I. S. 1761 ; 1960. Sheet glass of the specified colours shall be used if so shown on the detailed drawings or specified in the special provisions. For important buildings and for panes with any dimension of over 90 cm. (about 36″) plate glass of specified thickness shall be used.

Bd. S. 2. 2. *Plate glass.*—When plate glass is specified, it shall be "polished patent plate glass" of the best quality. It shall have both the surfaces ground flat and parallel and polished to obtain clear undistorted vision and reflection. The plate shall be of the thickness mentioned in the item, shown in the detailed drawings or specified in the special provisions. In the absence of any specified thickness, the thickness of plate glass to be supplied shall be 6 mm. (about ¼″). A tolerance of 0.55 to 0.80 mm. shall be admissible on the nominal thickness of polished plate glass.

Bd. S. 2.3. *Obscured glass.*—This type of glass transmits light so that the vision is partialy or almost completely obscured. Principal types are plain rolled or double rolled, figured, rolled, ribbed, fluted frosted glass on one or both sides and rough cast. The thickness and type shall be as mentioned in the item or special provisions or detailed drawings. The ribbed or fluted type of glass shall be used when more diffused types of lighting is desired than can be obtained with other types of obscured glass. The thickness and type of glass shall be as detailed on drawings or as specified in the special provisions and as directed by the Engineer.

Bd. S. 2. 4. *Wired Glass.*—In this type of glass, wire netting is embedded in a sheet or plate glass. Wire mesh is inserted during rolling. Electrically welded 13 mm. Georgian square mesh or 22 mm. hexagonal mesh is used. The thickness of glass shall not be less than 6 mm. (about ¼″). Two varieties are:—

(1) cast wired which is a transparent wired glass and

(2) polished wired which is a transparent wired glass with both surfaces ground and polished.

Bd. S. 2. 5. *Glass Blocks.*—These may also be called glass bricks. These are used in glass brick panels. These are hollow glass blocks formed by fusing together two halves of pressed glass and partially evacuated. The sizes of the bricks may be 15 cm., 20 cm. and 30 cm. square and approximately 10 cm. thick or as shown on the drawings or as specified in the special provisions. The glass bricks shall be of approved make like those of Pilkington.

Ribs, flutes or prisms shall be cast on one or both of the blocks if specified in the special provisions for obscruing the glass and to diffuse light.

Bd. S. 3. *Putty.*—The putty to be used for fixing the glass in wooden frames shall conform to I. S. 419-1967.

The putty may be coloured to suit the colour of door or window, etc. For glazing in metal sashes, putty to be used shall conform to I.S. 420-1953.

Bd. S. 4. *Mastic.*—For glazing in metal sashes, patent mastic shall be used instead of putty, when so specified in the special provisions or directed by the Engineer. Glass bricks shall be laid in mastic specified by the manufacturers of glass blocks or in 1:3 cement mortar if so specified in the special provisions.

Bd. S. 5. *Fixing.*

A. *In Wooden frames and sashes.*—The glass panes shall be properly cut to fit the rebates of the frames and sashes truly with a slight minus margin of about 1.5 mm. (about 1/16″) on all sides. The rebates should not be less than 8 mm. (about ⅓″) in the frames and

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



sashes. Before glazing, the frames shall be primed and prepared for painting so that the wood may not draw oil out of the putty and the putty may adhere properly. The rebate shall be puttied first and glass pane is then pressed into position and secured with glazier's sprigs and firmly back puttied. The rebates shall be neatly chamfered. The putty may be given a coat of oil paint or oil to match the side surface and also seal the edges of the putty to the glass. The putty shall be left for a week or so before painting to ensure its setting.

When so specified, for better class of work and larger panes of glass, the glass shall be bedded in putty and fitted to the frames with wooden beads or mouldings and secured with brass countersunk or round headed screws or with brass screws and cups. For fixing plate glass or large sheets of glass, the glass shall be embedded in putty externally, but internally, wash leather, valvet, felt, rubber or some similar material approved by the Engineer shall be used before fixing the beads.

Where dry glazing is specified, the glass shall be held in place by moulded wooden fillets fixed with brass screws. Round the end of the glass and between it and wooden fillets, a piece of chamois or wash leather shall be inserted to act as a cushion.

The mode of fixing shall be specified in the special provisions. If not so specified, panes up to 0.25 sq. m. shall be fixed without beads and larger panes shall be fixed with the use of wooden beads. Unless otherwise specified, all plate glass exceeding 0.5 sq. m. in area shall be fixed with the use of wash leather, felt, velvet, etc., and beads.

B. *In metal frames.*—The glazing in metal frames shall be done more or less in the same way as in wooden frames but the putty shall contain a hardening agent like litharge or a patent mastic shall be used as directed by the Engineer, since there will be no absorption of oil as in the case of wooden frames.

Glazing in metal frames shall be done generally as specified in I.S. 1081-1960.

C. *Glass crete.*—In glass brick panelling, also called glass-crete work, the glass bricks shall be fixed in the required places in brick, stone or R. C. framework. Glass blocks shall be fixed in mastic in the manner specified by the patentee. The glass blocks may also be fixed in cement mortar 1:3 if so specified in the special provisions. A strong bond shall be provided in the glass brick panelling and the side walls.

No glazing shall be considered complete until all stains have been removed from the surface of glass and wood work or metal frame. The contractor shall make good any glass broken by his work people while fixing or cleaning. All doors and windows shall be cleaned, all damaged putty or glazing shall be repaired and the whole left perfect on the completion of the work.

Bd. S. 6. *Item to include.*—If the glazier's work is an independent item of work or forms a sub-item combined with any other item of work, the glazing rate shall include the following:—

(1) Providing the specified type of glass panes of the required dimensions and fixing material.

(2) Fixing the glass in the frame as specified, including cutting and waste.

(3) Cleaning the glazed work.

(4) Repairing of any work damaged during glazing.

(5) All labour, material, scaffolding and equipment to carry out the item.

Bd. S. 7. *Mode of measurement and payment.*—If glazier's work is not combined with any other item of work, and is to be paid independently, the contract rate shall be per square metre of glazed area fixed and completed in all respects. The panes shall be measured net from rebate to rebate. Each pane of glass shall be measured to the nearest 0.5 cm. both in width and height. The curved or irregularly shaped pieces shall be measured net. The area of each pane shall be worked out correct up to 2 places of decimals of a square metre and the areas of each class of glazing shall be worked out separately.

When glazing is included in a composite item of glazing and framework, no separate measurements for glazier's work shall be taken. The composite item for glazing and framework will be paid for separately at an inclusive rate.

The glass brick pancelling shall be measured net between the framework. The dimensions shall be measured correct to two places of decimals of a metre and the area calculated correct to two places of decimals of a square metre. The brick, stone, or R. C. C. framework shall be measured and paid separately.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. T. DOORS, WINDOWS, VENTILATORS AND PARTITIONS

*List of items for Doors, Windows, ventilators and Partitions*


| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 1. | Providing and fixing Burmah/superior Indian teakwood frame 70 mm.×95 mm. for first class doors and windows without/with ventilator including all mouldings, rebating, holdfast and finishing with oil paint/french polish/varnish complete ... | 457 |
| Bd. T. 2. | Providing and fixing country teak wood/jungle wood (—— species) frame 70 mm.×95 mm. for second class doors and windows including chamfering/rounding, rebating, and holdfast and finishing with oil painting/oiling complete ... | 458 |
| Bd. T. 3. | Providing and fixing superior Indian teak wood first class fully glazed/panelled ventilators or clerestorey window/fanlights curved/rectangular in shape as per drawings including the frame, brass fixtures and fastenings and finishing the wood work with french polish/oil paint (*a*) without mild steel bars (*b*) with mild steel bars finished with approved oil paint ... | 458 |
| Bd. T. 4. | Providing and fiixing country teak wood 2nd class fully glazed/panelled ventilator or clerestorey window or fanlight, curved/rectangular in shape as per detailed drawings including the frame, iron fixtures and fastenings and finishing the wood work with oiling/oill painting (*a*) without mild steel bars (*b*) with mild steel bars finished with approved oil paint ... | 459 |
| Bd. T. 5. | Providing and fixing Burmah/superior Indian teak wood double leaf, 1st class, fully panelled door, without/with pannelled/glazed ventilator/fanlight, without/with iron bars as per detailed drawings, including the door frame, brass oxidised bars fixtures and fastenings without/with mortise lock and finishing the wood work with french polish/varnish/oil paint and iron bars with oil paint ... | 460 |
| Bd. T. 6. | Providing and fixing Burmah/superior Indian teak wood single leaf 1st class fully panelled door without/with panelled glazed ventilator/fanlight without/with iron bars as per detailed drawings including the door frame, oxidised brass/brass fixtures and fastenings without/with mortise lock and finishing the wood work with french polish/varnish/oil paint and finishing the iron work with oil paint ... | 461 |
| Bd. T. 7. | Providing and fixing country teak wood double leaf 2nd class fully panelled door without/with panelled/glazed ventilator/fanlight without/with iron bars as per detailed drawings, including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and finishing the iron bars with oil paint ... | 461 |
| Bd. T. 8. | Providing and fixing country teak wood single leaf 2nd class fully panelled door without/with panelled/glazed ventilator/fanlight, without/with iron bars as per detailed drawings, including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and mild steel bar with oil paint ... | 462 |
| Bd. T. 9. | Providing and fixing Burmah/superior Indian teak wood double leaf 1st class partly panelled and partly glazed door without/with glazed fanlight or ventilator as per detailed drawings, including the door frame, brass/oxidised brass fixtures and fastenings and finishing the wood work, with french polish/varnish/oil paint complete ... | 462 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 10. | Providing and fixing Burmah/superior Indian teak wood single leaf 1st class partly panelled and partly glazed door without/with glazed fanlight/ventilator as per detailed drawings, including the door frame, brass/oxidised brass fixtures and fastenings, finishing the wood work with french polish/varnish/oil paint complete ... | 462 |
| Bd. T. 11. | Providing and fixing country teak wood double leaf 2nd class partly panelled and partly glazed door without/with glazed ventilator/fanlight, as per detailed drawings, including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting complete ... | 462 |
| Bd. T. 12. | Providing and fixing country teak wood single leaf 2nd class partly panelled and partly glazed door without/with glazed ventilator/fanlight as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting ... | 463 |
| Bd. T. 13. | Providing and fixing Burmah/superior Indian teak wood double leaf 1st class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, brass/oxidised brass, fixtures and fastenings and finishing the wood work with french polish/varnish/oil paint and iron bars with oil paint ... | 463 |
| Bd. T. 14. | Providing and fixing Burmah/superior Indian teak wood single leaf 1st class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings, including the door frame, brass/oxidised brass fixtures and fastenings and finishing the wood work with french polish/varnish/oil paint and finishing the iron bars with oil paint ... | 463 |
| Bd. T. 15. | Providing and fixing country teak wood double leaf 2nd class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings, finishing the wood work with oiling/oil painting and finishing the iron bars with oil paint ... | 463 |
| Bd. T. 16. | Providing and fixing country teak wood single leaf 2nd class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and the iron bars with oil paint ... | 464 |
| Bd. T. 17. | Providing and fixing country teak wood double leaf, battened ledged and braced door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete ... | 464 |
| Bd. T. 18. | Providing and fixing country teak wood single leaf battened, ledged and braced door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil pointing complete ... | 464 |




अनुक्रमणिका
Table of Contents

| ITEM No. | ITEM | PAGES |
|---|---|---|
| Bd. T. 19. | Providing and fixing country T. W. double leaf battened, framed and braced door without/with ventilator without/ with iron bars as per detailed drawings including the door frame, iron fixtures and fastening and finishing with oiling/ oil painting complete ... | 465 |
| Bd. T. 20. | Providing and fixing country teak wood single leaf framed, battened and braced door without/with ventilator without/ with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/ oil painting complete ... | 465 |
| Bd. T. 21. | Providing and fixing country teak wood double leaf plain planked door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete ... | 465 |
| Bd. T. 22. | Providing and fixing country teak wood single leaf plain planked door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete ... | 466 |
| Bd. T. 23. | Providing and fixing country teak wood double leaf second class false panelled door without/with ventilator without/ with iron bars as per detailed drawings including the door frame, iron fixtures and finishing with oiling/oil painting complete ... | 466 |
| Bd. T. 24. | Providing and fixing country teak wood single leaf, second class false penelled door without/with ventilator without/ with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting ... | 466 |
| Bd. T. 25. | Providing and fixing Burmah/superior Indian teak wood single/ double swing shutters full size, fully panelled as per detailed drawings including the door frame, double acting steel/brass spring hinges, brass oxidised/electroplated fixtures and fastenings and finishing with french-polish/varnish complete ... | 467 |
| Bd. T. 26. | Providing and fixing Burmah/Superior Indian teak wood single/ double swing shutters full size panelled and glazed as per detailed drawings including the door frame, double acting steel/brass spring hinges, brass oxidised/electroplated fixtures and fastenings and finishing with french-polish/varnish complete ... | 467 |
| Bd. T. 27. | Providing and fixing Burmah/superior Indian teak wood single/ double swing shutters, part size, panelled as per detailed drawings including double acting steel/brass spring hinges and finishing with french-polish/varnish complete (exclusive of the cost of door frame) ... | 467 |
| Bd. T. 28. | Providing and fixing Burmah/superior Indian teak wood single/ double swing shutters, part size, glazed with obscured glass as per detailed drawings or as approved, including double acting steel/brass spring hinges and finishing with french-polish/varnish complete (exclusive of the cost of door frame) ... | 468 |
| Bd. T. 29. | Providing and fixing country teak wood single/double swing shutters, part size, framed and panelled with galvanised iron asbestos cement/plywood sheets as per detailed drawings or as directed, including steel double acting spring hinges and finishing with oiling/oil painting complete (exclusive of the cost of door frame) ... | 468 |

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 30. | Providing and fixing double leaf door with country teak wood/ jungle wood (——species), frame and country teakwood jungle wood shutters with galvanised iron asbestos/plywood sheet panels as per detailed drawings including iron fixtures and fastenings and finishing with oiling/oil painting complete | 468 |
| Bd. T. 31. | Providing and fixing single leaf door, with country teak wood/ jungle wood (—species) frame and country teak wood/jungle wood (—species) with galvanised iron asbestos cement/plywood sheet panels as per detailed drawings, including iron fixtures and fastenings oiling/oil painting complete ... | 469 |
| Bd. T. 32. | Providing and fixing country teak wood double leaf second class door with flyproof galvanised iron wire gauge shutters inside in combination with battened, ledged and braced/ battened, framed and braced/plain planked shutters outside including the door frame, iron fixtures and fastenings, finishing with oiling/oil painting complete ... | 469 |
| Bd. T. 33. | Providing and fixing country teak wood single leaf second class door with flyproof galvanised iron wire gauze shutters inside in combination with battened, ledged and braced/ battened, framed and braced/plain planked shutters outside including the door frame, iron fixtures and fastenings, finishing with oiling/oil painting complete ... | 469 |
| Bd. T. 34. | Providing and fixing solid core flush door in single leaf ...mm. (.....") thick, decorative type, of exterior/interior grade, as per detailed drawings including Burmah/superior Indian teak wood door frame, approved face veneers on both faces with/ without glazing and venetians in the positions shown on the drawings or as directed, all necessary beads, mouldings and lipping, wrought iron holdfasts, chromium plated fixtures and fastenings, without/with brass mortise lock, chromium plated handles on both sides and finishing with french-polish/ waxing complete ... | 469 |
| Bd. T. 35. | Providing and fixing solid core flush door shutters in double leaves .....mm. (.....") thick, decorative type, of exterior/ interior grade, as per detailed drawings, including Burmah/ superior Indian teak wood door frame, approved face veneers on both sides, without/with glazing and venetians in the positions shown on the drawings or as directed, all necessary beads, mouldings and lipping, wrought iron holdfasts, chromium plated fixtures and fastenings, without/with brass mortise lock, chromium plated handles on both sides and finishing with french-polish/waxing complete ... | 470 |
| Bd. T. 36. | Providing and fixing cellular/hollow core flush door in single leaf .....mm. (about .....") thick commercial type of exterior/ interior grade as per detailed drawings including country teak wood frame, approved commercial plywood facing wrought iron holdfasts, oxidised iron fixtures and fastenings, and handles on both sides and finishing with spray-paint/oil-paint complete ... | 470 |
| Bd. T. 37. | Providing and fixing cellular/hollow core flush door in double leaves, .....mm. (about .....") thick commercial type of exterior/interior grade as per detailed drawings including country teak wood frame, approved commercial plywood facing, wrought iron holdfasts, oxidised iron fixtures and fastenings and handles on both sides and finishing with spray-paint/ oil-paint complete ... | 471 |


अनुक्रमणिका
Table of Contents

| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 38. | Providing and fixing country teak wood double leaf door with expanded metal shutters with —— cm. × —— cm. × —— mm. XPM corresponding to I.S. No. ..... mesh as per detailed drawings or as directed including the door frame, iron fixtures and fastenings, finishing with two coats of oil-paint/oiling complete ... | 471 |
| Bd. T. 39. | Providing and fixing country teak wood single leaf door with expanded metal shutters with —— cm. × —— cm. × —— mm. XPM corresponding to I.S. No. ..... mesh as per detailed drawings or as directed including the door frame, iron fixtures and fastenings, finishing with two coats of oil-paint/ oiling complete ... | 471 |
| Bd. T. 40. | Providing and fixing country teak wood double leaf door with 20 mm./25 mm. diameter round or 20 mm. square iron bars at 10 mm./15 mm. centres in shutters as per drawings or as directed including the teak wood frame, iron fixtures and fastenings and finishing with oiling/oil-paint complete ... | 472 |
| Bd. T. 41. | Providing and fixing Burmah/superior Indian teak wood double leaf first class window with plain/obscured glass shutters, without/with ventilator or fanlight, as per detailed drawings including the teak wood window frame, brass oxidised brass fixtures and fastenings and finishing the wood work with oil-paint/varnish or french polish (*a*) without mild steel bars (*b*) with mild steel bars without/with central wooden member/ mild steel flat and finished with oil-paint ... | 472 |
| Bd. T. 42. | Providing and fixing country teak wood double leaf second class window with plain-obscured glazed shutters without/with ventilator or fanlight as per detailed drawings including the teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil-painting/oiling complete, (*a*) without/with mild steel bars (*b*) with mild steel bars without/with central wooden member/mild steel flat and finished with oil-paint ... | 473 |
| Bd. T. 43. | Providing and fixing country teak wood window with double planked shutters without/with ventilators as per detailed drawings including teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil-paint/ oiling complete, (*a*) without mild steel bars, (*b*) with mild steel bars without/with central wooden member/mild steel flat finished with oil-paint ... | 473 |
| Bd. T. 44. | Providing and fixing Burmah/superior Indian teak wood window first class with double leaf glazed shutters on the inside and double leaf fully panelled/fully venetianed teak wood shutters on the outside without/with ventilator or fanlight as per detailed drawings including teak wood window frame, brass/oxidised brass fixtures and fastenings and finishing the wood work with oil-paint/varnish/french polish (*a*) without mild steel bars, (*b*) with mild steel bars, without/ with central wooden member/mild steel flat and finished with oil-paint ... | 474 |
| Bd. T. 45. | Providing and fixing country teak wood window second class with double leaf glazed shutters on the inside and double leaf fully panelled/fully venetianed/plain planked teak wood shutters on the outside without/with ventilator or fanlight as per detailed drawings including teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil-paint/oiling complete, (*a*) without mild steel bars (b) with mild steel bars, without/with central wooden member/mild steel flat and finished with oil-paint ... | 474 |

| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 46. | Providing and fixing country teak wood window second class with double leaf galvanised iron wire gauge shutters on the inside and double leaf fully panelled/plain planked shutters on the outside without/with ventilator or fanlight as per detailed drawings including the teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil-paint/oiling (*a*) without mild steel bars (*b*) with mild steel bars without/with central wooden member/mild steel flat and finished with oil-paint ... | 475 |
| Bd. T. 47. | Providing and fixing Burmah/superior Indian teak wood first class fully venetianed window as per detailed drawings including the frame and shutters, brass/oxidised brass fixtures and fastenings and finishing the wood work with oil-paint/ varnish/french polish (*a*) without mild steel bars (*b*) with mild steel bars without/with central wooden member/mild steel flat, and finished with oil-paint ... | 476 |
| Bd. T. 48. | Providing and fixing country teak wood fully venetianed second class windows, as per detailed drawings including the country teak wood window frame and venetianed shutters, iron fixtures and fastenings and finishing the wood work with oil-paint/ oiling (*a*) without mild steel bars (*b*) with mild steel bars without/with central wooden member/mild steel flats and finished with oil-paint ... | 476 |
| Bd. T. 49. | Providing and fixing country teak wood window with galvanised iron wire gauge double leaf shutters including the country teak wood window frame, iron fixtures and fastening and finishing the wood work with oil-paint/oiling (*a*) without mild steel bars (*b*) with mild steel bars without/with central wooden member/mild steel flat and finished with oil-paint | 476 |
| Bd. T. 50. | Providing and fixing country teak wood window with double leaf shutters inserted with expanded metal including the frame, iron fixtures and fastenings oil-paint/oiling the wood work and oil-painting the expended metal ... | 476 |
| Bd. T. 51. | Providing and fixing Burmah/superior Indian teak wood first class window with fixed venetians including the window frame varnishing/oil-painting complete ... | 477 |
| Bd. T. 52. | Providing and fixing Burmah/superior Indian teak wood louvered window with teak wood frame and glass louvers of approved quality with mild steel bars between the louvers including finishing the wood work with varnish/oil-paint and iron bars with oil-paint ... | 477 |
| Bd. T. 53. | Providing and fixing steel window of various sizes as per detailed drawings without/with hot dip zinc coating without/ with ventilators including fabrication, glazing with non-acetinic/plain obscured glass panes of approved type and quality, all fixtures and fastenings without/with teak wood boxing and architraves and finishing with oil-painting complete ... | 477 |
| Bd. T. 54. | Providing and fixing steel doors of various sizes as per detailed drawings without/with hot dip zinc coating without/with ventilators including fabrication, glazing with non-acetinic/ plain/obscured glass panes of approved type and quality, kick plates all fixtures and fastenings, without/with teak wood boxing and architraves, and finishing with oil-painting complete ... | 478 |

| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 55. | Providing and fixing rolling steel shutters fabricated from 18/20 gauge steel laths with side guides, bottom rail, brackets, door suspension shaft, rolling springs, locking arrangement and housing box of the top including painting complete ... | 478 |
| Bd. T. 56. | Providing and fixing rolling steel shutter fabricated from 18/20 gauge steel laths with side guides, bottom rail, brackets, door suspension shaft, housing box at the top including mechanical gear operation arrangement and painting complete ... | 479 |
| Bd. T. 57. | Providing and fixing collapsible steel gates in one/two leaves, with channel pickets, pivoted flat bars, including top and bottom guides, rollers, stoppers, handles, all fitting accessories, locking arrangement and painting complete ... | 479 |
| Bd. T. 58. | Providing and fixing Burmah/superior Indian teak wood, first class, fully panelled partition .....mm. thick with frame work of .....mm.×.....mm. verticals at .....cm. centres and .....mm.×.....mm. horizontals at .....cm. centres including all mouldings or ornamental work as shown on drawings and finishing the wood work with varnish/french-polish/oil-paint complete ... | 480 |
| Bd. T. 59. | Providing and fixing Burmah/superior Indian teak wood first class partly panelled and partly glazed partition×.....mm. thick with frame work of .....mm.×.....mm. verticals at .....cm. centres and .....mm.×.....mm. horizontals, at..... cm. centres or as shown on detailed drawings, including all mouldings and ornamental work and finishing the wood work with varnish/french polish/oil paint complete ... | 480 |
| Bd. T. 60. | Providing and fixing country teak wood second class, fully panelled partition .....mm. thick with frame work of .....mm. ×..... mm. verticals, at ..... cm. centres, and ..... mm.× ..... mm. horizontals at ..... cm. centres as per detailed drawings including finishing the wood work with oiling/oil painting complete ... | 481 |
| Bd. T. 61. | Providing and fixing partition of asbestos cement sheets of approved make and ..... mm. thick with country teak wood/ jungle wood (—— species), frame of ..... mm.×..... mm. verticals at ..... cm. centres and ..... mm.× ..... mm. horizontals at ..... cm. centres in regular panels including applying oil paint of approved colour to the asbestos cement sheets and oiling/oil painting the wood work complete ... | 481 |
| Bd. T. 62. | Providing and fixing partition of country teak wood/jungle wood (—— species) planks, ..... mm. thick as per detailed drawings including the teak wood/jungle wood frame of ..... mm.×..... mm. verticals at ..... cm. centres and ..... mm. ×..... mm. horizontals at ..... cm. centres or as shown on the drawings and finishing with oiling/oil paint complete ... | 482 |
| Bd. T. 63. | Providing and fixing partition of ..... mm. thick masonite facing of approved colour and shade on one side/both sides on country teak wood/jungle wood (——species) frame of ..... mm.×..... mm. verticals at ..... cm. centres and ..... mm.×..... mm. horizontals at ..... cm. centres including all mouldings or ornamental work shown in the drawings and french polishing ... | 482 |
| Bd. T. 64. | Providing and fixing partition of canvas facing on one side/ both sides of country teak wood/jungle wood (—— species) frame of ..... mm.×..... mm. verticals at ..... mm. centres and ..... mm.×..... mm. horizontals at ..... cm. centres or as per detailed drawings including applying oil paint of approved colour to the canvas and oil painting/oiling the wood work complete ... | 482 |

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd. T. 65. | Providing and fixing partition of plain/corrugated galvanised iron sheets of 1.22 mm. thick (18 B. W. G.) on country teak wood/jungle wood (—— species) frame of ..... mm.×..... mm. verticals at ..... cm. centres and ..... mm.×..... mm. horizontals at ..... cm. centres as per detailed drawings including oil painting/oiling the wood work ... | 482 |
| Bd. T. 66. | Providing and fixing partition of country teak wood/jungle wood (—— species) two way trellis work with battens or laths of 25 mm.×12 mm./40 mm.×12 mm. including frame of vertical and horizontal scantlings and finished with oil paint/ oiling complete ... | 483 |
| Bd. T. 67. | Providing and fixing partition of hoop iron trellis work including country teak wood/jungle wood (—— species) frame of vertical and horizontal scantlings and finishing with oil paint complete ... | 483 |
| Bd. T. 68. | Providing and fixing partition faced with 3/5/7 ply 6 mm. ($\frac{1}{4}$") thick Burmah/superior Indian teak veneers on both sides including necessary country teak wood frame work including french polishing/varnishing, the face veneers complete, (*a*) without skirting, (*b*) with superior Indian teak wood skirting with beading/mouldings as directed ... | 483 |
| Bd. T. 69. | Providing and fixing country teak wood/jungle wood ,..... species), door with double leaf shutters of two way trellies work with battens of ..... mm.×..... mm. (....."×.....") including 80 mm.×50 mm. door frame, iron fixtures and fastening and finishing the wood work with oiling/oil painting complete ... | 484 |
| Bd. T. 70. | Providing and fixing country teak wood/jungle wood (—— species), door with single leaf shutter of two way trellis work with battens of ..... mm.×..... mm. (....."×.....") size including the door frame, iron fixtures and fastenings and finishing wood work with oiling/oil painting complete ... | 485 |
| Bd. T. 71. | Providing and fixing country teak wood/jungle wood (——— species) door, with double leaf shutters of two way trellis work of hoop iron as per drawings approved by the Engineer including the door frame, iron fixtures and fastenings, and finishing with oil painting complete ... | 485 |
| Bd. T. 72. | Providing and fixing country teak wood/jungle wood ,..... species) door with single leaf shutter of two way trellis work of hoop iron as per detailed drawings approved by the Engineer including the door frame, iron fixtures and fastenings and finishing with oil painting complete ... | 485 |
| Bd. T. 73. | Providing and fixing straight run single track sliding door with plain planked shutters in two leaves as per detailed drawings, including iron fixtures and fastenings, cast iron rollers at the bottom/top hung on a steel back at the top and channel guide at the bottom, oiling/oil painting the wood work and oiling the rollers or wheels and the track complete ... | 485 |
| Bd. T. 74. | Providing and fixing straight run single track, sliding door with corrugated galvanised iron shutters with angle iron frame in two leaves as per detailed drawings including iron fixtures and fastenings, cast iron rollers at the bottom/top hung on a steel track at the top and channel guide at the bottom, oil painting the frame work and oiling the roller or wheels and the track complete ... | 486 |
| Bd. T. 75. | Providing and fixing country teak wood door with folding shutters plain planked/fully panelled second class as per detailed drawings including the door frame, iron fixutures and fastenings, oiling/oil painting the door complete ... | 486 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. T. DOORS, WINDOWS, VENTILATORS AND PARTITIONS

The wood work involved in the items under Doors, Windows, Ventilators and Partitions shall also satisfy the General requirements specified under Bd. Q. General wood work.

Fixtures and fastenings other than those provided in the specifications shall be included in the special provisions.

The relevant standard tables referred to are attached to these specifications.

Bd. T. 1. *Providing and fixing Burmah/superior Indian teak wood frame 70 mm.×95 mm. for 1st class doors and windows without/with ventilator including all mouldings, rebating, holdfast and finishing with oil-paint/french polishing/varnishing complete.*

Bd. T. 1. 1. *General.*—The item refers to preparation, supply and fixing of door or window frames of Burmah or superior Indian teak wood as mentioned in the item. The door/window sizes shown in the drawings shall be the clear unrebated openings of the frame. The frames shall be finished as specified in the wording of the item.

Bd. T. 1. 2. *Materials.*

Bd. T. 1. 2. 1. *Timber.*—Timber used shall be as mentioned in the item Burmah teak or superior Indian teak wood from Dandeli, Bulsar, Ballarshah, etc., and shall conform to A. 16.

Bd. T. 1. 2. 2. *Holdfasts.*—Three holdfasts shall be fixed to each post of the door frame and two to each post of the window frame. The iron holdfasts shall be of the size 30 cm. × 40 mm. × 5 mm. of the ⌙ form and each shall have two holes drilled in for fixing screws. *Each holdfasts shall be fixed with two long screws.*

Bd. T. 1. 3. *Construction.*—The item shall be carried out in conformity with I.S. 1003-1966, regarding material, construction and workmanship, finished dimensions of components being entirely as per clause 6 therein and as specified in the table attached unless otherwise shown on the detailed drawings. When ventilator is included, it shall be provided by having full length one piece posts for door or window and ventilator extending the frame on top of the head to the required extent. The unrebated edges of the frame in the opening shall be rounded or beaded uniformly unless other types of mouldings are shown on the drawings. Horns in heads and sills shall be 15 cm. long. When no sills are provided the vertical posts of the frame in the ground floor shall be embedded in the sill masonry for 10 cm. On upper floors the vertical posts shall be fixed in the floor slab or masonry by forming notches 1 cm. deep. Holdfasts shall be fixed as indicated in para. 7 of I.S. 1003-1966 with iron screws. Any slight adjustment of spacing necessary shall be done to have the holdfasts in the joints of masonry courses. The frames shall be erected in position and held plumb with strong supports from both sides and built in solid in masonry as it is being built. The shutters shall be fixed later.

Bd. T. 1. 4. *Finishing.*—The joints of the frame with the wall shall be made neatly with pointing or plaster as the case may be to fit into the groove left in the frame for the purpose. The exposed frame shall be finished as mentioned in the item with one coat of primer and 2 coats of oil paint of approved colour and shade as specified in B. 21.b. or with french polishing/varnishing as specified in Bd. N. When the frame is combined with shutters in one item, the frame shall have the same finish as the shutters. All parts of wood work resting on or set in masonry shall be well painted with 2 coats of hot boiling tar as specified in Bd. N.

If the frames are likely to be damaged by sun, rain or negligence of workmen they shall be suitably protected.

Bd. T. 1. 5. *Item to include.*—The rate shall include all labour, materials and equipment necessary to carry out the following operations:—

(1) Supply of the timber scantlings of the specified species of wood and of required dimensions and accessories such as holdfasts.

(2) Preparing the frame to the specified dimensions, shape, workmanship and fixing the frames including holdfasts in the work in the correct position as specified above.

(3) Finishing the wood work and joints with masonry as specified above.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.T.3.2.3.**

Bd. T. 1. 6. *Mode of measurement and payment.*—The contract rate shall be for a unit of one cubic metre of the wood work. The dimensions given in the relevant table and in I.S. 1003-1966 are the finished ones and no minus tolerance shall be permitted for planning etc. The length shall be measured correct up to a cm. and sectional measurements up to 2 mm. For moulding and roundings, the dimensions shall be measured for the least rectangle from which the mouding or rounding could be cut. The length of tenons, horns shall be added. The dimensions to be measured shall be limited to those shown in the drawings or directed by the Engineer. The total quantity shall be worked out correct up to three places of decimals of a cubic metre.

Bd. T. 2. *Providing and fixing country teak wood/jungle wood (———species) frame 70 mm.×95 mm. for 2nd class doors and windows without/with ventilator frame including chamfering rounding, rabating, holdfasts and finishing with oil painting/oiling complete.*

Bd. T. 2. 1. *General.*—The item refers to preparation, supply and fixing of door or window frames of country teak wood or jungle wood, as mentioned in the item. All the specifications for item Bd. T. 1, shall apply except that country teak wood or Jungle wood as specified in the item and approved by the Engineer shall be used instead of superior teak wood.

Bd. T. 3. *Providing and fixing superior Indian teak wood first class fully glazed/panelled ventilators or clerestorey window/fanlights, curved/rectangular in shape as per drawings including the frame, brass fixtures and fastenings and finishing the wood work with french polish/varnish/oil paint—*

*(a) without mild steel bars.*

*(b) with mild steel bars finished with approved oil paint.*

Bd T. 3. 1. *General.*—The item shall be carried out as per I. S. 1003-1966 for the requirements of material, construction, workmanship, equipment and sizes (unless otherwise specified) of ventilators subject to the following:—

Bd. T. 3. 2. *Materials*:

Bd. T. 3. 2. 1. *Timber.*—Timber shall be superior Indian teak from Dandeli, Bulsar or Ballarshah conforming to A. 16.

Bd. T. 3. 2. 2. *Holdfasts.*—According to Bd. T. 1. 2. 2. for window frames. When horns are provided in the sill and top, no holdfasts need be provided.

Bd. T. 3. 2. 3. *Fixtures and fastenings.*—All fixtures and fastenings shall be of brass or oxidised brass and shall be new sound and strong. They shall be sectional and of the best quality and workmanship. The size, shape, design and finish shall be as shown on drawings or as directed by the Engineer. Samples of all fixtures and fastenings to be used shall be got approved by the Engineer and deposited in his office for reference.

All the fixtures shall be fixed to the joinery in a secure and efficient manner. Any of the fixtures damaged during fixing shall be removed and new ones fixed in their place and the surface of joinery made good where affected, at the contractor's expense. When the type is not mentioned on the drawings or the item it shall be hung or swung as directed by the Engineer. In case the ventilator is hung. 2 brass 9 cm. butt hinges conforming to I.S. 205—1966 shall be fixed with brass screws. A pair of 25 cm. brass hooks and eyes shall be fixed to the ventilator frame and the shutter as directed. The hooks and eyes shall be as per I.S. 207-1964. If the detailed drawings specify different types of fixtures the work shall be carried out according to the drawings.

If the ventilator is of the swing type, then hooks and eyes can be dispensed with. The ventilator shall swing about a central horizontal axis of a pair of brass pivots in sockets. One pair of such centres, cleat hooks, one brass ring with screw attachment as per detailed drawings or directed by the Engineer and a good quality window hemp cord of adequate length for convenient operation of the ventilator shall be provided. A two pronged brass hook shall be embedded in the wall at a height of 2 mm. above floor level for tying the cord. All the fixtures shall be fixed as shown on the drawings or as directed by the Engineer.

For iron barred clerestorey windows mild steel bars shall be of 16 mm. diameter or as shown in drawings.

The finishing shall be done as per instructions of the Engineer.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. T. 3. 3. *Construction.*—The frame of ventilator shall be provided and fixed as specified in item Bd. T. 1. Finished sizes of components of ventilators shall be as given in the standard tables and drawings unless otherwise shown on the detailed drawings. The styles, rails and sash bars shall be moulded as shown in the drawings or as directed. When bars are to be provided 16 mm. mild steel bars shall be fixed in the ventilators 10 cm. centre to centre in mild steel flats 40 mm.×6 mm. after drilling holes in the latter. The diameter and spacing of these bars shall be as mentioned above unless otherwise shown on the drawings. The bars shall be fixed horizontal when the shutter is fixed on the pivots in the side posts of the frame and vertical when the shutter is hung on the horizontal member of the frame. The bars shall be passed through holes drilled into the mild steel flats 40 mm.× 6 mm. fixed in the recess in the frames. The flats shall be fixed with iron screws.

Bd. T. 3. 4. a. *Glazing.*—The glazing shall be in approved panels. The glass to be used shall be as specified on the detailed drawings. When not so specified 7.50 kg./sq. m. (24 oz./per sft.) glass plain or obscured as directed shall be used. The glazing shall be carried out as specified in Bd. S. and also as per clause 9 of I. S. 1003-1966.

Bd. T. 3. 4. b. *Panellings.*—When panelling is to be provided it shall be done according to Bd. T. 5., panels being adjusted to suit the size of the ventilator.

Bd. T. 3. 5. *Fanlight.*—The difference between the fanlight and the glazed ventilator mentioned in this specification is that instead of providing a moving shutter the whole opening of the fanlight is glazed in a fixed frame and thus fixtures and fastenings required for its movement are eliminated.

Bd. T. 3. 6. *Finishing.*—The wood work shall be finished as per Bd. T. 1.-4. The wood work of the leaf shall be finished similar to the frame. Iron bars, if provided shall be finished with 2 coats of paint of approved colour and shade over a priming coat of red lead as in B. 21. a.

Bd. T. 3. 7. *Item to include.*—The rate shall include all labour, material and equipment, necessary to carry out the following operations:—

(1) Supplying the required scantlings of teak wood for the frames and shutters and glass panes and fixtures and fastenings.

(2) Preparing the frame, shutter with necessary fixtures and fastenings, etc., and fixing as specified above.

(3) Finishing the wood work and joints with masonry.

(4) Providing, fixing and finishing mild steel bars if so specified.

Bd. T. 3. 8. *Mode of measurement and payment.*—The contract rate shall be per square metre of the ventilator measured for its clear unrebated opening of the frame. The linear dimensions shall be measured currect up to one centimetre and the area worked out correct up to three places of decimals of a square metre.

Bd. T. 4. *Providing and fixing country teak wood 2nd class fully glazed/panelled ventilator or clerestorey window or fanlight, curved/rectangular in shape as per detailed drawings including the frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting—*

(a) *without mild steel bars.*

(b) *with mild steel bars finished with approved oil paint.*

Bd. T. 4. 1. *General.*—The specifications for item Bd. T. 3 shall apply with the following changes:—

(1) The wood shall be country teak.

(2) The styles, rails and sash bars shall be chamfered and not moulded.

(3) Iron fastenings and fixtures shall be used instead of brass.

(4) When panelled ventilator shutters are provided, they shall conform to Bd. T. 7 but adjusted to the size of the ventilator as directed by the Engineer.

(5) When glazed shutters are to be provided they shall be divided into panels as shown in the drawings or directed by the Engineer with sash bars and styles and rails chamfered on the outside and rebated inside.

अनुक्रमणिका
Table of Contents

Bd. T. 4. 2. *Finishing.*—The wood work shall be finished with oiling or two coats of oil paint of approved colour as specified in Bd. N. Iron bars shall be finished with two coats of oil paint of approved colour as specified in B. 21. a.

Bd. T. 5. *Providing and fixing Burmah/superior Indian teak wood double leaf, Ist class, fully panelled door, without/with panelled/glazed ventilator/fanlight, without/with iron bars as per detailed drawings, including the door frame, brass/oxidised brass fixtures and fastenings without/with mortise lock and finishing the wood work with french polish/varnish/oilpaint and iron bars with oilpaint.*

Bd T. 5. 1. *General.*—The item shall be carried out in conformity with I.S. 1003-1966. (Specifications for timber, panelled and glazed doors and windows) for the requirements of material, construction, workmanship and the sizes (unless otherwise specified) subject to the following additional specifications.

Bd. T. 5.2. *Material.*

*Timber.*—Timber shall be Burmah or superior Indian teak as specified in the item and shall conform to A.16.

*Iron bars.*—Iron bars 16 mm. (5/8") diameter shall be used for ventilators or fanlights together with mild steel flats of 40 mm. × 6 mm., when included in the item.

*Fixtures and fastenings.*—The scale of fixtures and fastenings shall be as indicated in the table for the corresponding type of door. They shall be of brass or oxidised brass as mentioned in the item and shall be of good workmanship.

All fixtures and fastenings shall be new, sound and strong. They shall be sectional and of the best quality. The size, shape, design and finish shall be as shown on drawings and approved by the Engineer. Samples of all fixtures and fastenings shall be got approved by the Engineer and deposited in his office for reference.

Unless otherwise specified each leaf shall be hung with three brass butt hinges (or back flap), with brass screws. Each door shall be furnished with aldrop and lock, brass flush bolts, etc.

The fixtures and fastenings shall comply with the relevant Indian Standards 204 of 1966, 205-1966, 206-1962, 207-1964, 208-1965, 281-1964, 362-1968, 363-1961.

A superior brass mortise lock shall be provided when mentioned in the item.

All the fixtures shall be fixed to the joinery in a secure and efficient manner. Any of the fixtures damaged during fixing shall be removed and new ones fixed in their place and the surface of joinery made good where affected at the contractor's expense. The metal sockets shall be provided to all bolts where the shoots enter brick, stone, concrete, etc. These shall be securely fixed flush with the surface into morties and cemented. Mortise plates over holes shall be used in situations where the shoots enter wood. Parliamentary hinges shall be used when so shown in the drawing. Butt and similar hinges shall be counter sunk on the leaf edge and wood frame to a depth equal to the thickness of the flaps of the hinge.

Holdfasts shall be provided as per Bd. T. 1.

Bd. T. 5.3. *Construction.*—The frame for door or door and ventilator or fanlight shall be provided and erected as specified in Bd. T. 1. The door shall have double leaf shuttter. The finished sizes of components of door shall be as given in tables or drawing unless otherwise specified. If there is a discrepancy between the two, the Engineer shall decide which is to be followed and his decision shall be final.

The panels shall be of pattern and size as specified on the drawings or on detailed drawings or as directed by the Engineer. Wherever possible each panel shall be in a single width piece. But where two pieces have to be used and are permitted, both of them shall be of equal width. The panels shall have beaded edges on both sides. The finishings of corners of raised panel edges shall be done as shown on drawings or as directed by the Engineer.

If the item is inclusive of ventilator, the ventilator shall be hung or pivoted as shown on the drawing or directed by the Engineer and shall be finished similar to the door. The specifications for glazed or panelled ventilators or fanlight shall be as for the item Bd. T. 3.

Holdfacts shall be screwed securely to the outside of the frames and built into the joints of the masonry.

Bd. T. 5. 4. *Finishing.*—The joints of the frame with the wall shall be made neatly with pointing or plaster as the case may be. The wood work shall be finished by french polishing or varnishing or oil-painting as mentioned in the item. The varnishing or french polishing shall be done as per Bd. N. Oil painting shall be done in three coats of approved shade of paint as specified in B. 21.(b). The iron bars if provided shall be finished with two coats of oil plaint of approved shade as per B. 21.(a).

Bd. T. 5. 5. *Item to include.*—The rate shall include all labour, materials and equipment to carry out the following operations :—

(1) Supply of all the timber scantlings and fixtures and fastenings necessary for the door frames and leaves and iron bars for ventilators or fanlight when included in the item.

(2) Preparing the frames and leaves and fixing the door frames in the work and shutters to the frame with all the wood work, holdfasts and fixtures and fastenings and iron bars, when included.

(3) Coal-tarring of the embedded parts of the wood work in the masonry.

(4) The finishing of the wood work and iron bars when provided and joints with walls as specified.

Bd. T. 5. 6. *Mode of measurement and payment.*—The contract rate shall be for a unit of one square metre of the clear unrebated opening of the door. When doors are combined with fanlights or ventilators, the height shall be measured between the unrebated opening between the sill of the door and the head of the ventilator and the width between the unrebated opening between the posts.

When doors are combined with windows, they shall be measured separately for their respective clear unrebated openings.

Linear dimensions shall be measured correct up to one centimetre and the area worked out correct up to 3rd place of decimal of a square metre.

Bd. T. 6. *Providing and fixing Burmah/superior Indian teak wood single leaf 1st class fully panelled door without/with panelled/glazed ventilator/fanlight without/with iron bars as per detailed drawings including the door frame, brass/oxidised brass fixtures and fastenings without/with mortise lock and finishing the wood work with french polish/varnish/oil-paint and finishing the iron work with oil-paint.*

Bd. T. 6. 1. *General.*—The specifications for this item shall be the same as for item Bd. T. 5. except that the door shall have a single leaf shutter and correspondingly reduced fixtures and fastenings.

Bd. T. 7. *Providing and fixing country teak wood double leaf 2nd class fully panelled door, without/with panelled/glazed ventilator/fanlight without/with iron bars as per detailed drawings including the door, frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and finishing the iron bars with oil paint.*

Bd. T. 7. 1. *General.*—The item shall be carried out in conformity with I.S. 1003-1966 (specifications for timber panelled and glazed doors and windows) for the requirements of material, construction, workmanship and sizes (unless otherwise specified) subject to the following :—

Bd. T. 7. 2. *Materials.*

Bd. T. 7. 2. 1. *Timber.*—Timber shall be country teak wood only and shall comply with A. 16.

Bd. T. 7. 2. 2. *Fixtures and fastenings.*—As per Bd. T. 5. except that the fixtures and fastenings although similar in pattern to those in Bd. T. 5. shall be of iron instead of brass. Aldrops and handles may be somewhat inferior to the brass type but samples shall be got approved by the Engineer.

All bolts, hinges and other items of iron mongery with moving parts shall be properly oiled by the contractor before handing over the building. The finishing of other iron fixtures and fastenings shall be as ordered by the Engineer.

अनुक्रमणिका
Table of Contents



Bd. T. 7. 3. *Construction.*—The frame for door or door plus ventilator or fanlight shall be provided and erected as specified in item Bd. T. 1.

Construction of the door shall be similar to Bd. T. 5 except that the styles and rails shall be chamfered on both sides, instead of being moulded. Raised panels shall have square corners and edges on both sides unless specified otherwise.

If the item is inclusive of ventilator or fanlight, the ventilator or fanlight shall be of the type specified on the drawings. The specifications for ventilator or fanlight shall be the same as for the relevant item Bd. T. 4. Here the sill of ventilator or fanlight frame shall be eliminated. Ventilator or fanlight shall be finished similar to the door.

Bd. T. 7. 3. 1. *Hold fasts.*—Same as for item No. Bd. T. 1.

Bd. T. 7. 4. *Finishing.*—The wood work shall be finished as mentioned in the item by oiling or oil painting in two coats of approved colour as in Bd. N. The iron bars shall be finished with two coats of oil paint of approved colour over a priming coat of red lead. It shall be done as specified in B. 21. a.

Bd. T. 7. 5. *Item to include.*—Same as for item No. Bd. T. 5. and as specified above.

Bd. T. 7. 6. *Mode of measurement and payment.*—Same as for item No. Bd. T. 5.

Bd. T. 8. *Providing and fixing country teak wood single leaf 2nd class fully panelled door without/with panelled/glazed ventilator/fanlight, without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and mild steel bars with oil paint.*

Bd. T. 8. 1. *General.*—The specifications for this item shall be the same as for item No. Bd. T. 7. except that the door shall have only a single leaf shutter and correspondingly reduced fixtures and fastenings.

Bd. T. 9. *Providing and fixing Burmah/superior Indian teak wood double leaf 1st class partly panelled and partly glazed door without/with glazed fanlight or ventilator as per detailed drawing including the door frame, oxidised brass/blass fixtures and fastenings and finishing the wood work with french polish/varnish oil painting complete.*

Bd. T. 9. 1. *General.*—The specifications for item Bd. T. 5 shall apply here also with the addition of the following Bd. T. 9. 2.

Bd. T. 9. 2. The glazing shall be done in the place of upper four wooden panels according to clause No. 9 of I. S. 1003-1966 and Bd. 5. The sizes of openings for glazings shall be as per detailed drawings or as directed by the Engineer. Unless otherwise specified, the glass shall weigh not less than 7.5 kg./sq.m. (24 oz./sq.ft.). The glass shall be plain or obscured as directed by the Engineer. The styles and rails shall be rebated 10 mm. wide on the inside to receive the glass instead of being moulded. Sash bars shall be moulded and mitred on the outside and rebated 10 mm. wide on the inside to receive the glass. Ventilators or fanlight if provided shall be according to Bd. T. 3.

Bd. T. 9. 3. *Item to include.*—According to Bd. T. 5. 5 and shall also include sashbars and glazing.

Bd. T. 9. 4. *Mode of measurement and payment.*—According to Bd. T. 5. 6.

Bd. T. 10. *Providing and fixing Burmah/superior Indian teak wood single leaf 1st class partly panelled and partly glazed door without/with glazed fanlight/ventilators as per detailed drawings including the door frame, brass/oxidised brass fixtures and fastenings, finishing the wood work with french polish/varnish/oil paint complete.*

Bd. T. 10. 1. *General.*—The specifications for item No. Bd. T. 9 shall apply except that the door shall have only a single leaf and correspondingly reduced fixtures and fastenings.

Bd. T. 11. *Providing and fixing country teak wood double leaf 2nd class partly panelled and partly glazed door without/with glazed ventilator fanlight as per detailed drawings including the door frame, iron fixtures and fastening and finishing the wood work with oiling/oil painting complete.*

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. T. 11.1. *General.*—The specifications for item No. Bd. T. 9. shall apply subject to the following:

The edges of the styles rails, sashbars, etc., shall be chamfered and the panels shall have square edges and corners. Timber shall be country teak wood conforming to A. 16.

Fixtures and fastenings shall be of iron throughout. Ventilator or fanlight if provided shall be according to Bd. T. 4.

Bd. T. 12. *Providing and fixing country teak wood single leaf 2nd class partly panelled and partly glazed door without/with glazed ventilator/fanlight as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting.*

Bd. T. 12. 1. *General.*—The specifications for item No. Bd. T. 11 shall apply here also except that the door shall have a single leaf shutter and correspondingly reduced fixtures and fastenings.

Bd. T. 13. *Providing and fixing Burmah/superior Indian teak wood double leaf 1st class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, brass/oxidised brass fixtures and fastenings and finishing the wood work with french polish/varnish/oil paint and iron bars with oil paint.*

Bd. T. 13. 1. *General.*—The specifications for item Bd. T. 5 shall apply for this item subject to the following.

Bd. T. 13. 2. *Construction.*—The upper part of the door shutters shall be fixed with venetians as per detailed drawings or as directed by the Engineer, the frieze rails being omitted.

The blades shall be 90 mm. wide and 10 mm. thick unless otherwise specified and shall overlap about half their width. Blades shall have rounded edges or moulded if shown on the detailed working drawings. The blades shall be accurately and securely fixed to the operating stanchion by brass hinges. The stanchion shall be of finished size 25 mm.× 20 mm. and shall be moulded.

The frame of each shutter shall be rebated outside all round on the sides and bottom rail and inside on top rail. Ends of blades shall be rounded off to 10 mm. diameter and 20 mm. long pin to fit into the holes in the rebated portion of the frames. Ventilator shall be prepared and fixed as mentioned in the item according to the specifications for each type of shutter.

Bd. T. 13. 3. *Finishing.*—The wood work shall be finished by french polishing or varnishing or oil painting in 3 coats of approved shade paint as per Bd. N. and iron bars with 2 coats of oil paint, as per B. 21. 9.

Bd. T. 14. *Providing and fixing Burmah/superior Indian teak wood single leaf 1st class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawing including the door frame, brass/oxidised brass fixtures and fastenings and finishing the wood work with french polishing/varnishing/oil* paint *and finish the iron bars with oil paint.*

Bd. T. 14. 1. *General.*—The specifications for item Bd. T. 13 shall apply for this item also except that the door shall have a single leaf and correspondingly reduced fixtures and fastenings.

Bd. T. 15. *Providing and fixing country teak wood double leaf 2nd class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings, finishing the wood work with oiling/oil painting and finishing the iron bars with oil paint.*

Bd. T. 15. 1. *General.*—The specifications for item Bd. T. 13 shall apply for this item subject to the following changes:

Bd. T. 15. 2. *Timber.*—Timber shall be country teak wood conforming to A. 16.

अनुक्रमणिका
Table of Contents

Bd. T. 15. 3. *Fixtures and fastenings.*—Fixtures and fastenings shall correspond to these in Bd. T. 7. The blades of the venetians will be attached to the stanchions by wire clips, instead of brass hinges.

Bd. T. 15. 4. *Finishing.*—The wood work shall be finished by oiling or 2 coats of oil painting of approved shade of oil paint as per Bd. N. The iron bars shall be finished with 2 coats of oil paint. It shall be done according to B. 21. (a).

Bd. T. 16. *Providing and fixing country teak wood single leaf 2nd class partly panelled and partly venetianed door without/with venetianed/glazed ventilator or fanlight without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the wood work with oiling/oil painting and the iron bars with oil paint.*

Bd. T. 16. 1. *General.*—The specifications for item No. Bd. T. 15 shall apply, but the door shall have a single leaf and correspondingly reduced fixtures and fastenings.

Bd. T. 17. *Providing and fixing country teak wood double leaf, battened ledges and braced door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 17. 1. *Materials.*—

(*a*) *Timber.*—The timber used shall be country teak wood conforming to specification A. 16. Planks for battens shall not be more than 20 cm. nor less than 10 cm. in width but all the battens shall be of the same width. The wrought thickness of battens, ledges and braces shall be as per the relevant tables.

(*b*) *Fixtures and fastenings.*—All fixtures and fastenings shall be as per Bd. T. 7, as shown in relevant table or in the drawings. The type of hinges *e.g.*, butt hinges strap, or male and female hinges to be provided shall be as shown in the drawings or directed by the Engineer. When male and female hinges have to be used, a sample corresponding to the actual requirement should first be got approved by the Engineer.

Bd. T. 17. 2. *Construction and workmanship.*—The construction shall follow the specification B. 20 for 'General Wood Work'. The frame shall comply with specification No. Bd. T. 1. But it shall be of country teak wood. The country teak wood boards for the shutters shall be planed smooth on both sides to the sizes given in relevant table, unless other sizes are specified. The boards shall be rebated together. One edge of each board shall be beaded on the outside. The vertical boards shall be connected together by horizontal ledges screwed across the back of the door. The sizes and shapes of the ledges and their number shall be as per standard tables and detailed drawings unless specified otherwise. The braces shall be arranged between the ledges to slope downwards towards the hinges. Edges and ends of ledges shall be chamfered. When the two leaves join to close, the rebate shall be standing on the corresponding faces in each leaf.

When ventilators are provided, their shutters shall correspond to the door shutter and shall be prepared as directed by the Engineer. Iron bars when provided shall comply with specification No. Bd. T. 3.

Bd. T. 17. 3. *Finishing.*—The wood work shall be finished as per the item by oiling or two coats of oil paint of approved colour and shade as specified in Bd. N. The rebates of frames shall not be oiled. Iron bars when provided shall be painted with a priming coat of red lead and two coats of oil paint of approved colour as per B. 21 (a).

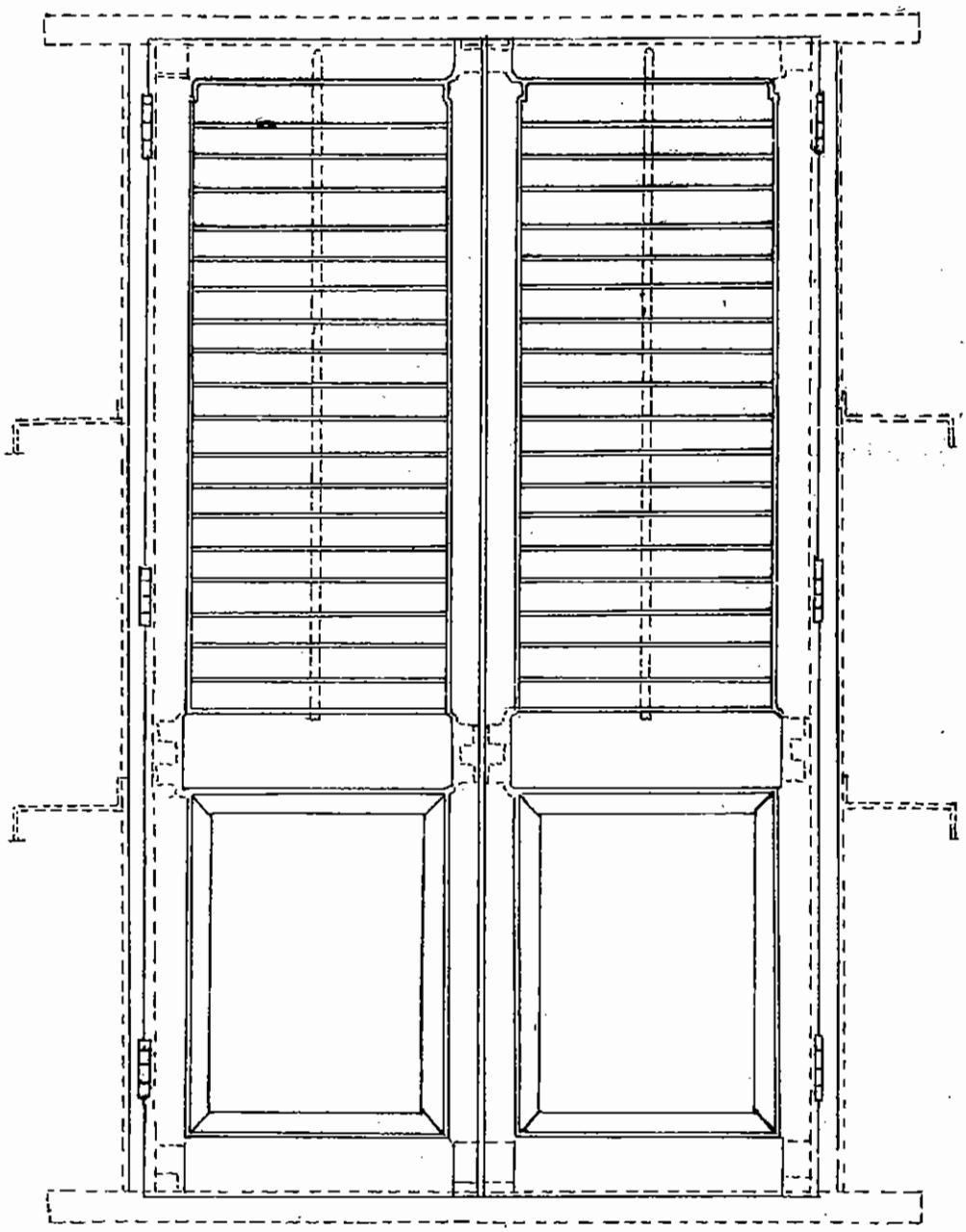
Bd. T. 17. 4. *Item to include.*—As per item No. Bd. T. 7 and as specified above.

Bd. T. 17. 5. *Mode of measurement and payment.*—As per item No. Bd. T. 5.

Bd. T. 18. *Providing and fixing country teak wood single leaf battened, ledged and braced door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 18. 1. *General.*—The specifications for item No. Bd. T. 17 shall apply except that the door shall be provided with a single leaf shutter only and correspondingly reduced fixture and fastenings.

अनुक्रमणिका
Table of Contents



ELEVATION

PARTLY PANELLED AND PARTLY VENETIANED DOOR

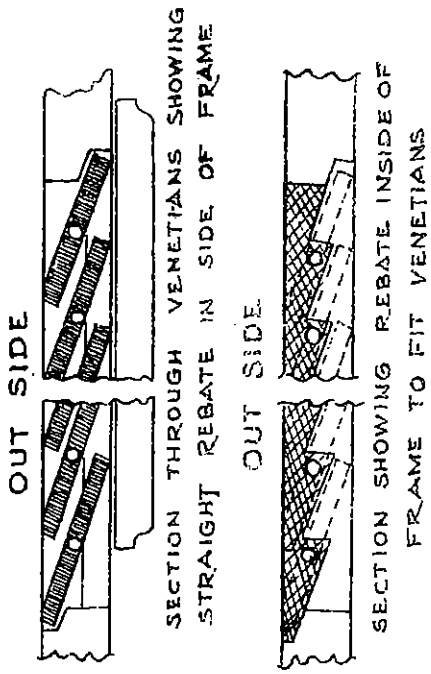
अनुक्रमणिका
Table of Contents

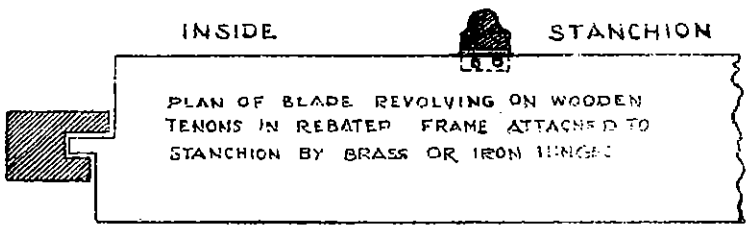
अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

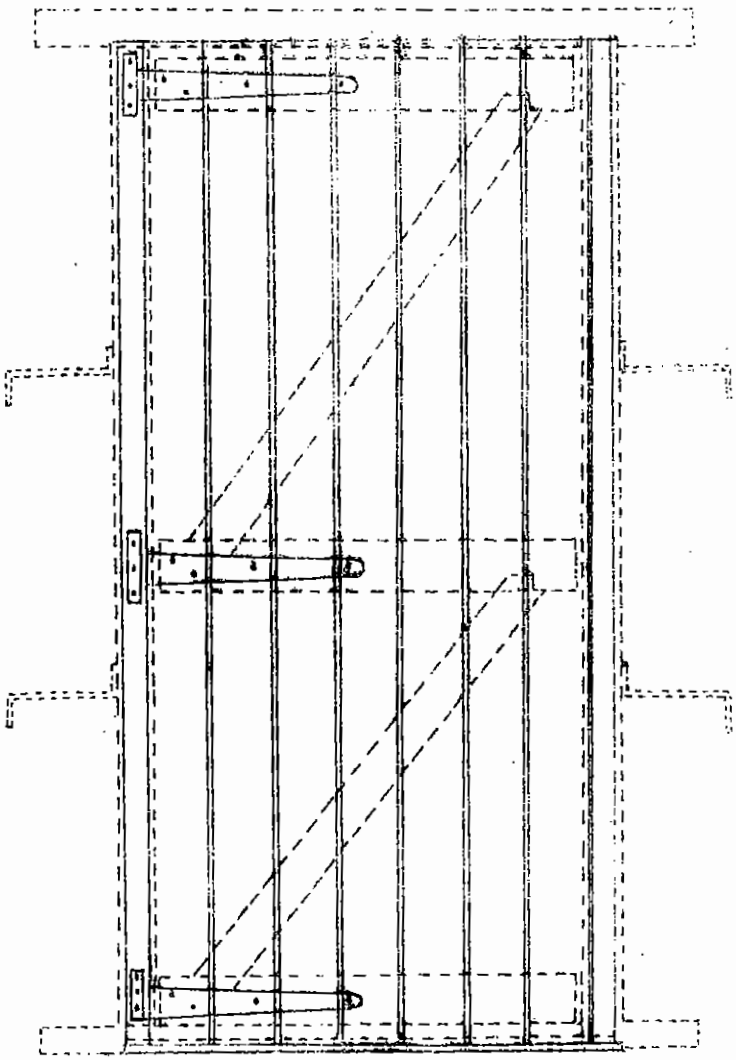
अनुक्रमणिका
Table of Contents


OUT SIDE
SECTION THROUGH VENETIANS SHOWING STRAIGHT REBATE IN SIDE OF FRAME
OUT SIDE
SECTION SHOWING REBATE INSIDE OF FRAME TO FIT VENETIANS


INSIDE
STANCHION
PLAN OF BLADE REVOLVING ON WOODEN TENONS IN REBATED FRAME ATTACHED TO STANCHION BY BRASS OR IRON HINGES

PLAN

अनुक्रमणिका
Table of Contents

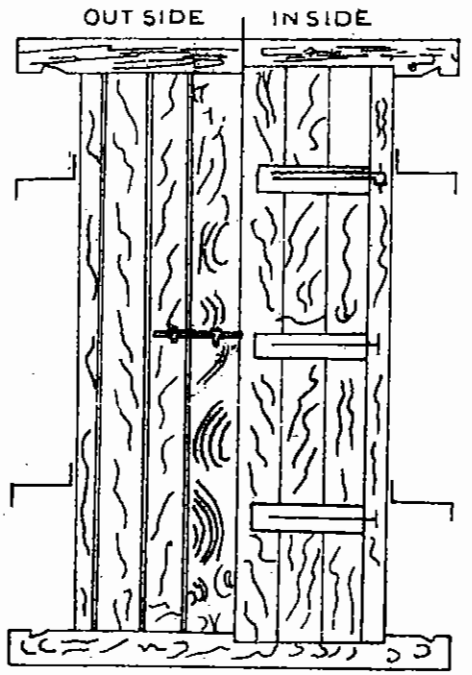


BATTENED, LEDGED & BRACED DOOR

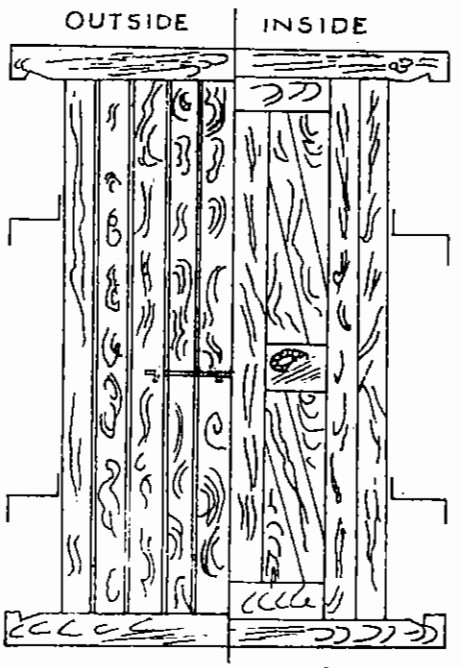
अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




DOOR BATTENED & LEDGED




DOOR FRAMED & BRACED

Bd. T. 19. *Providing and fixing country teak wood double leaf battened, framed and braced doors without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 19. 1. *Materials.*—

(*a*) *Timber.*—Timber used shall be country teak wood and shall conform to Bd. T. 17. 1.

(*b*) *Fixtures and fastenings.*—Same as per item No. Bd. T. 17. Three strap or male and female hinges shall be provided as directed for each leaf.

Bd. T. 19. 2. *Construction and workmanship.*—The construction shall follow the specification No B. 20 for general wood work.

The door frames shall be provided and fixed as specified in Bd. T. 17.

Each leaf shall consist of a framework made up of vertical styles, top, bottom and central rails and diagonal braces between top and centre and the centre and bottom rails respectively. Finished sizes of the components shall be as shown in the relevant tables. The thickness of the styles shall be equal to the combined thickness of the rails and battens. The thickness of the braces shall be the same as that of the rails. The styles shall be rebated for a width of 25 mm. to receive the battens. The battens shall be fixed to the frame with iron screws. The braces shall be arranged to slope downwards towards the hinge. The edges shall be chamfered or beaded on the inside. The boards shall be planed and rebated together and fixed flush on the framework. One edge of each board shall be beaded on both the faces. The finished sizes of the framework, battens or boards, etc., shall be as given in relevant tables or drawings, unless other sizes specified.

The ventilators shall be provided according to the relevant provision of Bd. T. 17.

Bd. T. 19. 3. *Finishing.*—The wood work shall be finished with oiling or two coats of oil paint of approved colour and shade, as specified in Bd. N. The rebates of the frame shall not be oiled. Iron bars when provided shall be painted with a priming coat of red lead and two coats of oil painting of approved colour as per Bd. 21. a.

Bd. T. 19. 4. *Item to include.*—Same as per item No. Bd. T. 7. and as specified above.

Bd. T. 19. 5. *Mode of measurement and payment.*—Same as for item No. Bd. T. 5.

Bd. T. 20. *Providing and fixing country teak wood single leaf framed, battened and braced door without/with ventilator without/with iron bars as per detailed drawings, including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 20. 1. *General.*—The specifications for item No. Bd. T. 19 shall apply except that the door shall be provided with a single leaf only and correspondingly reduced fixtures and fastenings.

Bd. T. 21. *Providing and fixing country teak wood double leaf plain planked door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 21. 1. *Materials.*—

(*a*) *Timber.*—Timber used shall be country teak wood conforming to specification No. Bd. T. 17. The width of each leaf shall be made up with not more than two planks.

(*b*) *Fixtures and fastenings.*—Same as per item No. Bd. T. 7. subject to the following:—

Strong iron butt hinges shall be used unless strap hinges are specially specified. The door shall be provided with iron aldrops and tower bolts for closing the door and hooks and eyes or hinged wooden blocks for keeping the doors open.

Bd. T. 21. 2. *Construction and workmanship.*—The construction shall follow the specification B. 20 for general wood work.

The door frame shall be provided as specified in Bd. T. 2.

For shutters, the country teak wood planks shall be planed smooth on both soles to the sizes given in relevant tables or detailed drawings. The boards shall be rebated and secured together by three horizontal ledges, screwed across the front of the door. The door shall have

अनुक्रमणिका
Table of Contents



one vertical style in the centre attached to one leaf. The horizontal ledges on the leaf on which the vertical style is fixed shall be jointed to the vertical style with a slight offset of about 10 mm. into the latter. The edges of all the horizontal ledges and vertical style shall be chamfered The size and shape of the ledges and their number shall be as per the standard tables and detailed drawings unless otherwise specified.

The ventilators when provided shall comply with relevant provision of Bd. T. 17.

Bd. T. 21. 3. *Finishing.*—The wood work shall be finished as mentioned in the item by oiling or 2 coats of oil paint of approved colour and shade as specified in Bd. N. The rebates of frames shall not be oiled. Iron bars when provided shall be painted with a priming coat of red lead and two coats of oil paint of approved colour, as per Bd. 21. a.

Bd. T. 21. 4. *Item to include.*—As per item No. Bd. T. 7.

Bd. T. 21. 5. *Mode of measurement and payment.*—Same as for item No. Bd. T. 5.

Bd. T. 22. *Providing and fixing country teak wood single leaf plain planked door without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oil painting complete.*

Bd. T. 22. 1. *General.*—The specifications for item No. Bd. T. 21 shall apply except that the door shall have a single shutter only. The vertical style shall be omitted and each horizontal ledge shall cover the full width of the leaf. Chain and staple shall be fixed to the middle horizontal ledge and the side post of the frame instead of an aldrop.

Bd. T. 23. *Providing and fixing country teak wood double leaf second class false panelled door, without/with ventilator without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing with oiling/oilpainting complete.*

Bd. T. 23. 1. *Materials.*

Bd. T. 23. 1. 1. *Timber.*—Timber to be used shall be country teak wood conforming to specification A.16.

Bd. T. 23. 1. 2.—*Fixtures and fastenings.*—As per Bd. T. 7.

Bd. T. 23. 1. 3. *Holdings.*—As per Bd. T. 1.

Bd. T. 23. 2. *Construction and workmanship.*—The specifications for this item shall be the same as for item No. Bd. T. 7. except for the following :—

The shutters shall be prepared by using plain planks of finished dimensions as shown on the drawings and fixing scantlings of specified finished dimensions on them so as to give the appearance of panels as shown on drawings or as directed by the Engineer. The chamfered or beaded edges of scantlings shall be as shown on the drawings.

Ventilators when provided shall comply with relevant portion of Bd. T. 7.

Bd. T. 23. 3. *Finishing.*—The wood work shall be finished as mentioned in the item with oiling or 2 coats of oil paint of approved colour and shade as specified in Bd. N. The rebates of frames shall not be oiled. Iron bars shall be finished with 2 coats of oil paint of approved colour as per B. 21. a.

Bd. T. 23. 4. *Item to include.*—As for item No. Bd. T. 7 and or as specified above.

Bd. T. 23. 5. *Mode of measurement and payment.*—As for item No. Bd. T. 5.

Bd. T. 24. *Providing and fixing country teak wood single leaf, second class false panelled door without/with ventilators without/with iron bars as per detailed drawings including the door frame, iron fixtures and fastenings and finishing the woodwork, with oiling/oil painting.*

Bd. T. 24.1. *General.*—The specifications for item No. Bd. T. 23 shall apply except that the door shall have a single leaf and correspondingly reduced fixtures and fastenings.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd. T. 25. *Providing and fixing Burmah/superior Indian teak wood single/double swing shutters full size, fully panelled as per detailed drawings including the door frame, double acting steel/brass spring hinges, brass oxidised/electroplated fixtures and fastening and finishing with french polish/varnish complete.*

Bd. T. 25. 1. *Materials.*

Bd. T. 25. 1. 1. *Timber.*—Timber shall be Burmah or superior Indian teak wood as specified in the item and shall comply with specification No. Bd. T. 5. The sizes of components shall be as specified for the corresponding size and type of doors except that there will be no rebates either in the frame or the leaves.

Bd. T. 25. 1. 2. *Fixtures and fastenings.*

(*a*) *Spring Hinges.*—Double acting spring hinges of mild steel or brass as mentioned in the item shall be used. There shall be 2 spring hinges and one blank hinge for each shutter unless specified otherwise. These hinges shall accord with I.S. 453-1963 in the requirements and sizes and shall be as shown on the drawings. When no size is specified or shown in the drawings, those of 101.6 mm. (4″) shall be used.

(*b*) *Ornamental handles.*—Ornamental handles brass oxidised or electroplated as specified in the item shall be fixed to each leaf on both sides. Other fixtures and fastenings shall be of the same type.

Bd. T. 25 2. *Construction and workmanship.*—The construction shall follow the specification B. 20 for general wood work.

The door frame shall comply with specification No. Bd. T. 1. except that it shall be unrebated. The edges in the openings shall be rounded uniformly.

The shutter shall be of finished dimensions with ornamental mouldings and panels and other components as specified on the detailed drawings approved by the Engineer for the particular type but adjusted for the absence of rebates in the frames and shutters by reducing the panels. The clearance between the finished shutter and the door frames and between the shutters themselves shall not exceed 3 mm. unless otherwise specified on the drawings. In case of double leaf door, no rebates shall be provided where they meet.

Each door shutter shall be fixed with two double acting spring hinges and one blank hinge. The hinges shall be fixed at positions as shown on the detailed drawings by cutting the necessary recess, to correspond to the thickness of the flaps, in the sides of the shutter style and the door frame. Spring hinges shall be fitted at the upper and lower level and the blank hinge in between.

Bd. T. 25. 4. *Finishing.*—The wood work shall be finished by french polishing or varnishing as specified in Bd. N.

Bd. T. 25. 5. *Item to include.*—As for item Bd. T. 5. but helical spring and blank hinges shall be used instead of butt hinges. Ornamental handles shall be provided on each leaf on both sides.

Bd. T. 25. 6. *Mode of measurement and payment.*—Same as for item No. B. T. 5.

Bd. T. 26. *Providing and fixing Burmah/superior Indian teak wood single/double swing shutters full size panelled and glazed as per detailed drawings including the door frame, double acting steel/brass spring hinges, brass oxidised/electroplated fixtures and fastenings and finishing with french polish/varnish complete.*

Bd. T. 26.1. *General.*—The specifications shall be the same as for item No. Bd. T. 25 except that the leaf shall be panelled and glazed. The sizes of openings for glazing and the type of glass shall be as detailed on the working drawings approved by the Engineer. If the type of glass is not specified, frosted glass weighing not less than 7.5 kg/sq. m. (24 oz/sq. ft.) shall be used. The glazing shall be done as per Bd. S.

Bd. T. 27. *Providing and fixing Burmah/superior Indian teak wood single/double swing shutters, part size, panelled as per detailed drawings including double acting steel/brass spring hinges and finishing with french polish/varnish complete (exclusive of the cost of door frame).*

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents





Bd. T. 27.1. *General.*—The specifications for item No. Bd. T. 25 shall apply but the shutter shall be only part size and fixed to the door frame as shown in the drawings or as directed. The panels shall be as shown in the drawings or as directed by the Engineer. Each leaf shall be provided with one spring hinge near the top and one blank hinge near the bottom The method of fixing doors shall be similar to that specified in Bd. T. 25. For double leaves, a loop prepared of m. s. flat 25 mm. × 3 mm. shall be attached to the raised portion of one central style with a bolt to lock the leaves. The door frame shall not be rebated. The door frame shall be excluded from the item and paid separately.

Bd. T. 27.2. *Item to include.*—Same as for item No. Bd. T. 5 except that door frame shall not be included in the item. Two pairs of double acting spring hinges shall be provided instead of 3 pairs of hinges. A loop of mild steel flat shall be attached at the top to lock the leaves.

Bd. T. 27.3. *Mode of measurement and payment.*—The contract rate shall be per square metre of the door shutter within the clear opening of the door frame. If the top and bottom rails are given any ornamental projections, the area shall be measured overall and if only the vertical styles are projected, the height shall be measured from the top edge of top rail to the bottom edge of bottom rail, projection of the vertical styles being neglected.

The dimensions shall be measured correct, up to a cm. and area measured correct up to 3 places of decimals of a sq. metre.

Bd. T. 28. *Providing and fixing Burmah/superior Indian teak wood single/double swing shutters, part size, glazed with obscured glass as per detailed drawings or as approved, including double acting steel/brass spring hinges and finishing with french polish/varnish complete (exclusive of the cost of door frame).*

Bd. T. 28.1. *General.*—The specifications for item No. Bd. T. 27 shall apply except that glazing shall be provided instead of wooden panels between the rails and styles. The sizes of openings for glass panes shall be as specified on the drawings or as approved by the Engineer. The glazing shall be as per Bd. S.

The type of glass shall be obscured with design as approved by the Engineer.

Bd. T. 29. *Providing and fixing country teak wood single/double swing shutters, part size, framed and panelled with galvanised iron metal/asbestos cement/plywood sheets as per detailed drawings or as directed, including steel double acting spring hinges and finishing with oiling/oil painting complete (exclusive of the cost of door frame).*

Bd. T. 29. 1. *General.*—The specifications for this item shall be the same as for item No. Bd. T. 27, except that the wood to be used for the styles and the rails of the framing shall be country teak wood and the panels shall be formed by inserting 18 gauge galvanised iron sheets or 6 mm. thick asbestos cement sheets or 6 mm. thick plywood sheets as mentioned in the wording of the item.

Bd. T. 30. *Providing and fixing double leaf door with country teak wood/jungle wood (—species) frame and country teak wood/jungle wood shutters with galvanized iron/asbestos cement plywood sheet panels as per detailed drawings including iron fixtures and fastenings and finishing with oiling/oil painting complete.*

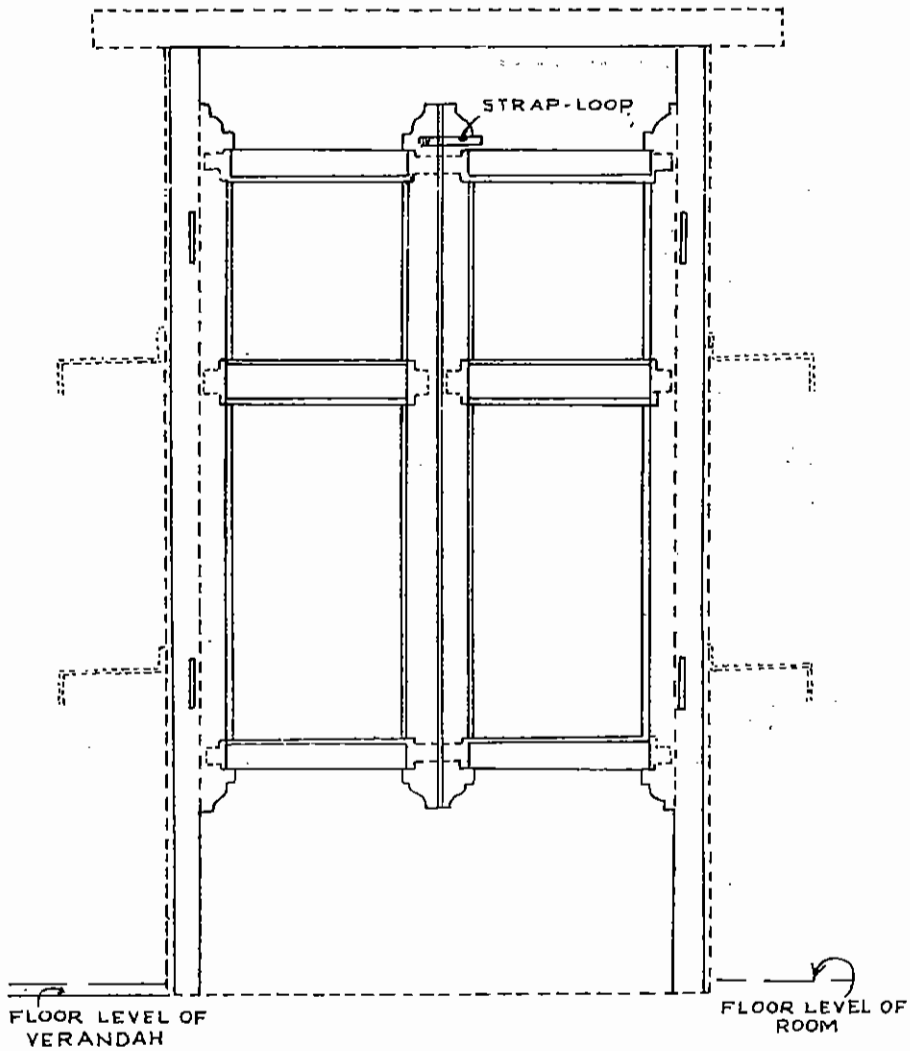
Bd. T. 30. 1. *General.*—The specification for this item shall be the same as for item No. B. T. 7. except for the following:—

The frame and shutters shall be of the specified wood.

The shutter shall be prepared by fitting styles, and rails (top, bottom, lock and frieze) as for panelled leaves with simple chamfer on edges only. The styles and rails shall be grooved with just sufficient width for receiving panels and plain panels of galvanized iron sheeting or asbestos cement sheeting or plywood boards shall be fitted into the grooves. The finished sizes of all the components shall be as per the relevant tables and drawings for panelled doors unless specified otherwise.

Bd. T. 30. 2. *Finishing.*—The wood work shall be finished with oiling or 2 coats of oil paint of approved colour and shade as specified in Bd. N. The panels shall be painted with 2 coats of oilpaint of the approved shade. The rebates of frames shall not be oiled.

अनुक्रमणिका
Table of Contents




INSIDE ELEVATION

PART SIZE SWING SHUTTERS



Bd. T. 30. 3. *Item to include.*—As for item No. Bd. T. 5 and as specified above.

Bd. T. 30. 4. *Mode of measurement and payment.*—As for item No. Bd. T. 5.

Bd. T. 31. *Providing and fixing single leaf door, with country teak wood/jungle wood frame and country teak wood/jungle wood (—species) shutters with galvanized iron/asbestos cement/plywood sheet panels as per detailed drawings including iron fixtures and fastenings, oiling/oil painting complete.*

Bd. T. 31.1. *General.*—The door shall have a single leaf. The specifications for item No. Bd. T. 30 shall apply except that there shall be a single leaf instead of two leaves with corresponding reduced fixtures and fastenings.

Bd. T. 32. *Providing and fixing country teak wood double leaf second class door with flyproof galvanised iron wire gauze shutters inside in combination with battened, ledged and braced/battened, framed and braced/plain planked shutters outside including the door frame, iron fixtures and fastenings, finishing with oiling/oil painting complete.*

Bd. T. 32. 1. *General.*—The item refers to double leaf second class teak wood door with two sets of shutters, inner of galvanised iron wire gauze and the outer of battened, ledged and braced shutter or battened, framed and braced shutters or plain planked shutters as in the item. The teak wood frame shall be suitable for 2 sets of shutters and shall be provided as described in I.S. 1003-1966 and Bd. T. 2. except for sizes of scantlings. The outer pair of shutters shall conform to specifications given for items Bd. T. 17 or Bd. T. 19 or Bd. T. 2. 1, depending on the type specified.

Bd. T. 32. 2. *Wire gauze shutters.*—The finished sizes of the wooden components like styles, rails, muntings shall be as per the panelled doors second class, as also the workmanship for them. Each leaf shall have 2 panels of wire gauge as per drawings as or directed by the Engineer. The styles, rails, etc., shall be rebated 12 mm. along the side where they receive the gauze. The galvanised iron flyproof webbing of not more than 3 mm. mesh shall be used unless otherwise specified. The webbing shall be bent at 90 to 12 mm. along both sides of the rebate and fixed securely to the styles, rails and muntings by 12 mm. galvanised iron staples at about 15 cms. intervals, staggered spacing. Teak wood fillets of the size 10 mm.×10 mm. shall be securely and neatly fixed with small screws, spaced about 7.5 cm. centres, around the rebate for each panel of webbing after the fillets are pressed well into the angle to hold the gauze in two faces. The exposed edge of fillets shall be neatly rounded. The gauze shall be tightly stretched during fixing. The space between the fillet and the rebate where the webbing is bent shall be neatly finished with putty, so that cut end of webbing may not be visible. Each shutter shall be fitted with a pair of double acting steel spring hinges conforming to I. S. 453-1963. Each shutter shall be provided with one handle of iron.

Bd. T. 32. 3. *Finishing.*—The wood work of the shutters shall be finished with coats of oil paint of approved colour or oiling as specified in Bd. N., as per the item.

Bd. T. 32. 4. *Item to include.*—As for Bd. T. 7. and as above.

The item shall also include the cost of providing and fixing the additional set of shutters as specified including its fixtures and fastenings and finishing.

Bd. T. 32. 5. *Mode of measurement and payment.*—As for item Bd. T. 5. No separate measurement for additional door shutter shall be given, the rate being inclusive of the two shutters and the frame.

Bd. T. 33. *Providing and fixing country teak wood single leaf second class door with flyproof galvanised iron wire gauze shutter inside in combination with battened, ledged and braced/battened, framed and braced/plain planked shutters outside including the door frame, iron fixtures and fastenings, finishing with oiling/oil paint complete.*

Bd. T. 33. 1. *General.*—The specifications given for Item No. Bd. T. 32 shall apply. The door however shall have single leaf shutter, with four panels of wire gauze as per drawings or as directed with single leaf outside shutter of the specified type.

Bd. T. 34. *Providing and fixing solid core flush door in single leaf* mm. ( ") *thick, decorative type of exterior/interior grade, as per detailed drawings including, Burmah/superior Indian teak wood door frame, approved face veneers on both faces with/without glazing and venetians in the positions shown on the drawings or as directed, all*

*necessary beads mouldings and lipping, wrought iron holdfasts, chromium plated fixtures and fastenings, without/with brass mortise lock, chromium plated handles on both sides and finishing with french polish/waxing complete.*

Bd. T. 34. 1. *General.*—The door shall be of flush type solid core, single shutter with T. W. frame. Following specifications shall apply:—

Bd. T. 34. 2. *Shutter.*—The solid core shutter shall be of the decorative type of the exterior or interior grade as mentioned in the item. It shall confirm to the relevant specifications for the type and grade given in I. S. 2202-1966. Specifications for wooden Flush Door Shutters (solid core type). *It shall be obtained from manufacturers from the approved list of I. S. I. with I. S. I. marking whenever available within reasonable distance or as approved by Engineers.*—The finished thickness of the shutter shall be as mentioned in the item. Face veneers used shall be of the pattern and colour approved by the Engineer and an approved sample shall be deposited with the Engineer for reference. When glazing and venetians are provided in the item, the glazing shall be done in the door shutter in the position shown on the detailed drawings or as directed by the Engineer. The glazed opening and the type of glass shall be as specified on the detailed drawings or as directed. The glazing shall be done as specified in Bd. T. 5 with wooden beads.

Venetians shall be in the position shown in the drawings. The size of the venetianed opening shal be as specified on the detailed drawings. Venetians shall be of the fixed type.

When no drawings are supplied, venetians and glazing, as per I. S. 2202-1966 shall be followed.

Bd. T. 34. 3. *Door frame.*—This shall conform to specification Bd. T. 1.

Bd. T. 34. 4. *Holdfasts.*—According to Bd. T. 5.

Bd. 34. 5. *Fixtures and fastenings.*—As specified for item No. Bd. T. 5. unless shown otherwise on the detailed drawings. The fixtures and fastenings shall be chromium plated. The mortise lock shall be of brass and shall have chromium plated handle on both sides.

Bd. T. 34. 6. *Finishing.*—The wood work shall be finished by french polishing or waxing as specified in Bd. N.

Bd. T. 34. 7. *Item to include.*—As per Bd. T. 5. The door frame, leaf, fixtures and fastenings and fixing shall be as specified above.

Bd. T. 34. 8. *Mode of measurement and payment.*—As per Bd. T. 5.

Bd. T. 35. *Providing and fixing solid core flush door shutters in double leaves mm. (.....,....") thick, decorative type of exterior/interior grade, as per detailed drawings including Burmah/superior Indian teak wood door frame, approved face veneers on both sides with/without glazing and venetians in the positions shown on the drawings or as directed, all necessary beads, moldings and lipping, wrought iron holdfasts, chromium plated fixtures and fastenings, without/with brass mortise lock, chromium plated handles on both sides and finishing with french polish/wax complete.*

Bd. T. 35. 1. *General.*—The door shall have flush type solid core double leaf shutters and T. W. frame. The specifications for item Bd. T. 34 shall apply except that there will be two leaves with correspondingly increased fixtures and fastenings.

Bd. T. 36. *Providing and fixing cellular/hollow core flush door in single leaf——mm. (about————") thick commercial type of exterior/interior grade as per detailed drawings including country teak wood frame, approved commercial plywood facing, wrought iron holdfast, oxidised iron fixtures and fastenings and handles on both sides and finishing with spray paint/oil paint complete.*

Bd. T. 36. 1. *General.*—The door shall be of flush type with cellular or hollow core as specified in the item and shall have single shutter and country teak wood frame. The following specifications shall apply:—

Bd. T. 36. 2. *Shutter.*—The cellular or hollow core shutter shall be of the commercial type of the exterior or interior grade as mentioned in the item. It shall conform to the relevant specifications for the type and grade given in I. S. 2191-1966 for wooden Flush Door shutters (cellular or hollow core type). It shall be obtained from the manufacturers from the approved list of I. S. I. The finished thickness of the door leaf shall be as mentioned in the item.

अनुक्रमणिका
Table of Contents



Commercial plywood facing used shall be of the pattern and colour approved by the Engineer and an approved sample shall be deposited with the Engineer for reference.

Bd. T. 36. 3. *Door Frame.*—As per Bd. T. 2.

Bd. T. 36. 4. *Holdfasts.*—As per Bd. T. 1.

Bd. T. 36. 5. *Fixtures and fastenings.*—As per Bd. T. 7. except that they shall be of oxdised iron.

Bd. T. 36. 6. *Finishing.*—The wood work shall be finished with 2 coats of oilpaint of approved shade as per Bd. 21. b. or spray painted in approved colour as per the item.

Bd. T. 36. 7. *Item to include.*—As per Bd. T. 34. 7.

Bd. T. 36. 8. *Mode of measurement and payment.*—As per Bd. T. 34. 8.

Bd. T. 37. *Providing and fixing cellular/hollow core flush door in double leaves ..... mm. (about .....") thick commercial type of exterior/interior grade as per detailed drawings including country teak wood frame, approved commercial plywood facing wrought iron holdfasts, oxidised iron fixtures, fastenings and handles on booth sides and finishing with oilpaint/spray paint complete.*

Bd. T. 37. 1. *General.*—The door shall be of the flush type cellular or hollow core as mentioned in the item and shall have two leaves for shutters and country teak wood frame. The specifications for Bd. T. 36 shall apply except for the increased number of fixtures and fastenings.

Bd. T. 38. *Providing and fixing country teak wood double leaf door with expanded metal shutters with —— cm.× —— cm. × —— mm. XPM. corresponding to I. S. No. —— mesh as per detailed drawings or as directed including the door frame, iron fixtures and fastenings, finishing with two coats of oil paint/oiling complete.*

Bd. T. 38. 1. *General.*—The item refers to country teak wood door in two leaves with expanded metal shutters.

Bd. T. 38. 2. *Door frame.*—As for item No. Bd. T. 2.

Bd. T. 38. 3. *Fixtures and fastenings.*—As for item No. Bd. T. 17.

Bd. T. 38. 4. *Construction and workmansip.*—The finished sizes of wooden components like styles, rails, muntings shall be as per the standard drawings or tables as for panelled doors. The workmanship shall be as for a second class door. The expanded metal sheet conforming to the relevant No. of mesh in I. S. 412-1962 shall be used. The expanded metal shall be inserted into the grooves in styles, rails and muntings, and framed into place while the shutter is being assembled. It shall be secured with 25 mm. screws spaced at about 30 cm. centres, care being taken to see that the screws are set in the uncut mesh insert. The styles, rails and muntings around the expanded metal shall be rounded or moulded if so shown on drawings.

Bd. T. 38. 5. *Finishing.*—As for item Bd. T. 7.

Bd. T. 38. 6. *Item to include.*—As for item Bd. T. 7. except that the shutter leaves shall be made of XPM fixed in T. W. frames.

Bd. T. 38. 7. *Mode of measurement and payment.*—As for item Bd. T. 5.

Bd. T. 39. *Providing and fixing country teak wood single leaf door with expanded metal shutter with—cm. × —— cm.×—— mm. XPM corresponding to I. S. No. —— mesh as per detailed drawings or as directed including the door frame, iron fixtures and fastenings, finishing with two coats of oil paint/oiling complete.*

Bd. T. 39. 1. *General.*—The specifications for item No. Bd. T. 38 shall apply . The door however shall have a single leaf shutter with correspondingly reduced fixtures and fastenings, with four pannels of XPM as per drawings or as directed.

अनुक्रमणिका
Table of Contents

**Bd.T.41.3.**

Bd. T. 40. *Providing and fixing country teak wood double leaf door with 20 mm./25 mm. diameter round or 20 mm. square iron bars 10 cm./15 cm. centres in sutters as per drawings or as directed including the teak wood frame, iron fixtures and fastenings and finishing with oiling/oil paint complete.*

Bd. T. 40. 1. *General.*—The item refers to T. W. door with two leaves for shutters with iron bars fixed in them.

Bd. T. 40. 2. *Door Frame.*—As per item Bd. T. 1. 2.

Bd. T. 40. 3. *Door shutter.*—The styles, top, bottom and lock rails shall be 6 cm. thick and 10 cm. wide framed together. Braces of the same dimensions shall be fixed between top and lock rails and lock and bottom rails diagonally inclined towards the hinges. A rebate of 12 mm. ($\frac{1}{2}$") shall be kept in the central styles of the shutter. Mild steel round bars 20 or 25 mm. in diameter or 20 mm. square bars as mentioned in the item shall be fixed 10 or 15 cm. apart centre to centre in the shutters as mentioned in the item. The bars shall be housed into the top and bottom rails to a depth of 2.5 cm. and shall be passed through the lock rail and braces. Mild steel flats 50 mm.×6 mm. shall be fixed with iron screws to the top, bottom and lock rails by taking recesses of the exact dimensions of the flat and inserted into the side posts at least 12 mm. The mild steel bars shall pass through the hole kept in the flats as mentioned above and shall pass into the top and bottom rails for 2-5 cm.

Bd. T. 40. 4. *Fixtures and fastenings.*—As per Bd. T. 7.

A sbstantial aldrop of an approved make shall be fitted and the ends of bolts flared to prevent the nut to be screwed out.

Bd. T. 40. 5. *Finishing.*—The woodwork and iron bars shall be finished with 2 coats of oilpaint of approved colour and shade as per specification B. 21. Oiling shall be done according to Bd. N.

Bd. T. 40. 6. *Item to include.*—As per Bd. T. 7. but with iron barred shutters instead of panelled doors.

Bd. T. 40. 7. *Mode of measurement and payment.*—As per Bd. T. 5.

Bd. T. 41. *Providing and fixing Burmah/superior Indian teak wood double leaf first class window with plain/obscured glass shutters, without/with ventilator or fanlight, as per detailed drawings including the teak wood window frame, oxdised brass, brass fixtures and fastenings and finishing the wood work with oil paint/varnish/french polish—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with centre wooden member/mild steel flat and finished with oil paint.*

Bd. T. 41. 1. *General.*—The item refers to Burmah or superior Indian teak wood double leaf 1st class window in T. W. frame with or without fanlight or ventilator with fully glazed shutters as specified in the item. Ventilators or fanlight if included shall be glazed. All the specification given for item No. Bd. T. 9. shall apply. except that the shutter shall be fully glazed. The following additional specifications shall apply.

Bd. T. 41. 2. *Window frames.*—The window frame shall be of teak wood and shall comply with Bd. T. 1. When mild steel bars are to be provided, a wooden member of the same dimensions as the head sill or post of the frame but less in width by the thickness of the shutter shall be fixed in the middle of the frame with mortice and tenon joint and the bars pased through this member. Mild steel flat 50 mm.×10 mm. shall be used instead of wooden member when included in the item. When ventilators are to be provided on top or window area is to be added on sides, the frames for these shall be built up in one frame with each member in one full length.

Bd. T. 41. 3. *Fixtures and fastenings.*—Fixtures and fastenings shall be of brass or oxidised brass as provided and their types and members shall be those shown in the relevant table unless otherwise shown on the detailed drawings or specified in the special provisions. They shall comply with relevant I. S. 204-1966, I. S. 205-1966, I. S. 208-1965, I. S. 362-1968, I. S. 363-1961 unless special types are specified.

अनुक्रमणिका
Table of Contents



Bd. T. 41. 4. *Glazing.*—The glass to be used shall be plain or obscured or as directed by the Engineer and shall comply with specification Bd. S. and shall not be less than 7.5 kg/ sqm. (24 oz./sq. ft.) in weight and in sizes to suit the panels shown in the drawings or directed by the Engineer.

Bd. T. 41. 5.—*Mild Steel Bars.*—When Mild Steel Bars are included they shall be of 16 mm. rounds unless other sizes and shapes are specified in the special provisions or drawings. When mild steel bars are to be provided they shall be fixed through mild steel flats 40 mm. wide and 6 mm. thick at each end, holes being drilled through them for the purpose.

If the clear opening of the window along the bar length does not exceed 45 cm. no central flat is necessary. Only one such flat shall be used at right angles to the direction of bars for clear lengths of bars up to 75 cms. and for bar lengths exceeding 75 cms. two flats shall be used sutiably spaced as directed.

When vertical iron bars are provided for ventilator also the same window bars shall be taken through the transome into the head of the ventilator. Mild Steel Flats 40 mm.×6 mm. shall be fixed into the head of the ventilator and the bars passed through them.

Bd. T. 41. 6. *Construction.*—The frames shall be provided and fixed as specified in Bd. T. 1. The sizes of the components of double leaf shutters and frame shall be as given in the relevant tables unless other sizes are shown in the drawings or specified. Unlike the door shutter in Bd. T. 9, the window shutters shall be fully glazed without any wooden panels. Glazing shall be done according to Bd. S.

When Mild Steel bars are to be provided, mild steel flats 40 mm.×6 mm. shall be fitted into the frame by cutting a recess to fit the flat exactly. They shall have holes drilled through them to pass the bars through as specified above. The bars shall go 2.5 cm. in the frame. The flats shall be screwed to the frame with iron screws and shall be passed not less than 12 mm. into the adjoining member of the frame. The vertical or horizontal bars shall be passed at the centre through a horizontal or vertical wooden member as stated above or through a mild steel flat 50 mm.×10 mm. fixed in the centre of the frame as shown in the drawings or directed by the Engineer. The bars shall be spaced 10 cms. apart centre to centre, which may be varied up to a maximum of 2 cms. in order to have equal spacing between the clear window size.

Bd.T.41.7. *Finishing.*—The woodwork shall be finished as specified with varnish or french polish or painted with 3 coats of oil paint of approved shade and colour as specified in Bd.N. The iron bars shall be finished with 2 coats of oil paint over a priming coat of red lead as per B.21.a.

Bd.T.41.8. *Item to include.*—As per Bd.T.3. The item shall include fully glazed shutters instead of panelled shutters and there shall be no lock. When iron bars are mentioned in the item, the mild steel round bars, central wooden scantling or mild steel flat and mild steel flats in the frame specified above shall be included.

Bd.T.41.9. *Mode of measurement and payment.*—As per Bd.T.5. When double windows and/or ventilator are provided the window area to be paid shall be measured between the unrebated openings of the extreme outside members of the composite frame.

Bd.T.42. *Providing and fixing country teak wood double leaf 2nd class window, with plain obscured glass shutters, without/with ventilator or fanlight as per detailed drawings including teak wood window frame, iron fixtures and fastenings and finishing the wood work with oilpainting/oiling complete—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

Bd.T.42.1. *General.*—The same specifications as for item No. Bd.T.41 except that the edges of styles, rails and sash bars shall be chamferred instead of moulded and fixtures and fastenings shall be of iron instead of brass. Country teakwood shall be used instead of superior Indian teak wood.

Bd.T.43. *Providing and fixing country teak wood window, with double leaf planked shutters without/with ventilators as per detailed drawings, including teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil paint/oiling complete—*

(a) *without mild steel bars,*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.T.45.**

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

Bd.T.43.1. *General.*—The specifications shall be as for the item No. Bd.T.17 but the sizes shall be adjusted for the window according to those given in relevant tables. Braces shall be omitted. The iron fixtures and fastenings shall include 2 pairs of strong butt hings, tower bolts, handles, and a pair of hooks and eyes as shown in the relevant table and as directed.

When mild steel bars are to be provided they shall be provided, fixed and painted as for item No. Bd.T.41.

Bd.T.43.2. *Item to include.*—As for item No. Bd.T.17 except that shutters shall be planked and ledged and braces omitted.

Bd.T.43.3. *Mode of measurement and payment.*—As for Bd.T.41.

Bd.T.44. *Providing and fixing Burmah/superior Indian teak wood window first class with double leaf glazed shutters on the inside and double leaf fully panelled/fully venetianed teak wood shutters on the outside without/with ventilator or fanlight as per detailed drawings including teak wood window frame, oxidised brass/brass fixtures and fastenings and finishing the wood work with oil paint/varnish/french polish—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

Bd.T.44.1. *General.*—The window shall have two sets of double leaf teak wood shutters, one set being fully glazed for inside and the other set fully panelled or fully venetianed for outside as specified in the item. The teak wood frame shall be as specified in I. S. 1003-1966 for two sets of shutters. If so specified in the item the mild steel bars shall be provided, fixed and finished as described in item Bd.T.41. The fanlight or ventilators if ordered shall be in conformity with specification for item No. Bd.T.3. and Bd.T.41. The glazed shutters shall be as specified for item No. Bd.T.41. The panelled shutters shall conform to specifications given for item No. Bd. T. 5. adjusting the sizes of components to suit the windows and subject to the additional relevant specifications in Bd.T.41.3 and Bd.T.41.4. If venetianed shutters are to be used, specifications for them shall be as described below.

Bd.T.44.2. *Venetianed shutters.*—For venetianed shutters, specifications given for item No. Bd.T.13 shall apply, except that the shutter shall be fully venetianed and not partly venetianed and partly panelled as in Bd.T.13. The fixtures and fastenings for these shutters shall be as described in Bd.T.41.3.

Bd.T.44.3. *Finishing.*—The wood work shall be finished with 2 coats of oil paint of approved colour and shade or varnished or french polished as specified in the item. Iron bars if provided shall be finished with 3 coats of oil paint of approved colour and shade as per B.21.a.

Bd.T.44.4. *Item to include.*—As per Bd.T.5, but adjusted to suit the window—

The item shall include the cost of providing and fixing glazed and panalled or venetianed shutters as specified in the item and the extra fixtures and fastenings and finishing them as specified. The item shall also include the cost of providing and fixing mild steel bars with central and other mild steel flats when m.s. bars are included in the item.

Bd.T.44.5. *Mode of measurement and payment.*—As per Bd.T.41.

The window with both types of shutters shall be measured as a single combined item and paid for the area of the unrebated opening between the extreme members of the frame.

Bd.T.45. *Providing and fixing contrary teak wood window 2nd class with double leaf glazed shutters on the inside and double leaf fully panelled/fully venetianed/plain planked teak wood shutters on the outside, without/with ventilator or fanlight as per detailed drawings including teak wood window frame, iron fixtures and fastenings, and finishing the wood work with oil paint/oiling complete—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat finished with oil paint.*



अनुक्रमणिका
Table of Contents

Bd.T.45.1. *General.*—The window shall have 2 sets of teak wood shutters, one set being fully glazed for inside of the window and the outside set being fully panelled/fully venetianed or plain planked teak wood shutters as mentioned in the item. The teak wood frame shall be as specified in I. S. 1003-1966, for two sets shutters and shall also comply with Bd.T.1. If so mentioned in the item, the mild steel bars shall be provided and fixed and finished as described in the item No. Bd.T.41. The fanlight or ventilator if included shall be in conformity with specification for item No. Bd.T.4. and Bd.T.42. The glazed shutters shall be as specified for item No. Bd.T.42. The outer pair of shutters shall be as specified below.

Bd.T.45.2. *Panelled shutters.*—The panelled shutters shall be as described for item No. Bd.T.7. but the sizes of components shall be adjusted for the window according to sizes given in the relevant table. They shall be subject to the additional relevant specification No. Bd.T.44 but with iron fixtures and fastenings instead of brass.

Bd.T.45.3. *Venetianed shutters.*—Specifications given for item No. Bd.T.15 shall apply except that the shutters shall be fully venetianed and not partly venetianed and partly panelled as in Bd.T.15. The sizes of components shall be adjusted for the window according to the sizes given in the relevant table. The fixtures and fastenings shall be as described in Bd.T.41. but iron fixtures shall be used instead of brass.

Bd.T.45.4. *Planked shutters.*—These shutters shall be as described for item Bd.T.43 and shall have fixtures and fastenings as for Bd.T.41.3 but of iron instead of brass.

Bd.T.45.5. *Finishing.*—The wood work in the item shall be finished with 2 coats of oil paint or oiling as mentioned in the item. Mild steel bars if provided shall be finished with 2 coats of oil paint as per B.21.a.

Bd.T.45.6. *Item to include.*—As for item Bd.T.5 but adjusted to suit the window.

The item shall include both the pairs of shutters, fixtures and fastenings and finishing the window. The item shall also include the cost of providing and fixing mild steel bars with central and other mild steel flats if they are included in the item.

Bd.T.45.7. *Mode of measurement and payment.*—As per Bd.T.41.

Bd.T.46. *Providing and fixing country teak wood window 2nd Class with double leaf galvanized iron wire gauze shutters on the inside and double leaf fully pannelled/plain planked shutters on the outside without/with ventilator or fanlight as per detailed drawings including the teak wood window frame, iron fixtures and fastenings and finishing the wood work with oil paint/oiling—*

(a) *without mild steel bars,*

(b) *with mild steel bars with/without central wooden member/mild steel flat and finished with oilpaint.*

Bd.T.46.1. *General.*—The window shall have 2 sets of shutters one set being of galvanized iron wire gauze for the inside of the window, and the other being fully pannelled 2nd class type or plain planked shutters for the outside as mentioned in the item. The teak wood frame shall be as specified in I.S. 1003-1966 for two sets of shutters and shall also comply with specifications for item Bd.T.2. If so mentioned in the item, the mild steel bars shall be provided, fixed and finished as described in the item Bd.T.42. The fanlight or ventilator if included shall be in conformity with specifications for item No. Bd.2.3. and Bd.T.42. The galvanized iron wire gauze shutters shall comply with specification given for item No. Bd.T.49.

The panelled or planked shutter shall conform to specifications given in item No. Bd.T.45.2 or Bd.T.54.4, respectively.

Bd.T.46.2. *Finishing.*—As for item Bd.T.45.

Bd.T.46.3. *Item to include.*—As for item No. Bd.T.45 except that one pair of shutters shall be of galvanized iron wire gauze and the other fully pannelled or plain planked as mentioned in the item.

Bd.T.46.4. *Mode of measurement and payment.*—As per item Bd.T.44.

Bd.T.47. *Providing and fixing Burmah/superior Indian teak wood 1st class fully venetianed window as per detailed drawings including the frame and shutters, oxidised brass/brass fixtures and fastenings and finishing the wood work with oil paint/varnish/french polish.*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

Bd.T.47.1. *General.*—The item refers to teak wood first class window with a single set of venetianed shutters. The venetianed shutters shall be as described in item Bd.T.44.

Bd.T.47.2. *Item to include.*—As per item Bd.T.41 except that shutters shall be fully venetianed instead of glazed.

Bd.T.47.3. *Mode of measurement and payment.*—As per Bd.T.41.

Bd.T.48. *Providing and fixing country teak wood fully venetianed second class window, as per detailed drawings including the country teak wood window frame and venetian shutters, iron fixtures and fastenings and finishing the woodwork with oil paint/oiling—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

Bd.T.48.1. *General.*—The item refers to teak wood 2nd class window with a single set of venetianed shutters. The venetianed shutters shall be as described in item Bd.T.45.

Bd.T.48.2. *Window frame.*—The window frame shall be of country teak wood and shall conform to specification given for Bd.T.2.

Bd.T.48.3. *Mild steel bars.*—These shall be provided and fixed as described for Bd.T.41.

Bd.T.48.4. *Fixtures and fastenings.*—These shall be as for Bd.T.42.

Bd.T.48.5. *Finishing.*—The wood work shall be finished as mentioned in the item with 2 coats of oil paint of approved colour or oiling and the iron bars shall be finished with 2 coats of oil paint as per B.21.a.

Bd.T.48.6. *Item to include.*—As per item Bd.T.41 except that the shutter shall be venetianed.

Bd.T.48.7. *Mode of measurement and payment.*—As per Bd.T.41.

Bd.T.49. *Provinding and fixing country teak wood window with galvanized iron wire gauze double leaf shutters, including the country teak wood window frame, iron fixtures and fastenings and finishing the woodwork with oil paint/oiling—*

(a) *without mild steel bars,*

(b) *with mild steel bars without/with central wooden member/mild steel flat and finished with oil paint.*

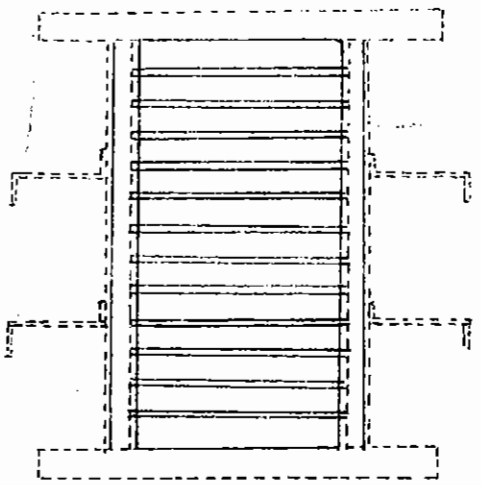
Bd.T.49.1. *General.*—Here galvanised iron wire gauze shutters shall be as described in Bd.T.32.2. except that spring hinges shall not be provided. Instead butt hinges shall be used. Specifications Bd.T.48,2, Bd.T.48.3. Bd.T.48.4, Bd.T.48.5 and Bd.T.48.6 shall apply.

Bd.T.49.2. *Item to include.*—As per Bd.T.41 except that the sutters shall be of galvanised iron wire gauze.

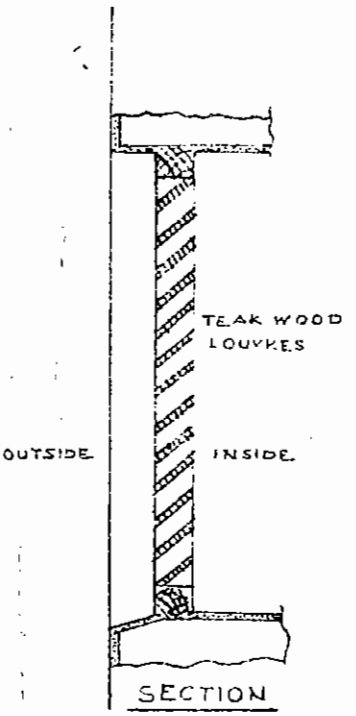
Bd.T.49.3. *Mode of measurement and payment.*—As per Bd.T.41.

Bd.T.50. *Providing and fixing country teak wood window with double leaf shutters inserted with expanded metal including the frame, iron fixtures and fastenings, oil plainting/oiling the wood work and oil painting the expanded metal.*

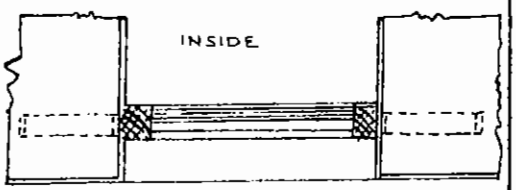
# FIXED LOUVRES



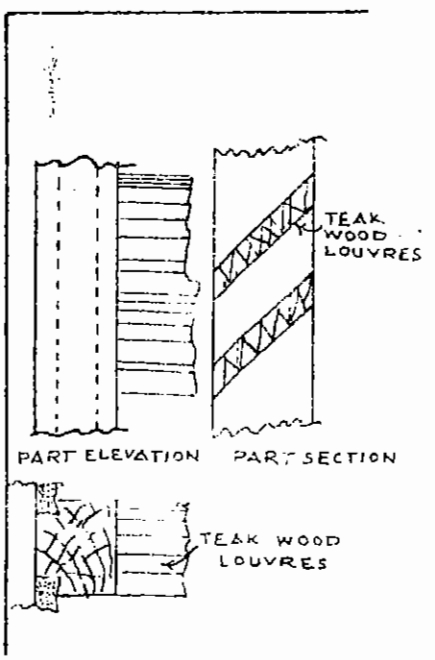
OUTSIDE ELEVATION




SECTION




SECTIONAL PLAN




PART ELEVATION PART SECTION

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.T.50.1. *General.*—The item refers to teak wood windows with expanded metal shutters. All other details of specification shall remain the same as for Bd.T.49 except that the shutters shall be as specified below :—

Bd.T.50.2. *Shutters.*—Expanded metal conforming to I. S. 412-1962, and of the size specified on the detailed drawings or as directed by the Engineer, shall be inserted into the grooves in styles, rails and muntings and framed into place while the shutter is being assembled. It shall be secured with Nettle fold screws, care being taken to see that the screws are set in the uncut mesh insert. The netting should be fixed with long way of mesh vertical. The mesh shall be finished with 2 coats of oil paint of approved colour.

Bd.T.51. *Providing and fixing Burmah/superior Indian teak wood 1st class window with fixed venetians including the window frame, varnishing/oil painting complete.*

Bd.T.51.1. *Timber.*—All timber shall be T. W. as specified in the item and shall conform to specification A.16.

Bd.T.51.2. *Holdfasts.*—Holdfasts shall be as specified for Bd.T.5 and shall be in 2 pairs.

Bd.T.51.3. *Construction.*—The construction shall follow the specifications No. B.20 for General Wood Work.

The frame of the window shall be of the finished sizes and shapes as specified on the detailed drawings or as directed by the Engineer. It shall comply with Bd.T.1 and shall be unrebated. The frame sides shall be notched at required places to house the wooden venetians.

The venetians shall be of teak wood and shall be of finished sizes as shown on the drawings. The venetians shall be either rounded or moulded or given any architectural treatment as shown on the drawings. They shall be securly housed into the sides of the frame at an angle of 45° or as shown on the drawings.

Bd.T.51.4. *Finishing.*—The wood work shall be finished by 2 coats of oil paint of approved colour and shade or varnishing as specified in Bd.N., as per the wording of the item.

Bd.T.51.5. *Item to include.*—The item shall include all labour, materials and use of equipment and tools to carry out—

(1) Providing and fixing the window frame with holdfasts.

(2) Providing and fixing the wooden venetians as specified above.

(3) Finishing the wood work.

Bd.T.51.6. *Mode of measurement and payment.*—Same as for item No. Bd.T.5.

Bd.T.52. *Providing and fixing Burmah/superior Indian teak wood louvered window with teak wood frame and glass louvers of approved quality with mild steel bars between the louvers including finishing the wood work with varnish/oil paint and iron bars with oil paint.*

Bd.T.52.1. *General.*—The specifications for item Bd.T.51 shall apply except that glass louvers shall be fixed instead of timber venetians. The glass for the louvers shall be of the obscured/wired glass type as specified on the drawings or as directed by the Engineer. The sizes of louvers also shall be as specified on the detailed drawings or as directed by the Engineer. They shall be fixed in grooves cut into the frame. Wooden beads shall be screwed to the frame to prevent removal of louvers. Mild steel bars shall be of 15 mm (about 5/8") diameter and they shall be fixed horizontally at every third louver in the sides of the frame. The bars shall be finished with 2 coats of oil paint.

Bd.T.52.2. *Item to include.*—As per Bd.T.51. except that glass louvers shall be used instead of wooden venetians. Item shall also include providing, fixing and finishing the mild steel bars and wooden beads as specified above.

Bd.T.52.3. *Mode of measurement and payment.*—As per item Bd.T.51.

Bd.T.53. *Providing and fixing steel windows of various sizes as per detailed drawings without/with hot dip zinc coating without/with ventilators including fabrication, glazing with non-acetinic/plain/obscured glass panes of approved type and quality all fixtures and fastenings, without/with teak wood boxing and architraves and finishing with oil painting complete.*

Bd.T.53.1. *General.*—The item refers to providing and fixing steel windows in buildings. The steel windows shall conform to I. S. 1038-1968 regarding material, fabrication, dimensions of steel windows, sizes of rolled steel sections and fixtures and fastenings unless other sizes

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



are specified in the special provisions. Steel window frames shall be hot dip zinc coated if so mentioned in the item. The type of window shall be as shown on drawings or as directed by the Engineer with fixed and/or side hung shutter. If ventilators are provided they shall be top or centre hung as shown on drawings or directed by the Engineer. The steel windows without or with ventilators shall be fixed and glazed as specified in I. S. 1081-1960. The type of glass shall be as mentioned in the item and approved by the Engineer. It shall not weigh less than 7.5 kg./sq. m. (about 24 oz./sq. ft.). If the steel windows are supplied by an approved manufacturer they shall be fixed and glazed as per the instructions of the manufacturer. Unless otherwise specified in the special provisions, the sizes of openings for windows shall be from those specified in I. S. 1038-1968 and as shown in the drawings.

Bd.T.53.2. *T. W. boxing and architraves.*—When included in the item teak wood boxing of 20 cm×2 cm, and architrave of 6 cm.×2 cm. or other sizes shown in the drawings shall be provided all round the window from inside and the edges shall be finished with plaster or dado work as the case may be obtain a finished job. The joints of the window frame with masonry shall be finished neatly with cement mortar.

Bd.T.53.3. *Finishing.*—The steel windows which are not hot dip zinc coated shall be finished with 2 coats of oil paint of approved colour and shade on a primer coat of red lead as specified in B.21.a. The wooden boxing and architraves shall be finished with 2 coats of oil paint of approved shade as specified in Bd.N.

Bd.T.53.4. *Item to include.*—All labour, materials and equipment required for—

(1) providing the fabricated steel windows as specified above at the site with all accessories, fixing materials and glass panes,

(2) Fixing the steel windows in the required positions and glazing,

(3) Providing the T. W. boxing and architraves,

(4) Finishing the joints of frames with masonry with cement mortar and painting the steel windows and boxing and architraves.

Bd.T.53.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one sq. m. of the area covered by the outer dimensions of the window frame. The dimensions shall be measured outside to outside of the outer edges of the frame (excluding lugs) correct upto a cm. The dimensions of composite windows, ventilators, etc., shall be measured from outside to outside of the outer most members of the composite frame including mullions, transomes, etc., but excluding lugs. The area shall be worked out correct upto 3 places of decimals of a sq. m.

Bd.T.54. *Providing and fixing steel doors of various sizes as per detailed drawings without/with hot dip zinc coating without/with ventilators including fabrication, glazing with-non acetinic/plain/obscured glass panes of approved type and quality, kick plates all fixtures and fastenings, without/with teak wood boxing and architraves and finishing with oil-painting complete.*

Bd.T.54.1. *General.*—The item refers to providing and fixing of steel door in a building. The steel doors shall conform to I. S. 1038-1968 and fixing and glazing the door shall be done, as per I. S. 1081-1960. The specifications given for item Bd.T.53 shall also apply.

Bd.T.55. *Providing and fixing rolling steel shutters fabricated from 18/20 gauge steel laths with side guides, bottom rail, brackets, door suspension shaft, rolling springs, locking arrangements and housing box at the top including painting complete.*

Bd.T.55.1. *General.*—The rolling steel shutters shall be of approved make and design and shall be suitable for fixing in the position ordered, i.e., outside, inside, on or below lintel or between jambs. The shutter shall be of the manually operated pull or push up type up to 10 sq. m. area. If the area of the shutter is between 10 sq. m. and 13 sq. m. three ball bearings shall be provided for easy operation. The particulars of the shutters shall generally be as under unless any other suitable changes are proposed by the approved manufacture and acceppted by the Engineer :—

(*a*) The shutter shall be constructed with curved slats or laths from mild steel sheets of the specified gauge. The laths shall be machine moulded and straightened with an effective bridge depth of 16 mm (about 5/8″). These slats shall slide into one another forming a continuous hinge throughout their length and shall be fitted with alternating end lock.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(*b*) Side guides and bottom rail shall be built up from mild steel rolled sections but in the case of small shutters they may be of pressed steel. The sizes of these members shall be as shown on dawings or as approved by the Engineer. The guides shall be generally 6 cm. (about 2½").

(*c*) Rolling springs shall be manufactured from tested unbreakable high tensile tempered spring steel wire or strip of adequate strength to balance the shutter in all positions.

(*d*) The springs assembly shall be supported on strong mild steel or malleable cast iron brackets shaped to fit the lintel. The shutter when coiled up shall be housed in a box of 18 gauge sheet metal.

(*e*) Locking arrangement shall be provided at the bottom of the shutter at both ends. The shutter shall be opened from outside.

(*f*) The shutter shall be complete with door suspension shafts, locking arrangements, pulling hooks, handles and other accessories.

(*g*) Fixing shall be done in a workmanlike manner so that the operation of the shutter is easy and smooth. All work disturbed or cut away shall be made good to match the existing.

Bd.T.55.2. *Finishing.*—The whole work shall be painted with 1 coat of red lead and 2 coats of aluminium or other paint of approved shade as directed as per specification No. B.21a.

Bd.T.55.3. *Item to include.*—The rate shall include all labour, materials and use of equipment to carry out the following :—

(1) Providing and fabricating the shutter, guides, brackets, bottom rails, housing box and other accessories.

(2) Transporting, erecting and fixing the shutters.

(3) Finishing as specified above.

Bd.T.55.4. *Mode of measurement and payment.*—The contract rate shall be per sq. m. of the clear opening to be covered. The dimensions of the opening shall be measured correct to two places of decimals of a metre and the area calculated correct to three places of decimal of a sq. m.

Bd.T.56. *Providing and fixing rolling steel shutter fabricated from 18/20 gauge steel laths with side guides, bottom rail, brackets, door suspension shaft, housing box at the top including mechanical gear operation arrangement and painting complete.*

Bd.T.56.1. *General.*—The item refers to the rolling steel shutter operated with gear arrangement. The shutter shall be of the same description as the push up type specified in Bd.T.55 with the following addition.

Bd.T.56.2. *Mechanical gear.*—Gear handle and operating arrangements shall be provided in the required positions and places as shown on the drawings or as directed by the Engineer. Gear will be operated by hand only.

Bd.T.56.3. *Item to include.*—As per Bd.T.55.4.

The rate shall include providing and fixing gear box, handle and other accessories.

Bd.T.57. *Providing and fixing collapsible steel gates in one/two leaves, with channel pickets, pivoted flat bars, including top and bottom guide, rollers, stoppers, handles, all fitting accessories, locking arrangements and painting complete.*

Bd.T.57.1. *General.*—The item refers to collapsible steel gates in one or two leaves as mentioned in the item. The gates shall be of the approved design and make and fabricated out of best quality mild steel channels, flats, etc. Dimensions and other particulars shall generally be as under unless other design is shown in the drawings or approved by the Engineer :—

(*a*) *Pickets.*—These shall be of 20 mm mild steel channels of heavy section unless other sizes are shown in the drawings. Distance centre to centre of channel pickets shall be 12 cm with an opening of 10 cm or as ordered.

(*b*) Pivoted mild steel flats shall be 20 mm. × 6 mm. or as ordered.

(*c*) Top and bottom guides shall be tee or flat iron of approved size.

(*d*) Other fittings like stoppers, fixing holdfasts, locking cleats, brass handles, brass lock and cast iron rollers shall be of approved design and size.

अनुक्रमणिका
Table of Contents

**Bd.T.59.**

The fitting shall be done in a workmanlike manner. The gate shall open and close smoothly and easily. All work cut and disturbed in fixing shall be made good to match the existing. The bottom runner shall be sunk level with the floor and proper grooves shall be formed along the runner.

Bd.T.57.2. *Finishing.*—The gate shall be finished with 2 coats of oil paint of approved colour and shade on an undercoat of red lead as per B.21.a.

BdT.57.3. *Item to include.*—The rate shall include all labour, materials and use of equipment to carry out the following :—

(1) Providing the fabricated steel collapsible gate with its accessories and fittings and transporting it to the site.

(2) Erecting and fixing the gate in the required position as specified above.

(3) Finishing.

Bd.T.57.4. *Mode of measurement and payment.*—As per Bd.T.54.

Bd.T.58. *Providing and fixing Burmah/superior Indian teak wood, first class fully panelled partition — mm. thick with frame of mm. × —— mm. verticals at —— cm. centre and —— mm. × —— mm. horizontals at —— cm. centres including all mouldings and ornamental work as shown on drawings and finishing the wood work with varnish/french polish/oil paint complete.*

Bd.T.58.1. *General.*—The item shall be carried out on the lines specified for item No. Bd.T.5. for a fully panelled first class door. The thickness of partition mentioned in the item shall be the thickness of the stiles. The finished sizes of components of the partitions, and their shapes shall be as shown on the detailed drawings. The following additional specifications shall be applicable.

Bd.T.58.2. *Construction.*—When so shown on the drawings or directed by the Engineer the ends of horizontals of the frame shall be fixed into the masonry or strong rigid posts and well secured to obtain adequate rigidity. Similarly the ends of verticals of the frame shall be secured to the floor and the top of slab or beam.

The intermediate bays between horizontal and verticals shall be filled with panels as shown on the drawings or directed by the Engineer.

Where shown on drawings, teak wood ornamental cresting shall be provided over the horizontal top pieces and teak wood ornamental knobs fixed at the heads of all the open uprights. The edges shall be beaded.

Bd.T.58.3. *Finishing.*—The whole wood work shall be finished as specified in the item by french polishing, varnishing or two coats of oil paint of approved colour and shade as specified in Bd. N. The junctions with walls or posts shall be neatly finished.

Bd.T.58.4. *Item to include.*—The rate for the item shall include all labour, materials and equipment necessary to carry out the following operations :—

(1) Supply of teak wood scantling and planks, brass screws, etc., required for the work.

(2) Preparing and fixing the partition and frame with all its wood work as specified.

(3) Finishing of the wood work.

Bd.T.58.5. *Mode of measurement and payment.*—The contract rate shall be per square metre of the partition. If any door or window or ventilator is fixed in the partition it shall be paid for separately under a separate item in the tender. The linear dimensions shall be measured for the net area outside to outside of frames correct up to a centimetre and area worked out correct up to three places of decimals of square metre. All opening of doors, windows, ventilators inclusive of their frame shall be deducted.

Bd.T.59. *Providing and fixing Burmah/superior Indian teak wood first class partly panelled and partly glazed partition, —— thick with frame work of —— mm. × —— mm. verticals at —— cm. centres and —— mm. × mm. horizontals, at —— centres or as shown on detailed drawings, including all mouldings and ornamental work and finishing the wood work with varnish/french polish/oil paint complete.*

अनुक्रमणिका
Table of Contents



Bd.T.59.1. *General.*—The specifications for item No. Bd.T.58. shall apply here also with the following change :—

Upper portion of the partition shall be glazed with obscured glass. The sizes of openings for glazing and type of obscured glass shall be as shown on drawings or as directed by the Engineer. The glazing shall be done as per Bd.S.

Bd.T.60. *Providing and fixing country teak wood second class fully panelled partition —— mm. thick with frame of —— mm. × —— mm. verticals at —— cm. centres and —— mm. × ——— mm. horizontals at —— cm. centres as per detailed drawings including finishing the wood work with oiling/oil painting complete.*

Bd.T.60.1. *General.*—The item shall be carried out on the lines specified for item Bd. T.7. for a fully panelled, second class door. The thickness of partition mentioned in this item shall be the thickness of styles. The sizes of components of the partitions and of panels and their shapes shall be as shown on the detailed drawings or as directed by the Engineer. The following additional specifications shall be applicable.

Bd.T.60.2. *Construction.*—The ends of horizontals and verticals of the frame shall be fixed as specified in Bd.T.58.

The intermediate bays between horizontals and verticals shall be filled with panels as per the details drawings.

Instead of providing beadings or mouldings to the edges of frames holding the panels, they shall be finished by chamfering. The raised panels shall have square corners and edges on both sides.

The whole wood work shall be finished with oiling or painting in two coats of approved shade of oil paint as mentioned in the item, as per Bd.N.

Bd.T.60.3. *Item to include.*—As per item No. Bd.T.58. subject to the above.

Bd.T.60.4. *Mode of measurement and payment.*—As per item No. Bd.T.58.

Bd.T.61. *Providing and fixing partition of asbestos cement sheets of approved make and —— mm. thick with country teak wood/jungle wood (—— species) frame of —— mm. × —— mm. verticals at —— cm. centres and —— mm. × —— mm. horizontals at —— cm. centres in regular panels including applying oil paint of approved colour to the asbestos cement sheets and oil painting/oiling wood work complete.*

Bd.T.61.1. *Timber.*—Timber used in the wood work shall be country teak wood or jungle wood as mentioned in the item and it shall conform to A. 16.

Bd.T.61.2. *A. C. Sheets.*—These shall be of approved make and quality and of the thickness mentioned in the item. The sizes shall be as shown on the drawings.

Bd.T.61.3. *Construction details.*—The construction of the frame shall follow the specification B. 20 for "General wood work". The sizes of the verticals and horizontals of the frame, and their spacings shall be as mentioned in the item and or shown in the drawings. The ends of the horizontals and verticals of the frame shall be fixed as specified in Bd.T.58. The whole partition shall be strongly secured to rigid supports. The intermediate bays between horizontals and verticals shall be filled with A. C. sheets, A. C. sheets shall be nailed to the rebated wooden frame with beaded or chamfered battens to form neat panels or fixed in any other manner as specified on the detailed drawings or as directed by the Engineer.

Bd.T.61.4. *Finishing.*—The A. C. sheets and wood work shall be painted on both sides with two coats of oilpaint of approved colour and shade. The wood work shall be oil painted in approved colour in two coats as mentioned in the item. If so directed the beads may be picked out by oil painting in a different colour.

Bd.T.61.5. *Item to include.*—The rate shall include labour, materials and equipment necessary to cary out the following operations for the satisfactory completion of the item:—

(1) Supplying the scantlings and A. C. sheets of specified sizes.

(2) Preparing and fixing the partition as specified above.

(3) Finishing, A. C. sheets, beads and exposed wood work.

Bd.T.61.6. *Mode of measurement and payment.*—As per item No. Bd.T.58.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.T.65.1.**

Bd.T.62. *Providing and fixing partition of country teak wood/jungle wood (——species) planks, —— mm. thick as per detailed drawings including teak wood/jungle wood frame of —— mm. × —— m. verticals at —— cm. centres and ——×—— horizontals at —— cm. centres or as shown on the drawings and finishing with oiling/oilpaint complete.*

Bd.T.62.1. *Timber.*—The timber used shall be country teak wood or jungle wood as mentioned in the item and shall conform to A.16.

Bd.T.62.2. *Construction.*—The construction shall follow the specification No. B. 20 for "General wood work".

The partition shall be of the size as shown on the drawings or as directed by the Engineer. The components of frame shall be of the sizes as shown on the drawings. The ends of the horizontals and verticals of the frame shall be fixed as specified in Bd.T.58. The planks shall be tongued and grooved and fixed to the frame with iron screws. Any decorative work shall be shown on drawings.

Bd.T.62.3. *Finishing.*—The wood work shall be finished with oiling or two coats of oil-paint of approved colour and shade and this shall be done as specified in Bd.N.

Bd.T.62.4. *Item to include.*—As per Item No. Bd.T.58. modified as above.

Bd.T.62.5. *Mode of measurement and payment.*—As per Item No. Bd.T.58.

Bd.T. 63. *Providing and fixing partition of ———— mm. thick masonite facing of approved colour and shade on the side/both sides on country teak wood/jungle wood (—— species) frame of —— mm. × —— mm. verticals at —— cm. centres and —— mm. × —— mm. horizontals at —— cm. centres including all mouldings or ornamental work shown in the drawings and french polishing.*

Bd.T.63.1. *General.*—The frame of the specified wood shall be prepared and fixed as specified in Bd.T.61.

The partition shall be provided with a facing of masonite boards of thickness as mentioned in the item. The colour and shade of masonite shall be as approved by the Engineer. The facing shall be on one side or both sides as mentioned in the item. The boards shall be fixed with brass screws to the partition as shown in the drawings, either plain or divided in panels with battens, beaded or chamfered if shown in the drawings or directed by the Engineer. The boards, battens and exposed parts of the frame shall be french polished as specified in Bd.N.

Bd.T.63.2. *Item to include—*

(1) Providing and fixing the frame of specified wood.

(2) Providing and fixing masonite boards and battens as specified.

(3) Finishing the masonite facing and exposed wood work with french polish.

Bd.T.63.3. *Mode of measurement and payment.*—As per Bd.T.58.

Bd.T.64. *Providing and fixing partition of canvas facing on one side/both sides of country teak wood/jungle wood (—— species) from of —— mm.×—— mm. verticals at —— cm. centres and —— mm. × —— mm. horizontals at —— cm. centres and as per detailed drawings including applying oilpaints of approved colour to the canvas and oil painting/ oiling the wood work complete.*

Bd.T.64.1. *General.*—The specifications shall be the same as for item No. Bd.T 61 except that canvas shall be used in place of asbestos sheets. The canvas cloth shall be of approved quality and shall be fixed with iron screws on battens or beads to the wooden frame. It shall be painted on both sides with two costs of oil paint of approved colour and shade. The exposed wood work shall be painted with two coats of oil paint of approved colour or oiled as mentioned in the item as per Bd.N.

Bd.T.65. *Providing and fixing partition of plain/corrugated galvanized iron sheets of 1.22 mm. thick (18 B.W.G.) on country teak wood/jungle wood frame (—— species) of —— mm × —— mm. verticals at —— cm. centres and —— mm. × —— cm. horizontal at cm. centres as per detailed drawings including oil painting/oiling the wood work.*

B.T.65.1. *General.*—The specifications for item No. Bd.T.61. shall apply here also except that—

(1) The plain or corrugated galvanised iron sheets of the specified gauge as mentioned in item and approved quality shall be used instead of A. C. Sheets.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



(2) The galvanised iron sheets shall be screwed with iron screws to the wooden frame with battens or fillets if so shown on the drawings or directed by the Engineer.

(3) The wood work only shall be finished as specified.

Bd.T.66. *Providing and fixing partition of country teak wood/jungle wood (—species) two way trellis work with battens or lands of 25 mm.×12 mm./40 mm.×12 mm. including frame of vertical and horizontal scantlings and finishing with oil paint/oiling complete.*

Bd.T.66.1. *Timber.*—Timber to be used shall be country teak wood or jungle wood as specified in the item, complying with A.16. Unless otherwise shown on the drawing, the timber battens shall be of finished size mentioned in the item, well planed and straight and with square edges. Finished sizes of frame scantlings shall be 80 mm.×50 mm. (3″×2″) unless otherwise shown on the drawing. They shall be spaced 2 m. apart unless other spacings are shown in the drawings.

Bd.T.66.2. *Construction.*—The construction shall be according to specification B.20 for "General wood work".

The frame work shall be perfectly rigid and shall be securely fixed to the masonry or strong rigid posts.

The battens shall be crossed horizontally and vertically or diagonally in opposite directions at an angle of 45° or 30° or at any angle shown on the drawings or as directed by the Engineer. They shall be fixed together with iron screws at every alternate crossing. The sizes of openings shall be about 50 mm.×50 mm. (2″×2″) or 40 mm.×40 mm. (1½″×1½″) or any other size that may be shown in the drawings or directed by the Engineer. The trellis work shall be secured to the wooden frame of horizontals and verticals.

Bd.T.66.3. *Finishing.*—The trellis work shall be finished as mentioned in the item by oiling or oilpainting in two coats as specified in Bd. N.

Bd.T.66.4. *Item to include.*—The rate for the item shall include all labour, materials and use of tools necessary to carry out the following operations:—

(1) Supplying the teak wood or jungle wood scantlings for frame and teak wood or jungle wood battens and screws.

(2) Preparing and fixing the frame and trellis work as specified above.

(3) Finishing.

Bd.T.66.5. *Mode of measurement and payment.*—As per Bd.T.58.

Bd.T.67. *Providing and fixing partition of hoop iron trellis work including country teak wood/jungle wood (—species) frame of vertical and horizontal scantlings and finishing with oil paint complete.*

Bd.T.67.1. *General.*—The item refers to partition of trellis work of hoop iron with frame of country T. W. or jungle wood as mentioned in the item. The specifications shall be the same as for item Bd.T.66 except that hoop iron trellis work shall be used instead of trellis work of teak wood or jungle wood battens. The hoop iron shall be 25 mm. wide and 1,22 mm. thick (18 B.W.G.) weighing 0,25 kg/metre interlacing diagonally a tan angle of 45° leaving clear openings of 5 cm. square and fixed with 4 cm. long wire nails.

The scantlings of frame work shall not be spaced more than one metre apart and shall be 80 mm.×50 mm. in section.

The hoop iron shall be heated and rubbed over with boiled linseed oil before being fixed.

Bd.T.68. *Providing and fixing partitions faced with 3/5/7 ply 6 mm. (¼″) thick Burmah/superior Indian teak veneers or both sides including necessary country teak wood frame work including french polishing/varnishing the face veneers complete without skirting with superior Indian teak wood skirting with mouldings beading as directed.*

Bd.T.68.1. *General.*—The item refers to partition with teak veneer facing on both sides on country T. W. frame work with or without T. W. skirting as mentioned in the item.

BdT.68.2. *Timber.*—The timber for frame work shall be country teak wood and shall conform to A. 16. The planks for skirting shall be superior Indian teak.

Bd.T.68.3. *Veneers.*—Veneer boards shall be of Burmah or superior Indian teak 3 or 5 or 7 ply 6 mm. (¼″) thick. They shall be of approved pattern and shall conform to I. S. 1328-1959. Samples shall be got approved by the Engineer and deposited with him for reference.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.T.69.8.**

Bd.T.68.4. *Construction.*—The construction shall follow the specification B.20 for General Wood work.

For the framing, the country teak wood scantling shall be 80 mm.×40 mm. (about 3″×1½″) for verticals and horizontals both placed at about 2/3 metre (about 2′) centres, unless other sizes and spacings are shown on the drawings. The frame shall be fixed rigidly as specified in Bd.T.58. On this frame, the veneer shall be fixed on both faces with screws. The facing shall be finished over with polish or varnish. Screwheads shall be countersunk, wood puttied and touched up.

If so mentioned in the item, superior Indian teak wood skirting shall be provided and fixed. The plank for the skirting shall be 20 cm.×2 cm. (8″×¾″) unless otherwise shown on the drawings. Bottom part of partition where skirting is provided shall not be veneered.

Any door, window or ventilator that may be fixed to or in the partition shall be paid for separately.

Bd.T.68.5. *Finishing.*—The veneer and skirting shall be finished with french polish or varnish as per Bd.N.

Bd.T.68.6. *Item to include.*—The rate for the item shall include all labour, material and equipment to carry out the following:—

(1) Supplying the teak wood scantlings, planks and veneers, brass screws for face-work and iron screws for frame work.

(2) Preparing and fixing the frame and skirting and fixing veneers on the frame.

(3) Finishing the veneers and skirting.

Bd.T.68.7. *Mode of measurement and payment.*—As per Bd.T.58.

The skirting when provided will be measured as a part of the partition.

Bd.T.69. *Providing and fixing country teak wood/jungle wood (—— species) door with double leaf shutters of two way trellis work with battens of —— mm×—— mm. (——″×——″) including 80 mm.×50 mm. door frame, iron fixtures and fastenings and finishing the wood work with oiling/oilpainting complete.*

Bd.T.69.1. *General.*—The item refers to providing and fixing double leaf trellis door of teak wood or jungle wood of specified species including the frame as shown in the drawings or directed by the Engineer.

Bd.T.69.2. *Timber.*—Timber to be used shall be country teak wood or jungle wood as specified in the item and shall comply with A. 16.

Bd.T.69.3. *Shutter.*—The door shall have two leaves for shutter. Each leaf of the shutter shall have a frame of 50 mm.×50 mm. (2″×2″) scantling for the two styles and the top, bottom and central rails. The timber battens shall be of finished size as mentioned in the item, well planed and straight with square edges. If the door is in a trellis partition the size of the battens in the door shall be the same as those of the partition. The trellis work shall be screwed to the styles and rails as described in Bd.T.66. The trellis work of the shutters and of the partition in which they are fixed shall be in the same plane and the battens of one shall correspond with those in the other both with regard to position, size and angle of fixing.

Bd.T.69.4. *Frame.*—The door frame shall be prepared from 80 mm×50 mm. (3″×2″) scantlings. No rebates will be cut in the frame for the shutters which will be fixed flush to the frame with iron butt hinges. The door frame shall be fixed wherever possible, to the framing of the trellis work in which the door is to be fixed.

Bd.T.69.5. *Fixtures and fastenings.*—The fixtures and fastenings shall be as for Bd.T.7.

Bd.T.69.6. *Finishing.*—The wood work shall be finished as mentioned in the item with two coats of oilpaint in approved colour or oiling as specified in Bd.N.

Bd.T.69.7.—*Item to include*—

The rate for the item shall include (1) all labour, materials and use of tools, necessary to carry out the item,

(2) Supplying the timber scantling necessary, iron screws, fixtures and fastenings,

(3) Preparing and fixing the door with frame shutters and fixtures and fastenings,

(4) Finishing the wood work.

Bd.T.69.8. *Mode of measurement.*—As for item Bd.T.7.

अनुक्रमणिका
Table of Contents

Bd.T.70. *Providing and fixing country teak wood/jungle wood (—— species) door with single leaf shutter of two way trellis work with battens of ——— mm.×——mm. (——"×——") size including the door frme, iron fixtures and fastenings and finishing wood work with oiling/oilpainting complete.*

Bd.T.70.1. *General.*—The specifications for Bd.T.69 shall apply except that the door shall have a single leaf shutter and the fixtures and fastenings shall be reduced suitably.

Bd.T.71. *Providing and fixing country teak wood/jungle wood (—— species) door, with double leaf shutters of two way trellis work of hoop iron as per drawings approved by the Engineer including the door frame, iron fixtures and fastenings and finishing with oilpainting complete.*

Bd.T.71.1. *General.*—The item refers to double leaf hoop iron trellis door with a door frame of teak wood or jungle wood of specified species mentioned in the item. The specifications given for Bd.T.69 shall apply except that hoop iron trellis shall be used instead of wooden trellis. The hoop iron trellis work shall be of the same description as given for item Bd.T.67.

Bd.T.72. *Providing and fixing country teak wood/jungle wood (—— species) door with single leaf shutter of two way trellis work of hoop iron as per detailed drawings approved by the Engineer including the door frame, iron fixtures and fastenings and finishing with oilpainting complete.*

Bd.T.72.1. *General.*—The specifications given for Bd..T.71 shall apply except that the door shall be of single leaf shutter and the fixtures and fastening shall be reduced suitably.

Bd.T.73. *providing and fixing straight run single track, sliding door with plain planked shutters in two leaves as per detailed drawings, including iron fixtures and fastenings, cast iron rollers at the bottom/top hung on a steel back at the top and channel guide at the bottom, oiling/oil painting the wood work and oiling the rollers or wheels and the tract complete.*

Bd.T.73.1. *General.*—The item provides for a straight run sliding door with two leaf plain planked shutter on a single track with rollers at the bottom or hung from the top, as mentioned in the item.

Bd.T.73.2. *Timber.*—The timber used for wood work shall be country teak wood conforming to A. 16.

Bd.T.73.3. *Fixtures and fastenings.*—Fixtures and fastenings shall be of iron of approved manufactures as per detailed drawings or as directed by the Engineer.

Bd.T.73.4. *Construction.*—The shutter shall have two leaves and shall be of the plain planked type. The sizes and shapes of shutters shall be as per the detailed drawings or as directed by the Engineer.

In case of top hung type sliding door, each leaf shall have two hangers, each having four wheels and running in a steel track of boxlike section as per the detailed drawings or as directed by the Engineer. The wheels shall be machined.

The track shall be supported on iron brackets which shall be included in the item.

The bottom of the door shall be held in place by malleable iron guides running in a steel channel let into the floor. The guide shall be as per the designs approved by the Engineer.

For doors with rollers at the bottom, the hangers shall not be required. The rollers shall run on the single track of steel fixed in the floor. The roller shall be of cast iron and machined.

The leaves of the doors shall be secured with locking bars and padlock the arrangement being as shown in the detailed drawings or as directed by the Engineer.

All the wheels and rollers shall be oiled and shall be in good working condition.

Bd.T.73.5. *Finishing.*—The wood work in the door shall be finished as mentioned in the item with 2 coats of oil paint of approved colour or oiling as per Bd.N.

Bd.T.73.6. *Item to include.*—The rate for the item shall include all labour materials and use of tools, required to carry out the following operations :—

(1) Providing the planks, ledges of required sizes, mild steel track girders and channels of the required size supports and rollers or wheels in required numbers.

(2) Preparing the door shutters and fixing in position the shutters, track, wheels, or rollers, bottom guide, etc.

(3) Finishing.

Bd.T.73.7. *Mode of measurement and payment.*—The contract rate shall be per square metre of the clear opening of the door. The dimensions shall be measured correct upto 2 places of decimals of a metre and the area worked out correct upto 2 places of decimals of a sq. m.

Bd.T.74. *Providing and fixing straight run single track, sliding door with corrugated galvanised iron shutters with angle iron frame in two leaves, as per detailed drawings including iron fixtures and fastenings, cast iron rollers at the bottom/top hung on a steel track at the top and channel guide at the bottom, oil painting the frame work and oiling the roller or wheels and the track complete.*

Bd.T.74.1. *General.*—The specifications given for item Bd.T.73 shall apply except that the shutters shall be of corrugated galvanised iron sheets in angle iron frames as per detailed drawings or as directed by the Engineer.

Bd.T.75. *Providing and fixing country teak wood door with folding shutters plain planked/fully panelled second class as per detailed drawings including the door frame iron fixtures and fastenings, oiling/oilpainting the door complete.*

Bd.T.75.1. *General.*—The item refers to a door with folding type shutters which shall be plain planked or fully panelled second class as mentioned in the item and as per detailed drawings or as directed by the Engineer.

Bd.T.75.2. *Timber.*—Timber used shall be country teak wood and shall conform to A.16.

Bd.T.75.3. *Door frame.*—The door frame shall be made out of scantlings of sizes shown in the drawing with 3 pairs of wrought iron hold fasts.

Bd.T.75.4. *Shutter.*—The shutter shall be of the folding type made up of planks and ledges or styles, rails and panels as mentioned in the item and of suitable sizes as per detailed drawings or as directed by the Engineer. In plain planked shutter the planks shall cover the whole height in single pieces.

Bd.T.75.5. *Fixtures and fastenings.*—These shall be of iron and shall be approved make and workmanship. There shall be 3 butt hinges provided at every fold. At the end leaf and frame, the door shall be provided with three male and female or strap or T hinges as shown in the drawings or as directed by the Engineer. One tower bolt shall be provided to each fold to secure it to the floor and an iron aldrop of not less than 30 cm length for locking the door.

Bd.T.75.6. *Finishing.*—The wood work shall be finished as mentioned in the item with 2 coats of oil paint of approved colour or oiling as per Bd.N.

Bd.T.75.7. *Item to include.*—The rate for the item shall include all labour, materials and use of tools to carry out the following operations :—

(1) Providing country teak wood scantlings planks and ledges of required sizes and iron fixtures and fastenings as required.

(2) Preparing the shutter and frame and fixing them in position.

(3) Finishing.

Bd.T.75.8. *Mode of measurement and payment.*—As for item Bd.T.5.

---

अनुक्रमणिका
Table of Contents



## SCANTLINGS OF DOOR FRAMES

| Serial No. | Size of Door (Opening in wall) mm. × mm. (Ft. in × Ft. in.) | Description | Number | For frame carrying single set of shutters | | For frame carrying two sets of shutters | |
|---|---|---|---|---|---|---|---|
| | | | | Breadth mm. | Thickness mm. | Breadth mm. | Thickness mm. |
| 1 | 1475 × 2375 (4′-11″ × 7′-1½″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |
| 2 | 1375 × 2175 (4′-7″ × 7′-2¾″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads | 1 | 70 | 95 | 70 | 146 |
| 3 | 1175 × 2175 (3′-11¼″ × 7′-2¾″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |
| 4 | 1175 × 2075 (3′-11¼″ × 6′-10¾″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |
| 5 | 1075 × 2075 (3′-7¼″ × 6′-10¾″) | Posts | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |
| 6 | 1075 × 1815 (3′-7¼″ × 6′-3″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |
| 7 | 875 × 1875 (2′-11½″ × 6′-3″) | Posts .. | 2 | 70 | 95 | 70 | 146 |
| | | Heads .. | 1 | 70 | 95 | 70 | 146 |

*Note.*—1. Same finished sizes for scantlings shall be used for the frames of ventilators or fanlight.
2. The lengths of all scantlings shall be suitable for the sizes of the opening of the door.
3. Where sills are included, the sections for sills shall be same as for head.

## SCANTLINGS OF WINDOW FRAMES

| Serial No. | Size of Window (Opening in wall) mm. × mm. (Ft. in. × Ft. in). | Description | Number | For frame carrying single set of shutters | | For frame carrying two sets of shutters | | Original size of winow given in P. W. D. Hand Book Vol. I, (Opening in frame) |
|---|---|---|---|---|---|---|---|---|
| | | | | Breadth mm. | Thickness mm. | Breadth mm. | Thickness mm. | |
| 1 | 1375 × 1675 (4′-7″ × 5′-7″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 4′ × 5′ |
| 2 | 1175 × 1675 (3′-11¼″ × 5′-7″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 3½′ × 5′ |
| 3 | 1175 × 1475 (3′-11¼″ × 4′-11″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 3½′ × 4′½ |
| 4 | 1075 × 1475 (3′-7¼″ × 4′-11″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 3′ × 4½′ |
| 5 | 1075 × 1375 (3′-7¼″ × 4′-7″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 3′ × 4′ |
| 6 | 875 × 1175 (2′-11½″ × 3′-11¼″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 2½′ × 3′½ |
| 7 | 775 × 1075 (2′-7½″ × 3′-7¼″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 2′ × 3′ |
| 8 | 1675 × 1075 (5′-7″ × 3′-7¼″) | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 5′ × 3′ |
| 9 | 1075 × 575 (3′-7¼″ × 1′-11¾″ | Posts .. Head and Sill. | 2 2 | 70 | 95 | 70 | 146 | 3′ × 1½′ |

*Note.*—1. Lengths of the components shall be suitable for the sizes of openings.
2. The same scantlings shall be used for iron barred windows.

अनुक्रमणिका
Table of Contents

## SCANTLINGS OF DOORS (PANELLED)

| Serial No. | Size of Door (Opening in wall) mm. × mm. (Ft. in × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Original Size of door given in P. W. D. Hand Book I (opening in frame) | Strong butt hinges | Tower bolt 300 mm. size | Tower bolt 250 mm. size | Tower bolt 200 mm. size | Tower bolt 150 mm. size | Mortise lock | Sliing door bolt |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1475 × 2375<br>15 DT 24<br>(4′-11″ × 8′-10½″) | Styles .. | 4 | 95 | 35 | 4½′ × 7½′ | 3 pairs 125 mm. | 2 | .. | 1 | .. | 1 | 1 |
| | | Top rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Frieze rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Lock rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Bottom rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Top panels .. | | | 30 | | | | | | | | |
| | | Central panels .. | | | 30 | | | | | | | | |
| | | Bottom panels .. | | | 30 | | | | | | | | |
| 2 | 1375 × 2175<br>14 DT 22<br>(4′-7″ × 7′-2¾″) | Styles .. | 4 | 95 | 35 | 4′ × 7′ | 3 pairs 125 mm. | .. | 2 | 1 | .. | 1 | 1 |
| | | Top rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Frieze rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Lock rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Bottom rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Top panels .. | | | 25 | | | | | | | | |
| | | Central panels .. | | | 25 | | | | | | | | |
| | | Bottom panels .. | | | 25 | | | | | | | | |
| 3 | 1175 × 2175<br>12 DT 22<br>(3′-11¼″ × 7′-2¾″) | Styles .. | 4 | 95 | 35 | 3½′ × 7′ | 3 pairs 100 mm. | .. | 2 | 1 | .. | 1 | 2 |
| | | Top rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Frieze rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Lock rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Bottom rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Top panels .. | | | 25 | | | | | | | | |
| | | Central panels .. | | | 25 | | | | | | | | |
| | | Bottom panels .. | | | 25 | | | | | | | | |
| 4 | 1175 × 2075<br>12 DT 21<br>(3′-11¼″ × 6′-10¾″) | Styles .. | 4 | 95 | 35 | 3½′ × 6½′ | 3 pairs 100 mm. | .. | 2 | 1 | .. | 1 | 2 |
| | | Top rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Frieze rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Lock rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Bottom rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Top panels .. | | | 25 | | | | | | | | |
| | | Central panels .. | | | 25 | | | | | | | | |
| | | Bottom panels .. | | | 25 | | | | | | | | |
| 5 | 1075 × 2075<br>11 DT 21<br>(3′-7½″ × 6′-10¾″) .. | Styles .. | 4 | 95 | 35 | 3′ × 6½′ | 3 pairs 100 mm. | .. | .. | 2 | 1 | 1 | 2 |
| | | Top rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Frieze rails .. | 2 | 95 | 35 | | | | | | | | |
| | | Lock rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Bottom rails .. | 2 | 197 | 35 | | | | | | | | |
| | | Top panels .. | | | 25 | | | | | | | | |
| | | Central panels .. | | | 25 | | | | | | | | |
| | | Bottom panels .. | | | 25 | | | | | | | | |

*Note.*—The length of all components of scantlings shall be suitable for the sizes of shutters.



अनुक्रमणिका
Table of Contents

## SCANTLINGS OF DOORS

### (Partly Pannelled and Partly Glazed)

| Serial No. | Size of door (Opening in wall) *mm.* × *mm.* (Ft. in × Ft. in). | Description | Number | Breadth mms. | Thickness mms. | Size of door given in P. W. D. Hand Book Vol. I (Clear opening in frame) | Strong butt hinges | Tower bolt 300 mm. size | Tower bolt 250 mm. size | Tower bolt 200 mm. size | Tower bolt 150 mm. size | Mortise lock | Sliding door bolt | Rubber knob at the back of door fixed to the wall, per shutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1475 × 2375<br>15 DT 24<br>(4′-11″ × 7′-10½″) | Styles .. | 4 | 95 | 35 | 4½′ × 7½′ | 3 pairs 125 mm. | .. | 2 | 1 | .. | 1 | 1 | 1 |
| | | Lock Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Top Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Bottom Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Panels .. | .. | .. | 20 | | | | | | | | | |
| | | Sash Bars (Vertical) .. | 2 | 35 | 35 | | | | | | | | | |
| | | Sash Bars (Horizontal) .. | 6 | 35 | 35 | | | | | | | | | |
| 2 | 1375 × 2175<br>14 DT 22<br>(4′-7″ × 7′-2¾″) | Styles .. | 4 | 95 | 35 | 4″ × 7′ | 3 pairs 125 mm. | .. | 2 | 1 | .. | 1 | 1 | 1 |
| | | Lock Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Top Rails .. | 2 | 95 | 35 | | | | | | | | | |
| | | Bottom Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Panels .. | .. | .. | 25 | | | | | | | | | |
| | | Sash Bars (Vertical) .. | 2 | 35 | 35 | | | | | | | | | |
| | | Sash Bars (Horizontal) .. | 6 | 35 | 35 | | | | | | | | | |
| 3 | 1175 × 2175<br>12 DT 22<br>(3′-11½″ × 7′-2¾″) | Styles .. | 4 | 95 | 35 | 3½′ × 7′ | 3 pairs 100 mm. | .. | 2 | 1 | .. | 1 | 1 | 1 |
| | | Lock Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Top Rails .. | 2 | 95 | 35 | | | | | | | | | |
| | | Bottom Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Panels .. | .. | .. | 35 | | | | | | | | | |
| | | Sash Bars (Vertical) .. | 2 | 35 | 25 | | | | | | | | | |
| | | Sash Bars (Horizontal) .. | 6 | 35 | 35 | | | | | | | | | |
| 4 | 1175 × 2075<br>12 DT 21<br>(3′-11¼″ × 6′-10¾″) | Styles .. | 4 | 95 | 35 | 3½′ × 6½′ | 3 pairs 90 mm. | .. | .. | 2 | 1 | .. | 1 | 1 |
| | | Lock Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Top Rails .. | 2 | 95 | 35 | | | | | | | | | |
| | | Bottom Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Panels .. | .. | .. | 25 | | | | | | | | | |
| | | Sash Bars (Vertical) .. | 2 | 35 | 35 | | | | | | | | | |
| | | Sash Bars (Horizontal) .. | 6 | 35 | 35 | | | | | | | | | |
| 5 | 1075 × 2075<br>11 DT 21<br>(3′-7½″ × 6′-10¾″) | Styles .. | 4 | 97 | 35 | 3′ × 6½′ | 3 pairs 90 mm. | .. | .. | 2 | 1 | .. | 1 | 1 |
| | | Lock Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Top Rails .. | 2 | 95 | 35 | | | | | | | | | |
| | | Bottom Rails .. | 2 | 197 | 35 | | | | | | | | | |
| | | Panels .. | .. | .. | 25 | | | | | | | | | |
| | | Sash Bars (Vertical) .. | 2 | 35 | 35 | | | | | | | | | |
| | | Sash Bars (Horizontal) .. | 6 | 35 | 35 | | | | | | | | | |

*Note.—The length of components of shutters shall be suitable for the size of shutter.



अनुक्रमणिका Table of Contents
अनुक्रमणिका Table of Contents

## SCANTLINGS OF DOORS (LEDGED)

| Serial No. | Size of Door (Opening in wall) mm. × mm. ( Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Size of Door given in P. W. D. Hand Book Vol. I (Clear opening in Frame) | Strong strap hinges | Tower Bolts 250 mm. | Tower Bolts 200 mm. | Tower Bolts 150 mm. | Handles | Hooks and eyes 250 mm. | Sliding bolt for padlock | Rubber knob at the back of door fixed to the wall, per shutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1375 × 2175, 14 DT 22 | Planks .. | 6 | 222 | 35 | 4′ × 7′ | 3 pairs | 2 | 1 | .. | 1 | 2 | 1 | 1 |
| | (4′-7″ × 7′-2¾″) .. | Ledges .. | 6 | 72 | 35 | | 150 mm. | | | | | | | |
| 2 | 1175 × 2175, 12 DT 22 | Planks .. | 8 | 144 | 35 | 3½′ × 7′ | 3 pairs | 2 | 1 | .. | 1 | 2 | 1 | 1 |
| | ((3′-11½″ × 7′-2¾″) .. | Ledges .. | 6 | 72 | 35 | | 150 mm. | | | | | | | |
| 3 | 1175 × 2075, 12 DT 21 | Planks .. | 8 | 144 | 35 | 3½′ × 6½′ | 3 pairs | .. | 2 | 1 | 1 | 2 | 1 | 1 |
| | (3′-11½″ × 6′-10¾″) .. | Ledges .. | 6 | 72 | 35 | | 125 mm. | | | | | | | |
| 4 | 975 × 2075 10 DT 21 | Planks .. | 8 | 119 | 35 | 3′ × 6½′ | 3 pairs | .. | 2 | 1 | 1 | 2 | 1 | 1 |
| | (3′-3¼″ × 6′-10¾″) .. | Ledges .. | 6 | 72 | 35 | | 125 mm. | | | | | | | |
| 5 | 975 × 1875, 10 DT 19.. | Planks .. | 8 | 119 | 35 | 3′ × 6′ | 3 pairs | .. | 2 | 1 | 1 | 2 | 1 | 1 |
| | (3′-3¼″ × 6′-3″) .. | Ledges .. | 6 | 72 | 35 | | 100 mm. | | | | | | | |
| 6 | 875 × 1875, 9 DT 19 .. | Planks .. | 6 | 197 | 35 | 2½′ × 6′ | 3 pairs | .. | 2 | 1 | 1 | 2 | 1 | 1 |
| | (2′-11½″ × 6′-3″) .. | Ledges .. | 3 | 72 | 35 | | 100 mm. | | | | | | | |

*Note.*—The length of the components of shutters shall be suitable for the sizes of shutters.



अनुक्रमणिका Table of Contents
अनुक्रमणिका Table of Contents

## SCANTLINGS OF DOORS (BATTENED, FRAMED AND BRACED)

| Serial No. | Size of Door (Opening in wall) mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Original size of Door given in P. W. D. Hand Book Vol. I (Opening in Frame) | Strong strap hinges | Tower Bolts 300 mm. | Tower Bolts 250 mm. | Tower Bolts 200 mm. | Tower Bolts 150 mm. | Aldrop Bolts | Hooks and eyes. 200 mm. | Rubber knob at the back of door fixed to the wall per shutter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1475 × 2375<br>15 DT 24<br>(4′-11″ × 7′-10½″) | Styles<br>Centre rails<br>Top rails<br>Bottom rails<br>Battens<br>Diagonals | 4<br>2<br>2<br>2<br>10<br>4 | 95<br>197<br>95<br>197<br>120<br>95 | 35<br>35<br>35<br>35<br>17<br>17 | 4′-6″ × 7′-6″ | 3 pairs 225 mm. | 2 | .. | 1 | .. | 1 | 2 | 1 |
| 2 | 1375 × 2175<br>14 DT 22<br>(4′-7″ × 7′-3″) | Styles<br>Centre rails<br>Top rails<br>Bottom rails<br>Battens<br>Diagonals | 4<br>2<br>2<br>2<br>10<br>4 | 95<br>197<br>95<br>197<br>105<br>95 | 35<br>35<br>35<br>35<br>17<br>17 | 4′-0″ × 7′-0″ | 3 pairs 225 mm. | .. | 2 | 1 | .. | 1 | 2 | 1 |
| 3 | 1175 × 2175<br>12 DT 22<br>(3′-11¼″ × 7′-2¾″) | Styles<br>Centre rails<br>Top rails<br>Bottom rails<br>Battens<br>Diagonals | 4<br>2<br>2<br>2<br>8<br>4 | 95<br>197<br>95<br>197<br>105<br>95 | 35<br>35<br>35<br>35<br>16<br>16 | 3′—6″ × 7′—0″ | 3 pairs 225 mm. | .. | 2 | 1 | .. | 1 | 2 | 1 |
| 4 | 1175 × 2075<br>12 DT 21<br>(3′-11¼″ × 6′-10¾″) | Styles<br>Centre rails<br>Top rails<br>Bottom rails<br>Battens<br>Diagonals | 4<br>2<br>2<br>2<br>8<br>4 | 95<br>197<br>95<br>197<br>105<br>95 | 35<br>35<br>35<br>35<br>16<br>16 | 3′— 6″ × 6′—6″ | 3 pairs 225 mm. | .. | .. | 2 | 1 | 1 | 2 | 1 |
| 5 | 1056 × 2075<br>11 DT 21<br>(3′-7½″ × 6′-10¾″ | Styles<br>Centre rails<br>Top rails<br>Bottom rails<br>Battens<br>Diagonals | 4<br>2<br>2<br>2<br>6<br>4 | 95<br>197<br>95<br>197<br>120<br>95 | 35<br>35<br>35<br>35<br>16<br>16 | 3′—0″ × 6′—6″ | 3 pairs 150 mm. | .. | .. | 2 | 1 | 1 | 2 | 1 |

*Note.*—The length of components of shutters shall be suitable for the sizes of shutters.



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## DOORS (BATTENED AND FRAMED)

*Scantlings for styles and rails shall be as given in table for panelled doors*

| Serial No. | Size of Door (Opening in Wall) mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mms. | Original size of Door given in P. W. D.o Hand Book Vol. I (Opening in Frame) |
|---|---|---|---|---|---|---|
| 1 | 1475 × 2375<br>15 DT 24<br>(4′-11″ × 7′-10½″) | Top panel<br>Central Panels<br>Bottom panels | 2<br>2<br>2 | 538 | 10 | 4′-6″ × 7′-6″ |
| 2 | 1375 × 2175<br>44 DT 22<br>(4-7″ × 7′2¾″) | Top panel<br>Central panel<br>Bottompaenls | 2<br>2<br>2 | 488 | 10 | 4′-0″ × 7′-0″ |
| 3 | 1175 × 2175<br>12 DT 22<br>(3′-11¼″ × 7′-2¾″) | Top panel<br>Central panel<br>Bottom panels | 2<br>2<br>2 | 388 | 10 | 3′-6″ × 7′-0″ |
| 4 | 1175 × 2075<br>12 DT 21<br>(3′-11¼″ × 6′-10¾″) | Top panel<br>Central panel<br>Bottom panel | 2<br>2 | 388 | 10 | 3′-6″ × 6′-6″ |
| 5 | 1075 × 2075<br>11 DT 21<br>(3′-7¼″ × 6′-10¾″) | Top panel<br>Central panel<br>Bottom panel | 2<br>2<br>2 | 338 | 10 | 3′-6″ × 6′-6″ |

*Note.*—The lengths of the components of shutters shall be suitable for the sizes of shutters.
2. Fixtures and fastenings shall be as given for panelled door.

Scantlings of doors (Plain planked)

| Serial No. | Size of Door (Opening in wall) mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Size of Door given in P. W. D. Hand Book Vol. I (Clear opening in Frame) | Strong butt hinges | Chain and staple | Rubber knob at the back of door fixed to the wall, per shutter |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1075 × 1875<br>11 DT 19<br>(3′-7¼″ × 6′-3″) | Planks<br>Ledge<br>Vertical<br>Ledge<br>Top and Bottom.<br>Ledge<br>Middle | 2<br>1<br><br><br>2<br>2 | 247<br>72<br><br><br>72<br>95 | 22<br>35<br><br><br>35<br>35 | 3′ × 6′ | 3 pairs 250 × mm. | 2 | 1 |
| 2 | 875 × 1875<br>9 DT 19<br>(2′-11½″ × 6′-3″) | Planks<br>Ledge<br>Vertical<br>ledge<br>Top and Bottom.<br>Ledge<br>Middle | 4<br>1<br><br><br>2<br>1 | 197<br>72<br><br><br>72<br>95 | 22<br>35<br><br><br>35<br>35 | 2½′ × 6′ | 3 pairs 250 mm. | 2 | 1 |

*Note.*—The lengths of components of shutters shall be suitable for the sizes of shutters.

अनुक्रमणिका
Table of Contents

## SCANTLINGS OF WINDOWS (GLAZED)

| Serial No. | Size of Window (Opening in Wall) mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Original size of Window given in P. W. D. Hand Book Vol. I. (Opening in Frame) | Strong butt hinges | Tower bolts 250 mm. | Tower bolts 200 mm. | Tower bolts 150 mm. | Handles | Hooks and eyes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1375 × 1675<br>14 WT 17<br>(4′-7″ × 5′-7″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>4<br>2<br>8 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 4′-0″ × 5′-0″ | 2 pairs<br>100 mm. | | 2 | 1 | 1 | 2<br>250 mm. |
| 2 | 1175 × 1675<br>12 WT 17<br>(3′-11½″ × 5′-7″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>4<br>2<br>8 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 3′-6″ × 5′-0″ | 2 pairs<br>100 mm. | | 2 | 1 | 1 | 2<br>250 mm. |
| 3 | 1175 × 1475<br>12 WT 15<br>(3′-11½″ × 4′-11″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>4<br>2<br>8 | 70<br>95<br>38<br>38 | 35<br>35<br>38<br>38 | 3′-6″ × 4′-6″ | 2 pairs<br>100 mm. | | 2 | 1 | 1 | 2<br>250 mm. |
| 4 | 1075 × 1475<br>11 WT 15<br>(3′-7½″ × 4′-11″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>3<br>2<br>8 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 3′-0″ × 4′-6″ | 2 pairs<br>90 mm. | 2 | 2 | 1 | 1 | 2<br>225 mm. |
| 5 | 1075 × 1375<br>11 WT 14<br>(3′-7½″ × 3′-11½″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>4<br>2<br>8 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 3′-0″ × 4′-0″ | 2 pairs<br>90 mm. | | | 3 | 1 | 2<br>225 mm. |
| 6 | 75 × 1175<br>9 WT 12<br>(2′-11½″ × 3′-11½″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 4<br>4<br>2<br>8 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 2′-6″ × 3′-6″ | 2 pairs<br>75 mm. | | | 3 | 1 | 2<br>200 mm. |
| 7 | 775 × 1075<br>8 WT 11<br>(2′-7½″ × 3′-7½″) | Styles<br>Rails<br>Sashbars Vertical<br>Sash bars Horizontal | 2<br>2<br>1<br>2 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 2′-0″ × 3′-0″ | 1 pair<br>90 mm. | | | 2 | 1 | 1<br>200 mm. |
| *8 | 575 × 875<br>6 WT 9<br>(1′-11½″ × 2′-11½″ | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 2<br>2<br>1<br>2 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 1′-6″ × 2′-6″ | 1 pair<br>90 mm. | | | 2 | 1 | 1<br>200 mm. |
| 9 | 1675 × 1075<br>17 WT 11<br>(5′-7″ × 3′7½″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 2<br>2<br>4<br>2 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 5′-0″ × 3′-0″ | 2 pairs<br>100 mm. | | 2 | | 1 | 1<br>300 mm. |
| 10 | 1075 × 575<br>11 WT 6<br>(3′-7½″ × 1′-11½″) | Styles<br>Rails<br>Sashbars Vertical<br>Sashbars Horizontal | 2<br>2<br>2<br>1 | 70<br>95<br>35<br>35 | 35<br>35<br>35<br>35 | 3′-0″ × 1′-6″ | 1 pair<br>90 mm. | | | 2 | 1 | 1<br>225 mm. |

*In single Leaf.



अनुक्रमणिका
Table of Contents

## SCANTLING OF WINDOWS (PLANK SHUTTERS)

| Serial No. | Size of Window (Opening in Wall) mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Size of Window given in P. W. D. Hand Book Volume I (Clear Opening in Frame) | Strong butt hinges | Tower bolts 200 mm. | Tower bolts 150 mm. | Handles | Hooks and eyes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1375 × 1675<br>14 WT 17<br>(4′-7″ × 5′-7″) | Planks<br>Ledges | 6<br>6 | 220<br>70 | 35<br>35 | 4′ × 5′ | 2 pairs<br>125 mm. | 2 | 1 | 1 | 2<br>250 mm. |
| 2 | 1175 × 1675<br>12 WT 17<br>(3′-11½″ × 5′-7″) | Planks<br>Ledges | 8<br>6 | 142<br>70 | 35<br>35 | 3½′ × 5′ | 2 pairs<br>125 mm. | 2 | 1 | 1 | 2<br>250 mm. |
| 3 | 1175 × 1475<br>12 WT 15<br>(3′-7½″ × 4′-11″) | Planks<br>Ledges | 8<br>6 | 142<br>70 | 35<br>35 | 3½′ × 4½′ | 2 pairs<br>100 mm. | 2 | 1 | 1 | 2<br>250 mm. |
| 4 | 1075 × 1475<br>11 WT 15<br>(3′-11½″ × 4′-11″) | Planks<br>Ledges | 8<br>6 | 142<br>70 | 35<br>22 | 3½′ × 4½′ | 2 pairs<br>100 mm. | 2 | 1 | 1 | 2<br>225 mm. |
| 5 | 1075 × 1375<br>11 WT 14<br>(3′-7½″ × 4′-7″) | Planks<br>Ledges | 8<br>6 | 131<br>70 | 22<br>22 | 3′ × 4′ | 2 pairs<br>90 mm. | | 3 | 1 | 2<br>225 mm |
| 6 | 875 × 1175<br>9 WT 12<br>(2′-11½″ × 3′-11½″) | Planks<br>Ledges | 6<br>4 | 136<br>70 | 22<br>22 | 2½′ × 3½′ | 2 pairs<br>90 mm. | | 3 | 1 | 2<br>200 mm. |



अनुक्रमणिका
Table of Contents

## SCANTLINGS OF WINDOWS (VENTILATED SHUTTERS)

| Serial No. | Size of Window (Opining in Wall mm. × mm. (Ft. in. × Ft. in.) | Description | Number | Breadth mm. | Thickness mm. | Original Size of Window given in P. W. D. Hand Book Volume I (Opening in Frame) | Strong Butt Hinges | Tower Bolts 200 mm. | Tower Bolts 150 mm. | Handles | Hooks and Eyes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1375 × 1675<br>14 WT 17<br>(4′-7″ × 5′-7″) | Styles<br>Rails<br>Venetian Blades<br>Stanchion | 4<br>6<br>60<br>4 | 70<br>95<br>72<br>35 | 35<br>35<br>10<br>35 | 4′ × 5′ | 2 pairs 100 mm. | 2 | 1 | 1 | 2 250 mm. |
| 2 | 1175 × 1675<br>12 WT 17<br>(3′-11½″ × 4′-7″) | Styles<br>Rails<br>Venetian Blades<br>Stanchion | 4<br>6<br>60<br>6 | 70<br>95<br>72<br>35 | 35<br>35<br>10<br>35 | 3½′ × 5′ | 2 pairs 100 mm. | 2 | 1 | 1 | 2 250 mm. |
| 3 | 1175 × 1475<br>12 WT 15<br>(3′-11½″ × 4′-11″) | Styles<br>Rails<br>Venetian Blades<br>Stanchion | 4<br>6<br>52<br>6 | 70<br>95<br>72<br>35 | 35<br>35<br>10<br>35 | 3½′ × 4½′ | 2 pairs 100 mm. | 2 | 1 | 1 | 2 230 mm. |
| 4 | 1075 × 1475<br>11 WT 15<br>(3′-7½″ × 4′-11″) | Styles<br>Rails<br>Venetian Blades<br>Stanchion | 4<br>6<br>52<br>4 | 70<br>95<br>72<br>35 | 35<br>35<br>10<br>35 | 3′ × 4½′ | 2 pairs 90 mm. | 2 | 1 | 1 | 2 225 mm. |
| 5 | 1075 × 1375<br>11 WT 14<br>(3′-7½′ × 4′-7″) | Styles<br>Rails<br>Venetian Blades<br>Stanchion | 4<br>6<br>48<br>4 | 70<br>95<br>72<br>35 | 35<br>35<br>10<br>35 | 3′ × 4′ | 2 pairs 90 mm. | .. | 3 | 1 | 2 225 mm. |



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. U. IRON WORK

*List of items for Iron Work*


| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd.U.1. | Providing and fixing wrought iron/mild steel grill work for windows, ventilators, etc., up to — kg./sq. m. as per drawings including fixtures and painting ... ... ... ... | 498 |
| Bd.U.2. | Providing and fixing wrought iron/mild steel grill railing upto — kg./sq. m. with teak wood hand rail, sill and newel posts for staircase including fabricating, fixtures, erecting, painting the grill work and sill with approved oil paint and polishing the sill, hand rail and the newel post with french polish ... ... ... | 498 |
| Bd.U.3. | Providing and fixing, wrought iron/mild steel grill railing upto — kg/sq. m. with teak wood hand rail, sill and posts for verandah including fabricating, fixtures, erecting and painting the grill and wood work with approved oil paint ... ... ... | 499 |
| Bd.U.4. | Providing and fixing cast iron spiral staircase of —— m. diameter with galvanised iron pipeshaft, cast iron steps, cast iron or wrought iron balusters, mild steel or wrought iron rail, mild steel/cast iron chequered plate landing, 1 : 3 : 6 cement concrete foundation and painting with approved oil paint complete ... ... ... | 499 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.U.2.2.**

## Bd. U. IRON WORK

Bd.U.1. *Providing and fixing wrought iron/mild steel grill work for windows, ventilators etc. upto —— kg. per sq. m. as per drawing including fixtures and painting.*

Bd.U.1.1. *General.*—The item provides for wrought iron/mild steel grill prepared to the designs shown in the drawings or as directed by the Engineer, for fixing to windows, ventilators, gates, etc., including the specified wrought iron or mild steel sections, fabrication, fixing in the frame, fixtures and painting with 3 coats of oil paint of approved shade.

Bd.U.1.2. *Materials.*—The wrought iron or mild steel sections as mentioned in the item shall comply with the specification No. A.14 or A.10 and A.11 as relevant. The sections shall be squares, flats, rounds, etc., of the specified dimensions shown in the drawings. Standard screws, rivets, welding rods, etc., shall be used.

Oil paint shall comply with specification No. A.17. The priming coat shall be of red lead and the other two coats shall be of a shade approved by the Engineer.

Bd.U.1.3. *Construction.*—The fabrication of the specified sections of wrought iron/mild steel shall be done according to specification No. B. 19, B. 18 and B. 10.

The grill shall be fabricated to the designs and patterns shown in the drawings the weight corresponding to that mentioned in this item and the joints shall be riveted and welded as shown in the plans or directed by the Engineer. The grill so formed shall be fixed into the frames of the windows, ventilators, etc., before they are erected in position. The outside strip frame of the grill shall be housed to its full thickness into the recess cut into the frame of the window, ventilator, etc. The grill shall be fixed to the frame with screws at the rate of one screw per 30 cm. of the length of the outer strip subject to a minimum of 2 Nos. in each side of the frame or as indicated on the drawings. The screws shall be countersunk and shall be fixed with the tops of their heads flush with the face of the frame strip.

The grill shall be painted with one coat of red lead oil paint and 2 coats of oil paint of approved shade when the entire work is completed. Painting shall conform to the specification No. B.21.(*a*).

Bd.U.1.4. *Item to include.*—(1) All materials such as wrought iron or mild steel sections of specified sizes, oil paints, screws, rivets, welding rods, etc., including wastage for completing the item satisfactorily.

(2) All labour for cutting grooves in the frame fabrication of the grill by riveting and welding, fixing the grill into the frame, painting, hoisting, erection, etc., for completing the item satisfactorily.

(3) Use of tools and equipment necessary for the job.

Bd.U.1.5. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the grill.

The length and breadth shall be measured from inside to inside of the grill frame and correct upto 5 mm. Portion embedded in the wooden frame shall be neglected in the measurements. The area shall be calculated correct upto three places of decimals of a square metre.

Bd.U.2. *Providing and fixing wrought iron/mild steel grill railing upto —— kg/sq. m. with teak wood handrail, sill and newel posts for staircase including fabricating fixtures, erecting, painting the grill work with approved oil paint and polishing the sill, handrail and the newel post with french polish.*

Bd.U.2.1. *General.*—The item provides for the staircase railing of wrought iron or mild steel grill as mentioned in the item with teak wood handrail, sill and newel posts including fabrication of grill to the designs and patterns shown on the drawings or as directed by the Engineer, hoisting and fixing in position, painting the grill and teak wood sill and polishing the teak wood handrail and newels.

Bd.U.2.2. *Materials.*—Teak wood shall comply with the requirements of specification No. A.16.

Wrought iron or mild steel shall comply with the specification No. A.14 or A.10 as may be relevent.

Welding rods shall comply with specification No. B. 18. Rivets, screws, etc., shall be of standard material and size.

Oil paint shall comply with the specification No. A.17. The priming coat shall be of red lead and the other two coats shall be of a shade approved by the Engineer.



अनुक्रमणिका
Table of Contents

Bd.U.2.3. *Construction.*—The teak wood railing, sill, side posts, if any, and newels shall be of the pattern and design as indicated on the drawings. The wood work shall conform to the specification No. B.20.

The grill work and its fixing shall conform to the specification No. Bd.U.1.

The grill work shall be painted with one coat of red lead oil paint and 2 coats of oil paint of a shade approved by the Engineer as per B. 21.

The wooden sill handrail and newel shall be polished as per specification No. Bd. N.

Bd.U.2.4. *Item to include.*—(1) All materials such as wrought iron or mild steel and teak wood sections of specified sizes including wastage, oil paint, screws, rivets, welding rods, etc., for completing the item satisfactorily.

(2) All labour for fabricating and fixing grill, shaping wood work, framing, housing and fixing in position, painting, polishing, etc., for completing the item satisfactorily.

(3) Use of tools and equipment necessary for the job.

Bd.U.2.5. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the railing. The length shall be measured along the centre line of the railing outside to outside of newels. Overlapping lengths at newels and corner posts shall be excluded from the measurements of length. The height shall be measured from the bottom of the sill to the top of the handrail at right angles, to the slope. All the dimensions shall be measured correct upto 2 places of decimals of a metre and area calculated correct to three places of decimals of a square metre.

Bd.U.3. *Providing and fixing wrought iron/mild steel grill railing upto —— kg. per sq. m. with teak wood handrail, sill and posts for verandah including fabricating, fixtures, erecting and painting the grill and wood work with oil paint.*

*General.*—The item provides for the verandah railing or wrought iron or mild steel grill as per the item with teak wood handrail, sill and side posts including fabrication of grill to the designs and patterns shown on the drawings, hosting and fixing in position and painting the grill and wood work with 3 coats of oil paint.

The item shall comply with the specification No. B.U.2. for the staircase railing in all respect except that it shall have no newel posts and all wood work shall be painted with a priming coat of white oil paint and two coats of oil paint of approved shade. The design and pattern of grill work shall be as shown in the drawings for verandah railing.

Bd.U.4. *Providing and fixing cast iron spiral staircase of —— m. diameter with galvanised iron central pipeshaft, cast iron steps, cast iron or wrought iron balusters, mild steel or wrought iron rail, mild steel/cast iron chequered plate landing, 1 : 3 : 6 cement concrete foundation and painting with approved oil paint complete.*

Bd.U.4.1. *General.*—The item provides for the cast iron spiral staircase of specified diameter with cast iron steps, cast iron or wrought iron balusters, mild steel or wrought iron rail mild steel or cast iron chequered plate landing, 1 : 3 : 6 cement concrete foundation and painting the staircase with 3 coats of approved oil paint.

Bd.U.4.2. *Materials.*—Cast iron steps shall conform to the specification No. A.13 and be cast to the designs, patterns and dimensions shown in the drawings.

Mild steel or cast iron chequered plate for landing shall be of the size shape shown on the drawings and shall conform to the specification No. A.10.

All structural steel such as the railing, balusters and angles, etc., for supporting the landing shall be of the dimensions shown on the drawings and shall conform to the specification No. A.11.

Cast iron steps and cast iron balusters and chequered plate landing if used shall be of the shape, size and pattern as shown on the drawings and shall conform to the specification No. A.13.

Wrought iron balusters and the railing if used shall be of the size and shape as shown on the drawings and shall conform to the specification No. A.14.

Cement concrete 1 : 3 : 6 shall conform to the specification No. B.6.

The oil paint shall conform to the specification No. A.17.

Galvanized iron pipe for the central shaft shall be of the diameter and length specified on the drawing and shall comply with I. S. 1329-1958 and shall be of the medium type.

Nuts and bolts shall be of the specified diameter.

अनुक्रमणिका
Table of Contents



**Bd.U.4.5.**

Bd.U.4.3. *Construction.*—The various components of the staircase shall be of the shape, size and design as shown on the drawing. All the components shall be correctly assembled to conform to the drawing.

Galvanized iron pipe of the specified diameter for the central shaft shall be embedded for the specified length into the cement concrete footing at the exact location and shall be truly vertical. The first step shall also be supported on concrete foundation as shown in the drawings. The cement concrete foundation shall be cast to the shape, size and location indicated on the drawing and shall conform to specification No. B.6. The proportion of the concrete shall be 1 : 3 : 6 or as specified in the drawing.

The cast iron steps shall be fixed to the shaft and to each other as indicated on the drawings.

The railing of cast iron wrought iron balusters shall be fixed through the holes left in the steps with nuts or other devices shown on the drawings. Mild steel or cast iron chequered landings shall be provided as shown in the drawings with necessary arrangements for supporting the landing. The central shaft shall be carried up as shown in the drawings and plugged up at the top.

The entire staircase shall be painted with one coat of red lead oil paint before assembly and two coats of oil paint of approved shade after erection. Painting shall conform to specification No. B.21.

Bd.U.4.4. *Item to include.*—(1) Galvanised iron pipe shaft, cast iron steps, mild steel or cast iron chequered plate landings, mild steel or cast iron balusters, mild steel handrail and concrete, steel nuts, bolts and other relevant materials required to complete the work as shown in the drawings.

(2) Assembling and fixing cast iron steps on the galvanised iron pipe shaft and with one another and railing, landing with necessary supporting arrangement and concrete foundations for the shaft and the first step.

(3) All labour, materials and use of equipment, tools and plant required for completing the item satisfactorily.

Bd.U.4.5. *Mode of measurement and payment.*—Spiral staircase shall be fully detailed in the drawings or special provisions as to their over all diameter, the rise and tread of steps with their types, thickness and design, the dimensions of the central shaft, dimensions and type of the landings and railing and handrail. The diameter shall be measured outside to outside of steps of the fully assembled staircase.

The contract rate shall be per step. Number of steps shall be counted, a step comprising of a riser and tread.

The measurement shall be by number of steps, each landing being counted as one step. Each step shall include the central shaft, landing, railing or balustrade, handrail and other such necessary fittings. The rate per step shall also include the cost of concrete foundation for the shaft and first step.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. V. WATER SUPPLY AND SANITARY FITTINGS

*List of items for Water Supply and Sanitary Fittings.*


| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd.V.1. | Providing and laying cast iron pipes of Class A/Class B of ——— mm. diameter with socket and spigot ends/flanges and cast centrifugally/vertically including specials, excavation, laying pipes and back filling the french complete ... | 507 |
| Bd.V.2. | Providing and making lead joints for —— mm. diameter cast iron pipe line including lead and testing ... | 509 |
| Bd.V.3. | Providing and making flanged connections for the —— mm. diameter cast iron pipe line including painting, rubber insertion, nuts and bolts ... | 510 |
| Bd.V.4. | Providing and making ferrule connection of mm. diameter to water main including ferrule couplings and cast iron bell mouth cover and fixing ... | 510 |
| Bd.V.5. | Providing laying and fixing mm. diameter heavy/medium type galvanised iron pipes with screwed socket joints and necessary galvanised iron fittings such as sockets, backnuts, elbows, bends, tees, reducers, enlargers, plugs, clamps, etc., including necessary excavation, backfiling, fixing with clamps, drilling holes in walls, slabs, etc., and remarking complete | 511 |
| Bd.V.6. | Providing and fixing ——— mm. diameter water meter with/without non return valve including strainer, sockets/union nut and construction of brick masonry chamber with locking arrangement and lock ... | 513 |
| Bd.V.7. | Providing and fixing ——— mm. diameter water meter with/without non-return valve, water meter box with lock, sockets/union nut and strainer complete ... | 513 |
| Bd.V.8. | Providing and fixing ——— mm. diameter screw down bib tap/stop tap of brass including necessary sockets/union nut complete ... | 514 |
| Bd.V.9. | Providing and fixing screw down —— mm. diameter wheeled stop tap of gun metal/brass including necessary sockets/union nut complete ... | 514 |
| Bd.V.10. | Providing and fixing —— mm. diameter gun metal/brass stop tap with crutch/wheel including sockets/union nut and brick masonry chamber with locking arrangement and lock ... | 514 |
| Bd.V.11. | Providing and fixing —— mm. diameter gun metal/brass stop tap with crutch/wheel including sockets/union nut and box chamber with lock complete ... | 515 |
| Bd.V.12. | Providing and fixing —— cm. diameter chromium plated brass shower rose to 12 mm. diameter supply pipe including necessary bend and socket complete ... | 515 |
| Bd.V.13. | Providing and fixing drinking fountain including basin, jet, self-closing tap, stop tap for controlling the pressure, necessary galvanised iron pipe up to the outside of the wall, inlet pipe and lead/galvanised iron pipe leading the waste water from the basin up to the outside of the wall ... | 516 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| ITEM No. | ITEM | PAGE |
|---|---|---|
| Bd.V.14. | Providing and fixing ——— mm. diameter concussion push-button type gunmetal/brass self-closing tap including necessary socket complete ... | 516 |
| Bd.V.15. | Providing, hoisting and fixing in position water storage tank of 3 mm. thick mild steel sheets —— litre capacity including mild steel hinged and framed cover with locking arrangement, overflow pipe, scour pipe with plug, outlet flange sockets, all valve with copper float interconnecting pipes and fabricated by welding/riveting with mild steel angle frame complete ... | 517 |
| Bd.V.16. | Providing and fixing in position mild steel bar reinforcement for R. C. C. water tanks as per detailed designs, drawing and schedule including cutting, bending, providing, hooks, binding with wires and supporting as required complete ... | 518 |
| Bd.V.17. | Providing and casting in situ water proofed cement concrete 1:1½:3/1:2:3 for R. C. C. water tanks and reservoirs including centering if required, formwork, mechanical vibration, finishing the formed faces if required, with cement mortar 1:3 of sufficient minimum thickness to give smooth and even surfaces and watertightness and curing ... | 518 |
| Bd.V.18. | Providing and fixing fittings and accessories such as ball cock overflow pipe with mosquito proof coupling, scour pipe with plug, manhole, with cover and locking arrangement, connecting pipes and embedding intake and outtake pipes into the R. C. C. water reservoir ... | 518 |
| Bd.V.19. | Providing and fixing 45 cm. wide steel ladder of 40 mm.×6 mm. steel flat stringers and step of 18 mm. diameter mild steel bars including fixing it in 1:2:4 cement concrete block of 60 cm.× 30 cm.×30 cm. and painting the ladder ... | 518 |
| Bd.V.20. | Providing and fixing Indian type white glazed earthenware ——— cm. water closet pan including trap, white earthenware foot rests, cast iron soil and vent pipes up to the outside face of the wall, 1:5:10 cement concrete bedding, 13.6 litre (3 gallons) cast iron high level flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, 32 mm. (1¼″) diameter lead flush pipe with fittings and clamps, 20 mm. (¾″) diameter galvanised iron overflow pipe with mosquito proof coupling, galvanised iron chain and pull, painting of the cistern and exposed pipes and cutting and making good walls and floors ... | 519 |
| Bd.V.21. | Providing and fixing European type white glazed earthenware water closet pan with polished teak wood/mahogany seat and lid with chromium plated brass hinges and rubber buffer including cast iron soil and vent pipes up to the outside face of the wall, 13.6 litre (3 gallons) cast iron high level flushing cistern with fittings, pipes and stop tap, brackets for fixing the cistern, 32 mm. (1¼″) diameter lead flush pipe with fittings and clamps, 20 mm. (¾″) diameter galvanised iron overflow pipe with mosquito proof coupling, galvanised iron chain and pull, painting of the cistern and exposed pipes and cutting and making good walls and floors ... | 521 |
| Bd.V.22. | Providing and fixing European type white glazed earthenware water closet pan with polished teak wood/mahogany seat and lid with chromium plated brass hinges and rubber buffers | |


अनुक्रमणिका
Table of Contents

| ITEM No. | ITEM | PAGE |
|---|---|---|
| | including cast iron soil and vent pipes up to the outside face of the wall, 13.6 litre (3 gallons) pressed steel enamelled/ white glazed earthenware low level flushing cistern with fittings inlet pipe with stop tap, brackets for fixing the cistern 40 mm. ($1\frac{1}{2}$") diameter enamelled/porcelain bend and rubber, 20 mm. ($\frac{3}{4}$") diameter galvanised iron overflow pipe with specials and mosquito proof coupling, chromium plated working handle, painting of the exposed pipes and cutting and making good wall and floor ... | 521 |
| Bd.V.23. | Providing and fixing white glazed earthenware stall type urinal with cast iron flushing cistern of 5 litre capacity with fittings, inlet pipe and stop tap, brackets, for fixing the cistern, 32 mm. ($1\frac{1}{4}$") diameter lead/brass/brass oxidised/brass chromium plated flush pipe with fittings and finishing arrangement including lead soil pipe, lead trap, soil pipe connections up to the outside face of the wall ... | 522 |
| Bd.V.24. | Providing and fixing white glazed earthenware shall type urinal with cast iron automatic flushing cistern of 5 litres capacity with fittings, inlet pipe with stop tap, brackets, for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipes, fittings and spreader arrangement, including lead soil pipe, lead trap, soil pipe connections up to the outside face of the wall ... | 522 |
| Bd.V.25. | Providing and fixing a group of 2/3/4 while glazed earthenwere stall type urinal with cast iron 5/10 litres capacity automatic flushing cisterns, fittings, brackets for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipes, fittings and spreader arrangement including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall ... | 523 |
| Bd.V.26. | Providing and fixing white glazed earthenware lipped flat back/ corner type urinal with cast iron 5 litre flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, 32 mm. ($1\frac{1}{4}$") diameter, lead/brass/brass oxidised/brass chromium plated flush pipe with fittings including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall ... | 523 |
| Bd.V.27. | Providing and fixing white glazed earthenware lipped flat back/ corner type urinal with cast iron automatic flushing cistern of 5 litre capacity with fittings, inlet pipe and stop tap, brackets for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipe with fittings including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall ... | 524 |
| Bd.V.28. | Providing and fixing a group of 2/3/4 white glazed earthenware lipped flat back type urinals with cast iron 5/10 litres automatic flushing cistern with fittings, inlet pipe and stop tap, brackets for fixing the cistern, lead/brass/brass oxidised/ brass chromium plated flush pipes with fittings including lead soil pipe, lead trap and soil pipe connections up to the out side face of the wall ... | 524 |
| Bd.V.29. | Providing and laying ———— mm. diameter half round white glazed earthenware pipes in 1:5:10 cement concrete including bends ... | 524 |

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd.V.30. | Providing and fixing white glazed earthenware wash hand basin of —— cm. × —— cm. × —— cm. size including cold water pillar tap/cold and hot water pillar taps, brackets, rubber plug and brass chain, stop tap, and necessary pipe connections including lead waste pipe and trap up to the outside face of the wall. ... | 524 |
| Bd.V.31. | Providing and fixing white glazed earthenware sink —— mm. × ——— mm. × ——— mm. including all connections of the galvanised iron supply and lead waste pipes up to the outside face of the wall, cold water pillar tap/cold and hot water pillar taps, rolled steel or cast iron brackets, rubber plug with chain and stop tap complete ... | 525 |
| Bd.V.32. | Providing and fixing 8 cm. (3″) cast iron nahani trap including cast iron grating, bend and piece of cast iron pipe up to the outside face of the wall ... | 526 |
| Bd.V.33. | Provides and fixing —— mm. diameter cast iron rain water pipes with lugs including rain water receiving recess with cast iron grating, necessary fittings such as bends, effects and shoe and painting with oil paint ... | 526 |
| Bd.V.33a. | Providing and fixing galvanised 18 gauge plain sheet metal rain water pipes of ——— mm. diameter with clamps including necessary fittings such as effects, elbows and shoes ... | 527 |
| Bd.V.33b. | Providing and fixing —— size galvanised plain sheet metal rain water valley Ogee/caves/half round gutters including fittings such as the outlets, angles, and stop bends with brackets fixed with screws to rafters ... | 528 |
| Bd.V.34. | Providing and fixing —— mm. diameter asbestos cement rain water pipes including necessary fittings such as bends, effects, shoe and painting with oil paint ... | 528 |
| Bd.V.34.a. | Providing and fixing-size asbestos cement valley/boundary/half round/Ogee gutters with brackets and nut bolts including fittings such as drop end, stop end, union clip and angles ... | 529 |
| BdV.35. | Providing and fixing —— mm. diameter cast iron soil/vent/waste pipe with necessary, fixtures and fittings such as bends, tees, single junctions, double junctions, slotted vent, offsets on walls or in the ground including exacavation, laying, refilling trench and painting the exposed pipes with oil paint ... | 529 |
| Bd.V.36. | Providing and fixing —— mm. diameter asbestos cement soil/vent/waste pipes including necessary fittings, such as bends, tees, single junction, double junction, slotted vent, effects, excavation, refilling trench and painting the exposed pipes with oil paint ... | 530 |
| Bd.V.37. | Providing and laying —— mm. diameter half round salt glazed stoneware pipes in brick masonry including fittings such as bends, toes, single junction, necessary excavation and jointing | 530 |
| Bd.V.38. | Providing and fixing 15 cm.×10 cm (6″×4″) salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap ... | 531 |


अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents




| ITEM NO. | ITEM | PAGE |
|---|---|---|
| Bd.V.39. | Providing and laying —— mm. diameter salt glazed stoneware pipes including fittings such as bends, tees, single junctions, double junctions, excavation, laying, jointing, refilling the trench ... | 532 |
| Bd.V.40. | Providing and laying —— mm. diameter glazed stoneware pipes on 1:4:8 cement concrete bed, including fittings such as bends, tees, single junctions, double junctions laying, excavation, jointing and refilling trench ... | 532 |
| Bd.V.41. | Providing and laying concrete pipes of I. S. NP. class of ..... mm. diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collars in cement mortar 1:1 and refilling the trench ... | 532 |
| Bd.V.42. | Providing and laying concrete pipes of I. S. NP. class of ..... mm. diameter on 1:4:8 cement concrete bed including necessary collars, excavation, laying and fixing with collars in cement mortar 1:1 and refilling the trench ... | 533 |
| Bd.V.43. | Providing and constructing brick masonry inspection chamber —— cm.×—— cm. including 1:4:8 cement concrete foundation, 1:2:4 cement concrete channels/half round glazed stoneware pipe channels, brick masonry, plastering inside and airtight cast iron lid with frame fixed in cement concrete ... | 533 |
| Bd.V.44. | Providing and constructing brick masonry intercepting trap chamber of 90 cm.×45 cm. including 1:4:8 cement concrete foundation, 1:2:4 concrete channels/half round glazed stoneware pipe channels, salt glazed stoneware intercepting trap with rodding pipe set in 1:4:8 cement concrete block, brick masonry, plastering inside and cast iron lid with frame fixed in cement concrete ... | 534 |
| Bd.V.45. | Providing and fixing hume pipe septic tank —— mm. diameter with vent pipe and cap including necessary excavation and laying ... | 534 |
| Bd.V.46. | Providing soak pit of —— cm.×—— cm.×—— cm. including excavating and filling with brick bats ... | 535 |
| Bd.V.47. | Providing and constructing a —— cm.×—— cm.×—— cm cess pool chamber including 1:2:4 cement concrete foundation, brick masonry side walls and cast iron lid with frame fixed in 10 cm. thick 1:2:4 concrete ... | 535 |
| Bd.V.48. | Connecting the house drain to the municipal sewer including necessary excavation, pipe fittings and their laying, breaking manhole brick masonry, making good the masonry and any other damage and restoring the surface to the original condition ... | 536 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. V. WATER SUPPLY AND SANITARY FITTINGS

General specifications for all Water Supply and Sanitary items.

All the items under this group shall conform to the detailed specifications given for each of the items, in addition to the bye-laws of the local bodies within whose jurisdiction the items are executed.

Where the bye-laws of the local bodies differ from the detailed specifications for an item, the bye-laws shall override these specifications.

All damage done to floors, walls, etc., during the process of fixing water supply drainage and sanitary installations shall be restored to their original condition.

All the pipes, fittings and appliances shall be free from cracks and other flaws before fixing and shall be undamaged in all respects during and after fixing. Any damage shall have to be rectified satisfactorily.

All the pipes, fittings and appliances shall be thoroughly cleaned before fixing and particular care shall be taken to see that no extraneous material gets into them during fixing.

All items required for ensuring leak proof jointing and efficient functioning of the pipes and appliance shall be carried out without extra claims.

All cutting and waste of pipes involved in fitting them shall be included in the rate.

All diameters of pipes shall be the diameters of the inside bore.

All the pipes, appliances, fixtures and all other materials to be used shall be new and of good quality.

All the water supply and sanitary items, shall be carried out by experienced and/or licensed plumbers to the entire satisfaction of the municipal bye-laws and the Engineer.

Bd.V.1. *Providing and laying cast iron pipes of Class A/Class B of ———— mm, diameter with socket and spigot ends/flanges and cast centrifugally/vertically including specials, excavation, laying pipes, and back filling the trench complete.*

Bd.V.1.1. *General.*—The item pertains to providing and laying cast iron pipes of Class A or Class B of specified diameter with socket and spigot ends or flanges and cast centrifugally or vertically as specified in the item for water supply including flanged socket, flanged spigot, collar, socketed bends, socketed tee, socket cross, socket and spigot tapers cap, plug, flanged bends, flanged dock foot bends, flanged tee, flanged cross, flanged taper, excavation laying pipes and back filling.

This item shall be subject to the general specification.

Bd.V 1.2. *Materials.*—The diameter of the cast iron pipes specified in the wording of the item shall be the inside diameter of the bore of the pipes and the pipes shall conform to I. S. 1536—1967 or I.S. 1537—1960. All the fittings (specials) shall conform to I.S. 1538—1960. The pipes and fittings shall have sockets and spigot and/or flanges as shown in the drawings, specified in the special provisions or necessary for the work.

Bd.V.1.3. *Excavation.*—Before starting excavation of the trench, sight rails shall be fixed on the alignment of the pipe line at an interval of 30 m and at every change of grade and direction at a definite and as far as practicable uniform height above the invert of the pipes, the centre line being clearly marked on each rail.

The trench for laying the pipes shall be excavated true to lines, levels and grades as shown on the drawings or directed by the Engineer with the help of boning rods.

The pipes and fittings shall have sockets and spigot and/or flanges as shown in the drawings.

The width of the trench shall be at least 30 cm. (about 12") wider than the socket of the pipe so as to allow room for ramming the refilled material under and at the sides of the pipe.

The depth shall be such that the pipe shall have a clear cover of at least 75 cm. The trench shall be excavated through all strata met with. When it is necessary and ordered by the Engineer in writing, the sides shall be shored or sloped ; otherwise, they shall be as vertical as possible. The rate shall include shoring and provision of slopes.

In case rock is met with, it shall be excavated 15 cm. more than the required depth for providing cushioning by chiselling and line drilling unless blasting is permitted in writing by the Engineer. Special precautions shall have to be taken in blasting as ordered by the Engineer.

अनुक्रमणिका
Table of Contents

**Bd.V.1.5.**

Various materials excavated shall be separated and stacked beyond one meter or more from the edge as may be necessary in the opinion of the Engineer to avoid damage to the trench. Any excess excavation shall be filled with suitable material in layers not exceeding 15 cm. watered and thoroughly compacted.

If the trench bed is in soft or made up earth, it shall be compacted fully after watering if necessary. If in rock, the excavation shall be taken down 15 cm. below the bed line and refilled to this level with rammed earth or murum.

The bed shall be even and to the correct grade and line in all cases.

Dewatering of the trench, if required, shall be done without separate claims.

Before lowering the pipes into the trench, hollows shall be cut in the bed, and in a narrow trench, the width of excavation increased opposite the joints to receive the socket and to give adequate room for caulking the lead joints.

The trench shall be barricaded and warning boards fixed. Red lights shall be hung at night time at sufficiently close intervals to indicate the danger and a chowkidar employed to see that the lights are properly burning. The contractor shall be solely responsible for any accidents due to any default in barricading, sign posting or red lights and shall bear the consequences.

In case of excavation across a road, permission of road authorities shall be obtained for the excavation of the road surface which shall be made good and restored to the original condition by the contractor at his own cost. At all road crossings, the trench shall be excavated only for half the width of the road and pipe laid. The other half shall be excavated only after backfilling over the laid pipe and making it suitable for the traffic. At all road crossings, the pipes shall be laid below the crust of the road.

All pipes, cables, service lines etc., met with during the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost.

Bd.V.1.4. *Laying.*—The pipes shall be laid out along the side of the trench, each pipe in its proper position for laying with an extra pipe after every 20 to allow for cutting if necessary. Where the trench crosses a road or place where such distribution is inadmissible, the pipes shall be stacked in heaps at each end, sufficient to fill in the length. Small pipes below 100 mm. diameter may be stacked in heaps at every 30 m.

As far as possible, pipes shall be laid straight in rising or falling gradient. It should be possible to empty the pipe readily and completely.

The socket end of the pipe shall be facing up hill. All the pipes shall be used in standard lengths as far as possible. Cut lengths may be used only where necessary to make up the exact length. All the pipes shall be first inspected for any damage and cracks. No cracked or damaged pipes shall be used. The pipes shall be thoroughly cleaned with brushes to remove any accumulated stones or soil inside and the inside of socket and the outside of the spigot shall also be cleaned similarly. The pipes shall then be lowered into the trench and the spigots neatly placed into the sockets for full length and properly supported. The pipes shall be carefully packed underneath so that they shall bear properly throughout their whole length. The entire pipe length shall be supported on the trench bed evenly throughout.

Any deviation either in plan or elevation of less than $11\frac{1}{4}°$ shall usually be effected by laying the straight pipes round a flat curve, of such radius that the minimum thickness of lead at the face of the socket shall not be reduced below 6 mm. (about $\frac{1}{4}''$) or the spacing between the spigot and socket increased beyond 12 mm. (about $\frac{1}{2}''$) at any joint. A deviation of about $2\frac{1}{4}°$ at each joint can be erected in this way.

In case of rock bed, murum bedding of 15 cm. shall be provided before laying pipe.

The lead joints shall be made and paid as specified separately.

At the end of each day's work, the open end shall be suitably plugged.

Bd.V.1.5. *Back filling.*—After making the lead joints, and testing the pipe line to ensure leak proof joints, the trench shall be refilled in layers and manually rammed. The excavated stuff shall be used in filing, such that the filling shall correspond to the original natural layers. The filling shall be kept raised by about 8 cm. per metre, of the depth of trench for subsequent settlement. In the case of trench in rock, a bedding and cushioning of murum shall be provided on the sides and top of the pipe. Any surplus excavated stuff shall be disposed off satisfactorily without causing nuisance.

अनुक्रमणिका
Table of Contents



Bd.V.1.6. *Item to include.*—(1) Supply of cast iron pipes of specified type and diameter and fittings such as flanged socket, flanged spigot, collar, socketed bends, socketed cross, socket and spigot tapers, cap, plug, flanged bends, flanged duck foot bends, flanged cross, flanged taper, etc.

(2) Excavating trench including laying out, setting up sight rails, ramming soft bed, providing and ramming murum cushioning in rock excavation, shoring sloping, dewatering if required, protecting and refilling trench, after laying the pipe and making good excavated road surface.

(3) Laying pipes including cutting where necessary and waste.

(4) All necessary labour, materials and use of tools and equipment to complete the item satisfactorily.

Bd.V.1.7. *Mode of measurement and payment.*—The contract rate shall be for one metre of pipe laid including all fittings. Making up lead or flanged joints will be paid for separately. Cutting and waste will not be paid for separately. The length shall be measured net on the straight and curves along the centre line over the pipes and fittings correct upto one cm.

Bd.V.2. *Providing and making lead joints for mm diameter cast iron pipe line including lead and testing.*

Bd.V.2.1. *General.*—The item pertains to the provisions and making of lead joints for the cast iron pipe line including lead and testing.

Bd.V.2.2. *Materials.*—Fine hemp rope.

Lead wool or caulking lead conforming to I.S. 782—1966 shall be used for making joints.

Bd.V.2.3. *Preparations.*—The outside of the spigot and the inside of the socket shall be thoroughly cleaned with a brush. The spigot shall be carefully centred in the socket by one or more laps of spun hemp yarn twisted into ropes of uniform thickness thoroughly soaked in hot coal-tar of bitumen and ried before use. The hemp rope shall be well caulked into the back of the socket to leave a depth for lead as indicated below:—

| Diameter of pipe | Depth of lead |
|---|---|
| 75 mm | 50 mm |
| 100 mm | 50 mm |
| 125 mm | 60 mm |
| 150 mm | 60 mm |
| 175 mm | 60 mm |
| 200 mm | 72.1 mm |
| 225 mm | 72.2 mm |
| 250 mm | 72.5 mm |

The proper depth of each joint shall be as specified and tested before running the lead by passing completely round it a wooden gauge notched out to the correct depth of lead, the notch being held close up against the face of the socket.

Bd.V.2.4. *Leading.*—Before leading the joints the alignment of the pipes and the gradient shall be checked.

The leading of joints shall be done by means of ropes covered with clay or by using special leading rings. The lead shall be melted rendering it thoroughly fluid and each joint shall be filled in one pouring.

Bd.V.2.5. *Caulking.*—After a section of convenient length has been leaded, caulking shall be commenced. The lead shall be freed from the leading pipe outside of the socket of the other pipe, with a flat chisel and then caulked round three separate times with the proper caulking tools of increasing thickness and hammer 2 to 3 kg. weight in such a manner as to make the joints sound and watertight. After being well and evenly set up, the joint shall be left flush neat and even with the socket.

Where it is inconvenient or dangerous to use molten lead, lead wool may be inserted in strings not less than 6 mm thick and thoroughly caulked as explained above.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.V.4.2.**

Bd.V.2.6. *Testing.*—After each section of the pipe line has been completed, it shall be tested for water tightness. The ends shall be suitably closed with a valve, cap or plug or a blank flange. The pipe line shall then be filled with water. Pressure shall then be applied with a hand force pump upto 7 kg/square centimetre (about 100 lbs/ square inch) or 15 per cent. above the highest working pressure in the line whichever is more. When the pipe is laid on an appreciable gradient, the test shall be carried out at the upper end of the section.

Any leaking joints shall be made good and the test repeated till a perfectly leak-proof pipe line is obtained.

Bd.V.2.7. *Item to include.*—(1) Piglead or lead wool, treated hemp rope.

(2) Winding rope on spigot and centering the pipe, caulking, casting molten lead or lead wool and caulking including watering if necessary.

(3) Testing and making good leaking joints if required.

(4) All labour, materials and use of tools and equipment.

Bd.V.2.8. *Mode of measurement and payment.*—The contract rate shall be per number of one joint of pipe and fittings.

The measurement shall be for the number of lead joints.

Bd.V.3. *Providing and making flanged connections for the mm. diameter cast iron pipe line including painting, rubber insertion, nuts and bolts.*

Bd.V.3.1. *General.*—The item pertains to the provision and making of flanged connections for the specified diameter cast iron pipe line including painting flange faces, rubber insertion, nuts and bolts.

Bd.V.3.2. *Material.*—Oil paint shall conform to A.17.

The rubber insertion cloth shall be three ply and of approved thickness. The packing shall be of the full diameter of the flange with necessary holes for the bolts and the pipe bore. It shall be even both at the inner and the outer edge. Where flange is not fully faced, the packing may be of the dimension of the facing strip only. Its proper placing shall be tested before another pipe is jointed on.

The nuts and bolts shall be of the maximum diameter to go into the holes. They shall conform to I. S. 1363—1963.

Bd.V.3.3. *Connection.*—Where possible, the flange faces coming in contact shall be painted freely with red oxide oil paint and then the joint made with the nuts and bolts tightening from evenly on all sides.

A thin fibre of leadwool may be used to make the joint watertight where the flange faces are not true.

Where the rubber packing is specified the three ply rubber insertion cloth of approved thickness shall be inserted between the two flange faces and then the nuts and bolts inserted and tightened to make the joint.

Bd.V.3.4 *Testings.*—According to Bd.V.2.6.

Bd.V.3.5. *Item to include.*—(1) Oil paint, rubber insertion, nuts and bolts, lead wool, fibre.

(2) Making connections.

(3) Testing and remaking of faulty joints.

(4) All labour, materials and use of tools for satisfactory completion of the item.

Bd.V.3.6. *Mode of measurement and payment.*—The contract rate shall be per number of connections.

Bd.V.4. *Providing and making ferrule connection of mm. diameter to water main including ferrule couplings and cast iron bell mouth cover and fixing.*

Bd.V.4.1. *General.*—The item pertains to provision and fixing of a ferrule for obtaining water supply from the water mains.

This item shall be subject to the general specifications.

Bd.V.4.2. *Materials.*—The ferrule for connection with cast iron water main shall be of gun metal or hard brass and shall be of the diameter specified in the wording of the item. The ferrule shall be fitted with a screwed plug or valve capable of completely shutting off the supply. It shall be got approved before use. Couplings shall be cast in one piece with cast iron bell mouth cover for connections.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



BdV..4.3. *Fixing.*—The contractor shall obtain necessary permission of the competent authorities if required for making the connection.

The ferrule shall be fixed into the water mains without protruding inside and shall include making hole in the water main and covering with cast iron bell mouth cover. The ferrule shall be fitted watertight.

Bd.V.4.4. *Item to include.*—(1) Ferrule and couplings and cast iron bell mouth.

(2) Obtaining permission, if required, for making the connection, boring hole in the main and fixing ferrule and paying necessary fees, if any.

(3) All necessary labour, materials and use of tools required for completing the item satisfactorily.

Bd.V.4.5. *Mode of measurement and payment.*—The contract rate shall be for one ferrule connection of the specified diameter.

The measurement shall be for the number of ferrule connections of the specified diameter. The rate and payment shall be subject to the Bye-laws of the local Authority.

Bd.V.5. *Providing, laying and fixing mm. diameter heavy/medium type galvanised iron pipes with screwed socket joints and necessary galvanised iron fittings such as sockets, backnuts, elbows, bends, tees, reducers, enlargers, plugs, clamps, etc., including necessary excavation, backfilling, fixing with clamps, drilling holes in walls, slabs, etc., and remarking complete.*

Bd.V.5.1. *General.*—The item pertains to providing and fixing of heavy or medium type as mentioned in the item, galvanised iron pipes of the specified diameter for water supply including necessary galvanised iron fittings and all connected work such as excavation, drilling through walls, slabs, fixing with clamps, backfilling and making good the damage.

This item shall be subject to general specifications.

Bd.V.5.2. *Materials.*—The galvanised iron pipes shall be of the type and diameter specified in the wording of the item and shall comply with I.S. 1239—1968 for the specified type. The specified diameter of the pipes shall refer to the inside diameter of the bore pipes and fittings of which the galvanising has been damaged shall not be used. Unless otherwise specified, heavy type (C class) galvanised iron pipes shall be used in Greater Bombay and medium type (B Class) elsewhere. Clamps, screws, and galvanised iron fittings shall be of the standard type to match the pipes.

Fine hemp and linseed oil for fixing of the fittings.

Bd.V.5.3. *Excavation.*—The trench for laying the pipes shall be excavated to the lines and levels as directed by the Engineer. The bed shall be made even. Unless otherwise specified in the special provisions, the excavation shall be about 30 cm. (about 12″) wide and not less than 45 cm. (about 18″) deep. The trench shall be excavated through all strata met with. Where necessary, sides may be shored or sloped. In case rock is met with the section of the trench may be slightly reduced but sufficient to receive the pipe and the cushioning with a safe margin. Dewatering shall be done where necessary.

The excavation shall be done only so much in advance of laying of pipes as to cause least damage to the trench and least inconvenience to traffic and in other respects.

In case of excavation across, a road, permission of road authorities shall be obtained for the excavation of the road surface which shall be made good and restored to the original condition at the contractor's cost. At all road crossings, the trench shall be dug only for half the width of the road and pipe laid. The other half share be excavated only after back filling is done over the laid pipe and making it suitable for the traffic. In case of such road excavations and in other cases where accidents are likely to occur due to the excavation and pipe laying operations sufficient care shall be taken to avoid accidents, etc., by erecting barricades, caution boards, keeping watchmen and maintaining red lights at night time. The contractor shall be responsible for accidents due to his carelessness in this respect and shall bear the consequences.

At all the road crossings the pipes shall be laid lower than the crust of the road.

All the pipes, water mains, cables, etc., met in the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost.

The pipe shall be laid on a well compacted bed in the trench. The trench after laying the pipe shall be refilled except at the joints, in layers and manually rammed. Care shall be taken to see that no earth, etc., gets inside the pipes. The filling shall be kept raised by about 5 cm.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



for subsequent settlement. In the case of trench through rock, a bedding and cushioning of murum, good earth or sand shall be provided for the pipe. The trench at the joints shall be filled similarly after satisfactory testing of the pipe. Any surplus excavated stuff shall be disposed off satisfactorily without causing nuisance.

Bd.V.5.4. *Laying and fixing.*—The plumbing contractor shall get the layout of the plumbing and drainage system approved by the competent authorities as may be required by the bye-laws. Should any changes in the layout be necessary to get such approval, the contractor shall get the approval of the Engineer and make the amendments to comply with the bye-laws. The pipes shall be generally so laid or fixed as not to be exposed to the heat of the sun or be subject to any injury or risk to the pipe. As far as possible, the pipes shall be laid plumb and in straight and parallel lines. The pipe shall be laid to falling or rising gradients or dead level so as to avoid air locks. It should be possible to empty the pipes readily and completely. All water-supply pipes shall as far as possible, be kept outside of walls, partitions and floors and be exposed to view and accessible. They shall be used in standard lengths, cut lengths being used only where necessary to make up the exact lengths.

The pipe shall be laid into the trench and screwed with sockets, elbows, tees, bends, etc., as necessary. In making the joints, a few turns of fine hemp, dipped in linseed oil shall be taken over the threaded end of the pipe and the socket screwed home over the pipe with pipe wrench. Pipes connected shall generally touch each other, the socket covering each end about equally. The branch connections shall not protrude in the bore of the parent pipes.

No joint shall be located in the thickness of the walls.

If the pipe is required to be cut and the end threaded, the burns of the cut end shall be filed smooth and any obstruction in the bore shall be entirely eliminated. The rate includes wastage in cutting, etc.

When the pipe is to be fixed to walls it shall be fixed with standard brackets, clips or holder bats keeping the pipe about 12 mm. (about $\frac{1}{2}$") clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another when more than one pipe is laid unless unavoidable. The supporting clips, etc., for the pipe shall be spaced at about two meters or so as necessary. When holes are not left during construction they shall be cut into the walls or slabs, etc., to pass the pipe through or to fix clamps, etc. After fixing of the pipes, clamps, etc., these shall be neatly made good.

Bd.V.5.5. *Painting.*—After laying of the pipes, the trench shall be refilled as explained earlier. All external pipes shall be painted with two coats of approved shade of anticorrosive paint and internal pipes with two coats of oil paint of approved shade according to B.21.

Bd.V.5.6. *Testing.*—On completion of laying the pipe line and fixing taps, etc., the pipeline shall be tested with a hydraulic pump for a pressure of 7 kg/sq.cm. (about 100 lbs./sq. inch) or for any other pressure if mentioned in the special provisions or the Municipal Bye-laws. No leakage at the joints shall be allowable. Any leakage found shall be removed by redoing the joint satisfactorily, without extra cost to the Department.

Any other tests specified in the Bye-laws of the local Authority shall be carried out by the contractor to the satisfaction of such authorities and any defects found out shall be remedied by the contractor without extra claims.

Bd.V.5.7. *Item to include.*—(1) Supply of galvanised iron pipes of specified diameter and type and galvanised iron fittings such as sockets, elbows, bends, tees, enlargers, reducers, backnuts, plugs, unions etc., hemp, linseed oil, clamps, screws, wooden plugs etc., to fix the pipe to the walls.

(2) Excavating and back filling trenches including dewatering, cutting through walls, floor etc., and making good.

(3) Laying, jointing and fixing the pipe with the fittings including cutting pipes, wastage and threading the ends.

(4) Painting exposed pipes.

(5) Testing.

(6) All necessary labour, materials and use of tools.

Bd.V.5.8. *Mode of measurement and payment.*—The contract rate shall be for one metre of each type and diameter of pipe laid complete with fittings, clamps etc., as specified.

The lengths shall be measured net on the straight and bends along the centre line of the pipes and fittings correct up to a cm.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.V.6. *Providing and fixing mm. diameter water-meter with/without non-return valve including strainer, sockets/union nut and construction of brick masonry chamber with locking arrangement and lock.*

Bd.V.6.1. *General.*—The item pertains to the provision and fixing of tested water meter of specified diameter and of approved make with or without non-return valve as mentioned in the item including strainer, sockets or union nut, as per the item and brick masonry chamber with locking arrangement and lock. This item shall be subject to the general specifications.

Bd.V.6.2. *Materials.*—Water-meter of the specified diameter shall conform to I. S. 779E-1966 and of an approved make.

It shall be tested and accepted only after being certified to be accurate.

The non-return valve shall be of the same diameter as that of the meter and shall be of the make specified in the special provisions. If not so specified, it shall be of the best make available in the market and approved by the Engineer.

The bricks shall conform to A.9.2.

The cement mortar of 1:6 and 1:5 proportions shall conform to B.5.(a).

The cast iron frame and lid shall be of the standard approved type and shall conform to A.13 regarding material.

Cement concrete 1:5:10 base and cement concrete 1:2:4 for slab shall conform to B.6.

Bd.V.6.3. *Fixing.*—The water-meter shall be fixed into the pipeline with necessary sockets or union nut as mentioned in the item. The non-return valve shall be fixed towards the outlet end of the water-meter. The strainer shall be fixed at the inlet end.

Fixing shall conform to Bd.V.8.3.

Unless otherwise specified or shown in the drawings, the chamber shall have inside dimensions of 60 cm×45 cm×30 cm. (2′—0″×1′—6″×1′—0″).

Necessary excavation shall be done for the provision of the chamber. The chamber shall be provided with a foundation slab of 1:5:10 cement concrete 10 cm. thick. If the strata is not suitable, 15 cm. thick rubble soling shall be provided.

The brick masonry shall be built in 1:6 mortar to a thickness of one brick of IS/conventional type and shall conform to B.8.(*b*).

Unless otherwise specified cast iron frame shall have inside dimensions of 45 cm.×30 cm. and shall be 10 cm. high. The lid fixed on the frame have locking arrangement with lock and the frame shall be fixed in 15 cm. thick cement concrete slab.

The inside of the brick masonry shall be plastered with cement mortar 1:5. Plastering shall conform to B. 11 and shall be 12 mm. thick.

Bd.V.6.4. *Item to include.*—(1) Supply of water-meter, non-return valve, strainer, sockets/union nut, cast iron frame and lid with locking arrangement and lock.

(2) Excavating, constructing brick masonry chamber with concrete base and fixing frame and lid with locking arrangement and lock and fixing water-meter and non-return valve.

(3) All necessary labour, materials and use of tools.

Bd.V.6.5. *Mode of measurement and payment.*—The contract rate shall be for one water-meter of the specified diameter fixed including fittings and chamber with cast iron frame and locking arrangement.

The measurement shall be for the number of water-meters thus fixed.

Bd.V.7. *Providing and fixing mm. diameter water-meter with/without non-return value, water-meter box with lock, sockets/union nut and strainer complete.*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.V.10.2.**

Bd.V.7.1. *General.*—The item pertains to the provision and fixing of water-meter of the specified diameter with or without non-return valve as mentioned in the item including sockets or union nut, non-return value, strainer and water-meter box with lock. This item shall be subject to the general specifications.

Bd.V.7.2. *Materials.*—Water-meter of the specified diameter shall conform to I. S. 779E-1966 and Bd. V.6.2.

The water-meter box shall conform to I. S. 2104:1962.

Cement concrete 1:2:4 shall conform to B.6.

Bd.V.7.3. *Fixing.*—Fixing shall be done as per Bd.V.6.3.

The water-meter box shall be fixed over a base of 10 cm. thick 1:2:4 cement concrete.

Bd.V.7.4. *Item to include.*—(1) Supply of water-meter, sockets or union nut, non-return value strainer, water-meter box with lock and 1:2:4 cement concrete bed.

(2) Fixing of water-meter with sockets or union nut, non-return value strainer and water-meter box with lock.

(3) All necessary labour, materials and use of tools.

Bd.V.7.5. *Mode of measurement and payment.*—Contract rate shall be for one water-meter of the specified diameter provided as above. The measurement shall be for number of water-meters provided.

Bd.V.8. *Providing and fixing mm. diameter screw down bib-tap/stop tap of Brass including necessary socket/union nut complete.*

Bd.V.8.1. *General.*—The item pertains to the provision and fixing of screw down bib tap or stop tap as mentioned in the item, of the specified diameter including necessary accessories. This item shall be subject to the general specifications.

Bd.V.8.2. *Materials.*—The bib or stop tap shall conform to I. S. 781-1967.

Bd.V.8.3. *Fixing.*—The bib tap or stop tap shall be fixed into the pipe line with necessary sockets or union nut in places indicated on the drawing or as ordered by the Engineer. A few turns of fine hemp dipped in linseed oil shall be taken over the threaded ends to obtain a completely watertight joint. If there is a leak observed on test, the joint shall be remade to make it leak proof.

Bd.V.8.4. *Item to include.*—(1) Screw down bib tap or stop tap of the specified diameter, fine hemp, linseed oil and fixing of bib tap or stop tap.

(2) All necessary materials, labour and use of tools.

Bd.V.8.5. *Mode of measurement and payment.*—The contract rate shall be for one screw down bib tap or stop tap fixed. Measurement shall be for the number of bib taps or stop taps fixed.

Bd.V.9. *Providing and fixing screw down mm. diameter wheeled stop tap of gun metal/brass including necessary sockets/union nut complete.*

Bd.V.9.1. *General.*—The item shall conform to the specification No. Bd.V.8. in all respects except that it shall have an operating wheel. The material of the wheeled stop valve shall be gun metal or brass as specified in the item.

Bd.V.10. *Providing and fixing mm. diameter gun metal/brass stop tap with crutch/wheel including socket/union nut and brick masonry chamber with locking arrangement and lock.*

Bd.V.10.1. *General.*—The item pertains to the provisions and fixing of stop tap with wheel/crutch of specified diameter including sockets/union nut and brick masonry chamber with locking arrangement and lock. This item shall be subject to the general specifications.

Bd.V.10.2. *Materials.*—The stop tap of specified diameter with crutch or wheeled handle as mentioned in the item shall conform to I. S. 781-1967. It shall be of gun metal or brass as mentioned in the item.

The bricks shall conform to A.9.2.

The cement mortar of 1:6 and 1:5 proportions shall conform to B.5.(*a*).

The cast iron frame and lid shall be of standard approved type and shall conform to A 13 regarding material.

Cement concrete 1:2:4 and 1:5:10 shall conform to B.6.



अनुक्रमणिका
Table of Contents

Bd.V.10.3. *Fixing.*—The stop tap shall be fixed into the supply pipe at places indicated on the plans or as ordered by the Engineer with necessary sockets or union nut. The fixing shall conform to Bd.V.8.3.

Unless otherwise specified, the chamber shall be 30 cm. × 30 cm. inside with the depth corresponding to the depth of the pipe below the ground level.

Necessary excavation shall be done for provision of the chamber. The chamber shall be provided with foundation slab of 1:5:10 cement concrete 10 cm. thick. If the strata is not good, 15 cm. thick rubble soling shall be provided.

The brick masonry shall be built to a thickness of one brick of I. S. or conventional type in cement mortar 1:6 and conform to Bd.B.8.(*b*).

Unless otherwise specified cast iron frame shall have inside dimensions of 30 cm. × 30 cm. and 10 cm. high with a lid with locking arrangement. The frame shall be fixed in a 15 cm. thick 1:2:4 cement concrete slab.

The inside of the brick work shall be plastered with cement mortar 1:5. Plastering shall conform to B-11 and 12 mm. thick.

Bd.V.10.4. *Item to include.*—(1) Stop tap with wheel handle or crutch as mentioned in the item with sockets/union nut, brick, masonry chamber including concrete base, concrete slab, cast iron frame and lid with locking arrangement and lock.

(2) Excavating, fixing the stop tap, constructing brick masonry chamber and fixing lid with frame.

(3) All necessary labour, materials and use of tools.

Bd.V.10.5. *Mode of measurement and payment.*—The contract rate shall be for one such stop tap fixed into a chamber including the cost of the chamber.

The measurement shall be for such stop taps fixed including the chambers.

Bd.V.11. *Providing and fixing mm. diameter gun metal/brass stop tap with crutch/wheel including sockets/union nut and box chamber with lock.*

Bd.V.11.1. *General.*—The item pertains to the provision and fixing of stop tap of gun metal or brass of specified diameter with crutch or wheeled handle and as mentioned in the item and shall include sockets/union nut and box with lock. This item shall be subject to the general specification.

Bd.V.11.2. *Material.*—The stop tap of specified diameter with crutch or wheeled handle shall conform to I. S. 781-1967, and shall be made of gun metal or brass as mentioned in the item.

The box shall conform to I. S. 2104-1962.

Bd.V.11.3. *Fixing.*—The stop tap shall be fixed into the supply pipe at places indicated on the plans or as directed by the Engineer, with necessary sockets or union nut.

The fixing shall conform to Bd.V.8.3.

The box shall be fixed over a base of 10 cm. thick 1:2:4 cement concrete and shall have a locking arrangement and lock.

Bd.V.11.4. *Item to include.*—(1) Stop tap of gun metal or brass with crutch or wheeled handle as mentioned in the item and sockets or union nut, box with lock and 1:2:4 cement concrete base.

(2) Fixing of stop tap with socket or union nut and box with locking arrangement and lock.

(3) All labour, materials and use of tools.

Bd.V.11.5. *Mode of measurement and payment.*—The contract rate shall be for one such stop tap fixed.

The measurement shall be for the number of such stop taps fixed.

Bd.V.12. *Providing and fixing cm. diameter chromium plated brass shower rose to 12 mm. diameter supply pipe including necessary bend and socket complete.*

Bd.V.12.1. *General.*—The item pertains to the provision and fixing of a chromium plated brass shower rose of the specified diameter to the supply pipe including accessories. This item shall be subject to the general specification and shall generally conform to para. 6.4 of I. S. 2064-1962.

**Bd.V.14.4.**

Bd.V.12.2. *Materials.*—The shower rose shall be of the chromium plated brass and of the specified diameter and of the type and make approved by the Engineer. The necessary bend and socket shall conform to I. S. 1239-1968 Part I, 1969 Part II.

Bd.V.12.3. *Fixing.*—The shower rose shall be fixed in the position indicated on the drawings or as ordered by the Engineer. The joints shall be leak proof.

A stop tap shall be provided to control the water-supply to the shower rose and shall be provided for separately.

Bd.V.12.4. *Item to include.*—(1) Shower rose, bend and socket and their fixing.

(2) All labour, materials and use of tools.

Bd.V.12.5. *Mode of measurement and payment.*—The contract rate shall be for one shower rose.

The measurement shall be for the number of shower roses fixed.

The supply pipe and the stop tap shall be measured and paid separately.

Bd.V.13. *Providing and fixing drinking fountain including basin, jet, self-closing tap, stop tap for controlling the pressure, necessary galvanised iron pipe up to the outside of the wall, inlet pipe and lead/galvanised iron pipe leading the waste water from the basin up to the outside of the wall.*

Bd.V.13.1. *General.*—The item pertains to the provision and fixing of fountain including all necessary pipe connections and accessories. This item shall be subject to the general specifications.

Bd.V.13.2. *Materials.*—Drinking fountain shall conform to I. S. 1700-1960.

The pipes shall conform to I. S. 404-1962 and I. S. 1239-1968 Part I, 1969 Part II for the lead and galvanised iron pipes, respectively.

The stop tap shall conform to I. S. 781-1967.

Bd.V.13.3. *Fixing.*—The drinking fountain shall be fixed in the position indicated on the drawings or as ordered by the Engineer. The installation shall conform to I. S. 1700-1960. Lead pipes shall have wiped solder joints and brass unions at the ends. Tests for proper functioning of the fountain shall be given after complete installation.

Bd.V.13.4. *Item to include.*—(1) Drinking fountain including basin, jet, self-closing tap, inlet pipe, lead or galvanised iron outer piping up to the outside of the walls as mentioned in the item and stop tap.

(2) Fixing the drinking fountain with all its accessories, piping and the stop tap and giving satisfactory test.

(3) All necessary labour, materials and use of tools.

Bd.V.13.5. *Mode of measurement and payment.*—Contract rate shall be for one drinking fountain fixed including fixing of various pipes and fittings.

The measurement shall for the number of drinking fountains fixed.

Bd.V.14. *Providing and fixing mm. diameter concussion push-button type gun metal/brass self-closing tap including necessary socket complete.*

Bd.V.14.1. *General.*—The item pertains to the provisions and fixing concussion push-button type self-closing tap of specified diamater including socket. This item shall be subject to the general specifications.

Bd.V.14.2. *Materials.*—Self-closing, concussion push-button type tap of specified diameter shall conform to I.S. 1711-1960 and shall be of gun metal or brass as mentioned in the item.

Socket shall conform to I.S. 1239-1968 Part I, 1969 Part II and shall be of the diameter to go with the tap and pipe.

Bd.V.14.3. *Fixing.*—The tap shall be fixed to the supply pipe at places indicated on the drawings or as directed by the Engineer with necessary socket. The fixing shall conform to Bd. V.8.3.

Bd.V.14.4. *Item to include.*—(1) Self-closing tap, socket and hemp and linseed oil.

(2) Fixing the tap.

(3) All necessary labour, materials and use of tools.

अनुक्रमणिका
Table of Contents



Bd.V.14.5. *Mode of measurement and payment.*—The contract rate shall be for one self-closing tap fixed.

The measurement shall be for the number of taps fixed.

Bd.V.15. *Providing, hoisting and fixing in position water storage tank 3 mm. thick sheet of mild steel litre capacity including mild steel hinged and framed cover with locking arrangement, overflow pipe, scour pipe with plug, outlet flange sockets, ball valve with copper float, inter-connecting pipes and fabricated by welding/rivetting with mild steel angle frame complete.*

Bd.V.15.1. *General.*—The item pertains to the provision and installation of mild steel water storage tank including all necessary fittings complete. When welding is to be done, there shall be no angle iron frame. This item shall be subject to the general specifications.

Bd.V.15.2. *Materials.*—Mild steel sheet 3 mm. thick, mild steel angles, mild steel flats, galvanised iron pipes, stop tap, ball cock with copper float.

The mild steel 3 mm. thick shall conform to A.11.

Unless other sizes are shown in the drawings the mild steel angles shall be 40 mm.×6 mm. and flats shall be 40 mm.×6 mm. and shall conform to A.11.

Unless other sizes are shown in the drawings the galvanised iron pipes shall be 25 mm. for overflow, 40 mm. mm. for scour and 50 mm. for inter-connection. These pipes shall conform to I. S. 1239-1968 Part I, 1969 Part II. Brass mosquito proof coupling for overflow pipe. Galvanised iron plug for the scour pipe.

Bd.V.15.3. *Fabrication and Installation.*—The mild steel storage tank shall be for the capacity mentioned in the wording of the item and shall conform to the drawings. The capacity mentioned in the wording of the item shall be the net water available for use and not the gross contents.

When angle iron frame is used, the connections may be made by welding or rivetting. When the sheets have to be connected without any iron frame, it shall be done by welding only.

If no design is provided by the Department, the contractor shall submit his own design of the mild steel tank for the specified capacity, for approval of the Engineer in advance. The contractor shall be wholly responsible for the design even though the general features are approved by the Engineer.

The fabrication of the tank shall conform to the specification B.19. R. S. Joists, etc., on which tank will be supported will be paid for separately.

A manhole of about 45 cm. diameter shall be provided in the top sheet reinforced at the edge and provided with hinged cover with locking arrangement. The cover and its joint shall be light proof, dust proof and mosquito proof. The lid shall be circular.

Holes of required diameter shall be punched in the places indicated for fixing scour tap, outlet pipe connecting pipes and overflow pipes and water-supply pipe, when necessary. All the joints of the fittings with the tank at these holes shall be made by flange sockets welded on at these holes to a watertight fit.

The tank shall be painted and finally erected in position indicated on the drawings or as ordered by the Engineer. Any damage in transport, hoisting, etc., shall be the responsibility of the contractor and he shall make good all damages. The position and length of the over-flow and scour pipe shall be such that the discharge does not damage the walls, etc. All necessary fittings shall then be screwed to these sockets with leak proof joints. Ball cock shall be fixed to the supply pipe at the proper level.

The tank shall be painted with a priming coat of paint of red oxide of iron on the inside and outside and subsequently with two coats of approved shade of good anti-corrosive oil paint not containing lead compound on the inside and suitable paint to match the colour of the sourdings on the outside. Painting shall conform to B.21. On completion of the erection, fitting, painting, etc., the tank shall be filled with water and tested for the performance. Any leakage or defect detected shall be rectified without any extra cost to the Department.

Bd.V.15.4. *Item to include.*—(1) All steel sheets, fittings and accessories and fabrication.

(2) Painting.

(3) Erecting, hoisting and fixing fittings and accessories.

(4) Testing and rectifying leakage, etc.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.V.19.**

Bd.V.15.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one litre of the capacity.

The measurement shall be for the net capacity of the tank in litres. The contents of water in between the invert of the outlet pipe and the level of water at fully closed ballcock position shall be worked out and converted into litres.

B. V. 16. *Providing and fixing in position mild steel bar reinforcement for R.C.C. water tanks as per detailed designs, drawing and schedules including cutting, bending, providing hooks, binding with wires and supporting as required complete.*

Bd.V.16.1. *General.*—The item pertains to the provision and fixing in position of mild steel bar reinforcement for R.C.C. water tanks and reservoirs.

The item shall comply fully with the specification No. B.10.

Bd.V.17. *Providing and casting in situ waterproofed cement concrete 1 : 1½ : 3. 1 : 2 : 3 for R.C.C. water tanks and reservoirs including centering if required, formwork, mechanical vibration, finishing the formed faces if required with cement mortar 1 : 3 of sufficient minimum thickness to give smooth and even surfaces and watertightness and curing.*

Bd.V.17.1. *General.*—The item provides for the waterproofed cement concrete cast in situ for the water tanks and reservoirs including centering if required, forms, vibration of concrete, finishing of the formed faces if required, with cement 1 : 3.

The item shall comply with the specification No. Bd. F.22.

The frame of the manhole shall be embedded into the concrete while casting in the position shows on the drawings or as directed by the Engineer.

Where necessary the pipes, etc., shall be embedded during the casting of the concrete in their correct position and where not so necessary holes shall be left while casting of the concrete in proper places.

Fittings and accessories themselves shall be paid under a separate item.

Bd.V.18. *Providing and fixing fittings and accessories such as ballcock over-flow pipe with mosquito proof coupling, scour pipe with plug, manhole with cover and locking arrangement, connecting pipes and embedding intake and outflow pipes into the R.C.C. water reservoir.*

Bd.V.18.1. *General.*—The item pertains to the provision and fixing of the fittings and accessories of the R.C.C. water reservoir. Where necessary, the pipes, etc., shall be embedded during the casting of concrete. Where not so necessary in the opinion of the Engineer, holes may be left while casting of the concrete and the accessories fixed later. All these holes shall be made good and waterproofed where necessary, after fixing of the accessories. The frame of the manhole shall be embedded into the concrete while casting.

All these accessories and their fixing shall comply with the requirements as given for the steel tank.

Bd.V.18.2. *Item to include.*—The following fittings and accessories are included under this item :—

(1) Ball cock of the diameter of the supply pipe.

(2) 25 mm. diameter galvanised iron overflow pipe with mosquito proof coupling.

(3) 40 mm. diameter scour plug with galvanised iron pipe.

(4) 45 cm. diameter manhole cover with frame.

(5) 50 mm. diameter connecting galvanised iron pipes.

The intake and outtake pipes shall be as provided separately and shall not be included in this item.

Bd.V.18.3. *Mode of measurement and payment.*—The contract rate shall be lump per tank. The measurement shall be for the set of accessories fixed as detailed above to a reservoir.

Bd.V.19. *Providing and fixing 45 cm. wide steel ladder of 40 mm. × 6 mm. mild steel flat stringers and steps of 18 mm. diameter mild steel bars for water tank including fixing it in 1 : 2 : 4 cement concrete block of 60 cm. × 30 cm × 30 cm. and painting the ladder.*

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.V.19.1. *General.*—The item pertains to the provision and fixing of a 45 cm. wide steel ladder including fixing in cement concrete block and painting.

Bd.V.19.2. *Materials.*—40 m. × 6 mm. mild steel flat shall conform to A.11.

18 mm. diameter mild steel bar shall conform to A.10.

Cement concrete 1 : 2 : 4 shall conform to the specification No. B.6.

Oil paint shall conform to A.17.

Bd.V.19.3. *Fabrication and fixing.*—The shape of the ladder shall conform to the drawings or as ordered by the Engineer. The upper end shall be bent so as to provide easy climbing. The curved top of the stringers shall be at least 75 cm. above the top of the tank. The last step shall be 30 cm. below the top of the tank. The stringer after the curve shall extend up to the top of the tank. The spacing of steps shall be 30 cm. (12 inches).

Fabrication shall conform to B.19.

The lower end of the ladder shall be embedded into a block of 1 : 2 : 4 cement concrete.

The ladder shall be painted with a base coat of red lead paint and two coats of good anti-corrosive oil paint of approved shade. The painting shall conform to B.21.

Bd.V.19.4. *Item to include.*—(1) Mild steel flats, bars, concrete and paints.

(2) Fabricating, fixing in concrete block and painting.

(3) All necessary labour, materials and use of tools and equipment for the satisfactory completion of the item.

Bd.V.19.5. *Mode of measurement and payment.*—The contract rate shall be for one metre of length of the ladder. The length shall be measured from the ground or the floor along the ladder up to the top of the tank correct up to 5 cm.

Bd.V.20. *Providing and fixing Indian type white glazed earthenware cm. size watercloset pan including P or S trap, white glazed earthenware foot rests, cast iron soil and vent pipes up to the outside face of the wall, 1:2:4 brickbat lime concrete bedding, 13.6 litre (3 gallons) cast iron high level flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, 32 mm. (1¼") diameter lead flush pipe with fittings and clamps; 20 mm. (¾") diameter galvanised iron overflow pipe with mosquito proof coupling, galvanised iron chain and pull, painting of the cistern and exposed pipes and cutting and making good walls and floors.*

Bd.V.20.1. *General.*—The item pertains to the provision and fixing of Indian type white glazed earthenware W.C. pan of the specified dimension with cast iron high level 13.6 litre flushing cistern and other flushnig accessories and necessary pipe connections up to the soil and vent pipes fixed on the outside of wall.

This item shall be subject to the general specifications and relevant provisions of I.S. 2064-1962.

Bd.V.20.2. *Materials.*—The Indian type water-closet pan, trap and foot rests shall conform to I.S. 771-1963. Unless a particular make and quality are specified in the item or special provisions, the water-closet pan, trap and foot rests shall be of the best Indian make available in the market. These shall be got approved by the Engineer before use.

The cast iron pipes shall be of the make specified or shall be the best available in the market and got approved by the Engineer and shall have been treated with Dr. Angus Smith's solution. The fittings shall be of the same quality as that of the pipes.

Brickbat lime concrete 1:2:4 shall conform to specification No. Bd.D.3.

The cast iron high level flushing cistern shall be 13.6 litre (3 gallons) capacity and shall generally conform to the type mentioned in I.S. 774-1964. The cast iron or mild steel cantilever brackets shall conform to I.S. 775-1962.

The 32 mm. (1¼") diameter lead pipe shall conform to I.S. 404-1962.

The 20 mm. (¾") diameter galvanised iron overflow pipe and the inlet pipe shall conform to I.S. 1239—1968 Part I, 1969 Part II. The mosquito proof coupling shall be as per the municipal requirements or shall be got approved by the Engineer. Brass stop tap 12 mm. shall conform to I.S. 781—1967

अनुक्रमणिका
Table of Contents

**Bd.V.20.5.**

The galvanised iron chain and pull shall be of standard type and of sufficient length and shall be of the make approved by the Engineer. It shall generally conform to para 4.7 of I.S. 774—1964.

Clause 8 of I.S. 2064-1962 shall be carefully attended to regarding all the appliances.

Oil paint shall conform to A.17.

Bd.V.20.3. *Fixing.*—The water-closet pan and the flushing cistern shall be fixed into the places indicated on the drawings or as ordered by the Engineer.

The vent and soil pipes shall run through the holes left in the wall and the wall made good. If holes are not left in the wall they shall be cut and the cavity surrounding the pipe made good properly after fixing the pipes.

The pan shall be placed into position with the trap jointed in cement mortar 1 : 1 and the connecting pipes duly connected including the lead pipe from the flushing cistern. The jointing of various pipes shall conform to para. 5 of I.S. 1742-1960 code of practice for Building Drainage. The jointing of cast iron pipes shall be with 1:1 cement mortar with hemp yarn caulking.

Brick bat lime concrete 1:2:4 shall be cast and pressed all round the embedded surface of the pan and fittings and pipes to get a solid embedment without any hollows. The whole area for W. C. shall be provided with 1:2:4 brick bat lime concrete. The pan shall be fixed sightly at a lower level than the level of the general flooring which should slope on all sides towards the pan. If the pan is damaged in handling or fixing, it shall be replaced by the contractor at his own expense.

The flushing cistern shall be fixed on two iron or mild steel cantilever brackets fixed in the wall at the height indicated on the drawing or as ordered by the Engineer. In no case, shall the distance from the top of the pan to the underside of the cistern shall be less than 125 cm.

The inlet end shall be connected to the distribution pipe through a stop tap, pipe and bends. The bend, pipe and stop tap shall be included in the item. The lead flushing pipe shall be connected to the outlet nipple and tail pipe with a coupling brass nut.

The 20 mm. ($\frac{3}{4}$") diameter overflow pipe shall be fixed to the flushing cistern and shall be fixed to the wall with holder battens and clamps. The overflow pipe shall run through the hole left in the wall and project for at least 45 cm. beyond the outside surface of the wall and the wall made good. If no hole is left, hole shall be cut and after fixing the pipe, surrounding cavity of the pipe shall be made good. The outlet shall be slightly bent downwards and shall be fixed with a mosquito proof coupling.

The lead flushing pipe shall be bent leaving a straight length of about 30 cm. at the top and the lower portion after the bend shall be housed into the recess cut in the wall and shall be concealed with plaster.

After the flooring is completed, the foot rests shall be fixed in cement mortar 1 : 1. The flooring shall be paid for separately.

The chain and the pull shall be fixed to the protruding lever arm of the flushing cistern.

The whole installation shall be tested for leak proof joints and satisfactory functioning.

The cistern, brackets and all the exposed pipes shall be painted with a base coat of red lead oil paint and two coats of approved shade of good oil paint. Painting shall conform to B.21.

Bd.V.20.4. *Item to include.*—(1) Water-closet, pan, trap, cast iron pipes, brick bat lime concrete 1 : 2 : 4, foot, rests, flushing cistern with fitting and brackets, inlet pipe from cistern up to stop tap, and stop tap, lead pipe, with nut, chain and pull, overflow pipe with mosquito proof coupling, oil paint.

(2 ) Cutting holes in walls and floors where necessary and making good after fixing of pipes, fixing pan, trap, vent and soil pipes, laying 1:5:10 cement concrete, fixing foot rests, cistern, overflow pipe, lead pipe, chain and pull and painting including cutting and waste.

(3) Testing the installation to give satisfactory results.

(4) All necessary labour, materials and use of tools for the satisfactory completion of the item.

Bd.V.20.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one water-closet pan fixed with all arrangements.

The measurement shall be for the number of such water-closet pans fixed.

अनुक्रमणिका
Table of Contents



Bd.V.21. *Providing and fixing European type white glazed earthenware water-closet pan with polished teak wood/mahogany seat and lid with chromium plated brass hinges and rubber buffers including cast iron soil and vent pipes up to the outside face of the wall, 13.6 litre (3 gallons) cast iron high level flushing cistern with fittings, pipes and stop tap, brackets for fixing the cistern, 32 mm. (1¼" diameter lead flush pipe with fittings and clamps, 20 mm. (¾") diameter galvanised iron overflow pipe with mosquito proof coupling, galvanised iron chain and pull, painting of the cistern and exposed pipes and cutting and making good walls and floors.*

Bd.V.21.1. *General.*—The item pertains to the provision and fixing of European type white glazed earthenware water-closet pan, cast iron high level flushing cistern and other flushing accessories and necessary pipe connections up to the soil and vent pipes fixed on the outside of the wall.

This item shall be subject to the general specifications and relevant positions of I. S. 2064—1962.

Bd.V.21.2. *Materials.*—The European type water-closet pan shall conform to I. S. 771—1963. The water-closet pan shall be of the best Indian make available in the market unless one of a particular make and quality is specified in the special provisions. This shall be got approved by the Engineer before use.

All other materials shall be as specified in Bd.V.20.2.

Bd.V.21.3. *Fixing.*—The European type water-closet pan and the flushing cistern shall be fixed into the places indicated on the drawings or as ordered by the Engineer.

The vent and soil pipes shall run through the holes left in the floor and walls and the walls and floor made good. If holes are not left in the floor and wall, they shall be cut and the cavity surounding the pipes made good properly after fixing the pipes.

The pan shall be fixed into position in 1:1 cement mortar with the connecting pipes duly connected including the lead pipe from the flushing cistern. All other fittings including the flushing cistern, piping, etc., and the test shall be done as in Bd.V.20.

The cistern, brackets and all the exposed pipes shall be painted with a priming coat of red lead oil paint and two coats of approved shade of good oil paint. Painting shall conform to B.21.

The seat and lid shall then be fixed to the pan with chromium plated hinges.

Bd.V.21.4. *Item to include.*—(1) Providing European type water-closet pan, seat and lid, cast iron pipes, flushing cistern with fittings and brackets, inlet pipe from cistern up to stop tap and stop tap, lead pipe with nuts, chain and pull, overflow pipe with mosquito proof coupling, oil paint.

(2) Cutting holes in floors and wall where necessary and making good after fixing of pipes, fixing pan, pipes, cistern, overflow pipe, lead pipe, chain and pull and painting including cutting and waste.

(3) Testing the installation to give satisfactory results.

(4) All necessary labour, materials and use of tools for the satisfactory completion of the item.

Bd.V.21.5. *Mode of measurement and payment.*—The contract rate shall be for one European type water-closet pan fixed with all arrangements.

The measurements shall be for the number of such water-closet pans fixed.

Bd.V.22. *Providing and fixing European type white glazed earthenware water-closet pan with polished teak wood/mahogany seat and lid with chromium plated brass hinges and rubber buffers including cast iron soil and vent pipes up to the outside face of the wall, 13.6 litres (3 gallons) cast steel enamelled/white glazed earthenware low level flushing cistern with fittings, inlet pipe and stop tap, brackets for fixing the cistern, 40 mm. (1¼") diameter enamelled procelain bend and rubber, 20 mm. (¾") diameter galvanised iron overflow pipe with specials and mosquito proof coupling, chromium plated working handle, painting of the exposed pipes and cutting and making good wall and floor.*

Bd.V.22.1. *General.*—The item shall conform to the specification No. Bd.V.21 except that the flushing cistern shall be of pressed steel and porcelain enamelled or white glazed earthenware low level type as mentioned in the item with chromium plated brass handle as specified in I. S. 374-1960 and connected to the water-closet pan by means of 40 mm. diameter enamelled or porcelain bend and rubber. When fixed into position, the distance between the top of



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



the pan and the under side of the cistern shall not be more than 30 cm. The cistern shall be fixed in such a way that the seat and cover of the water-closet pan shall come to a stable position when raised.

Bd.V.23. *Providing and fixing white glazed earthenware stall type urinal with cast iron 5 litre capacity flushing cistern with fittings, inlet pipe and stop tap, brackets for fixing the cistern, 32 mm. (1¼") diameter lead/brass/brass oxidised/brass chromium plated flush pipe with fittings and flushing arrangement including lead soil pipe, lead trap, soil pipe connection up to the outside face of the wall.*

Bd.V.23.1. *General.*—The item pertains to the provision and fixing of a stall type urinal with cast iron high level cistern with lead or brass oxidised or brass chromium plated (as per the item) flush pipe and spreader arrangement as mentioned in the item including all fittings and soil pipe connections up to the outside face of the wall.

This item shall be subject to the general specifications and relevant provisions of I. S. 2064—1962.

Bd.V.23.2. *Materials.*—The stall type urinal shall conform to I. S. 771—1963. Unless the make and quality are mentioned in the item or special provisions, the stall type urinal shall be of the best Indian make available in the market and approved by the Engineer.

The lead pipes and the galvanised iron pipes shall conform to I. S. 404—1962 and I. S. 1239—1968 Part I, 1969 Part II, respectively. Lead pipes shall always be used where bending to shapes is required. Brass pipes shall conform to I. S. 407—1966.

The cast iron high level flushing cistern shall be of 5 litres capacity and shall conform to I. S. 774—1964. Brass stap tap shall conform to I. S. 781—1967 and shall be of 12 mm. side.

The galvanised iron overflow pipe 20 mm. (¾") diameter shall conform to I. S. 1239—1968 Part I, 1969 Part II and shall be fixed with the mosquito proof coupling as per the municipal requirements or approved by the Engineer.

The brackets for fixing the flushing cistern shall conform to I. S. 775—1962 and may be of cast iron or of mild steel.

Oil paint shall conform to A.17.

Bd.V.23.3. *Fixing.*—The stall urinal shall be fixed on to the wall at places indicated on the drawings or as ordered by the Engineer with 1:2 cement mortar. The installation of the stall urinal shall also conform to para. 6.6 of I. S. 2064—1962.

All the pipe connections shall be made as shown on the drawings or as necessary for the item. The connections shall conform to para. 5 of I. S. 1742—1962.

The fixing of the flushing cistern and pipe connections shall conform to the details given in Bd.V.21 (European type water-closet). The spreader arrangement shall be made by providing a spreader nozzle at the end of the flushing pipe.

All exposed ferrous pipes and the flushing cistern with the brackets shall be painted with one coat of red lead and two coats of good anti-corrosive oil paint of approved shade. Painting shall conform to B.21.

Bd.V.23.4. *Item to include.*—(1) Stall type urinal, flushing cistern with brackets and fittings, inlet pipe from cistern up to stop-tap, galvanised iron and lead or brass pipes specified, spreader nozzle, oil paint.

(2) Fixing of urinal, flushing cistern with fittings, brackets and pipes and painting exposed lead and iron pipes and cistern with brackets, cutting and waste.

(3) All necessary labour, materials and use of tools for the satisfactory completion of the item.

Bd.V.23.5. *Mode of measurement and payment.*—The contract rate shall be for one stall urinal fixed with flushing cistern and the necessary fittings. The measurement shall be for the number of urinals with flushing cisterns fixed.

Bd.V.24. *Providing and fixing white glazed earthenware stall type urinal with cast iron, 5 litre capacity automatic flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipes, fittings and spreader arrangement, including lead soil pipe, lead trap and soil pipe connections up to the face of the wall.*



अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.V.24.1. *General.*—The item pertains to the provision and fixing of a stall type urinal with cast iron high level 5 litre capacity automatic flushing cistern with lead/brass/brass oxidised or brass chromium plated flush pipes as mentioned in the item of suitable diameter to fit the flushing cistern and the arrangement, fittings and spreader arrangement as mentioned in the item including all fittings and trap and soil pipe connections up to the outside face of the wall.

This item shall fully conform to specification Bd.V.23, except that the flushing cistern shall be of cast iron 5 litre capacity with valveless syphon automatic flushing arrangement and shall be of the approved make or as specified in the special provisions. If not so specified it shall be the best available in the market and approved by the Engineer.

Bd.V.25. *Providing and fixing a group of 2/3/4 white glazed earthenware stall type urinals with cast automatic flushing cistern, of iron 5/10 litres capacity, fittings, brackets for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipes, fittings and spreader arrangement including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall.*

Bd.V.25.1. *General.*—This item shall fully conform to specification Bd.V.24 except that a group of specified number of urinals shall be fixed which shall be measured as one unit and paid for at the contract rate for such a unit.

For a group of 2 urinals, one cistern of 5 litre capacity with necessary fittings shall be connected to both the urinals. If there are 3 urinals, one cistern of 10 litre capacity shall be connected to all the three urinals. When there are 4 urinals one cistern of 5 litre capacity shall be connected to each group of 2 urinals.

Bd.V.26. *Providing and fixing white glazed earthern ware lipped flat back/corner type urinal with cast iron 5 litre flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, 32 mm. (1¼") diameter lead/brass/brass oxidised/brass chromium plated flush pipe with fittings including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall.*

Bd.V.26.1. *General.*—The item pertains to the provision and fixing of a lipped flat back or corner type urinal as mentioned in the item with cast iron high level 5 litre capacity flushing cistern including all fittings and soil pipe connections up to the outside face of the wall.

This item shall be subject to the general specifications.

Bd.V.26.2. *Materials.*—The lipped type urinal shall be flat back or corner type as mentioned in the item and shall conform to I. S. 771—1963. It shall be of the best Indian make available in the market and approved by the Engineer. Pipes, fittings and other materials shall be as specified in Bd.V.23.2. A lead soil pipe with a trap shall be fixed to the outlet end of the urinal bowl.

Bd.V.26.3. *Fixing.*—The lipped type urinal shall be fixed on to the wall at places indicated on the drawings or as ordered by the Engineer.

The installation of the urinal shall also conform to paragraph 6.6 of I. S. 2064—1962.

The urinal shall be securely fixed to the wall with the top of the bowl a 65 cm. from the floor or such distance as may be directed by the Engineer.

All the pipe connections shall be made as shown on the drawings or as necessary for the item.

The jointing shall conform to paragraph 5 of I. S. 1742—1962.

The 32 mm. (1¼") diameter lead soil pipe shall be provided with U trap.

The flushing cistern, its fixing and the pipe connections shall conform to the details of Bd.V.21., i.e., for the European type water-closet.

All the exposed lead and ferrous pipes and the flushing cistern with brackets shall be painted with one coat of red lead and two coats of good anticorrosive oil paint of approved shade.

Painting shall conform to B.21.

Bd.V.26.4. *Item to include.*—(1) Lipped type urinal, flushing cistern with brackets, inlet pipe from cistern up to stop tap, stop tap and fittings, galvanised iron, lead or brass pipes and trap as mentioned in the item and oil paint.

(2) Fixing of urinal, flushing cistern with brackets, fittings, the specified type of pipes painting cistern with brackets and exposed pipes, cutting and waste.

(3) All necessary labour, materials and use of tools for the satisfactory completion of the item.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.V.26.5. *Mode of measurement and payment.*—The contract rate shall be for one urinal fixed with flushing cistern and all fittings and pipes. The measurement shall be for the number of urinals with flushing cisterns fixed.

Bd.V.27. *Providing and fixing white glazed earthenware lipped flat back/corner type urinal with cast iron 5 litres automatic flushing cistern with fittings, inlet pipe and stoptap, brackets for fixing the cistern, lead/brass/brass oxidised/brass chromium plated flush pipe with fitting including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall.*

Bd.V.27.1. *General.*—The item pertains to the provision and fixing of lipped flat back/corner type urinal as mentioned in the item with cast iron 5 litres capacity automatic flushing cistern with lead or brass or brass oxidised or brass chromium plated flush pipes as per the item, of suitable diameters to match the flushing cistern and the arrangement including all fittings and soil pipe connections up to the outside face of the wall.

This item shall fully conform to Bd.V.26 except that the flushing cistern shall be of cast iron 5 litres capacity with valveless syphon automatic flushing arrangement with the flush pipes as mentioned above and shall be of the make as specified in the special provisions. If not so specified, it shall be the best available in the market and approved by the Engineer.

Bd.V.28. *Providing and fixing a group of 2/3/4 white glazed earthenware lipped flat back type urinals with cast iron 5/10 litres automatic flushing cistern with fittings, inlet pipe and stoptap, brackets for fixing the cistern lead/brass/brass oxidised/brass chromium plated flush pipes with fittings including lead soil pipe, lead trap and soil pipe connections up to the outside face of the wall.*

Bd.V.28.1.—*General.*—The item shall fully conform to Bd.V.27 except that a group of specified number of urinals shall be fixed which shall be measured as one unit and paid for at the contract rate for such a unit. The number and capacity of cisterns to be provided for the groups shall be as specified in Bd.V.25.

Bd.V.29. *Providing and laying —— mm. diameter half round white glazed earthenware pipes in 1:5:10 cement concrete including bends.*

Bd.V.29.1. *General.*—The item pertains to the provision and laying of half round white glazed earthenware pipes of specified diameter in 1:5:10 cement concrete including bends.

The item shall be subject to the general specifications.

Bd.V.29.2. *Materials.*—The white glazed pipes and bends shall conform to part A of I.S. 771—1963 regarding the quality of the material. The diameter shall refer to the inside diameter of the pipe. Cement concrete 1:5:10 shall conform to B.6.

Cement mortar 1:1 shall conform to B.5(*a*).

Bd.V.29.3. *Laying.*—The half round white glazed earthenware pipes of specified diameter shall be laid accurately to lines, levels and slopes as indicated on the drawings or as ordered by the Engineer.

The pipes shall be laid over a bedding of 1:5:10 cement concrete to make up the level and slope. Any chipping of the floor concrete to set pipes shall be included in the rate. The joints shall be made with 1:1 cement mortar and on the exposed face with 1:1 white cement mortar and cured.

Bd.V.29.4. *Item to include.*—(1) Half round white glazed pipes, bends, 1:5:10 cement concrete, chipping of floor if necessary, 1:1 ordinary and white cement mortar.

(2) Laying concrete pipes and bends and making the joints in cement mortar and curing, cutting and waste.

(3) All necessary labour, material and use of tools.

Bd.V.29.5. *Mode of measurement and payment.*—The contract rate shall be for one metre of the pipe laid including the cement concrete bedding. The measurement shall be for the length along the centre line over the straight length and bends.

Bd.V.30. *Providing and fixing white glazed earthenware wash hand basin of —— cm. ×——cm.×——cm. size including cold water pillar tap/cold and hot water pillar taps, brackets, rubber plug and brass chain, stoptap and necessary pipe connections including lead waste pipe and trap up to the outside face of the wall.*

Bd.V.30.1. *General.*—The item pertains to the provision and fixing of wash hand basin of the specified size including all necessary fixtures and pipe connections up to the outside face of the wall. The item shall be subject to the general specifications.

अनुक्रमणिका
Table of Contents

Bd.V.30.2. *Material.*—The wash hand basin shall conform to I. S. 771—1963.

The brackets shall conform to I. S. 775—1962. Brass waste shall be 32, mm, and of standard pattern with standard pattern plugs and brass chains.

The lead and galvanised pipes shall conform to I. S. 404—1962 and I. S. 1239—1968 part I, 1969 part II respectively.

The 12 mm. ($\frac{1}{2}$") pillar taps shall conform to I. S. 1795—1961 pillar taps and shall be chromium plated. They shall have sufficient length of nose. 12 mm. brass stoptap shall conform to I. S. 781—1967.

Oilpaint shall conform to A.17.

Bd.V.30.3. *Fixtures.*—The basin shall be fixed at the location and level shown on the drawings or as ordered by the Engineer, being supported on a pair of rolled steel or cast iron cantilever brackets embedded in wall or fixed to wall with wooden cleats and screws. The height of the top of the basin from the floor shall be 75 cm. as specified in para. 6.3.11 of I. S. 2061—1962, unless other heights are ordered by the Engineer.

The brackets shall be securely embedded in or fixed to the wall and the basin fixed on to the brackets.

The waste pipe shall run through the wall. If holes are not left in the wall, they shall be cut and the cavity surrounding the pipes made good after fixing of the pipe.

All the pipe connections shall be made as shown on the plans or as found necessary and ordered by the Engineer for the item up to the outside face of the wall to supply and waste pipes. Brass stoptap shall be fixed on the supply pipe.

The pipe connections shall conform to para. 5 of I. S. 1742—1962. The lead waste pipe shall be provided with a trap.

All the exposed pipes and brackets shall be painted with one coat of red lead and two coats of good oilpaints of approved shade. Painting shall conform to B.21.

Bd.V.30.4. *Item to include.*—(1) Basin, pillar taps, brass stoptap, plug with chain, brackets, pipes, trap and oilpaint.

(2) Fixing of brackets, basin, taps, plugs, lead and galvanized pipes up to the outside face of the wall and painting pipes, cutting and waste.

(3) All necessary labour, materials, use of tools.

Bd.V.30.5. *Mode of measurement and payment.*—The contract rate shall be for one basin of the specified size fixed complete with all fittings and pipes. The measurement shall be for the number of such basins fixed.

Bd.V.31. *Providing and fixing white glazed earthenware sink —— cm.×—— cm.×—— cm. including all connections of the galvanised iron supply and lead waste pipes up to the outside face of the wall, cold water piller tap cold and hot water pillar taps, rolled, steel or cast iron brackets, rubber plug with chain and stop tap complete.*

Bd.V.31.1. *General.*—The item pertains to the provision and fixing of white glazed earthenware sink of the specified size including all pipe connections up to the outside face of the wall, tap or taps, brackets, plug and stop tap complete.

This item shall be subject to the general specifications and relevant provision of I. S. 2064—1962.

Bd.V.31.2. *Material.*—The sink shall conform to the requirements of I. S. 771—1963. It shall be of the make specified in the special provisions and if not so mentioned, shall be best available in the market approved by the Engineer.

The bracket shall conform to I. S. 775—1962.

The pipes shall conform to I. S. 1239—1968 part I, 1969 part II and I. S. 404—1962 for steel and lead pipes respectively and the fittings like union nut.

32 mm. brass waste of standard pattern with brass chain and 32 mm. rubber plug.

12. mm. pillars taps shall be chromium plated and shall comply with I. S. 1795-1961. They shall have adequate length of nose. 12 mm. brass stop shall conform to I. S. 781—1967.

Oil paint shall conform to A.17.

Bd.V.31.3. *Fixing.*—The sink shall be fixed in position indicated on the drawings with rolled steel or cast iron brackets embedded into or fixed to the wall with plugs, clamps and screws or as ordered by the Engineer. It shall also conform to para. 6.5 of I. S. 2064—1962.

अनुक्रमणिका
Table of Contents



**Bd.V.33.2.**

The brackets shall be securely embedded in or fixed to the wall and the sink properly fixed on to the brackets.

Holes shall be cut into masonry if they are not left and shall be made good after fixing the pipes.

All the pipe connections shall be made as shown on the plans or as found necessary and ordered by the Engineer up to the outside face of the wall to the supply and waste pipes. Brass stoptap shall be fixed on the supply pipe.

The pipe connections shall conform to para. 5 of I. S. 1742—1962. The lead waste pipes shall be provided with a trap.

The pipes and brackets shall be painted with one coat of red lead and two coats of good oilpaint of approved shade. Painting shall conform to B.21.

Bd.V.31.4. *Item to include.*—(1) Sink, pillar taps, brass waste with rubber plug and brass chain, brackets, lead and galvanised pipes trap, union nut, stoptap, oilpaint.

(2) Fixing brackets, sink, taps, plugs, lead and galvanised pipes up to the outside face of the wall, painting pipes and brackets, cutting holes in masonry and making good after fixing the appliances, pipes, etc., cutting and waste.

(3) All necessary labour, materials and use of tools.

Bd.V.31.5. *Mode of measurement and payment.*—Contract rate shall be for one sink. The measurement shall be for the number of sinks fixed.

Bd.V.32. *Providing and fixing 8 cm. (3") cast iron nahani trap including cast iron grating, bend and piece of cast iron pipe up to the outside face of the wall.*

Bd.V.32.1. *General.*—The item pertains to the provision and fixing of 8 cm. (3"), cast iron nahani trap in sinks and baths including the cast iron grating, bends and cast iron pipe piece up to the outside face of the wall.

This item shall be subject to the general specification.

Bd.V.32.2. *Material.*—The 8 cm. (3") cast iron nahani trap, bend and pipe with 12.5 cm. (5") grating shall be the best available in the market and approved by the Engineer. It shall conform to A.13 regarding its material.

Bd.V.32.3. *Fixing.*—The cast iron nahani trap with the bend and pipe piece shall be fixed as per the drawings or the instructions of the Engineer.

The joints shall be sealed with 1:1 cement mortar. This shall conform to para. 5 of I. S. 1742-1962.

Bd.V.32.4. *Item to include.*—(1) Nahani trap with grating, bend, cast iron pipe up to the outside face of the wall and cement mortar.

(2) Fixing of the trap, bend and pipe, cutting and waste.

(3) All necessary labour, materials and use of tools.

Bd.V.32.5. *Mode of measurement and payment.*—The contract rate shall be for one nahani trap fixed. The measurement shall be for the number of nahani traps fixed.

Bd.V.33. *Providing and fixing —— mm. diameter cast iron rain water pipes with lugs including rain water receiving recess with cast iron grating, necessary fittings such as bends, offsets and shoe, and painting with oilpaint.*

Bd.V.33.1. *General.*—The item pertains to the provisions of fixing cast iron rain water pipe of specified diameter with socket and spigot ends and lugs for fixing including rain water receiving recess and cast iron grating at the top, fittings, fixing to walls and painting.

The item shall be subject to the general specifications.

Bd.V.33.2. *Materials.*—Cast iron pipes of specified diameter and fittings shall conform to I. S. 1230—1968. They shall be treated with Dr. Angus Smith's solution before use.

Cast iron grating shall be of a slightly bigger diameter than that of the pipe and shall conform to A.13 regarding its material.

Oil paint shall conform to A.17.

Cement concrete 1:2:4 shall conform to B.6.

अनुक्रमणिका
Table of Contents

Bd.V.33.3. *Fixing.*—The pipes shall be fixed at places indicated on the drawings or as ordered by the Engineer.

If holes are not left in the parapet, they shall be cut and the cavity surrounding the pipe made good properly after fixing pipe.

In the case of terraced roof, the cast iron grating shall be fixed at the inlet end of the pipes properly secured in the parapet wall to receive the rain water. The cast iron grating shall be recessed at a slightly lower level than the adjacent terrace floor.

The pipes shall be fixed with nails driven through the lugs and the holder battens fixed in the walls with the socket facing up. Pipes and fittings shall be kept 12 mm. from the walls to facilitate cleaning, painting etc. The joints shall be sealed with a few turns of spun yarn soaked in bitumen or tar. It shall be pressed home with a caulking tool for $\frac{1}{3}$rd the depth of joint more skein of yarn shall be wrapped if necessary and well rammed home. The joint shall then be filled with cement mortar 1:3. At the ground level, they shall be supported on a 1:2:4 cement concrete block of 30 cm.×30 cm. and of sufficient height.

All the necessary fittings shall be included in the pipeline at proper places. The inlet end shall be carefully fixed to admit water from the roof. The outlet shall be with a shoe.

The pipe shall be painted with one coat of red lead oilpaint and two coats of good anti-corrosive oilpaint of approved shade. Painting shall conform to B.21.

Pipes, fittings and joints shall be tested for leakage and any defects noticed shall be testified without extra cost to the Department.

Bd.V.33.4. *Item to include.*—(1) Cast iron rain water pipes, fittings, cast iron grating, cement mortar 1:3, cement concrete 1:2:4, oilpaints and necessary fixtures.

(2) Cutting holes in masonry, making good extra cavities, fixing on wall, sealing joints with cement mortar 1:3, supporting at ground level on 1:2:4 cement concrete block painting, cutting and waste.

(3) Testing.

(4) All necessary labour, materials and use of tools.

Bd.V.33.5. *Mode of measurement and payment.*—The contract rate shall be for one metre of pipe fixed. The measurement shall be for the length of pipe fixed. The length shall be measured along the centre line of the pipe over all fittings from end to end.

Bd.V.33(*a*). *Providing and fixing galvanised 18 gauge plain sheet metal rain water pipes of —— mm. diameter with clamps including necessary fittings such as offsets, elbows and shoes.*

Bd. V.33(*a*).1. *General.*—The item pertains to the provision and fixing of galvanised plain sheet metal rainwater pipes of the specified diameter with clamps and screws including fittings.

Bd.V.33(*a*).2. *Materials.*—The pipes, fittings and the accessories shall conform to I. S. 1728—1960.

Bd.V.33(*a*).3. *Fixing.*—The pipes shall be fixed at places indicated on the drawings or as ordered by the Engineer.

The pipes shall be fixed with clamps and screws on to the holder battens fixed on the wall. The pipes shall be kept 12 mm. clear off the wall for the facility of cleaning etc.

The joint of pipes shall be with a socket joint with a lap of at least 75 mm. All the necessary fittings shall be included in the pipe line at proper places. The outlet shall be with a shoe.

The pipes shall be tested for leakage and defects if any, shall be rectified.

Bd.V.33(*a*).4 *Item to include.*—(1) Galvanised plain sheet metal pipes, fittings clamps and screws.

(2) Fixing pipes and fittings with clamps and screws.

(3) Testing.

(4) All necessary labour, materials and use of tools.

Bd.V.33(*a*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre. The length shall be measured along the centre line over pipes and fittings correct up to 1 cm.

अनुक्रमणिका
Table of Contents



**Bd.V.34(a).3.**

Bd.V.33(*b*). *Providing and fixing —— size galvanised plain sheet metal rain water Ogee/valley/eaves/half round gutters including fittings such as the outlets, angles, and stopbends with brackets fixed with screws to rafters.*

Bd.V.33(*b*).1. *General.*—The item pertains to the provisions and fixing of galvanised plain sheet metal rainwater Ogee or half round or valley or eaves gutter as mentioned in the item of the nominal size mentioned in the item including fitting with brackets to rafters.

Bd.V.33(*b*).2. *Materials.*—The gutter, brackets and fitting, shall conform to I. S. 1728—1960.

Bd.V.33(*b*).3. *Fixing.*—The gutters shall be fixed at places indicated on the drawings or as ordered by the Engineer.

The gutters shall be fixed with brackets and screw to the rafters.

The jointing of gutters shall conform to para. 5 : 3 of I. S. 1728—1960.

All the necessary fittings shall be included in the gutter at proper places.

The gutter shall be tested for leakage and defects, if any, shall be rectified.

Bd.V.33(*b*).4. *Item to include.*—(1) Galvanised plain sheet metal gutters, fittings, brackets and screws.

(2) Fixing gutters and fittings with brackets and screws to rafters.

(3) Testing.

(4) All necessary labour, materials and use of tools.

Bd.V.33(*b*).5. *Mode of measurement and payment.*—The contract rate shall be for one metre. The measurement shall be for the length measured along the centre line over all fittings correct up to 5 cm.

Bd.V.34. *Providing and fixing —— mm. diameter asbestos cement rain water pipes including necessary fittings such as bends, offsets shoe and painting with oil paint.*

Bd.V.34.1. *General.*—The item pertains to the provision and fixing asbestos cement rain water pipes of specified diameter to walls including fittings and painting.

This item shall be subject to the general specifications.

Bd.V.34.2. *Materials.*—Asbestos cement pipes of specified diameter and fittings shall conform to I. S. 1626—1960.

Oilpaint shall conform to A.17.

Standard holder bats or wall clips.

In all other respects this item shall conform to Bd.V.33 for cast iron rain water pipes except that the asbestos cement pipes shall be screwed to the walls with holder bats, clamps or wall clips with the hooks embedded in concrete blocks inserted in the wall. Clamps shall be made with 32 mm. × 1.5 mm. mild steel strips prepared to the required shape so as to fit tightly on the socket of the pipe and then tightened with bolts.

When liable to damage, protection will be provided as in Bd.V.36.3. Such protection will be paid for separately.

Bd.V.34(*a*). *Providing and fixing ——— size asbestos cement valley/boundary/half round/ogee gutter with brackets and nut bolts including fittings such as drop end, stop end, union clip and angles.*

Bd.V.34.(*a*). 1. *General.*—The item pertains to the provision and fixing of asbestos cement gutters of the specified size and shape with brackets and nut bolts including fittings.

Bd.V.34(*a*).2. *Materials.*—The gutters and fittings shall confirm to I. S. 1626-1960.

The brackets shall be of mild steel flat 40 mm×6 mm and shall be suitably shaped with holes for bolts, 6 mm nuts and bolts.

Bd.V.34(*a*).3. *Fixing.*—The gutters shall be fixed in position as indicated on the drawings or as ordered by the Engineer.

The guttters shall be fixed on mild steel flat brackets with 6 mm nuts and bolts.

The joints of the gutters shall conform to para. 12 of I. S. 1626-1960.

The gutters shall be tested for leakages and defects if any, rectified.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



Bd.V.34(*a*).4. *Item to include.*—(1) Asbestos gutter of the specified size and shape, fittings, brackets and bolts and nuts.

(2) Fixing gutters on brackets with nuts and bolts.

(3) Testing.

(4) All necessary labour, materials and use of tools, scaffolding ladder etc.

Bd.V.34.5.(*a*). *Mode of measurement and payment.*—The contract rate shall be for one metre. The length shall be measured along the centre line over all fittings, correct upto a cm.

Bd.V.35. *Providing and fixing ——— mm. diameter cast iron soil/vent/waste pipe with necessary fixtures and fittings such as bends, tees, single junctions, double junctions, slotted vent, offsets on walls or in the ground including excavation, laying, refilling trench and painting the exposed pipes with oil paint.*

Bd.V.35.1. *General.*—The item pertains to the provision and fixing of cast iron soil or vent or waste pipes as mentioned in the item, of specified diameter including all fittings, excavation, laying, refilling fixing to wall and painting the exposed pipes. The item shall be subject to the general specifications.

Bd.V.35.2. *Materials.*—Cast iron pipes of specified diameter shall have sockets for underground and sockets with lugs for fixing on walls. They shall be of the make specified or shall be the best available in the market and approved by the Engineer and shall have been treated with Dr. Angus Smith's solution. They shall generally comply with the following requirements.

| Normal diameter of pipe | Thickness | Overall weight of 180 cm. long pipe inclusive of lugs |
|---|---|---|
| 50 mm | 5 mm | 11 kg. |
| 80 mm | 5 mm | 18 kg. |
| 100 mm | 5 mm | 24 kg. |

All the pipes, fittings etc. should be free from cracks and other flaws. The interior of the pipes and fittings shall be clean and smooth.

All the fittings shall be of the same quality as that of pipe. The fittings shall have cleaning eyes with plugs where necessary. Offsets of the required shape and dimensions to suit each particular location shall only be used.

Oil paint shall conform to A. 17.

Cement concrete 1:2:4 shall conform to B. 6.

Cement morter 1:1 shall conform to B. 5(a).

Bd.V.35.3. *Laying and fixing.*—The pipes shall be laid or fixed at locations indicated on the drawings or as ordered by the Engineer.

The excavation and laying of the cast iron pipes shall conform to Bd.V.1.3. The socket end shall be the inlet end for the soil or waste pipes. In vent pipes the socket shall face up. The joints shall be filled with cement mortar 1:1 conforming to B.5 (*a*). The jointing shall conform to para. 5.1 and 5.8.3. of I. S. 1742—1960. The filling shall conform to Bd.V.1.5.

Where the cast iron pipes are fixed on to the wall they shall be supported on a 1:2:4 cement concrete block of 30 cm × 30 cm and sufficient height in the ground. The concrete shall conform to B.6.

The pipes shall be fixed on to the wall with nails driven through the lugs to the holder battens. Necessary fittings shall be included in the pipes.

The exposed pipes shall be painted with a base coat of red lead and two coats of good anti-corrosive oil paint of approved shade. Oil painting shall conform to B.21.

Bd.V.35.4. *Testing.*—The joints of cast iron pipes laid underground shall be tested for a 60 cm head over the crown of the highest pipe between two inspection chambers.

The lowest end shall be plugged water tight. Water shall then be filled in the inspection chamber at the upper end of the line with 60 cm depth of water over the crown. Any defective joint shall be re-made or embedded in 15 cm layer of concrete 1.2.4 to make it leak-proof.

For pipes fixed on walls, smoke test shall be carried out as detailed under.



अनुक्रमणिका
Table of Contents

**Bd.V.37.3.**

Greasy cotton waste shall be burnt in a smoke machine consisting of a bellows and a burner Leakage through the joints shall be observed and defective joints rectified.

Bd.V.35.5. *Item to include.*—(1) Cast iron pipes, fittings, cement mortar, cement concrete, oilpaint and necessary fixtures.

(2) Excavating, laying and fitting pipes, refilling, fixing pipes to wall, sealing joints with cement mortar 1:1 including the joints with the pipes coming out of walls from different appliances and fittings and supporting on concrete block, cutting and waste.

(3) Testing pipe joints and rectifying defective joints.

(4) All necessary labour, materials and use of tools.

Bd.V.35.6. *Mode of measurement and payment.*—The contract rate shall be for one metre of pipe laid. The measurement shall be over all the fittings along the centreline from end to end.

Bd.V.36. *Providing and fixing —— mm. diameter asbestos cement soil/vent/waste pipes including necessary fittings, such as bends, tees, single junction, double junction, slotted vent, offsets, excavation, refilling trench and painting the exposed pipes with oil paint.*

Bd.V.36.1. *General.*—The item pertains to the provision and fixing asbestos cement soil or vent or waste pipes as mentioned in the item of specified diameter including all fittings, excavation, laying, refilling, fixing to walls with holder bat and clamps and painting the exposed pipe.

This item shall be subject to the General specifications.

Bd.V.36.2. *Materials.*—Asbestos cement pipes of specified diameter shall conform to I. S. 1626:1960 for pipes fixed on walls and class 1 of I. S. 1592—1960 for pipes laid under-grounds as provided in the special provisions.

Wall clips or holder bats.

All the fittings shall have cleaning eyes where they are necessary. Offsets to suit the actual projection shall be used at each such location.

Oilpaint shall conform to A.17.

Bd.V.36.3. *Fixing.*—Fixing shall conform to Bd.V.35 except that the pipes shall be fixed to the walls with wall clips or holder bats as specified in Bd.V.34

When there is likelihood of any damage occurring to the asbestos cement pipes and fittings on ground floor, suitable protection such as enclosing the pipes in cement concrete may be necessary. Such protection when provided shall be paid for separately.

In all other respects this item shall conform to Bd.V.35.

Bd.V.37. *Providing and laying —— cm. diameter half round salt glazed stoneware pipes in brick masonry including fittings such as bends, tees, single junction, necessary excavation and jointing.*

Bd.V.37.1. *General.*—The item pertains to the provision and laying of half round, salt glazed stoneware pipes of specified diameter in brick masonry including fittings, necessary excavation and jointing.

This item shall be subject to the general specifications.

Bd.V.37.2. *Materials.*—Half round salt glazed stoneware pipes of specified diamater and fittings shall conform to I. S. 651—1965.

Cement mortar 1 : 6 for brick masonry and 1 : 3 for jointing of pipes and finishing top of masonry shall conform to B.5(a).

Bricks shall conform to A.9.2.

Bd.V.37.3. *Laying.*—The half round pipes shall be laid to lines, levels and slopes indicated on the drawings or as directed by the Engineer.

Necessary excavation or trimming of the ground shall be done for the laying of the brick masonry for the bedding of the pipes.

The brick masonry shall be in cement mortar 1 : 6 and shall conform to B.8(b). When not shown in the drawings, it shall be such that it shall extend at least half brick beyond the outside edge of the pipe on either side. There shall be at least two brick layers under the invert of the pipe. The top of the brick masonry beyond the pipe edge shall be finished sloping towards the pipe in cement mortar 1 : 3.

The maonry shall be built so that the pipes shall be laid to the lines, curves and slopes as required and the joints shall be made with 1 : 3 cement mortar while laying only and cured.

Bd.V.37.4. *Item to include.*—(1) Half round S. W. G. pipes, and fittings, bricks and cement mortar.

(2) Excavation, constructing brick masonry, laying pipes and finishing, including cutting and waste when necessary.

(3) All necessary labour, materials and use of tools.

Bd.V.37.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one metre of pipe including brickwork and finishing. The measurement shall be for the length measured along the centre line over all fittings correct upto a cm.

Bd.V.38. *Providing and fixing 15 cm. × 10 cm. (6" × 4") salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.*

Bd.V.38.1. *General.*—The item pertains to the provision and fixing of a salt glazed stoneware gully trap outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.

This item shall be subject to the general specifications.

Bd. V.38.2. *Materials.*—Cast iron grating in the sink shall be of the size as shown on the drawings or as ordered by the Engineer and shall conform to A.13 regarding materials. A similar cast iron grating shall be provided for the trap in the chamber outside. The chamber shall have a cast iron frame and cover.

Salt glazed stoneware gully trap shall be 15 cm.×10 cm. (6"×4") and shall be the best available in the market and approved by the Engineer.

Salt glazed stoneware pipes shall conform to I. S. 651—1955 and shall be of the internal diameter indicated on the drawings or as ordered by the Engineer.

Bricks shall conform to A.9.2. Cement mortar 1 : 6 and 1 : 3 shall conform to B.5(a).

Cement concrete 1 : 4 : 8 shall conform to B.6.

Bd.V.38.3. *Fixing.*—The arrangement shall conform to the drawings or the instructions of the Engineer.

The gully trap shall be set into 1:4:8 cement concrete extending 30 cm. beyond the trap on three sides over which shall be constructed one brick masonry chamber of the dimensions indicated on the drawings or as ordered by the Engineer. There will be wall on the fourth side. The brick masonry shall be constructed in cement mortar 1:6 and shall conform to B.8(b). The inside shall be plastered with cement mortar 1 : 3 which shall conform to B.11. The top lid of cast iron alongwith the cast iron frame shall be fixed in cement concrete 1 : 2 : 4 slab 10 cm. thick. Hole shall be cut into the masonry if not left and the stoneware pipe shall run through the wall. Cast iron grating shall be fixed in the bath or the site and the hole shall be made good properly. The trap in the chamber shall have a similar cast iron grating.

Bd.V.38.4. *Item to include.*—(1) Cast iron gratings, glazed stoneware pipe, gully trap, cement concrete, brick masonry chamber with cast iron frame and lid.

(2) Cutting hole in the masonry, fixing cast iron gratings, stoneware pipe, gully trap in cement concrete, constructing brick masonry chamber with frame and lid including cutting and waste.

(3) All necessary labour, materials and use of tools.

Bd.V.38.5. *Mode of measurement and payment.*—The contract rate shall be for one gully trap fixed.

The measurement shall be for the number of gully traps fixed.

अनुक्रमणिका
Table of Contents



**Bd.V.41.3.**

Bd.V.39. *Providing and laying ..... mm. diameter salt grazed stoneware pipes including fittings such as bends, tees, single junctions, double junctions, excavation, laying jointing, refilling the trench.*

Bd.V.39.1. *General.*—This item pertains to the provision and laying salt glazed stoneware pipes of specified diameter including all necessary fittings, excavation, laying, jointing and refilling.

This item shall be subject to the general specifications.

Bd.V.39.2. *Materials.*—Salt glazed stoneware pipes and fittings shall be of the diameter specified in the wording of the item and shall conform to I. S. 651—1955.

Cement mortar 1:1 shall conform to B.5(a) spun yarn shall be of approved quality.

Bd.V.39.3. *Laying.*—The excavation and laying of the pipes shall conform to Bd.V.1.3. The pipes shall be laid to the exact slope and the sockets shall be at the inlet ends.

Jointing shall generally be done as per clause 5.6 of I. S. 1742—1960. Spun yarn soaked in cement wash shall be passed round the spigot and the spigot inserted into the socket. The spun yarn shall then be caulked to fill not more than $\frac{1}{4}$th the total depth of the socket. Sufficient yarn shall be used for obtaining a good joint. Cement mortar of 1:1 with a little water shall then be pressed into the joints with hand and finished at 45°. The mortar shall be cured for 7 days.

The refilling shall conform to Bd.V.1.5.

Bd.V.39.4. *Testing.*—Testing shall conform to Bd.V.35.4.

Bd.V.39.5. *Item to include.*—(1) Salt glazed stoneware pipes, necessary junctions, bends, cement mortar 1:1 and spun yarn.

(2) Excavation, laying pipes, jointing with spun yarn and cement mortar, refilling the trenches and testing including cutting and waste.

(3) All necessary labour, materials and use of tools.

Bd.V.39.6. *Mode of measurement and payment.*—The contract rate shall be per metre of pipe laid. The measurement shall be for the length of pipe laid, measured along the centre line over all fittings, correct up to 3 places of decimals of a metre.

Bd.V.40. *Providing and laying ..... mm. diameter glazed stonewear pipes on 1:4:8 cement concrete bed, including fittings such as bends, tees, single junctions, double junctions, laying, excavation, jointing, and refilling the trench.*

Bd.V.40.1. *General.*—The item shall conform to the specification No. Bd.V.39 except that 1:4:8: cement concrete bedding including excavation shall be provided for the pipe as given in I. S. 1742—1960 paragraph 5.9.1 in it. The rate shall include the 1:4:8 concrete which shall conform to the specification No. B.6.

Bd.V.41. *Providing and laying concrete pipes of I. S. N. P. Class of —— mm. diameter in proper line, level and slope including necessary collars, excavation, laying, fixing with collors in cement mortar 1:2 and refilling the trench.*

Bd.V.41.1. *General.*—The item pertains to the provision and laying of cement concrete spun pipes of I. S. NP class of specified diameter in proper lines, level, and slopes including collars, excavation, laying, jointing and refilling.

This item shall be subject to the general specification.

Bd.V.41.2. *Materials.*—The concrete pipes of the specified diameter and the collars for these pipes shall conform to I. S. 458—1956.

Cement mortar 1:1 shall conform to B.5.(a).

Bd.V.41.3. *Laying.*—The excavation shall conform to Bd. V.1.3.

The pipes shall be laid to lines levels and slopes indicated on the drawings or as ordered by the Engineer.

The handling and laying of the concrete pipes shall conform to I.S., 783—1959 paragraph 9 in it. The joint shall be done as per paragraph 10.2.3.1 of I. S. 783—1959.

The refilling shall be done as per Bd.V.1.5.

अनुक्रमणिका
Table of Contents

Bd.V.41.4. *Testing.*—According to Bd.V.35.4. except that the head shall be 1.5. m.

Bd.V.41.5. *Item to include.*—(1) Concrete pipes, collars, mortar.

(2) Excavating, laying pipes, jointing, refilling, testing.

(3) All necessary labour, material and use of tools.

Bd.V.41.6. *Mode of measurement and payment.*—The contract rate shall be for one metre of pipe laid. The measurement shall be for the net length of the pipe laid, measured along the centre line over collars from and to end, from inside of one inspection chamber to inside of the other inspection chamber and over the fittings on their centre line.

Bd.V.42. *Providing and laying concrete of I. S. NP. class of ——— mm. diameter on 1:4:8 cement concrete bed including necessary collars, excavation, laying and fixing with collars in cement mortar 1:1 and refilling the trench.*

Bd.V.42.1. *General.*—The item shall conform to the specification No. Bd.V.41. except that 1:4:8: cement concrete bedding shall be provided for the pipe as given in the I. S. 1742—1960, paragraph 5.9.1 in it. The rate shall include 1:4:8 concrete which shall conform to specification No. B.6.

Bd.V.43. *Providing and constructing inspection chamber of brick work —— cm.×——. cm. including 1:4:8 cement concrete foundation, 1:2:4 cement concrete channels/half round glazed stoneware pipe channels, plastering inside of brick masonry and air-tight cast iron lid with frame fixed in cement concrete.*

Bd.V.43.1. *General.*—The item pertains to the provision of inspection chambers of brick masonry of the internal size specified in the item and of the required depth including 1:4:8 cement concrete foundation, 1:2:4 cement concrete channels corresponding to the pipes or salt glazed stoneware half round channels, one brick masonry in cement mortar 1:6 plastered on the inside with cement mortar 1 : 3 with cast iron frame and air-tight lid fixed into a concrete slab at top.

This item shall be subject to the general specification.

Bd.V.43.2. *Materials.*—Bricks shall conform to A.92 of I. S. or conventional type as ordered Cement mortar 1:6 and 1:3 shall conform to B.5 (a).

Cement concrete 1:4:8 and 1:2:4 shall conform to B.6.

Cast iron frame and lid shall conform to I.S. 1726—1967 and shall be of the full size of the chamber. They shall be of the air-tight and heavy type where subjected to vehicular traffic.

Bd.V.43.3. *Construction.*—The inspection chamber shall be of the internal dimensions specified and shall have sufficient depth so as to receive the pipes.

Necessary excavation shall be done for the construction of the chamber.

Foundation of 1:4:8 concrete shall be 15 cm. thick, shall extend 8 cm. beyond the outside faces of the chamber and shall conform to B.6.

The brick masonry shall be of one brick, in cement mortar 1:6 and shall conform to B.8(b).

The cement concrete 1:2:4 shall be laid to necessary shapes inside to form channels for the pipes being received. The channels shall be of the appropriate diameter and shall be half-round. The sides shall be kept sloping towards the channels. Alternatively if so provided, half-round, S. W. G. pipes shall be fixed to form channels.

The brick masonry shall be plastered with 1:3 cement mortar on the inside and shall conform to B.11.

The cast iron frame and lid shall be fixed into the 1:2:4 concrete slab 10 cm. at the top.

Bd.V.43.4. *Item to include.*—(1) Excavating, concreting foundation, constructing brick masonry, laying 1:2:4 concrete forming channels or laying half round salt glazed stoneware pipes, plastering the inside faces, fixing cast iron frames and lid in concrete.

(2) All necessary labour, materials and use of tools.

Bd.V.43.5. *Mode of measurement and payment.*—The contract rate shall be for one inspection chamber of the specified size constructed as detailed above.

The measurement shall be for the number of such chambers constructed.

Bd.V.44. *Providing and constructing intercepting trap chamber of brick masonry of 90 cm.×45 cm. size including 1:4:8 cement concrete foundation, 1:2:4 concrete channels/half-round glazed stoneware pipe channels, salt glazed stoneware intercepting trap with rodding pipe, set in 1:4:8 cement concrete block, brick masonry, cement plastering inside and cast iron lid with frame fixed in cement concrete.*

Bd.V.44.1. *General.*—The item pertains to the provision and construction of an intercepting trap brick masonry chamber including salt glazed stoneware interceptor with rodding pipe and cover, concrete foundation, concrete channels or half round salt glazed stoneware channels, setting of the intercepting trap in concrete block, brick masonry, plastering inside and cast iron lid with frame fixed in cement concrete.

This item shall be subject to the general specification.

Bd.V.44.2. *Materials.*—1:4:8 and 1:2:4 cement concrete shall conform to the specification No. B.6.

Bricks shall conform to A.9.2.

Cement mortar 1:6 and 1:3 shall conform to B.5(*a*). Cast iron frame and lid shall conform to A.13 regarding material and shall be the best available in the market and of the make and type approved by the Engineer.

Half round glazed stonewares pipes and the intercepting trap with the rodding pipe and cover shall conform to I. S. 651:1965 and shall be the best available in the market and of approved make.

Bd.V.44.3. *Construction.*—The intercepting trap chamber shall be provided in position indicated on the drawing or as ordered by the Engineer. The inside dimensions shall be 90 cm.×45 cm. and the depth shall correspond to the depth of drain.

Necessary excavation shall be done. The foundation cement concrete 1:4:8 shall be laid for a thickness of 23 cm. The intercepting trap shall be fixed into the extended portion of the foundation concrete on the main sewer side of the chamber. Brick masonry chamber of one brick thickness in cement mortar 1:6 shall be constructed with the inside dimensions of 90 cm.×45 cm. During the construction, the rodding pipe of the trap shall be embedded in the brick masonry. Brick masonry shall conform to B.8 (b). Channels in 1:2:4 cement concrete shall be formed into the chamber to lead away the sewage. Alternatively if so provided, half-round S. W. G. pipes shall be fixed to form channels. The floor of chamber shall be sloping towards the channels. The insides shall be plastered with cement mortar 1:3 which shall conform to B.11. The cast iron lid with frame shall be fixed on top in cement concrete 1:2:4, 10 cm. thick.

Bd.V.44.4. *Item to include.*—(1) Foundation concrete, brick masonry, concrete channels or half-round glazed stoneware pipes, stoneware glazed trap with rodding pipe and cover. Cast iron lid with frame fixed in cement concrete and plastering of the insides.

(2) Excavating, laying foundation concrete and trap with rodding pipe, constructing brick masonry, laying concrete forming channels/fixing half-round glazed stoneware pipes, cast-iron lid with frame in cement concrete and plastering insides with cement mortar.

Bd.V.44.5. *Mode of measurement and payment.*—The contract rate shall be for one intercepting chamber constructed. The measurement shall be for the number of such intercepting trap chambers constructed.

Bd.V.45. *Providing and fixing Hume pipe septic tank ..... mm. diameter with vent pipe and cap including necessary excavation and laying.*

Bd.V.45.1. *General.*—The item pertains to the provision and fixing Hume pipe septic tank of specified diameter with vent pipe and cap including necessary excavation.

This item shall be subject to the general specifications.

Bd.V.45.2. *Materials.*—The Hume pipe septic tank of specified diameter with vent pipe and cap shall conform to the manufacturers specifications and shall be in good condition without any damage or cracks at the time of fixing.

अनुक्रमणिका
Table of Contents



Bd.V.45.3. *Fixing.*—Necessary excavation shall be done for holding the septic tank into the ground. The Hume pipe septic tank shall be fixed in position and level indicated on the drawing or as ordered by the Engineer after consolidating the bed if necessary.

All the pipe connections shall be made properly in cement mortar 1:1. They vent pipe with the cap shall be fixed to the septic tank.

Necessary channel or pit shall be excavated for leading away effluent.

The septic tank shall be completely filled with water just before putting into use.

Bd.V.45.4. *Item to include.*—(1) Hume pipe septic tank, vent pipe with cap, cement mortar.

(2) Excavating, laying Hume pipe septic tank, fixing vent pipe and making inlet pipe connection, digging channel, filling the tank with water.

Bd.V.45.5. *Mode of measurement and payment.*—The contract rate shall be for one Hume pipe septic tank of the specified diameter fixed.

Bd.V.46. *Providing a soak pit of cm.× cm.× cm. including excavating and filling with brick bats.*

Bd.V.46.1. *General.*—The item pertains to the provision of a soak pit of cm.× cm.× cm. including excavating the pit and filling it with brick bats.

This item shall be subject to the general specifications.

Bd.V.46.2. *Materials.*—Brick bats shall be of properly burnt bricks.

Bd.V.46.3. *Construction.*—A pit of the specified dimensions shall be excavated at the specified place or at the place ordered by the Engineer.

The pit shall be completely filled with loosely packed brick bats.

Bd.V.46.4. *Item to include.*—(1) Excavating pit and filling with brick bats.

(2) All necessary labour, materials and use of tools.

Bd.V.46.5. *Mode of measurement and payment.*—The contract rate shall be for one soak pit of the specified dimensions. The measurement shall be for the number of soak pits constructed.

The stoneware glazed inlet pipe into the soak pit will be paid for separately.

Bd.V.47. *Providing and constructing a —— cm.× —— cm.× —— cm. cess pool chamber including 1:2:4 cement concrete foundation, brick masonry side walls and cast iron lid with frame fixed in 10 cm. thick 1:2:4 concrete.*

Bd.V.47.1. *General.*—The item pertains to the provision and construction of cess pool chamber with inside dimensions as specified in the item including concrete foundation, brick masonry walls, cast iron lid with frame in cement concrete.

This item shall be subject to the general specifications.

Bd.V.47.2. *Material.*—Cement concrete 1:2:4 shall conform to the specification No. B.6.

Bricks shall conform to A.9.2.

Cement mortar 1:6 and 1:3 shall conform to B.5 (a).

Cast iron lid with frame shall be the best available in the market and of the type and make approved by the Engineer.

Bd.V.47.3. *Construction.*—The cess pool chamber shall be provided at the places indicated on the drawings or as ordered by the Engineer.

Necessary excavation shall be done for the chamber.

The 1:2:4 cement concrete foundation shall be 15 cm. thick and shall extend 8 cm. beyond the outside faces of the brick masonry.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.V.48.3.**

The brick masonry of $1\frac{1}{2}$ bricks shall be constructed on the foundation with the inside dimensions of the chamber as specified. The brick masonry shall be constructed in cement mortar 1:6 and shall conform to B.8(b).

The insides and the bottom shall be plastered with cement mortar 1:3 which shall conform to B.11.

The cast iron lid with frame shall be fixed at top in cement concrete 1:2:4, 10 cm. thick.

Bd.V.47.4. *Item to include.*—(1) Concrete, bricks, mortar and cast iron lid with frame.

(2) Excavating, laying concrete base, constructing brick masonry, plastering insides and bottom, fixing cast iron with frame in cement concrete.

Bd.V.47.5. *Mode of measurement and payment.*—The contract rate shall be for one cess pool chamber of the inside dimensions specified and constructed.

The measurement shall be for the number of such cess pool chambers constructed.

Bd.V.48. *Connecting the house drain to the municipal sewer including necessary excavation, pipe fittings and their laying, breaking manhole brick masonry, making good the masonry and any other damage and restoring the surface to the original condition.*

Bd.V.48.1. *General.*—The item pertains to the provision of connecting the house drain to the municipal sewer including necessary excavation, pipes, fittings and their laying, making good the masonry and any other damage and restoring the road surface to the original condition.

The contractor shall obtain necessary permission for connecting the house drain to the municipal sewer, from the concerned authorities. He shall pay all the necessary charges towards the connection given by municipality.

This item shall be subject to the general specifications.

Bd.V.48.2. *Item to include.*—(1) Obtaining permission, paying all charges towards the connection with the municipal sewer as laid down by the municipality comprising of excavation, pipes and fittings, their laying, breaking of the manhole masonry, making good the masonry and any other damages restoring the road surface to the original condition or else executing all the above according to the byelaws.

Bd.V.48.3. *Mode of measurement and payment.*—The contract rate shall be for the job.

---

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. W. MISCELLANEOUS

*List of items for miscellaneous*


| ITEM NO. | ITEM | PAGES |
|---|---|---|
| Bd.W.1. | Providing and fixing copper lightning conductor including copper rod, upper terminal, tape conductor, earth plate, excavating, laying the conductor and refilling complete ... | 539 |
| Bd.W.2. | Guniting a surface with cement mortar 1:3/1:4—mm. thick under a pressure of 2.1 kg. to 2.8 kg. per sq. m. (about 30 lbs. to 40 lbs/sq. inch), including necessary reinforcement, forms, with/ without floating and curing complete ... | 540 |
| Bd.W.3. | Providing and erecting 1.2 m. high wire fencing with five rows of seven strand twisted galvanised iron wire supported on mild steel tee/mild steel angle/R.C.C. posts including excavating pits for foundation concrete, fixing posts in 1:4:8 cement concrete block, fastenings the wires and painting iron posts complete ... | 541 |
| Bd.W.4. | Providing and erecting 1.2 m. high wire fencing with five rows of barbed wire supported on teak wood round mild steel tree/ mild steel angle posts including excavating pits for foundation concrete, fixing the posts in 1:4:8 cement concrete block and fastening the wires ... | 542 |
| Bd.W.5. | Providing and fixing teak wooden gate including male and female hinges, locking arrangement and lock and painting ... | 542 |
| Bd.W.6. | Providing and fixing wrought iron, mild steel gate as per the detailed drawing including hinges, pivot blocks locking arrangement with lock and painting ... | 543 |
| Bd.W.7. | Providing and fixing —— cm×—— cm. marble year/name plate | 544 |
| Bd.W.8. | Dismantling the existing structure including sorting out serviceable materials and stacking them within the specified lead neatly as directed and disposing off the unsuitable materials | 544 |




अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



## Bd. W. MISCELLANEOUS

Bd.W.1. *Providing and fixing copper lighting conductor including copper rod, upper terminal, tape conductor, earth plate excavating, laying the conductor and refilling complete.*

Bd.W.1.1. *General.*—The item pertains to the provisions and fixing of lightning conductor including the upper terminal, conductor and the earth plate.

Bd.W.1.2. *Materials.*—(*a*) Copper tape conductor, 25 mm.×3 mm. (1″×$\frac{1}{8}$″).

(*b*) Solid copper rod upper terminal 19 mm. ($\frac{3}{4}$″) diameter 1.5 m. long with a knob at the end with a conical spike on top.

(*c*) Suitable clamps to fix the conductor to the wall.

(*d*) Copper earth plate 1.5 mm. thick and one square meter in area.

(*e*) Charcoal and sand for filling.

(*f*) Cast Iron pipe of 60 mm. diameter including fittings shall conform to I. S. 1230—1968.

Bd.W.1.3. *Fixing.*—The upper terminal shall be fixed vertically at the highest point on the building and shall be at least 1.5 m. long. The terminating cone on the knob shall have a height equal to the radius of its base.

The conductor tape shall be attached to the upper terminal at the lower end by double riveting and soldering and shall be fixed along the building face from outside, most exposed to rain, with suitable hold-fasts at every 1.3 m. or less. The conductor shall preferably be in one piece and shall be straight as far as possible. If required to be bent, the straight length between the ends of bend shall not be less than half the curve length. For a height of 3 metres from the ground the conductor shall be enclosed in a 60 mm. diameter cast iron pipe secured to wall for protection from injury or theft. All metal surfaces, ridges, roofs, gutters, etc., shall be connected to the conductor with metal connections.

All joins in copper rod and tapes besides being well cleaned, sand papered, screwed, scrapped or riveted, shall be soldered in addition.

The lower extremity of the conductor shall be carried to 1 metre under the ground.

Necessary trench and pit shall be excavated for laying of the conductor and the copper plate. The trench shall be 10 to 13 metres long and one metre deep and shall lead to a spot 5 to 6 metres from the building.

A copper tape of 25 mm.×3 mm. shall then be riveted and soldered to the lower end of the conductor and carried along the trench up to the spot where the copper plate shall be buried. The other end of the tape shall be connected to the copper earth plate by riveting and soldering.

All the joints from the upper end of the top terminal to the earth plate shall be mechanically and electrically perfect.

The copper plate shall as far as possible be buried 60 cm. to one metre below the subsoil water level in the driest season of the year. Where the permanent water level is deep, it is necessary to provide shallow earths in trenches laid away from the building, the depths varying from 3 cm. in clay soils to 60 cm. in sand or shingle through which the rain percolates more freely. The length of these trenches shall be from 10 m. to 30 m. in dry soil.

Alternatively the conductor tape may be attached to a copper plug suitably riveted and soldered. This plug shall then be inserted into a water supply pipe by coupling or T joint.

The earth plate shall be surrounded with charcoal. The copper conductor shall be laid in charcoal and the trench filled with sand.

The surface drainage shall, as far as possible, be directed towards the trench.

Generally copper tape and rod should not be painted. If so directed by the Engineers for architectural purposes, the upper terminal and the conductor shall be painted with a red oxide base and two coats of paint to match the adjacent wall. The oil painting shall conform to B.21.

*Testing.*—The lightning conductor shall be tested for the resistance by a suitable apparatus. The overall resistance of the complete conductor system from the top finial to the earth in wet weather should be about 1 to 2 ohms. It should never exceed 10 ohms. If the results are beyond the above limits, the defects shall be rectified so as to get satisfactory results.



अनुक्रमणिका
Table of Contents

**Bd.W.2.4.**

Bd.W.1.4. *Item to include.*—(1) Upper terminal, conductor, earth plate, cast iron pipe, oilpaint, charcoal and sand.

(2) Fixing upper terminal, conductor, earth plate, including clamps, double riveting and soldering, excavating, laying the conductor and copper plate in charcoal, filling trench with sand, encasing conductor in cast iron pipe as specified.

(3) Testing.

(4) All necessary labour, materials and use of tools and equipment required for carrying out the item satisfactorily.

Bd.W.1.5. *Mode of measurement and payment.*—The contract rate shall be for a unit of one metre length of the conductor. The measurement shall be for the length from the top of terminal to the lower end of the copper plate measured along the conductor and the square centre of the earth plate. No payment shall be made unless satisfactory test results are obtained and the work accepted.

Bd.W.2. *Guniting a surface with cement mortar 1:2/1:4—mm. thick under a pressure of 2.1 kg. to 2.8 kg. per sq. cm. (about 30 lbs. to 40 lbs/sq. inch) including necessary reinforcement, forms, with/without floating and curing complete.*

Bd.W.2.1. *General.*—The item pertains to the provisions and application of mortar layer of specified thickness on a surface of guniting including cement, sand, water, reinforcement, side forms where necessary, application of cement mortar of specified mix with the guniting plant, floating when included and curing.

Bd.W.2.2. *Materials.*—Cement shall conform to A.2 sand shall conform to A.16 and water shall conform to A.5.

Reinforcement shall be as provided in the item B.10 and cement mortar shall be of the proportion as given in the item and shall conform to B.5.(a) shall apply to the relevant extent.

The side forms when necessary shall conform to B.6.5(a).

Bd.W.2.3. *Process.*—Before placing the reinforcement the surface to be gunited shall be thoroughly cleaned with compressed air or water or both.

Reinforcement as specified in the drawings shall be fabricated and fixed on to the surface as required.

The side forms shall be fixed when necessary as specified in B.6.5(*a*) to confine guniting work to the required area.

The maximum size of sand particles for the different guns shall be as under:—

| | | |
|---|---|---|
| Cement gun type No. 2 | ... | 9 mm. |
| Cement gun type No. 1 | ... | 6 mm. |
| Cement gun type No. 0 | ... | 3 to 6 mm. |

The sand shall be well graded downwards.

The sand fed into the cement gun shall be slightly moist.

The compressed air entering the gun shall be dry and free from oil.

The surface to be gunited shall be wetted. The cement sand mixture with water added at the nozzle by a separate connection shall be ejected under a pressure of 2.1 kg. to 2.8 kg. per sq. cm. (30 lbs. to 40 lbs. per sq. inch). About 13.6 litres of water shall be used for every 50 kg. bag of cement.

Immediately on applying the cement sand mixture and water, the surface shall be floated, if so directed, to obtain an even surface and uniform thickness as specified.

The side forms shall be removed after 2 hours without causing damage to the surfaces.

After the initial set, the surface shall be cured as per the curing of plaster as specified under B.11.8.

Bd.W.2.4. *Item to include.*—(1) Supply of cement, sand, water, forms, reinforcement.

(2) Cleaning surface, fabricating and fixing reinforcement, erecting forms, applying cement sand mixture and water, floating the surface when directed and curing.

(2) All labour, materials and use of tools, plant and equipment for carrying out the work satisfactorily.

अनुक्रमणिका
Table of Contents

A - B Savant



Bd.W.2.5. *Mode of measurement and payment.*—The contract rate shall be for one sq. meter of surface gunited with cement mortar.

The measurement shall be for the length and breadth measured correct up to a cm. The area shall be calculated correct up to two places of decimals of a sq. m.

No deductions shall be made for openings up to 0.4 sq. m.

Bd.W.3. *Providing and erecting 1.2 m. high wire fencing with five rows of seven strand twisted galvanised iron wire supported on mild steel tee/mild steel angle/R.C.C. posts including excavating pits for foundation concrete, fixing posts in 1 : 4 : 8 cement concrete, block fastenings the wires and painting iron posts complete.*

Bd.W.3.1. *General.*—The item pertains to the provision and erection of wire fencing of twisted galvanised iron seven strand fencing wire in five rows supported on mild steel tee, mild steel angle or R.C.C. posts as mentioned in the item including excavating pits for the foundation, providing 1:4:8 cement concrete foundation block, fixing the posts in the concrete, fastening the wires and painting steel posts.

Bd.W.3.2. *Materials.*—Seven strand twisted galvanised iron fencing wire No. 4 shall be used, it shall be of the usual commerciai type. Mild steel tee posts of 50 mm.×50 mm.×6 mm. and mild steel angle posts of 50 mm.×50 mm.×6 mm. shall conform to A.11 and shall be 165 cm. long.

1:2:4 concrete for the R. C. C. posts shall conform to B.6 and M. S. bar reinforcement shall conform to B.10 and shall be of the diameter shown in the drawings. If not shown, they shall be 4 bars of 10 mm. diameter or 2 bars of 12 mm. diameter or one bar of 20 mm. diameter. When the wires are to be passed through, 4 or 2 bars shall be used.

Cement concrete 1:4:8 for the foundation block shall conform to Bd.E.1.

Galvanised iron straining bolts 30 cm. (about 12") long and 16 mm. diameter shall be of the standard commercial type.

Bd.W.3.3. *Eracting.*—The posts shall be fixed 2.3 m. to 2.6 m. centre to centre so as to have all the posts fixed at a regular intervals for the given length.

45 cm.×45 cm×45 cm. pits shall be excavated for foundation for the posts. The post shall be held in the correct position in the pit and 1:4:8 cement concrete poured round it and consolidated and cured to form the foundation block for the full depth of the pit. The post shall be 1.65 m. long and project 1.2 m. above the ground. The flange of the tee shall face outside.

Angle iron posts shall be fixed similarly with one leg of the angle facing outside.

R. C. C. post shall be either precast or cast in sit. The posts shall be of 1:2:4 reinforced cement concrete and shall be 10 cm. square at the top and 15 cm. square at the ground and the buried length shall be 15 cm. square throughout. The R. C. C. post shall be 1.65 m. long and fixed in the same way as the tee posts.

Holes shall be drilled into the web of the tee or in the leg of the angle at right angles to the outside leg for passing the wires through. Holes shall be left into the R. C. C. posts for passing the wires while casting.

The holes shall be at 22 cm. centre to centre leaving 22 cm. from the ground level and leaving 10 cm. at the top, or as directed by the Engineer.

The posts at every 30 m. and at angles shall be suitably strutted on either side of the posts. These struts shall be of angle irons and shall have foundation of 1 : 4 : 8 cement concrete like the posts. These struts shall be fixed at 45° and be fixed at the top most wire.

After the concrete has set. the fencing wires shall be fixed through holes made in the posts and strained with straining bolts. The steel posts shall be painted with a priming coat of red lead and two coats of good oil paint of approved shade. Painting shall conform to B.21.

Bd.W.3.4. *Item to include.*—(1) Supplying tees, angles or R. C. C. posts as mentioned in the item and specified above, seven strand twisted galvanised fencing wires, straining bolts, foundation concrete, angle struts, oil paint for steel posts.

(2) Excavating pits, fixing posts and struts in 1:4:8 cement concrete, fixing fencing wires to posts and straining the wires.

(3) Painting steel posts.

(4) All necessary labour, materials and use of tools for the satisfactory completion of the item.

अनुक्रमणिका
Table of Contents

**Bd.W.5.2.**

Bd.W.3.5. *Mode of measurement and payment.*—The contract rate shall be for one metre of fencing completed as specified. The measurement shall be for the length measured from the outside face of the first post to the outside post at the end. At angles, the measurement shall be along the centre line of the posts. The length shall be measured correct upto a cm.

Bd.W.4. *Providing and erecting 1.2 m. high wire fencing with five rows of barbed wire supported on teak wood round/mild steel tee/mild steel angle posts including excavating pits for the foundation concrete, fixing the posts in 1 : 4 : 8 cement concrete block and fastening the wires.*

Bd.W.4.1. *General.*—The item pertains to the provision and erection of barbed wire fencing 1.2 m. high with five rows of barbed wire to teak rounds or mild steel tee or mild steel angle posts as mentioned in the item including excavating pits for foundation, providing 1:4:8 cement concrete foundation block and fixing of the posts in concrete.

Bd.W.4.2. *Materials.*—Barbed wire shall conform to I.S. 278-1969.

2. Galvanised iron straining bolts 30 cm. (about 12") long and 16 mm. diameter shall be of the standard commercial type. Galvanised iron staples for fixing the wires to the posts and iron nails shall be of the standard commercial type.

3. Teak wood bully posts shall be 1.65 meter long and of average 8 cm. diamater and shall be straight for the full length.

4. Mild steel tee or mild steel angle posts shall be as per Bd.W.3.2.

5. Cement concrete 1:4:8: shall conform to Bd.E.1.

Bd.W.4.3. *Erection.*—The posts shall be fixed at 2.3 to 2.6 m. centre to centre so as to have all posts fixed at a regular interval for the given length.

45 cm. × 45 cm. × 45 cm. pits shall be excavated for foundations for the posts. The end of the bully to be embedded shall be coated with hot coal tar. The posts shall be held in the correct position in the pit and 1 :4 :8 cement concrete shall be poured around it and consolidated and cured to form the foundation block for the full depth of the pit. The post shall project for 1.2 m. above the ground.

The posts at every 30 m. and at angles shall be strutted on either side of the posts. These struts shall be of the same diamater as the posts. They shall be fixed at 45° and be fixed at the topmost wire and fixed in 1:4:8 cement at bottom similar to the posts.

After the concrete has set the barbed wire shall be fixed on to posts with staples of U shape for the bully posts and with close staples passing through the holes on the steel posts and strained with straining bolts. The wire shall be fixed to the posts with staples at every 22 cm. leaving 10 cm. at the top.

Bd.W.4.4. *Item to include.*—(1) Teak wood mild steel tee bullies or mild angle posts as specified in the item and corresponding struts, barbed wire, 1 : 4 : 8 cement concrete, staining bolts, nails and staples.

(2) Exacavating pits, providing 1:4:8 cement concrete foundation, fixing posts and struts in concrete and barbed wire to posts.

(3) All necessary labour, materials and use of tools for the satisfactory completion of the item.

Bd.W.4.5. *Mode of measurement and payment.*—The contract rate shall be per meter of fencing completed as specified. The measurement shall be for the length from the outside face of the first post to the outside of the last post. At angles the measurement shall be from the outside of the angle post. The length shall be recorded correct upto a cm.

Bd.W.5. *Providing and fixing teak wooden gate including male and female hinges, locking arrangement and lock and painting.*

Bd.W.5.1. *General.*—The item pertains to the provision and fixing of wooden gate including male and female hinges, locking arrangement and lock and painting.

Bd.W.5.2. *Materials.*—Timber shall be from country teak wood. Teak scantlings shall be of the specified section and of full lengths and shall conform to A.16. The sizes shown in the drawings shall be planed, wrought and finished ones.

Two sets of 50 mm. × 6 mm. × 45 cm. male and female hinges, with bolts and nuts shall be of the standard commercial type. The flat of the male hinge shall have its end 8 cm. or so bent to go into the joint of the masonry or concrete.

Loop of suitable size of 25 mm.×3 mm. mild steel flat with nut and bolt.

Oil paint shall conform to A.17.

Oxidised iron sliding aldrop of approved size, pattern and quality with lock.

Bd.W.5.3. *Construction.*—The wooden gate shall conform to the details on the drawings or the instructions of the Engineer. Woodwork shall conform to B.20. The gate shall have a camber of 2.5 cm. in the centre.

The flat of the male hinge shall have been embedded in the piller at heights indicated on drawings or as ordered by the Engineer.

The female hinges shall be bolted to the top and bottom rails of the gate frame and the gate then fitted on to the male hinges fixed in the pillers.

The loop shall be fixed to the end of one of the vertical styles of shutters with a bolt and nut and shall be free to move.

The aldrop shall be fixed to the central rail of the gate.

The gate shall be painted as per B.21(b) with two coats of approved shade of good oilpaint.

Bd.W.5.4. *Item to include.*—(1) Teak scantlings, mildsteel male and female hinges, nuts and bolts, aldrop with lock, loop and oilpaint.

(2) Fabrication of the gate, fixing male and female hinges to the pillars and the gate and fitting the gate to the pillers, fixing loop, aldrop and lock to the gate and oil painting.

(3) All necessary labour, materials and use of tools for the satisfactory completion of the item.

Bd.W.5.5. *Mode of measurement and payment.*—The contract rate shall be for a square metre. The measurements shall be for the vertical distance between the outside edges of the top and bottom rails and for the horizontal distance between the outside edges of the outer styles in closed position. Battens, railings, styles, etc., protruding above the top rail or below the bottom rail shall be ignored. The dimensions shall be recorded correct upto a cm. and the area calculated correct upto three places of decimals of a square metre.

Bd.W.6. *Providing and fixing wrought iron/mild steel gate as per the detailed drawing including hinges, pivot, locking arrangement with lock and painting.*

Bd.W.6.1. *General.*—The item pertains to the provision and fixing of wrought iron or steel gate as mentioned in the item as per the drawings including hinges, pivot blocks, locking agreement and lock and painting.

Bd.W.6.2. *Materials.*—The wrought iron or mild steel sections shall conform to A.14 or A.11 as relevant. The sections shall be of the dimensions and shapes as shown on the drawings.—Standard rivets and welding rods shall be used. Stone pivot blocks shall be of hard campact, fine grained and durable stone without any defect. They shall be as approved by the Engineer.

Oil paint shall conform to A.17. The priming coat shall be of red lead and the subsequent two coats shall be of approved shade. Cement concrete 1 : 2 : 4 shall conform to specification No. B.6.

Bd.W.6.3. *Construction.*—The hinge flat shall have been enbedded in the pillars as indicated on the drawings at specified heights. There shall be one such hinge to each of the shutters. The hinges shall comprise of mild steel flat bent through 180° with a radius sufficient to hold the end vertical bars of the gate. A square bar piece with curved end shall be used as a spacer and stopper at the time of fixing. This piece shall be fixed to the flats with nuts and bolts.

The fabrication of the gate shall conform to specifications Nos. B.19, B.18 and B.10.

The design of the gate shall be as per the drawings. The joints shall be riveted and welded as shown on the drawings or as ordered by the Engineer.

**Bd.W.8.**

The gate shutters shall be fixed on to the hinges and the lower ends of the outer verticals shall be supported on stone pivot blocks 20 cm. × 20 cm. × 20 cm. fixed into 1 : 2 : 4 cement concrete block of 45 cm. × 45 cm. × 45 cm. with its top flush with the ground.

The central verticals of the two shutters shall have rollers 40 mm. × 6 mm. mild steel flat shall be bent to the required curvature and fixed with welded pins over 1 : 2 : 4 cement concrete bed 15 cm. thick and 10 cm. wide perfectly level. The rollers shall roll over these flats.

The gate shall be painted with one coat of red lead oil paint and two coats of approved shade of oil paint. Painting shall conform to B.21.

Bd.W.6.4. *Item to include.*—(1) All wrought iron of mild steel sections of specified dimensions and shape, oil paint, rivets, welding rods, locking arrangement with lock, rollers, cement concrete 1 : 2 : 4, hinges and stone pivot blocks.

(2) Fabrication of gate to the required design, fixing stone pivot blocks and sliding flat rails in cement concrete and fixing gate to the pillars, locking arrangement with lock and painting.

(3) All necessary labour, materials and use of tools, plant and equipment.

Bd.W.6.5. *Mode of measurement and payment.*—The contract rate shall be for one square metre. The measurement shall be for the net area covered by the gate, the height being inclusive of the tips and toes of the vertical if extending beyond the top and bottom rails. The horizontal width shall be measured outside to vertical of side rails. The dimensions shall be measured correct upto a cm. and the area calculated correct upto three places of decimals of a square metre.

Bd.W.7. *Providing and fixing ..... cm. × ..... cm. marble year/name plate.*

Bd.W.7.1. *General.*—The item provides for the supply of ..... cm. × ..... cm. marble slab for year or name plate as per the item, engraving figures and letters as ordered by the Engineer and fixing it in position as indicated on the drawing or as ordered by the Engineer.

Bd.W.7.2. *Materials.*—The marble slab shall be of the size specified in the item and 25 mm. thick. It shall be of good quality milky white shade, free from veins and unsightly spots, etc. It shall have a uniform shade all over the surface. The surface shall be even, smooth and in one place with edges true and square. Marble border if provided in the detailed drawing, shall be of the size, shape and colour shown therein.

Cement mortar 1 : 2 shall conform to B.5(a).

Bd.W.7.3. *Engraving.*—The border, figures and letters shall be engraved as indicated on the drawings. The engraving shall be in "V" cut grooves and shall be painted neatly with black Japan.

Bd.W.7.4. *Fixing.*—The tablet shall be fixed securely in position shown, on the drawing or as ordered by the Engineer in cement mortar 1 : 2, with marble or mortar moulded border. Recess may be left in the masonry or the masonry may be cut subsequently for the purpose. No deductions shall be made for this recess.

Bd.W.7.5. *Item to include.*—(1) Supply of marble slab, engraving and fixing including painting with black japan and finishing with moulded border of marble or cement mortar.

(2) Cutting recess in masonry if required.

(3) All necessary labour, materials, use of tools and equipment for the satisfactory completion of the item.

Bd.W.7.6. *Mode of measurement and payment.*—The contract rate shall be for one square metre of the marble tablet overall including moulded marble border. Overlaps of slab and border of any shall not be measured. Cement mortar border shall be incidental and shall not be included in the dimensions. The dimensions shall be measured correct upto a cm. and the area calculated correct upto three places of decimals of a square metre.

Bd.W.8. *Dismantling the existing structure including sorting out serviceable materials and stacking them within the specified lead neatly as directed and disposing off the unsuitable materials.*

अनुक्रमणिका
Table of Contents



Bd.W.8.1. *General.*—The item provides for the complete removal of the existing structure after dimantling except such portions as may be required or permitted to be left in place as shown on the drawing or as directed by the Engineer, clearing the site, sorting out useful materials and stacking them nearly within a lead of 50 m. (about 164′) and disposing off the non-serviceable materials.

Bd.W.8.2. *Preliminaries.*—If necessary and if so directed by the Engineer, the contractor shall have to erect screens of canvas or other suitable materials and/or water the structures and area to avoid the nuisance of dust before and during dismanting. Care shall be taken to see that dismantling is done in such a sequence and manner as to prevent all avoidable damage to usable materials and any damage to nearby property or injury to life.

In case of structures which are to be moved for re-erection, all members shall be properly match-marked with paint. The pins, nuts, plates, structural steel members, timber, etc., shall be similarly marked for identification of their position in the entire assembly. All machined surfaces, pin holes, pins, etc.. shall be coated with grease.

An inventory of all possible serviceable materials shall be kept on record and signature of the contractor obtained in token of his acceptance. Any doubt or non-agreement with the same shall be reported by the contractor before starting the removal.

Portions required to be retained shall be clearly marked before starting dismantling.

If no separate provision exists in the tender for diversion of traffic if and when necessary the contractor shall nevertheless invariably be responsible for the construction and maintenance of adequate barriers, keeping watchmen and/or lights at the ends of the portions of the road required to be closed if any (for the facility of construction) to the satisfaction of the Engineer at his (Contractor's) cost, diversion itself being treated at extra work. The permission of the competent authority for the purpose shall be obtained by the contractor.

A Register shall be opened by the contractor on the work site to show a day-to-day account of the turn out, salvaged materials. This register should also show whether dismantled material is properly stacked or wasted. It shall be signed by the representative of the contractor and a responsible member of the Departmental supervising staff every day.

Bd.W.8.3. *Dismantling and removal.*—The structure shall be dismantled carefully and the materials removed without causing damage to the serviceable materials to the salvaged, the part of the structure to be retained and any properties or structures nearby. Any avoidable damage to articles to be salvaged and part of the structure to be retained and any damage to nearby property or structure shall be made good by the contractor without extra claims. The contractor shall be responsible for any injury to the workers or the public.

Unless otherwise specified, the structure shall be removed upto 45 cm. (about 18″) below the ground level and the portion which interferes in any way with the new construction shall be removed entirely. Removal of overlaying or adjacent materials if required for dismantling of the structure, shall be included in the item.

Where existing building is to be extended or otherwise incorporated in the new work, only such part or parts of the existing structure shall be removed as are necessary to provide a proper connection to the new work. The connecting edges shall be cut, chipped and trimmed to the required lines and grades without weakening or damaging the part of the structure to be retained.

Blasting if required, may be resorted to with the written permission of the Engineer. In such a case blasting shall be carried out as specified in B.2. All blasting operations shall be finished before the new construction is commenced.

Equipment or methods which might damage members, portions of the structure to be preserved or adjacent construction or structure shall not be used.

If sewers or drains are removed or disturbed, the contractor shall at once remove the foul matter. If sewers or drains have to be temporarily removed, the contractor shall provide temporary passage for the flow and remake the sewer or drain without extra claims. If existing sewers or drains are required to be removed permanently rebuilt to altogether new alignments, they shall be paid for separately as extra work if there is no provision in the tender for such work.

Bd.W.8.4. *Disposal.*—All the materials obtained from the removal of the structure shall be the property of Government. Serviceable materials shall be stacked neatly in such a manner as to avoid deterioration and in places directed by the Engineer within a lead of 50 m. (about 164″). Different categories of materials shall be stacked separately.

अनुक्रमणिका
Table of Contents

अनुक्रमणिका
Table of Contents



**Bd.W.8.8.**

Unless otherwise provided, excavated materials shall be used in back filling the excavation made in removing the structure in levelling ground or otherwise disposed off as directed within 50 m. (about 164′) free of cost.

Serviceable materials will be issued to the contractor for use in the new work or elsewhere at the rates provided in the tender or when not so provided at the rates agreed upon by the Engineer and the contractor.

Non-serviceable materials shall be disposed off by the contractor without causing any damage or inconvenience.

Bd.W.8.5. *Final clearance.*—All rubbish shall be cleared off the site and the ground left clean and clear. Any damage caused during the operation shall be made good.

Bd.W.8.6. *Responsibilities.*—The contract shall be responsible for—

(*i*) Maintaining a register of the salvaged materials.

(*ii*) Keeping intact the portion not to be removed.

(*iii*) Avoidable damage to serviceable articles to be salvaged during dismantling, conveyance and stacking.

(*vi*) Wasting of unserviceable materials and its consequences.

(*v*) Stacking neatly and safe custody of the salvaged materials till handing over to the Department.

(*vi*) Washing of unserviceable materials and its consequences.

(*vii*) Damages to nearby property and injury to workers and the public due to his operations.

Bd.W.8.7. *Item to include.*—(1) All labour, materials, use of equipment, tools and plant required for completing the job satisfactorily.

(2) Erecting and removing screens and watering when necessary as directed.

(3) Marking the structure suitably.

(4) Opening register of salvaged materials.

(5) Providing adequate barricades, signs, lights, etc.

(6) Removal of the structures.

(7) Diverting the existing drains, etc., temporarily and redoing the same, if not separately provided.

(8) Stacking serviceable materials.

(9) Wasting unserviceable materials.

(10) Clearing site on completion.

(11) Compensation for damaged properties or injuries to persons.

Bd.W.8.8. *Mode of measurement and payment.*—The contract rate shall be a lump sum for the complete job. Proportionate payment may be made through the running account bills. Full payment shall be made on completion of the item in all respects.

NAGPUR: PRINTED AT THE GOVERNMENT PRESS.

अनुक्रमणिका
Table of Contents