UNIT 1   ESTIMATION OF WORKS

Structure

1.1 INTRODUCTION

In this unit, we shall be introducing the concept of estimations of works and methods of carrying out estimation of works.

One of the definitions of estimate can be made, as it is a forecast of the cost of projects/work prior to the commencement of a job. An engineer authority forecasts the probable amount of money for which a contractor will execute the stipulated works provided the site conditions, time element, the tendency to variations and economic parameters remain unchanged. The essence of estimated cost of building/work lies in the fact that the actual cost of proposed building/work after completion should not differ by more than 10% from its estimated cost provided all the factors like cost of materials, labour accounted for while preparing estimate remain unaltered.

Importance of Estimation

(a)   The estimate helps in working out the approx cost of building/work/project before the same is taken in hand and thus helps in ascertaining the financial implications involved and also td know if it can be completed in accordance with specifications stipulated   . within certain financial limits or modifications are required or requires to drop the proposal itself depending on financial resources available.

(b)   It gives a definite base for "Cost Planning" of tlie project.

(c)   It helps in framing the tenders and to check the contractor's works during and after the execution for the purpose of running bills and final bill payments.

(d)   It also helps to obtain an Administrative Approval; and technical sanction in respect of Govt. works.

(e)   It can be used for fixing up value of project for insuranc requirements.

Methods of Estimation

The most common methods of working out estimates are as follows :

Detailed or Item-wise Estimate

In this method, the approximate cost of a building/work is worked out item by item. While doing so the cost of labour, materials,

tools/plants, overheads and profits are taken into consideration. It is usual practice to prepare such estimates prior to tender action and also while obtaining "Technical Sanction" (TS) after getting "Administrative Approval" (AA). Such estimates are generally based on SSR rates and necessary percentage is add d for covering elements like market variation, overheads and profit, etc. It is suitable for any type of work like buildings, water retaining structures, sewage disposal works, cross drainage works, chimneys, bridges, culverts, etc. This type of estimate gives very accurate results as compared to other methods of estimates depending upon the skill of quantity surveyor/estimator and also requires much more time.

Estimate on Plinth Area Basis

In this method, the plinth area of the proposed building is worked from the given plan of the building in square metres. The approximate cost of the proposed building can then be worked out as follows :

Approximate Cost of Building	=	Total Plinth area of Proposed Building in square metres	×	Rate of Construction of similar Building per square metre

The cost of construction per sq. metre is obtained by dividing the known cost of construction of a just previously constructed similar building with its plinth area. A certain percentage is added to the cost so worked out, to cater for probable market variation. It is usual practice to prepare such estimates prior to obtaining Administrative Approvals from competent authorities, particularly in MES.

Estimate on Cubicd Contents Basis

In this method, the total volume of proposed building is worked out by multiplying the plinth area with the height of building. This volume is multiplied by a rate per cubic metre prevailing at that time of similar type of building.

Total Plinth Area of Proposed Building in square metres	=	Volume of Proposed Building	×	Rate per cubic metre

The rate per cubic netre is worked out by dividing the known cost of construction of previously constructed similar type of building with its volume. A certain percentage is added to the cost so worked out to cater for probable market variation.

The rate per cubic metre of existing building is required to be suitably modified depending on

(a) Place of construction

(b) Year of construction

(c) Size and shape of building

(d) Foundation work, etc.

This method is not generally used in MES.

Q_1 = Current year weightage, and

Q_2 = base year weightage.

This method does not give realistic results when applied to any specific building.

Objectives

After studying this unit, you should be able to

- prepare the sequence of operations required for carrying out detailed or Itemwise estimate of a building.

1.2 OPERATIONS IN QUANTITY SURVEYING

As you are aware that the process of measuring or working out quantities of a building or a work, based oh a standard method of measurement, in a scientific and systematic manner is termed as "Quantity Surveying". When these quantities are priced at itemwise rates, will give you the estimated cost of a building or a work, to a reasonable degree of accuracy. The accuracy in measuring quantities and clear, concise and correct description of each item of work are the fundamental requirements of quantity surveying.

1.2.1 Stages Involved in Quantity Surveying

The four distinct stages involved in Quantity Surveying are summarized below:

Taking Off

It is the process of measuring dimensions from working drawings and recording them in a recognized form in a systematic concise manner on a specially ruled paper of take off sheet or Measurement Book. The description of each item is based on the drawings and specifications. It gives the type of material to be used, the size and the method of construction and the quality of finish. The term "taking off" does not merely mean the physical process of mdasuring, but also covers the entire process of deciding as to what to measure and how to measure.

Squaring Dimensions

The process of adding and/or multiplying of above recorded dimensions for obtaining the lineal, superficial or cubic measurements as per standard system of measurements is called as squaring dimensions.

Abstracting

In this process, the quantities of identical character and description are collected from take off sheets/Measurement Book and net total quantity of each item is arrived at in a trade wise order. This operation is called abstracting.

Billing

The process of writing down in details and in tradewise fashion from abstract sheets is called billing. The unit rates are quoted against each item of the bill and total amount of the billed quantity of each trade is worked out separately.

Before proceeding with the subject of detailed estimating, it is presumed that you have received a thorough training in building construction, mensuration, elementary trigonometry and standard method of measurement (SMM). The tables of measurements of planes and solids are **available** In standard books under mensuration section and can be readily referred.

Similarly, you have learnt in last **semester as** to how to **calculate** the perimeter of a building. The mean length of external walls and the length of internal walls **after** making allowance for **overlaps** at junctions are required for the measurements of **foundations,** brickwork or stonework. This has to be calculated **from figured** dimensions **where** given.

Standard Method of Measurement

Standard method of measurements of building and civil engineering works have been prepared in 'Handbook of Method of Measurement of Building Works' (SP : 27-1987). These methods have been given in different parts of Indian Standard Code IS : 1200. These methods have to be followed for a uniform mode of measurement in the country.

In the next section we will study in details the'various steps to be adopted in respect of each stage of Quantity Surveying.

1.2.2 Booking of Dimensions (Process of Writing Dimensions)

Dimension Paper

In MES, the standard dimension sheet used is generally 35 cm long and 20 cm wide. The same is ruled as shown below :

On perusal it will be seen that the sheet is divided into two equal halves. Each half part of it **contains** four columns :

Column No. 1

It is to be used for *Timsing.* Timsing is nothing but **a simple** means of multiplications, while writing the dimensions the quantity **surveyor/measurer** finds that there are several items of the same dimensions and instead of writing the same again and again, it will be preferable that the first item is timesed. A small diagonal line is placed against the first dimension and the number of repetitions are written in the timsing column. A small diagonal line implies the **purpose** of multiplying sign.

Column No. 2

It is to be used for writing dimensions of the measured quantity.

There are four different forms of measurements :

(a) Cubic items or cubic measurements

(b) Square or superficial measurements

(c) Runs or lineal measurements

(d) Numbers or **enumerated** items.

Examples of above mentioned forms together with an indication about the nature and use of description column are given subsequently. The rule of **booking** dimensions is to record length first, the width or breadth second and **thickness/height** third and last.

Column No. 3

It is the *squaring column* used for recording the result of squaring the dimensions entered in Column No. 2. The result may be'in volumes, areas, lineal or nos.

Column No. 4

It is the *descriptive column* in which description of items, heading, side notes and calculations are written. On extreme **right** side of this column, preliminary calculations and collections are generally made. This is known as *waste.*

For arriving at a dimension, all necessary calculations must be entered in the waste aolumn only and it should not be done on scraps of paper and thrown away. All these calculations termed as side-casts are always checked before dimensions are worked out, as any error found in a side-casts may be reflected in the dimensions and may recur more than once.

It is necessary that each take off sheet is given the column number and the name of jab.

The dimensions are entered in the take **off/dimensions** sheet by getting down the measurements immediately under each other in the dimensions column, each separate set being **divided from** the'next by a line.

Examples of above forms using all **four** columns of take off sheet are **given below :**

A Cubic Item

(1)	(2)	(3)	(4)	
	0.25		RCC $1:2:4$ type B1 using 20 mm grided stone aggregate in columns above GL.	Denotes a cubic measurement, 0.25 metre and 0.40 metre in cross-section and 2.4 metre in height.
	0.40			
	2.40	0.24	cu.m.	The calculation of above dimensions worked out is 0.24 Cu.M. written in Col-3 and the description of the item of RCC is written in Col-4

A *Square or Superficial Item*

(1)	(2)	(3)	(4)	
	10:00		Rendering on fair face of brickwork, 10 mm thick in cement mortar (1 : 4)	Denotes a **superficial** measurement. 10 metres long and 3.20 metres in height
	3.20	32.00	sq.m.	The calculations of above dimensions worked out is 32.00 **Sq.M.** written in Col-3. The description of the item of rendering is written in Col-4.

A *Run or Lineal Item*

(1)	(2)	(3)	(4)	
	15.00	15.00	Salt glazed stone ware pipe, 'A' grade, 100 mm bore for sewage line R.metre	Denotes a lineal **measurement** 15.00 Metre is the length. The calculation in Col-3 is 15.00 R Metres. The description of the item of sewage line is written in Col-4.

Numbers or Enumerated Items

(1)	(2)	(3)	(4)	
	3	3	200 mm long aluminium All drop bolt	Indicating 3 **in** number.

Timsing

(1)	(2)	(3)	(4)	
6/	1.50		RCC 1 : 2 : 4 type B1 using 20 mm graded stone aggregate in lintels	The measurements indicate that the cubic measurements are to be multiplied by 6.
	0.30			
	0.20			
		0.54	cu.m.	The measurements here indicate that the cubic measurements having been multiplied by 6, the result is to be multiplied by 2, **i.e.** the original measurement is to be multiplied by 12.
2/6	1.50			
	0.30			
	0.20			
		1.08	cu.m.	Sometimes similar measurements are **to be** added. This can be done as under :
			RCC 1 : 2 : 4 type B1 using 20 mm graded aggregate in lintels	Indicating that the cubic measurement is to be multiplied by 4 + 3 = 7
4	1.50			
3	0.30			
	0.20	0.63	cu.m.	Indicating that the cubic measurement is to be multiplied by (4 + 3) × 3 = 21. Thus timsing and dotting on is combined over here.
	1.50			
4	0.30	1.89		
3 3/	0.20		cu.m.	

All calculations and details of dimensions must be written down, in Column no. 4. These written calculations and dimensions will be checked subsequently. When referred to at a later stage it will be clear from the process of these figures arrived at. All these preliminary calculations are also known as "collections" and are made on the right side of this fourth column of description. They are required to be written clearly. They should not be scribbled, just because this column is termed as "Waste" column.

Sometimes, it is revealed that a dimension written is incorrect and is required to be cancelled. In that case the word 'NIL' should be written in squaring column against such measurement. This indicates that it is to be taken as cancelled.

Alteration in figures, **e.g.** a 1 into 2 or a 2 into 3, or a 3 into 8 or a 5 into 6, etc. or overwriting should not be made. Each and every figure should be clear. The method of erasing with pen knife or rubber should never be ,utilized. It is always better to cancel the wrong entries and write out the correct ones separately so as to avoid confusion by alterations.

Descriptions

The description of the item to be measured in description column with-indicating item No. and waste collection below the description of the item is written. After this the dimensions and squaring of the measurement are recorded in respective columns. The description can be abbreviated by using standard abbreviations. Where two or more dimensions are written for the same description of item, the same should be bracketed together by drawing a neat vertical line between column 3 and 4.

In case of any deduction, write clear words 'deduct for' in the description column and then enter the set of measurement and calculations in appropriate columns. It should be quite clear as to measurements are to be added or deducted.

Dimension Spacing

At the beginning with the work of taking off one has no idea of the space to be maintained between succeeding set of measurements. Hence crowding of descriptions should be avoided strictly. The measurements and corresponding descriptions of items should be sufficiently spaced. Sometimes, it is revealed that an item or measurements are overlooked and are required to be inserted in proper place. So if proper spacing is maintained it is quite pbssible to insert additional item or measurement at appropriate space. By way of maintaining adequate space, one may have to use additional take off sheets, but this will avoid the process of cancellation and rewriting. By'continuous practice, the measurer/quantity surveyor will be in a position to follow the process in a systematic manner.

SAQ 1

(a) What do you understand by term estimation? What is importance of estimation?

(b) What are the methods of estimation? Mention briefly the method of detailed estimate.

(c) What are the stages involved in quantity surveying? Elaborate each stage in brief.

(d) What are the functions of each column of take off sheet? Give example.

(e) What are the different forms of measurements? Explain with examples.

1.2.3 Procedure of Take Off

Before commencing the actual operation of "taking off" quantities, the measurer/quantity surveyor must know certain procedures. Without careful study one should not rush to a job otherwise it would result in many errors. Lot of preliminary work has to be done before commencing the work of "taking off".

The drawings are prepared by the Architectural section. The same are listed, proposed work marked on the same and sent to planning/contract section. The concerned measurerlquantity surveyor has to study the drawings in details. He has to visualize the work involved for understanding the job clearly. He has to interpret all the Architectural/structural drawings. After studying the drawings the items of different sections are listed out in the order to "taking off. Keeping in view the specifications framed/required. Before commencing the work of take off on receipt of drawings following actions are required to be taken as a preliminary work :

(a) Check that the plans, elevations, sections and other/RCC details are in agreement with each other.

(b) Check that overall dimensions are in agreement with total room and wall dimensions.

(c) In case of serious errors, the same should be brought to the notice of Architectural/structural section and get the same corrected.

(d) Get the drawings corrected if certain discrepancies are found out as a result of draftsman's obvious errors.

(e) Write down the missing dimensions after working out from all other dimensions. Never scale a drawing unless it is inevitable. Marked dimensions form a correct basis of all the measurements and scalings may cumulate errors.

(f) A visit to site is preferable to enable in collecting important site information like sub-soil, water level, soil strata, accessibility to site, availability of water and electricity, general approaches, local materialslpractices and any other aspect which will ultimately affect the prices.

The drawings are required to be reviewed keeping in view the site information got from the site visit. The provisional sums may be required to be included for certain site information. A list of complete queries on the information not included in drawings is required to be given to Architectural/Planning section and the drawing got modified suitably.

After completing above preliminary work, the **Measurer/Quantity Surveyor** will be in a position to commence the action of taking off quantities in proper order. The order of taking off quantities for building work as recommended is as under :

- (a) Foundation and work up to GL.
    - (i) **Site/surface** excavation (where **necessary/specified)**
    - (ii) Excavation over **areas/trenches** for **walls/footings**
    - (iii) Any planking and strutting required
    - (iv) Plain cement concrete (PCC) in foundation
    - (v) **Brickwork/stonework up** to GL
    - (vi) RCC in footings and columns up to GL including connected items
    - (vii) RFR, Pre-construction anti-termite treatment (ATT) where specified

- (b) Work from GL to plinth
    - (i) Brick work stonework in plinth
    - (ii) RCC columns **upto** plinth beams, plinth beams including connected items
    - (iii) Damp-proof course
    - (iv) Filling under floor, **ATT,** where specified and removal of surplus soil
    - (v) Hard core and PCC sub base

- (c) **Brickwork/stonework** in super-structure .

- (d) RCC columns, staircase if indicated in superstructure, beams and slabs including connected items. RCC lintels and **chhajjas** including connected items.

Note for Sl. No. (c) and (d)

In case of more than **one** storey construction it will be measured **from** plinth *toTop of first floor slab and for upper floors, it will be measured floor wise **i.e.** from floor slab to top of next floor slab.

- (e) **Brickwork/stonework/RCC** work in parapets and copings where indicated

- (f) Roof work, water **proofing** treatment in case of flat roof

- (g) Ceilings

- (h) Wall finishing

- (i) Flooring work including skirting, **dados**

- (j) Windows complete

- (k) Doors complete

- (l) Fittings and sundries

- (m) Staircase finishing

- (n) Sanitary fittings and plumbing

1.3 STANDARD SCHEDULE OF RATES AND ITS APPLICABILITY

Standard Schedule of Rates (SSR) is a document containing detailed specifications, description of all items of different trades of works with their current rates. The quantities are not mentioned therein. These rates are inclusive of cost of materials, labours, transportition charges, tools and plants required, profit, etc. and are revised every year/five years as the need may arise. The rates in SSR are intended to apply to every description of work that may be required in the construction and maintenance of buildings of all types or any work carried out under the agency of MES.

In MES, SSR is compiled and published by E-in-C's Branch, New Delhi. It comprises two parts. Provisions made in the Bureau of Indian Standard specifications and Codes of Practice have been considered and incorporated in the SSR to the extent they are applicable.

SSR (Part-I Specifications) comprises 21 sections. Section 1 pertains to General Rules, which are applicable to all Sections and are intended to supplement the provisions in the particular Section. It comprises of definitions of terms and expressions used in SSR Part-I; Standard abbreviations, specifications of materials, mode of approval of materials, Mode of testing of materials, Methods of storage of materials, workmanship with regard to BIS codes of practice and safety codes. Section-2 gives the consolidated list of Indian Standards referred to under the respective section. Sections from 3 to 18 cover different trades pertaining to building works and the same are as under :

Section-3.	Earthwork
Section-4	Concrete
Section-5	Brickwork
Section-6	Stone masonry
Section-7	Woodwork (Carpenter's Work)
Section-8	Jbinery
Section-9	Builder's Hardware
Section-10	Steel, Iron and Aluminium Work
Section-11	Roof Covering
Section-12	Ceiling and Linings
Section-13	Floor Finishes and Paving
Section-14	Plastering and pointing
Section-15	White-washing, Colour-washing and Distempering
Section-16	Glazing
Section-17	Painting
Section-18	Water Supply, Plumbing, Drains, and Sanitary Appliances

Further sections of other trades are as under :

| Section-19 | Electrical Work (External and Internal) |

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Section-20-A	Road Work
Section-20-B	Runway Pavement and Hard standing, Flexible and Rigid Pavement
Section-21	Demolition and Dismantling

Before elaborating the types of materials, its properties, specifications, various methods and standards of workmanship, the list of Indian Standards applicable is given. At present SSR-1991 (Part-I Specifications) as amended from time to time is in vogue.

As already stated herein above SSR Part-I1 deals with rates. At present SSR 2004 Part-II – Rates as amended from time to time is in vogue, This part also comprises 21 sections and an Appendix-A, giving the weights of structural steel and Aluminium sections as per relevant Indian Standards.

(a) In SSR 1996 Part II also Section-1, stipulates General Rules applicable to all sections to the extent the context permits and intended to supplement the provisions in the particular section. Earlier versions of SSR were divided into 8 zones viz. 'A' to 'H'. The 2004 version, a single SSR has been prepared, which is applicable throughout the country. This SSR has been prepared based on average market rates of labour and materials prevailing in various zones as collected from the commands. This will help to have a common platform for bowing market levels at various parts of country. The various other provisions catered in this section are : The rule of interpretations, definitions of terms and expressions used in this part, abbreviations used, the scope of the rates for materials supplied only, scope of handling, and fixing of old materials, mode of directions, use of alternative, method of measurements, the scope of term Net, Extent of measurement, scope of term Neatest, the scope of transport or carriage, rule about record of measurements, scope of Application of Rates, use of Proportional and Star Rates, clarification about Rates and the term Full Provision, rule of extra allowances to be made on net measured work executed in water, liquid, mud or foul positions or in tidal conditions or in buildings exceeding four storey high and RCC overhead Reservoirs, rule for the cost of Artificial Light for execution of work, etc. One has to be well conversant with these provisions before applying the rates.

(b) The Section-2 has given the labour rates per day of 8 working hours in respect of various labourers divided into three categories, i.e. unskilled, semi-skilled and skilled. It has been clarified in preamble that the rates do not bear any relation to minimum fair wages and that the rates are meant for compilation of proportional rates, depending on class of work performed and that the rates are inclusive of all necessary tools normally carried by the labour according to trade practice.

(c) The Sections from 3 to 18 cover different trades pertaining to building work and Section 19 to 21 pertain to other trades as already mentioned for SSR (Part-I) hereinbefore. At the beginning of each section special conditions covering method of measurement, types of operations, elements included in rates and scope covered in rates, special

requirements for operating certain rates, etc. are given. In addition to special conditions preambles are also given prior to certain **items/group** of items clarifying about applicability of rates. **After** special conditions, rates of different items including material and labour are given indicating unit of rate. At the end of each section rates of materials (supplied only) are given indicating the unit.

An Appendix 'A' is attached at the end of SSR Part-I1 givjng standard weights bf structural steel and Aluminium sections, etc. These weights have been reproduced from the relevant Indian Standards mentioned in the tables. These unit weights are to be used for converting running metre measured length of section into kilograms, where the rate of particular item is based on kilogram basis.

The **measurer/quantity** surveyor is required to be well conversant with various provisions of SSR Part-I and **II** and also locating and applying correct rates for items of works, while preparing **bills/estimates.**

SAQ 2

(a)   What is the procedure adopted for take off?

(b)   What do you know about **SSR.** Explain in brief?

(c)· How the tables given in Appendix 'A' of SSR Part-11 are used?

(d)   Which **SSR** is at present in use in **MES?** .

1.4 SUMMARY

In this unit, an attempt has been made to explain

(a)   The definition of an estimate and importance of estimate.

(b)   The methods of estimation.

(c)   The operations involved in quantity surveying.

(d)   The procedure for take off.

(e)   The, Standard Schedule of Rates (SSR) and its applicability.

1.5 ANSWERS TO SAQs

Refer the relevant preceding text in the unit or other **useful** books on the topic listed in the section 'Further Reading' given at the end to get the answers of SAQs.

UNIT 2 COMPLETE ESTIMATION OF ONE BUILDING

Structure

2.1 INTRODUCTION

In the previous unit, you have learnt about the procedure to be followed for estimation of a building. In this unit, you will be making preparatory work for complete estimation of one, building excepting internal electrification work and internal water supply work. You will be given a complete set of drawings of a building to be estimated and the brief specifications to be followed for that building. After studying the drawings and specifications, you will be preparing a list of items as per the order of taking off that particular building. That will be the preliminary work for estimation of that building. In short, you will be making all preparatory work for taking off and squaring of all items pertaining to given building.

Objectives

After studying this unit, you should be able to

- study drawings and specifications of any other building you will be coming across, and

- prepare a list of complete items for take off and square the quantities in respect of that building.

UNIT 2 COMPLETE ESTIMATION OF ONE BUILDING

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Objectives

After studying this unit, you should be able to

- study drawings and specifications of any other building you will be coming across, and

- prepare a list of complete items for take off and square the quantities in respect of that building.

2.2 A SET OF DRAWINGS OF A BUILDING

A set of drawings of a building to be estimated containing three sheets is attached as **Appendix** A at the **end** of this unit.

2.3 BRIEF PARTICULAR SPECIFICATIONS OF A BUILDING

The specifications to be followed for the building to be estimated are as under :

Excavation and Earthwork

Surface excavation in soft soil average 15 cm deep and **upto** 3 metres from the external face of wall and removal **upto** 50 metres. The level after surface excavation to be treated as Ground Level. The strata for excavation for foundations is as under :

(a) Hard soil – 90 **cms**

(b) Balance Soft rock

Hard soil/soft rock to be used for filling under floor. Lead for disposal of surplus spoil -- 200 to 250 metres. Extra soil if required for filling shall be brought from outside MD land.

Hard core of 63 mm gauge of broken stone.

Concrete

Type and mix of Cement Concrete

(a) Lean concrete work below foundations-footings	1 : 4 : 8 Type D2 (40 mm graded aggregate)
(b) **All** RCC work and PCC except (c) & (d)	1 : 2 : 4 Type B1 (20 mm graded aggregate)
(c) Plinth Protection	75 mm thick 1 : 3 : 6 type C2 using 40 mm graded aggregate over 75 thick hard core over rammed earth
(d) PCC Cill	80 mm thick PCC 1 : 3 : 6 Type C1 using 20 mm graded aggregate.
Stone Masonry	RR Masonry uncoursed in CM (1 : 6) in foundation and plinth.
Brickwork	(a) Full brick wall in super-structure in CM (1 : 6)
	(b) Half brick partition walls in CM (1 : 4)
Woodwork and Joinery	Formwork shall be of steel or plywood of adequate strength. All panel door shutters shall be factory made second class hard wood kiln seasoned and chemically treated.
Builder's Hardware	Butt hinges – cold rolled MS medium weight. All other iron mongery shall be Aluminium anodized
Steel and Iron Work :	
• Steel for reinforcement	– High strength deformed steel bars
• Structural Steel	– Standard quality steel
• Steel Window Ventilators	– Conforming to IS : 1038
• Rolling Shutter	– Self coiling type (gear type)
• Guard Bars to Windows	– 12 mm Square bars
• Pressed Steel Door Frames	– Fabricated out from 1.25 mm thick MS plain sheet, hollow portion filled with PCC 1 : 3 : 6 C1 type (using 20 mm aggregate)

Roof Covering	RCC roof slab laid to slope as shown on drawing
Water-proofing treatment	— 10 mm thick plaster in CM (1 : 3) using water-proofing compound and then normal four course water-proofing treatment. **Chhajjas** and canopy over doors, windows shall be finished with plaster mixed with water-proof compound.
Flooring	(a) **75** mm thick PCC 1 : 2 : 4 type B_1 over 75 mm thick PCC 1 : 3 : 6 type C2 Sub base over rammed earth (DG Set Room) Cement Mortar skirting to be provided (b) 22 mm **terrazzo** thick tiles with grey cement, over 20 mm thick **screeding** in CM over **75** mm thick PCC 1 : 3 : 6 C_2 Sub base over rammed *earth* (Rest Room and verandah) **Terrazzo** tile skirting to be provided. (c) **Glazed** Ceramic tiles over 20 mm thick screeding in CM over 75 mm thick PCC Sub base 1 : 3 : 6 type C2 (ovr rammed earth) Dado to be provided as shown in drawing
Plastering	**Internal** Surface – 15 mm thick cement plaster in CM (1 : 6). **External Surfaces** – Keyed pointing to RR masonry in CM (1 : 4) **upto** plinth beam and from plinth beam and above 5 mm finishing coat in CM (1 : 4) using water proofing compound over 15 mm thick cement plaster in CM (1: 6) with sand face finish. **Ceiling – 5 mm** thick cement plaster in CM (1 : 3)
White/Colour washing	Ceiling – three coats of white wash Internal Plastered Surface (a) DG Set Room – Dry Distemper (b) Other rooms – Three coats of whitewash *External Plaster* – Two coats of cement based paint over primer
Glazing	Glazing to **window/vents** (other than toilet) – 4 mm thick sheet glass Glazing to windows in toilet – 3 mm thick pin headed glass
Painting	Exposed surfaces of all woodwork, joinery and steel work including guard bars – to be painted with two coats of synthetic enamel paint over a primer.
Plumbing and Sanitary Fittings	(a) Indian type water closet (Omsa Pattern) with low level Flushing cistern (b) Wash Hand Basin with one CP pillar cock **15** mm bore, Mirror and towel rail and PVC waste pipe **upto Nahani trap.** (c) Gully traps and Nahani trap (d) Provisions of 100 mm bore CI soil pipe including fittings **upto** external face of wall and PVC (SWR) pipe and fittings thereafter 2 metres beyond the external face of wall. (e) Provision of **75 mm** bore **CI** waste pipe including fittings **upto** external face of wall and PVC (SWR) pipe and fittings thereafter **upto** and including Gully trap. (f) Water Storage Tank – PVC storage tank over PCC platform an roof slab, 500 **litres** capacity

2.4 A LIST OF ITEMS FOR TAKING OFF

The list of items of each trade for taking off above building after studying the drawings and specifications is as under :

2.4.1 Excavation and Earthwork

(a) Surface excavation av. 15 cm in soft soil before commencing the work and rembval of excavated soil to a lead not exceeding 50 metres.

(b) Surface excavation in hard soil for plinth protection.

(c) Excavation in trenches for foundations in hard soil and soft rock.

(d) Filling under floor with excavated soil/rock.

(e) Return, filling and ramming in soil.

(f) Removal of surplus soil/rock to a lead exceeding 200 and not exceeding 250 metres.

(g) Hardcore below plinth protection.

2.4.2 Concrete Work

(a) PCC type **D2** 1 : 4 : **8** using 40 mm aggregate in foundation.

(b) RCC in footings and plinth beam with type B1 1 : 2 : 4 (20 mm graded aggregate).

(c) -ditto- but in columns -ditto-.

(d) -ditto- but in beams/lintel beams -ditto-.

(e) -ditto- but in roof slab -ditto-.

(f) -ditto- but in lintel band -ditto-.

(g) -ditto- but in chhajjas -ditto-

(h) PCC type C1 1 : **3** : *6* in cills.

(i) Supply only WP compound.

2.4.3 Brickwork

(a) BB masonry in steps and walls in superstructure.

(b) Half brick partition walls in CM.

2.4.4 Stone Masonry

(a) RR Masonry uncoursed in foundation and plinth in CM.

(b) Extra over RR masonry for HD facework.

(c) Extra over face work for external angles for quoins.

2.4.5 Woodwork

(a) Use and waste formwork to sides of plinth beams.

(b) - ditto- but for columns.

(c) -ditto- but for beams/lintels.

(d) -ditto- but for slabs.

(e) -ditto- but for chhajjas.

(f) -ditto- but for lintel bands.

2.4.6 Joinery

Factory made paneled doors.

2.4.7 Builder's Hardware

(a) MS butt hinges.

(b) Barrel tower bolts aliminium.

(c) Sliding door bolt aluminium.

(d) Aluminium handle.

2.4.8 Steel and Iron Work

(a) MS torsteel reinforcement.

(b) MS guard bars.

(c) MS windows and ventilators.

(d) Steel rolling shutter.

(e) Pressed steel door frames.

2.4.9 Roof Covering

Water proofing treatment on roof surface.

2.4.10 Floor Finishes and Pavings

(a) Cement Concrete C2 1 : 3 : 6 in Sub-base.

(b) Cement Concrete B2 1 : 2 : 4 in flooring.

(c) Cement Concrete B1 1 : 2 : 4 in flooring (treads of steps).

(d) Cement Concrete C1 1 : 3 : 6 in plinth protection.

(e) 22 mm terrazzo tile flooring and skirting.

(f) Glazed ceramic tiles in flooring and dado.

(g) Platform for PVC tank.

2.4.11 Plastering and Pointing

(a) Rendering on BB in CM 1 : 6 internally on walls, 15 mm thick.

(b) Rendering with sand faced finish externally in CM (1 : 4), 20 mm thick on walls.

(c) Keyed pointing to RR in CM (1 : 4).

(d) Backing coat of rendering for tiles in dado/skirting.

(e) Screening below terrazzo tiles/glazed ceramic tiles.

(f) Rendering on roof surfaces, over chhajjas with WP compound and supply of WP compound.

(g) Rendering 5 mm thick in CM (1 : 3) in ceiling.

2.4.12 White Washing, Colour Washing and Distempering

(a) Three coats of white wash to ceiling surfaces.

(b) Two coats of dry distempering over primer on plastered surface.

(c) Three coats of white wash over plastered surfaces on wall.

(d) Two coats of cement based paint on primer over external plastered faces.

2.4.13 Glazing

(a) Glazing to steel windows with 3 mm thick pin headed glass to toilet portion.

(b) Glazing to steel windows/Vent with sheet glass 4 mm thick.

2.4.14 Painting

(a) 2 coats of enamel paint over primer to steel surfaces.

(b) -ditto- but on wooden surfaces.

2.4.15 Plumbing, Drains and Sanitary Appliances

(a) Orrisa pattern WC with 'P' trap.

(b) Low level flushing cistern.

(c) WHB with all fittings and accessories.

(d) Mirror.

(e) Towel rail.

(f) PVC water tank.

(g) CI soil pipe 100 mm bore upto external face of wall and PVC (SWR) pipe with fittings thereafter.

(h) CI waste pipe 75 mm bore upto external face of wall and PVC (SWR) pipe with fittings thereafter.

(i) CI Nahani trap.

(j) Gully trap.

2.5 SUMMARY

In this unit, an attempt has been made to explain

(a) as to how set of drawings of a building is to be studied with relation to particular specifications, and.

(b) as to how a list of items of each trade pertaining to building for taking off operation is to be made.

2.6 APPENDICES

Appendix A (3 Sheets)

UNIT 3   TAKE OFF AND SQUARING OF A BUILDING

Structure

3.1   Introduction

    Objectives

3.2   Take Off and Squaring of a Building

3.3   Summary

3.4   Answers to SAQs

3.1 INTRODUCTION

In the previous unit, you have learnt about order of taking off and points to be kept in view while taking off. Similarly, you have studied the drawings of given building and its specifications and based on the same you have prepared a list of items involved in each trade from excavation to finishing.

In this unit, we shall start the actual operation of taking off quantities and squaring in respect of each item involved. As you have learnt hereinbefore the first step will be to measure and record dimensions (take off) in respect of items involved in foundation and plinth. The second stage will be further to measure and record dimensions (take off) in respect of items involved in superstructure in the order of construction, up to finishing stage.

Objectives

After studying this unit, you should be able to

- prepare a take off and square the dimensions in respect of any other building, in a systematic way, when drawings and specifications are made available to you.

3.2 TAKE OFF AND SQUARING OF A BUILDING

Take off and squaring of a building referred in Unit 2 hereinbefore is attached as **Appendix B,** at the end of this unit.

SAQ 1 ?

Get a complete drawing of a simple building, with all details and take off and square the same keeping in view all steps mentioned hereinbefore and the example drawing attached as **Appendix 'A'** and details in **Appendix 'B"**

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3.3 SUMMARY

In this unit, an attempt has been made to explain

- as to how a take off and squaring of dimensions operations in respect of a complete building is prepared, and

- as to how the description of each item and the dimensions of each measurement are worked out in Column No. 4 of Dimension sheet.

3.4 ANSWERS TO SAQs

Refer the relevant preceding text in the unit or other useful books on the topic listed in the section 'Further Reading' given at the end to get the answers of SAQs.

3.5 APPENDICES

Appendix B (58 sheets).

Take Off and Squaring of a Building

			Sheet-1
			Stage I – Foundation & Plinth
			Item No. 1
	14.00 <u>15.00</u>	210.00	Surface excavation n.exc (not exceeding) 30 cm deep and averaging 15 cm deep and getting out in soft soil. L = 8000 + 3000 + 3000 = 14000 mm W = 9000 + 3000 + 3000 = 15000 mm sq. m.
			Item No. 2
			Excavation in trenches, n.exc 1.5 m wide and n.exc.1.5 m in depth for foundation and getting out in hard soil Depth = 900 mm For Column footings For Col. C1 size of footing 2000 × 2000 mm
8/	2.00 2.00 <u>0.90</u>	28.80	Nos. = 8 Nos.
4/	1.50 1.50 <u>0.90</u>	8.10	For Col. C2 Size of footing 1500 × 1500 mm Nos. = 4 Nos.
			For Walls Centre line of long walls (Ext) (top) 8000 <u>(−) 230</u> 7770 mm
			Deduct for footings C1 2 × 0.5 × 2000 <u>(−) 2000</u> mm C2 1 × 0.5 × 1500 <u>(−) 750</u> mm 5020 mm (A)

			Centre line of cross wall (ext) (RHS)
			                                        9000
			                                        <u>(−) 230</u>
			                                        8770 mm

			Deduct for footings C1 (0.50 + 2 + 0.50) × 2000 <u>(−) 6000</u> mm 2770 mm (B)

			Centre line of cross wall (Ext) (LHS)
			                                        9000 mm
			                                        <u>(−) 230</u> mm
			                                        8770 mm

		36.90	Deduct for footings C2 (0.50 + 2 + 0.50) × 1500 <u>(−) 4500</u> mm C/O 4270 mm (C)

			Sheet-2
		36.90	B/F
			Centre line for long wall (Ext) (bottom)
			Same as (A) on Sheet 1 5020 mm (D)
	17.08		(A) + (B) + (C) + (D) = 17080 mm
	0.68		Width = 380 mm
			150 mm
	0.90	10.45	<u>150 mm</u>
			cu.m. 680 mm
			Internal long wall between rest room and verandah
			C/C length 2270
			(+) <u>230</u>
			2500 mm
	0.75		Deduct for footing
	0.68		C2 0.5 × 1500 (−) 750 mm
	0.90	0.46	C1 0.5 × 2000 (−) <u>1000 mm</u>
			750 mm
			Internal cross wall between DG Set room and toilet, verandah and rest room
	2.77		
	0.68		Length same as 'B' above
	0.90	1.70	cu.m.
			Add for steps in front of verandah
			Length = 300 + 300 + 100 = 700
			(−) <u>150</u> (Offset of wall PCC)
			550
			Width = 1000 Depth = 150
	0.55		(+) 100 (+) <u>100</u>
	1.20		(+) <u>100</u> 250 mm
	0.25	0.17	cu.m. 1200 mm
			For <u>cross walls</u> of ramp
			Length 1000 + 115 = 1115 mm
			Deduct wall fdn 0.5 × 680 (−) <u>340</u> mm
2/	0.775		775 mm
	0.58		W = 380 + 100 + 100 = 580 mm
	0.45	0.40	cu.m. Depth = 450 mm
			Front Toe 2960 − 380 = 2580 C/C
	2.00		Deduct for wall portion
	0.15		2 × 0.50 × 580 (−) <u>580</u>
	0.45	<u>0.14</u>	cu.m. W = 150 mm 2000
		50.22	cu.m. Depth = 450 mm

			Sheet-3

Item No. 3

- Ditto – as per item No.2 above but getting out in soft rock – ditto -

For column footing
     Footing for Col. **C1,** size 2000 x 2000 mm

	2.00		Depth = 1150
	2.00		(−) 900
	0.25	8.00	cu.m. 250 mm
4/	1.50		Footing of Col C2, size 1500 x 1500 mm
	1.50		Depth same **as** for C1
	0.25	2.25	cu.m.
		10.25	cu.m. Total

Item No. 4

Cement concrete in foundations, filling and mass concrete type D2 1 : 4 : 8 (40 mm graded aggregate)

8/	2.00		For lean concrete below footings
	2.00		Depth = 100 mm
	0.10	3.20	For footings of C1
4/	1.50		For footings of C2
	1.50		
	0.10	0.90	
			For walls
	17.08		External length and breadth **as** before
	0.70		Depth = 150 mm
	0.15	1.79	
			Internal long wall between rest room and verandah
	0.75		
	0.70		
	0.15	0.08	
			Internal cross wall between DG Set room and toilet, verandah, Rest room
	2.77		
	0.70		
	0.15	0.29	cu.m.
		6.26	C/O

			Sheet-4
		6.26	B/F
	0.70 1.20 0.10	0.08	**For** Steps of Verandah Length = 700 mm (up to wall) Width = 1200 mm Depth = 100 mm
21	0.925 0.58 0.10	0.11	For Cross **Walls of Ramp** Length = 775 mm 150 mm (**upto** wall) 925 mm Width = 580 Depth = 100
	2.00 0.15 0.35	0.11	**Toe** Concrete ·**Length** = 2000 mm Width = 150 mm Depth = 450 mm (−) 100 mm floor 350 mm
		6.56	**cu.m.** Total

Item No. 5

Reinforced cement concrete in footings and plinth beams **with** cement concrete type B1 1 : 2 : 4 (20 mm graded **aggregate**)

8/	2.00 2.00 0.30	9.60	**Footings** of column C1 Size − 2000 x 2000 mm Depth − 300 mm
41	1.50 1.50 0.30	2.70	Footing of Column C2 Size 1500 x 1500 mm Depth − 300 mm
21	8.085 0.40 0.15	0.97	Size of plinth beams 400 x 150 mm On long walls 7700 **C/C** Add (+) . 200 (+) 115 8085
	2.185 0.40 0.15	0.13	FB for internal long wall between rest room and verandah Length 2500 **C/C** (−) 115 (−) 200 2185 mm
		13.40	C/O

		13.40	**Sheet-5**

		13.40	B/F
			Cross walls of DG Set Room and other 8770 C/C
31	8.08		2 x 230 (–) 460
	0.40		2 x 0.5 x 230 (–) 230
	0.15	1.45	8080 mm
		14.85	cu.m. Total
			Item No. 6
			Reinforced Cement Concrete in columns
			Cement Concrete Type B1 1 : 2 : 4 (20 mm graded aggregate)
81	0.23		Column C1 size 230 x 400
	0.40		Height upto GL = 1150
	0.75	0.55	(–) 300
			(–) 100
			750 mm
81	0.23		
	0.40		Height GL to plinth 450
		0.17	Deduct for flooring of DG Set room (–) 75
			Deduct for plinth beam (–) 150
			225 mm
41	0.23		
	0.23		Column C2 size 230 x 230 mm
	0.75	0.16	Heights same as for C1
41	0.23		
	0.23		
	0.225	0.05	
		0.93	
			cu.m. Total
			Item No. 7
			(a) Formwork to side of columns, rough finished surfaces of concrete square, rectangular
			For Column C1, girth 230
			400
81	1.26		630 x 2 = 1260 mm
	0.75	7.56	Height upto GL 750 mm
			For Column C2 230 x 4 = 920 mm
41	0.92		
	0.75	2.76	Height same as C1
		10.32	
			m² Total

Contd . . .

			Sheet-6
			Item No.7
			(b) -ditto- same as (a) above but fair finished surfaces
8/	1.26		For Column C1 height = 225 mm above GL
	0.225	2.45	
4/	0.92		
	0.225	0.83	For Column C2
		3.28	sq.m. Total
			Item No.8
			Formwork to sides of plinth beams rough finished surfaces of concrete, flat
			Externally
2/	8.17		Long walls 7770 C/C
	0.15	2.45	(+) 400
			8170 mm
2/	9.17		Cross walls 8770 C/C
	0.15	2.75	(+) 400
			9170 mm
			Internally
			DG Set Room
2/	4.87		Long walls 5270 C/C
	0.15	1.46	(−) 400
			4870 mm
2/	8.37		Cross walls 8770 C/C
	0.15	2.51	(−) 400
			8370 mm
			Rest Room
	9.26		2500 − 400 = 2100
	0.15	1.39	2923 − 400 = 2523
			4623
			× 2
			9246 mm
			Ver 2100
	9.25		2924 − 400 = 2524
	0.15	1.39	4624
			× 2
			9248
	9.25		Adjacent to toilet Same as in Rest Room
	0.15	1.39	
		12.34	sq.m. Total

			Sheet-7
			Item No. 9
			4
			Mild steel bars 10 mm dia. and over, cut to length, bent to shape required including cranking, bending, etc. including binding with MS wire (annealed) not less than 0.9 mm dia., deformed or twisted bars in reinforcement.
			Reinforcement for footings – for both footings 12 mm Tor steel 150 C/C both ways
			Footing for C1, Length of bar 2000
			Cover 2 x 50 (–) 100
			1900 mm
			No. of bars 1900 + 1 = 14 Nos. both sides
8/2/14/	1.90	425.60	150
			Footing for C2, Length of bar 1500
	_I_		Cover 2 x 5 0 (–) 100
			1400 mm
			No. of bars 1400 + 1 = 10 Nos. both ways
			150
	1.40	112.00	R.Metre
4/2/10/			
		537.6	R.Metre
			@ 0.888 kg/mtr
			477.39 kg
			Vertical Reinforcement of Column for Column C1 – 4 Nos. 16 mm dia Tor steel
	.-		Vertical length upto GL 450
			1150 GL
			PCC (–) 100
			Cover (–) 50 975
			Ftg bars (–) 25
			975 mm 300
			16 mm dia tor steel total length 300
			975
1.725	55.20	R. Metre	450
			@ 1.58 kg/mtr 1725 mm
8/4/			87.22 kg
			For column C2 4 Nos. 12 mm dia Tor steel
			Same as vertical bars of C1
	1.725	27.60	R. Metre 12 mm dia Tor steel
			@ 0.888 kg/mtr
4/4/			24.51 kg
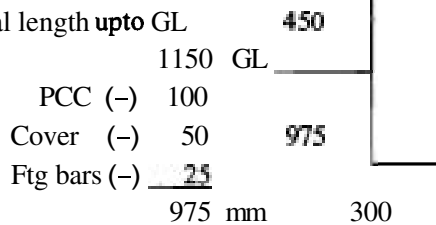
Contd . . .

33

			Sheet-8
			Reinforcement for plinth beams 12 mm dia. Tor steel,

Reinforcement for plinth beams 12 mm dia. Tor steel,

         3 Nos at bottom

         <u>2 Nos</u>. at Top

         5 Nos.

<u>On</u> long walls

   Length of bars   7770 **C/C**

        (+) <u>400</u>

        8170

   Less cover 2 x 25 (−) <u>50</u>

12 mm dia. Tor steel   8120

| 2/5/ | 8,12 | 81.20 | |

<u>On</u> cross walls

   Length of bars   8770 **C/C**

        (+) <u>400</u>

        9170 mm

   Less cover 2 x 25 (−) <u>50</u>

        9120 mm

<u>12 mm dia</u>

| 3/5/ | | 136.80 | |

<u>On</u> Internal, Plinth beams of rest room and verandah

   Length of bars   2500 **C/C**

        (+)<u>400</u>

        2900

   Less cover 2 x 25 (−) <u>50</u>

 12 mm dia   <u>2850</u> mm

2/5/	2,85	28.50	
		———	
		246.50	R.Metre @ 0.888 **kg/metre**

218.89 kg

kgs Grand Total C.O. to Abstract

| | | 808.01 | |

Item No.10

ditto- as per item **No.9** above, but 5 mm dia and over and including 10 mm dia in stirrups, spacers and binders, etc. using deformed or twisted bars

8 mm dia. Tor steel in links for Columns @ 150 mm C/C, concrete cover 40 mm

for Column **C1**   230 − 80 (cover). = 150

              400 − 80 (cover) = <u>320</u>

                             470

                             940

        2 × 12 × 8   (+)<u>192</u>

                         <u>1132</u> mm

				Sheet-9
				For C1 vertical Height = 975 + 450 = 1425 mm
8/10	1.132	90.56	R. Metre	No. of Links = $\dfrac{1425}{150}$ + 1 = 10 Nos.
				For C2 230 − 80 (Cover) = 150
				$\times \underline{\;4\;}$
				600
				$2 \times 12 \times 8 \qquad = \underline{192}$
				792 mm
4/10	0.792	31.68	R. Metre	•
				No. of Links = for plinth beams
				8 mm dia Tor steel @150 C/C Concrete Cover 25 mm
				Length 400 − 50 = 350
				150 − 50 = $\underline{100}$
				450 mm
				$\times \underline{\;2\;}$
				900
				$2 \times 12 \times 8 \qquad = \underline{192}$
				1092 mm
				No. of Stirrups
				<u>DG Set Room</u>
				On long wall 5270 − 400 = 4870 ÷ 150 +1 = 33
				2923 − 400 = 2523 ÷ 150+ 1 = 18 × 2 = 36
				On cross wall
				2924 − 400 = 2524 ÷ 150 + 1 = 18 × 2 = 36
				2923 − 400 = 2523 ÷ 150 + 1 = 18 × 2 = 36
				Rest RM, Ver and Toilet Walls
				On long walls 2500 − (200 + 115) = 2185 ÷ 150+1 = 16
				16
				16
				Cross wall − same as for DG Set Room on wall <u>108</u>
				Total 330 Nos.
330/	1.092	360.36	R. Metre	
		482.60	R. Metre @ 0.395 kg/mtr	
		190.63	kg	

Sheet-10

Item No. 11   --

M and L walling of random rubble, uncoursed, well bonded,
bedded and solidly hearted, built in cement mortar (1 : 6)

Masonry in foundation and plinth

Height upto GL =	**900**
PCC (−)	150
	750

External long walls

Length	= **7770** mm C/C
Deduct for Column portion (−) =	**200**
(−) =	115
	7059

2/	7.059	
	0.40	
	0.75	4.24

cu.m.

External and Internal cross walls

Length	= **8770** mm C/C
Deduct for Columns (−) =	115
(−) =	230
(−) =	230
(−) =	115
	8080 mm

3/	8.08	
	0.40	
	0.75	7.27

Internal long wall between Rest Room and Ver.

Length	= 2500
(−)	200
(−)	200
	2100

	2.10	
	0.40	
	0.75	0.63

Add for side covers to columns **C2**

4/2/	0.23	
	0.075	
	0.75	0.10

Add for side covers to end columns **C1**

4/	0.40	
	0.075	
	0.75	0.05

For side walls of Ramp

Height =	**450**
(−)	100
	350 mm + 275

Length	1230	
Less Toe (−)	200	$\dfrac{350 \text{ mm} + 275}{2}$
(−)	150	= 312.5 mm
	880 mm	

Masonry for Toe side walls

Height =	450
Floor (−) =	75
P.B. (−) =	150
	275 mm

2/	0.88	
	0.40	
	0.31	0.22
		12.51

C/O

		12.51	B/F
2/	7.059		Ext. long walls
	0.40		
	0.275	1.55	
3/	8.08		External and internal cross walls
	0.40		
	0.275	2.67	
	2.10		Int. long wall
	0.40		
	0.275	0.23	
4/2	0.23		Add for side cover
	0.075		
	0.275	0.04	
4/	0.40		
	0.075		
	0.275	0.03	
2/½	0.88		Add for side walls of ramp
	0.40		Max height = 375 mm
	0.375	0.13	
		17.16	cu.m.

Item No. 12

Extra over walling for hammer dressing to face stones and dressing of face beds and joints as specified, of RR walling uncoursed, with maximum depression on face from straight edge held against the dressed surface not exceeding 40 mm, granite or trap stone.

External face of wall

Long wall	7700 + 400	= 8170	
Cross wall	8770 + 400	= 9170	
		17340	
		× 2	
		34680 mm	
Deduct for	Steps	(−)	1000
	Ramp	(−)	3000
Column faces 4 × 230		(−)	920
Height = 275 mm			29760

	29.76		
	0.275	8.18	

For side walls of ramp

2/½/	0.88		
	0.375	0.33	
		8.51	sq.m.

			Sheet-12
			Item No. 13
			External angles (for quoins) in facings for walling of random rubble uncoursed
			For Four corners of the building
			Height above GL = 275 mm
4/	0.265	1.10	R.Metre
			Item No. 14
			Brickwork with sub class 'B' bricks, straight in cement mortar 1 : 6
	1.00		In steps
	0.60		Upto GL height = 150 mm
	0.15	0.09	
	1.00		Above GL – first step
	0.60		
	0.10	0.06	
	1.00		Second step
	0.30		
	0.14	0.04	
		0.19	cu.m.
			Item No. 15
			Spreading and leveling in layers not exceeding 25 cm thick, well ramming including watering as required
			For DG Set Room
			Depth of filling = 450 mm
			Less flooring (−) 75 mm
			Sub base (−) 75 mm
			300 mm
			Length 5270 mm
			(−) 400
			4870 mm
			Width 8770 mm
			(−) 400 mm
			8370 mm
	4.87		
	8.37		
	0.30		
		12.23	C/O

		12.23	**B/F**

<div align="center">

Sheet-13

</div>

			Rest Room
			Length 2500 mm C/C
			Wall (−) 400
			2100 mm
			Width 2923 mm C/C
			(−) 400 mm
			2523 mm
2.10			Depth 420 mm
2.52			Less flooring (−) 42 mm
0.30	1.59		Sub base (−) 75 mm
			303 mm
			Verandah
			Length same as Rest Room
2.10			Width 2924 mm
2.52			
0.30	1.59		(−) 400 mm
			2524 mm
			Toilet Portion
2.10			Depth 420 mm
2.52			Flooring (−) 18
0.33	1.75		Sub base (−) 75
	17.16		**cu.m.** Total 327 mm

Item No. 16

Returning, filling in, including spreading, levelling, watering and
well ramming in layers n.exc. 25 cm
        In Hard soil

	50.22		Excavation in Hard Soil (Item No. 2)
	10.25		Excavation in Soft Rock (Item No. 3)
	60.47		Total
	(−) 6.56		PCC in foundation (Item No. 4)
	(−) 14.85		RCC footings (Item No. 5)
	(−) 0.55		C1 RCC Columns upto GL (Item No. 6)
	(−) 0.16		C2
	(−) 12.51		RR walling upto GL (Item No. 11)
	(−) 0.09		Brickwork upto GL (Item No. 14)
	(−) 34.72		
	25.75		**cu.m.** Balance
	(−) 2.58		Deduct 10 %
	23.17		**cu.m.** Net Qty of RFR

			Sheet-14

Item No. 17

Removing excavated material n.exc.50 m and depositing where directed at a level n. exc. 1.5 m above the starting point in soils

	210.00 0.15	31.50	Qty of Item No.1　　= 210 Sq. m. 　　　Av. Depth of surface excn = 15 cm cu.m.

Item No. 18

-ditto- as item No.17 above but lead 200 m to 250 m

	50.22	Qty of Excavation in soil (Item No. 2)
	(-)17.16	<u>Less</u> Filling under floor in soil (Item No. 15)
	(-)23.17 (-)40.33	RFR in soil (Item No. 16)
	9.89	cu.m. Net

Item No. 19

-ditto- as per item No.16 above but soft rock

	18.25	cu.m.　Qty same as excavation in soft rock (Item No. 3)

Item No. 20

Cement concrete type C2 1 : 3 : 6 (40 mm graded aggregate) in Sub base 75 mm thick

	4.87 8.37	40.76	DG Set Room sq.m.
2/	2.10 2.523	10.60	Rest Room and Toilet
	2.10 2.524	5.30	Verandah
	2.20 1.05	2.31 58.97	Ramp 　Length 1200 – 150 = 1050 sq.m.

Stage – II Superstructure

Item No. 6

Reinforced cement concrete in columns with cement concrete
type B1 1 : 2 : 4 (20 mm graded aggregate)

Column C1 – size 230 × 400 mm
Ht from Plinth Beam (PB) to soffit of roof slab

```
                4600
                  75
                4675
Less slab (–) 150
                4525
```

Column C2   Size 230 × 230 mm

Ht from PB to soffit of roof slab = 3200

```
                        75
                      3275
Less slab      (–) 120
              3155 mm
```

cu.m.

Item No. 7(b)

Formwork to sides of columns fair finished surfaces of
concrete, square or rectangular

For C1 230 + 400 = 630 × 2 = 1260 mm

For C2 4 × 230 = 920 mm

sq.m.

Item No. 9

MS bars 10 mm dia and over, cut to length, bent to shape
required including cranking bending, etc. including binding
with MS wire, etc. Deformed or twisted bars in reinforcement

For C1 Vertical Reinforcement 4 Nos. 16 mm dia

```
Height above FFL  = 4600
Lap 60 × 1        =  960
                    5560 mm
```

R. Metre @ 1.58 kg/mtr

281.11 kg

For C2 Vertical reinforcement 4 Nos 12 mm dia

R. Metre @0.888 kg/mtr

```
Height above FFL  = 3200
Lap 60 × 12       =  720
                    3920 mm
```

55.70 kg   Total

kg Total

2/4	0.23		
	0.40		
	4.525	3.33	
4/	0.23		
	0.23		
	3.155	0.66	
		3.99	
2/4	1.26		
	4.525	45.61	
4/	0.92		
	3.155	11.61	
		57.22	
2/4/4/	5.56	177.92	
4/4	3.92	62.77	
		336.81	

			Sheet-16
			Item No. 10
			-ditto- as per Item No. 9 above, but 5 mm dia and over and including 10 mm in stirrups, etc. using deformed or twisted bars
			Links for C1, 8 mm dia @ 150 C/C
			Length as before 1092 mm
			Height upto beams = 4600 mm
			RB1 beam depth (−) 450
4/28/	1.092	122.30	4150 mm
			No. of links 4150 ÷ 150 = 28 Nos.
			For columns of Int. cross wall
			Height upto first beam = 3325
			RB1 Beam (−) 450
			2875
			No. of Links 2875 ÷ 150 = 19 Nos.
			Height above Ver slab = 4150
			(−) 3325
			No. of Links 825 ÷ 150 = 6 Nos. 825 mm
4/25/	1.092	109.20	Total Links 19 + 6 = 25 Nos.
			For Col C2, 8 mm dia @ 150 C/C
			Length = 792 mm as before
			Height upto beam = 3200 mm
			RB1 (−) 250
			2950 mm
4/20/	0.792	63.36	No. of Links 2950 ÷ 150 = 20 Nos.
		294.86	R.Mtr
			@ 0.395 kg/mtr
		116.47	kg Total
			Item No. 21
			Reinforced cement concrete in beams and lintels above 1.5 m clear span with cement concrete Type B1 1 : 2 : 4 (20 mm graded aggregate)
			Roof Beam RB1 (size 230 × 450) − 4 Nos.
			Clear span 5270 mm C/C
			(−) 400 mm
			4870 mm
			Depth = 450 mm
			·Slab (−) 150 mm
4/	4.87		300 mm
	0.23		
	0.30		
		1.34	cu.m.
		1.34	C/O

		1.34	B/F

Roof beam RB 2 size 230 × 250 mm

Beams at lower level in Rest Room, Ver and Toilet
(Supporting RS2)

long side beam clear span   2500 C/C

C2 (−) 125

C1 (−) 200

2175 mm

2/	2.175		
	0.23		
	0.13	0.13	

Depth d   = 250

S2 (−) 120

cu.m.   130 mm

Cross side beams clear span (end beams)

2923 C/C

C1/C2 (−) 115

C1/C2 (−) 115

Depth same as above   2693 mm

2/2/	2.693		
	0.23		
	0.13	0.32	

cu.m.

Cross side beam clear span (middle beam)

2924 C/C

C1/C2 (−) 115

C1/C2 (−) 115

Depth same as above   2694

2/1/	2.694		
	0.23		
	0.13	0.16	

cu.m.

Beams at top roof level in DG Set Room
(Supporting slab RS1)

Clear span same as above

Depth = 250

RS1 (−) 150

100 mm

2/2/	2.693		
	0.23		
	0.10	0.25	

cu.m

2/1/	2.694		
	0.23		
	0.10	0.12	

cu.m.

Lintel Beam LB   size 230 × 250 mm

Below lower slab level, i.e. RS 2

4/	2.175		
	0.23		
	0.25	0.50	

Long side LB clear span same as above, i.e. = 2175 mm
Nos. = 04 Nos., depth = 250 mm

2/4/	2.693		
	0.23		
	0.25	0.62	

Cross side LB clear span same as
above, i.e. = 2693 mm (end span)

2/1/	2.694		
	0.23		
	0.25	0.31	

for middle span same as above = 2694 mm

		3.75	C/O

		3.75	**B/F**

Sheet-18

Lintel beam L below roof slab RS1 level

Ldng side beam clear span same as RB1, i.e. = 4870 C/C

2/	4.87		
	0.23		
	0.25	0.56	cu.m.

LB cross side beams, clear spans same as LB at lower level

2/	2.693		
	0.23		
	0.25	0.31	cu.m.
1/	2.694		
	0.23		
	0.25	0.15	cu.m.
		4.77	cu.m. Total

Item No. 22

Formwork to sides and soffits of floor or roof beams, lintels etc, Plat fair finished surface

RB1   L = 4870 mm **a.b.**

Girth   Soffit   230
          Side   300
          Side   300
                    830 mm

4/	4.87		
	0.83	16.17	sq. metre

RB2 at RS2 Level
  Long side beam L = 2175 mm **a.b.**

                    Girth Soffit   230
                           Side   130
                           Side   130
                                     490 mm

21	2.175		
	0.49	2.13	sq. metre.

Cross side beams
        Clear span 2693 mm (a.b.)
        Girth = 490 mm (a.b.)

2/2/	2.693		
	0.49	5.28	sq. metre

        Clear span 2694 mm (a.b.)
            Girth = 490 mm (a.b.)

2/11	2.694		
	0.49	2.64	sq. metre
		26.22	C/O

		26.22	B/F
			For Beams at RS1 level
			Clear span 2693 mm (a.b)
			and 2694 mm (a.b.)
			Girth soffit 230 mm
2/2/	2.693		Side 100 mm
	0.43	4.63	sq. m. Side 100 mm
			430 mm
2/1/	2.694		
	0.43	2.32	sq. m.

For LB

At lower level
Long side clear span = 2175 (a.b.)

			Girth soffit 230
2/	2.175		Side 250
	0.73	3.18	sq. m. Side 250
			730 mm

Cross side clear span 2693 and 2694 (a.b.)

2/2/	2.693		
	0.73	7.86	sq. m.
2/1/	2.694		
	0.73	3.93	sq. m.

At below Roof slab RS1 (higher level)

2/	4.87		
	0.73	7.11	sq. m. Long side clear span 4870 (a.b.)
			Girth = 730 mm as above

Cross side clear span 2693 and 2694 a.b.

2/	2.693		
	0.73	3.93	sq. m.
1/	2.694		
	0.73	1.97	sq. m.

		61.15	Total

Deduct for chajja portion

	2.60		Canopy over RS (opening 2200)
	0.08	(-)0.21	Add for bearing 2 × 200 400
			2600

Chajja W4 on external walls
Opening 1200 (5 Nos.)
Add for bearing 2 × 150 (+) 300

			1500 mm
5/	1.50		
	0.08	(-)0.60	
		(-)0.81	
		60.34	sq. m. Net

			Sheet-20
			Item No. 9

Item No. 9

MS bars 10 mm dia and over, cut to length, bent to shape
required, etc. complete, deformed or twisted bars in
reinforcement

Reinforcement for RB1
Bottom bars − 4 Nos. 20 mm dia
Top bars   − 12 Nos. 20 mm dia
Stirrups 10 mm dia @ 150 mm C/C/
Length of bottom bars −   5270 mm C/C
(+) __400__ mm
5670 mm
Less cover 2 x 25   (−) __50__ mm
5620 mm
Length Top bars same as bottom bar

2Omm dia bars

4/6/	5.62		
		134.88	R. Metre
			@ 2.47 **kg/mtr**
		__333.15__	kg

Reinforcement for **RB2/LB**
Bottom bars   2 Nos. − 12 mm dia
1 No.   − 16 mm dia

Top bars   2 Nos. − 12 mm dia
Stirrups 8 mm dia @ 150 mm C/C for **RB2** supporting RS2

Length of bottom bars   2500 mm C/C
% C2 = 115
½ C1 = __200__
2815 mm
Less cover 2 x 25   (−) __50__ mm
2765 mm

16 mm dia bars

2/11	2.765	5.53	R.Metre
			@ 1.58 **kg/mtr**
		__8.74__	kg

12 mm dia bars

2/41	2.765	22.12	R.Metre
			@ 0.888 **kg/mtr**
		__19.64__	kg

LB below **RB2**
Qty same as RB2

		8.74	kg 16 mm dia bars
		19.64	kg 12 mm dia bars
		__389.91__	kg **C/O**

Contd . . .

		389.91	B/F
			Cross side beams **(RB2)** and LB
			Bottom bars
			1 − **16** mm dia length **9000** mm (Overall)
			Less cover **2 x 25** (−) **50** mm
			8950 mm
			Continuous **RB2** at **RS2** level − **2** Nos.
			-do- -do- at **RSI** level − **2** Nos.
			Continuous LB at LHS **&** middle − **2** Nos.
			-do- -do- at **RHS** − 1 No.
			7 Nos.
7/1/	8.95		**16 mm** dia bars
		26.65	**R.** Metre
			@ **1.58** kglmtr
		98.99	kg
7/4/	8.95		**12** mm dia bars
		250.60	**R.** Metre
			@ **0.888 kg/mtr**
		222.53	kg
			LB below **RBI** − **2** Nos.
			Length as before for **RB1** **5620 mm**
2/1/	5.62		**16** mm dia bars
		11.24	**R.** Metre
			@ **1.58 kg/mtr**
		17.76	kg
·2/4/	5.62		**12** mm dia bars
		44.96	**R.** Metre
			@ **0.888** kglmtr
		39.92	kg
			kg Total

Sheet-22

Item No. 10

-Ditto- as per Item No. 9, but 6 mm dia and over, upto and including 10 mm dia in stirrups, etc using deformed or twisted bars

For RB1 (230 × 450 mm)

Stirrups 10 mm dia @ 150 mm C/C

$$
\begin{array}{rl}
& 230 \text{ mm} \\
\text{Cover } 2 \times 25 \ (-) & \underline{50} \text{ mm} \\
& 180 \text{ mm} \qquad \text{(A)}
\end{array}
$$

$$
\begin{array}{rl}
& 450 \text{ mm} \\
\text{Cover } 2 \times 25 \ (\times) & \underline{50} \text{ mm} \\
& 400 \text{ mm} \qquad \text{(B)}
\end{array}
$$

$$
\begin{array}{rl}
(A + B) \times 2 & = 1160 \text{ mm} \\
2 \times 12 \times 10 & = \underline{240} \text{ mm (bent up portion)} \\
& 1400 \text{ mm}
\end{array}
$$

10 mm dia

Nos. = 4870 mm ÷ 150 mm + 1 = 33 Nos.

R. Metre
@ 0.617 kg/mtr
kg

| 4/33/ | 1.40 | 184.80 | |
| | | 114.02 | |

For RB2/LB (230 × 250 mm)

Stirrups 8 mm dia @ 150 mm C/C

$$
\begin{array}{rl}
\text{Length } 230 - 50 & = 180 \\
250 - 50 & = \underline{200} \\
& 380 \text{ mm} \\
& \underline{\times 2} \\
& 760 \text{ mm} \\
2 \times 12 \times 8 & \underline{192} \text{ mm} \\
& 952 \text{ mm}
\end{array}
$$

Number as below

| For RB2 at RS2 level | 2175 ÷ 150 + 1 = 16 |
| | 16 |

RB2 at RS1 and RS2 level 2693 ÷ 150 + 1
= 19 × 8 = 152
2694 ÷ 150 + 1 = 76

LB below RS1 & RS2 level
2693 ÷ 150 + 1 = 15 × 6 = 114
2694 ÷ 150 + 1 = 19 × 3 = 57
LB below RB1 – 2 Nos. – 33 Nos. × 2 = 66
497 Nos.

R. Metre
@ 0.395 kg/mtr
kg
kg   Total

497/	0.952	473.44	
		186.89	
		300.91	

			Sheet-23

Item No. 23

Reinforced cement concrete in slabs supported on walls, beams etc in floors, roofs with cement concrete Type B1 1 : 2 : 4 (20 mm graded aggregate)

Roof slab at verandah level (RS2)

Span length	2500	C/C
½ C1	200	
½ C2	115	
Over hang	600	
	3415 mm	

Width　　　　　　　　9000.00 mm (Out – Out)
　　Side projection =
　　　　2 × 150 = 300
　　　　　　　　9300.00

3.445
9.30
0.12

Thickness = 120 mm

3.81	cu. m.

Roof slab RS-1 (thickness = 150 mm)

Span length	= 5270.00	C/C
2 × 115	= 230.00	
Over hang 2 × 600	= 1200.00	
Total	= 6700.00	

6.70
9.30
0.15

Width same as RS2

9.35	
13.16	cu. m.

49

Sheet-24

Item No. 24

Formwork to soffits of suspended slabs such as roof slabs and similar work not exceeding 200 mm thick, fair finished surfaces

	2.27		
	8.54		
		19.39	sq. m.
2/	3.33		
	0.15	1.00	sq. m.
	9.00		
	0.60		
		5.40	
2/	2.693		
	5.04	27.15	
	2.694		
	5.04	13.58	
2/	6.70		
	0.15	2.01	
2/	9.00		
	0.60	10.8	
		79.33	sq. m.

Soffits of RS2

Clear span   2500.00 C/C

(115 + 115)   (−) 230

           2270 mm

Cross length   =   8770.00 C/C

(115 + 115)   (−) 230.00

           8540 mm

Overhang portion

Side overhang of 150 mm

Length   = 2500 mm C/C

(115 + 115)   (−) 230 mm

Over hang   600 mm

           3300 mm

Front overhang of 600 mm

Length   = 9000 mm

Soffits of RS1

Clear spans (end)   = 2923 mm C/C

(115 + 115)   (−) 230 mm

           2693 mm

Length 5040 mm

Clear span (middle)   2924 mm C/C

(115 + 115)   (−) 230 mm

           2694 mm

Overhang of 150 mm

Length   = 5270 mm

(115 + 115)   230 mm

        2 × 600   1200 mm

               6700 mm

Overhang of 600 mm

Length   = 9000 mm (out − out)

Item No. 25

Formwork to edges of roofs not exceeding 20 cm wide, horizontal or sloping, fair finished surface of concrete

For RS2

Over all span length of slab

25.43	25.43	R. Metre	same as before in Item No.23	=	3415
			Overall cross width as in Item No.23	=	9300

				12715 mm
				× 2
			Girth	25430 mm

For RS1

Overall dimensions as in Item No.23 above are

			6700 mm
			9300 mm
32.00	32.00	R. Metre	16000
			× 2
	57.43	R. Metre Total	Girth 32000 mm

Item No.26

M.S. bars 6 mm to 8 mm dia, cut to length, bent to shape required including cranking, bending, etc. complete and binding including with MS wire (annealed) not less than 0.9 mm dia, using deformed or twisted reinforcement bars

For RS 2 (one way slab)

Short span   • 8 mm dia @ 200 mm C/C alternate cranked
             • Extra bar 8 mm dia @ 400 mm C/C at top in overhang portion

Distribution • 8 mm dia @ 200 mm C/C
             • Extra bar 8 mm dia @ 300 mm C/C at top in overhang portion.

Short span bars

(a)

Length	2730 mm
Cover (15 + 15) (−)	30 mm
	2700
Crank 0.41 × 90	36.90 mm
	2736.9 mm
rounded to	2737 mm

(b)

Length	= 2730 mm
Overhang	600
	3300 mm
Cover (15 + 15) (−)	30
	3300 mm
Add for crank	36.90
	3336.90 mm
Rounded to	3337 mm

29/	2.737	79.37	R. Metre	
				No. of bars = 8440 ÷ 150 + 1 = 58
29/	3.337	96.77	R. Metre	29 bars of each type
		176.14	C/O	

			Sheet-26
			R.Metre B/F
		176.14	
			Extra bar over hang
			Length 600 mm
			Cover (–) 15 mm
			585 mm
			Beam portion 230 mm
			Slab portion 0.15 x 2270 340.5 mm
			1155.5 mm
			rounded to 1156 mm
221	1.156		Nos. 8540 + 400 + 1 = 22 Nos.
		25.43	R. Metre
			Add one bar at each corner of length 1600 mm
21	1.60		
		3.20	R. Metre
			Distribution Reinforcement
			Length 9000 mm overall
			Cover 2 x 15 (–) 30 mm
			8970 mm
			Nos. = 2270 ÷ 200 + 1 = 12 Nos.
121	8.97		
		107.64	R. Metre
			Extra bars at overhang of 150 mm
			Length = 150 mm
			Cover (–) 15 mm
			135 mm
			Beam portion 230
			Slab portion 341 (as before)
			706 mm
2/10	0.706		Nos. = 2700 ÷ 300 + 1 = 10 Nos.
		14.12	R. Metre
			Distribution bars at top for overhang portion 8 mm dia @ 200 C/C for overhang of 150 mm, one bar each side
			Length 2730
2/11	3.30		600
		6.60 .	R. Metre 330 mm
			For overhang of 600 mm, Nos = 570 ÷ 200 = 23 Nos.
			Length 9300 mm
31	**9.27**		Cover (–) 30 mm
		27.81	R. Metre 9270 mm
		360.94	@ 0.395 kg/mtr
		142.57	kg C/O to Sheet-28

Contd . . .

52

Reinforcement for RS1 (One way slab)

Reinforcement short span • 8 mm dia @ 150 C/C

Distribution • 8 mm dia @ 200 C/C
• Extra bar 8 mm dia @ 200 C/C
at top in over hang portion

End span (2693 clear span × 5040) - 2 Nos.
Short span bars

(a) ———————————   Length   215
                                   2693
                                   230
                    0.30 × 2694   808
              For crank 0.41 × 120   49 mm
                                   3995 mm

(b) ———————————   Length   215
                                   2693
                                   230
                    (600 – 15)   585
                       Crank   49
                                   3772 mm

Nos. = 5040 ÷ 150 + 1 = 35 Nos.
(a) – 18 Nos.
(b) – 17 Nos.

Middle span (2694 × 5040) - No.
Short span bars

(a) ———————————   Length   215
                                   2694
                                   230
                    0.3 × 2694   808
                    For crank   49
                                   3996 mm

(b) ——————————— of same length being middle span

Nos. = 35 Nos. as before

Extra bars in over hang portion of end spans
                    Length 600 – 15 = 585
                              beam = 230
                    In slab 0.15 × 2693   404
                                   1219 mm

Nos. = 18 Nos. each side

R. Metre C/O

2/18	3.995	
		143.82
2/17	3.772	
		128.25
35/	3.996	
		139.86
2/18/	1.219	
		43.88
		455.81
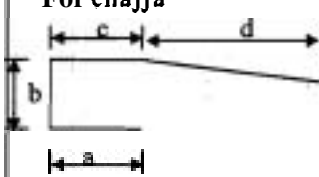
			Sheet-28
		455.81	R. Metre B/F
			Distribution bars of RS1
			Length 5040 mm
			(230 – 15) 215
			215
			5470 mm
			Nos. = 2693 ÷ 200 + 1 = 14 Nos. each
3/14/	5.47		For 2 end spans and one middle span
		229.74	R. Metre
			Extra bars in over hang position
			Length 700 – 15 = 685
			230
			0.15 × 2694 404 mm
2/3/16	1.319		1319 mm
		126.62	Nos. = 2923 ÷ 200 + 1 = 16 Nos. each span
4/	2.00		One bar of 200 mm for over hang
		8.00	
			Distribution bar for overhang
			For over hang of 15 mm No. of bars = 1 No.
			Length 5270
			230
			5500
2/1/	5.47	10.54	R. Metre (–) 30
			5470 mm
			For over hang of 600 mm No. of bars = 3 Nos each side
			Length = 9000
			300
			9300
2/31	9.27	55.62	(–) 30
		886.73	9270 mm
			R. Metre
			@ 0.395 kg/mtr
		350.26	kg
		142.57	B/F from Sheet-26
		492.83	kg Total
			Item No. 27
			Reinforced cement concrete in chhajjas with cement concrete type B1 1 : 2 : 4 (20 mm graded aggregate)
	2.60		RCC canopy 900 mm projection
	0.90		Length span 2200 mm
	0.07		Bearing 2 x 200 400
			2600 mm
		0.16	cu. m.
			Av. Thickness = (80 + 60) ÷ 2 = 70 mm
		0.16	C/O

0.07	0.32	cu. m.
	0.48	CU. m.

Item No. 28

Form work to chhajjas including edges fair finished surface of
concrete

     For canopy

          Length   = 2600 mm

      Soffit and front edge = 900 **mm**

                     60 **mm**

                 960 **mm**

	2.60	
	0.96	
		2.50
21	0.90	
	0.08	
		0.14

Side edges, length = 900 mm

        Width   = 80 mm **(max)**

For Chajjas

      Length   = 1500 mm

      Soffit and front = 600 mm

                   60 mm

              660 **mm**

5/	1.50	
	0.66	
		4.95
512	0.60	
	0.08	
		0.48

Side edges   length = 600 mm

             Width = 80 **mm (max)**

	8.07	sq. m.

Item No. 26

MS bars 6 mm to 8 mm dia, cut to length, bent to shape required
including cranking, etc. complete, using deformed or twisted
reinforcement bars

			Sheet30

For Canopy

8 mm dia cantilever bar length

c ⁻160 mm C/C

(a) 230 − 50 = 180
(b) 250 − 50 = 200

a (c) 230 − 25 = 205
(d) 900 − 25 = <u>875</u>
1460 mm

17/	<u>1.46</u>		
		24.82	R.M.

Nos. 2550 ÷ 160 + 1 = 17 Nos.

7/	<u>2.55</u>		
		17.85	

Distribution bars 8 mm dia @ 150 mm C/C
870 ÷ 150 + 1 = **7 Nos.**
Length   = 2550 mm

For chajja

(a) = 180
(b) = 200
b (c) = 205
(d) 600 − 25 = <u>575</u>
1160 mm

a

Nos. 1450 ÷ 160 + 1 = 10 Nos.

5/10	<u>1.16</u>		
		58.00	R. Metre

Distribution   8 mm dia @ 150 C/C
570 ÷ 150 + 1 = 5 Nos.
Length = 1450 mm

5/51	<u>1.45</u>		
		36.25	R. Metre
		<u>136.92</u>	R. Metre

@ 0.395 kg/mtr

		54.08	kg C.O. to Abstract

<u>Item **No.** 14</u>

Brickwork with sub class 'B' bricks, straight or curved on plan
exc. 6 m. mean radius with old size bricks, built in Cement
Mortar (1 : 6)

Rest Room walls
Long wall length   2500
(−)   115
(−) <u>200</u>
2185 mm

Height from top of P B to soffit LB = 2100

2/	2.185		
	0.23		
	<u>2.175</u>	2.19	cu. m. C/O

(+) = <u>75</u>
2175 mm

Contd . . .

		2.19	B/F

Cross wall length   = 2693

Wall above LB
Long wall height = $\dfrac{3200 + 3325}{2}$ = 3262.5 mm

			Less slab	(−)	120
			L.B.	(−)	250
			Upto LB	(−)	2100
					792.5 mm

2/ 2.185
0.23
0.72   0.79

	Cross wall height	3200
2.69	(−)	120
0.23	(−)	250
0.73 0.45	(−)	2100 mm
		730 mm

4.78

0.90
0.23
2.175   (−)0.45

Deduct for
PD3

W4   1200 × 1200
Height = 1200
Cill   80
1280 mm

1.20
0.23
1.28   (−)0.35
(−)0.80

3.98

Cu. M. C.O. to Summary on Sheet-34

2/ 2.185   Toilet portion
0.23   2.19 Long walls (PB to LB) same as Rest Room
2.175

2.69   Cross wall   - do -
0.23   1.35
2.175

2/ 2.185   Wall above LB
0.23   0.79   Long walls same as Rest Room
0.79

2.69   Cross wall
0.23   0.45
0.73   4.78 cu. m. C.O.

Sheet-32

		4.78	B.F.

Deductions

PD3

__W8__ (600 X 900)

	0.90		
	0.23		
2/	2.175	(-) 0.45	
	0.60		
	0.23		
	0.98	(-) 0.27	

Height = 900
Cill = __80__
980 mm

(-) 0.72 cu. m.
4.06 cu. m. Net C.O. to Summary on Sheet-34

DG Set Room

__Long walls__ length 5270 mm C/C
(−) __400__ mm Col
4870 mm

Rear long wall
Height from PB top to soffit of LB = 2175 mm

	4.87		
1/	0.23		
	2.175	2.44	cu. m.

Top of LB to Soffit of RB1

4600 mm

__Less__

	4.87		
	0.23		
	1.80	2.02	

Slab (−) 150 mm
RB1 (−) 300 mm
LB (−) 250 mm
Upto LB (−) __2100__ mm
1800 mm

Add for sloping portion of roof

Maximum height = $\dfrac{5040}{2 \times 20}$ = 126 mm

	4.87		
	0.23		
	0.06	0.07	

Av. Height = 126 ÷ 2 = 63 mm

4.53 cu. m.

__Deduct__ for window W4 (1200 x 1200)

Height = 1200 mm
Cill = __80__ mm
1280 mm

	1.20		
	0.23		
	1.28	(-) 0.35	

4.18 cu. m. Net C.O. to **Summary** on sheet-34

			Long wall front
			Height up from <u>PB to LB</u>
			Above FFL 3000 mm
			FFL above PB <u>75</u> mm
			3075 mm
			Length same as rear wall
	4.87		
	0.23		
	<u>3.075</u>	3.44	cu. m.
			Height above <u>LB top</u> to <u>RB1</u> 4600 mm
			RS1 (–) 150 mm
	4.87		RB1 (–) 300 mm
	0.23		LB (–) 250 mm
	<u>0.90</u>	1.01	Upto LB (– <u>3000</u> mm
			900 mm
	4.87		
	0.23		Add for sloping portion
	<u>0.06</u> av	<u>0.07</u>	
		4.52	
			Deduct
	2.20		For Rolling shutter (2200 x 3000)
	0.23		Height = 3000
	<u>3.075</u>	(-)1.56	Floor = <u>75</u>
			3075 mm
		<u>2.96</u>	cu. m. Net C.O. to **Summary** on **Sheet-34**
			<u>Cross walls</u>
			Length 2923 − 230 = 2693
			2924 − 230 = 2694
2/	8.08		2923 − 230 = <u>2693</u>
	0.23		8080 mm
	<u>2.175</u>	8.08	Height **upto** LB = 2175 (as per rear long wall)
2/	8.08		**Height** from LB top to RR2 = 4600 mm
	0.23		RS1 (–) 150 mm
	<u>2.00</u>	2.43	RB2 (–) 100 mm
		15.51	LB (–) 250 mm
			Upto LB (–) <u>2100</u> mm
			2000 mm
	1.00		<u>Deduct for</u>
	0.23		PD2 (1000 x 2100)
	<u>2.175</u>	(-) 0.50	Height = 2100
			<u>75</u>
			2175

For W4 (1200 × 1200)

Height   1200
Cill   80 mm
         1280 mm

5/	1.20		
	0.23		
	1.28	(-) 1.77	

For V2 (1200 × 600) 6 Nos (3 + 3)

Height = 600
Cill   = 80
        680 mm

6/	1.20		
	0.23		
	0.68	(-) 1.13	
		(-) 3.40	cu. m.
		12.11	cu. m. Net
		3.98	B.F from Sheet-31
		4.06	B.F. from Sheet-32
		4.18	B.F. from Sheet-32
		2.96	B.F. from Sheet-33
		27.29	cu. m. Total

Item No. 29

Brick work with sub class 'B' old size bricks straight or curved on plan in half brick walls built in cement mortar (1 : 4)

Partition walls in toilet

Long wall   2270 mm

Height $\frac{3200 + 3325}{2}$ = 3362.5 mm

	2.27		
	3.22		
		7.30	sq. m.

Slab   (−)   120.00 mm
                 75.00 mm
                3217.5 mm

Cross wall   length   = 1200 mm
                Height = 3248 mm

	1.20		
	3.20	3.84	

(−)   120 mm
(+)   75 mm
         3203 mm

		11.14	sq. metre

Deduct

For L 2270 + 1200 = 3470 mm

	3.47		
	0.10	(-) 0.35	

For PD 8

2/	0.80		
	2.13	(-) 3.40	
		(-) 3.75	
		7.39	sq. m. Net

Item No. 30

Providing reinforced cement concrete in lintel bands with
concrete type BI 1 : 2 : 4 (20 mm graded aggregate)

2 Band over partition wall at L level

	3.77			Length = 2270 + 100 + 100 + = 2470 mm
	0.115			Cross = 1200 + 100 — 1300 mm
	0.10	0.04	cu. m.	3770

Item No. 26

MS bars 6 mm to 8 mm dia, cut to length, bent to shape, etc.
complete and binding with M. S. wire complete using deformed
or twisted reinforcement bars

2/	2.44		
2/	1.27	4.88	8 mm dia Length = 2470 – (15 + 15) = 2440 mm
			1300 – (15 + 15) = 1270 mm
		2.54	
		7.42	R. Metre
			@ 0.395 kg/mtr
		2.93	kg C. O. to Abstract

Item No. 10

-Ditto- but 6 mm dia and over upto and including 10 mm dia in
stirrups, spacers and binders using deformed or twisted bars

8 mm dia @ 150 C/C

Length of spacers 115 – 30 = 85 mm

			No. = 2440 ÷ 150 + 1 = 17 Nos.
26/	0.085		R.Metre 1270 ÷ 150 + 1 = 9 Nos.
		2.21	@ 0.395 kg/mtr 26 Nos.
		0.87	kg · C.O. to Abstract

Item No. 31

Pressed steel frames for doors with one rebate including
necessary fixing lugs, hinges, lock strike plate, etc. complete, as
specified, supplied and fixed, size of frame 105 × 60 mm

			PD2 – (1000 × 2100) – 1 No.
1/	5.30	5.30	R. Metre Top member 1000 mm
			Verticals 2 × (2100 + 50) 4300 mm
			5300 mm
			PD3 – (900 × 2100) – 2 Nos.
			Top member 900 mm
2/	5.20	10.40	Vertical 2 × 2150 4300 mm
			R. Metre 5200 mm
			PD8 – (800 × 2100) – 2 Nos.
2/	5.10		Top member 800
		10.20	R. Metre Vertical 2 × 2150 4300
		25.90	R. Metre Total 5100 mm

			Sheet-36
			Item No. 32
			S and F steel windows, with side hung shutters including projecting type hinges with steel handle and peg stays, complete, with glazing bars, dovetailed and welded
6/	1.20 <u>1.20</u>		W4 – Size 1200 × 1200 mm 6 Nos.
		8.64	sq. m.
2/	0.60 <u>0.90</u>		**W8 – Size 600 x 900 mm 2 Nos.**
		1.08	sq. m.
		9.72	sq. m.
			Item No. 33
			S and F steel windows or ventilators, fixed type, with glazing bars
6/	1.20 <u>0.60</u>		V2 – 6 Nos. (1200 × 600)
		4.32	sq. m.
			Item No. 34
			S and F window guard bars, plain let in and fixed independently, conforming to Fe-410-0 or Fe-310-0
6/10/	<u>1.20</u>		For W4 – 10 Nos. horizontal, 12 mm Sq. bars
		72.00	R. Metre
2/7/	<u>0.60</u>		For W8 – 7 Nos. – do –
		8.40	R. Metre
6/5	<u>1.20</u>		For Ventilator – 5 Nos. – do –
		12.00	
		92.40	R. Metre @ 1.13 kg/metre
		104.41	kg

Item No. 35

Steel rolling shutters, without ball bearing, as specified including top cover, anchoring rod, hasp and staple and one shop coat of primer, erected in position as indicated complete, gear operated type with level gear box and crank handle

Opening size = 2200 x 3000 mm
Width   = 2200 + 50 + 50 = 2300

	2.30		
	3.00		
		6.90	sq. m.

Item No. 36

Cement concrete Type CO 1 : 3 : 6 (12.5 mm graded aggregate) In filling

For filling hollows of pressed steel frames

	25.90		
	0.105		
	0.06	0.16	cu. m.

Item No. 37

Providing cement concrete in Cills including weathering, slightly rounded or chamfered angles and thruating complete with type C1 1 : 3 : 6 (20 mm graded aggregate)

For **W4** 1200 + 100 = 1300 − **6** Nos.
W = 230 + 50 = 280 mm

6/	1.30		
	0.28		
	0.08	0.17	

For V2 − same as for **W4**

6/	1.30		
	0.28		
	0.08	0.17	
			cu. m.

			Sheet-38
			Item No. 38
			Rendering 15 mm thick on other than fair face of brickwork in CM (1 : 6)
			Internal faces of DG Set room
			5040
			8540
			13580
			× 2
			Add for Col 27160 mm
			Projections 2 × 2 × 105 420 mm
			27580 mm
			Height = 4600 mm
			RS -1 (−) 150 mm
			Skirting (−) 100 mm
	27.58		4350 mm
	4.35		
		119.97	sq. m.
2/0.50/	5.04		Add for Gable portion -- height = 126 mm
	0.126		
		0.64	
	2.2		Deductions
	2.90		RS Height = 3000 mm
		(−) 6.38	Skirting (−) 100 mm
			2900 mm
0.50/	1.00		PD2 (frame centrally fixed) in wall
	2.00		Height = 2100
		(−) 1.00	Skirting (−) 100
			2000 mm
5/0.50/	1.20		W4 (Centrally fixed in wall)
	1.20		
		(−) 3.60	
6/0.50/	1.20		V2 (Centrally fixed in wall)
	0.60		
		(−) 2.16	
		(−) 13.14	sq. m.
			Add for jambs of RS
	8.00		Lintel soffit 2200
	0.23		Vert 2 × 2900 5800
		1.84	sq. m. 8000 mm
		− 109.31	sq. m. Net C.O. to Summary Sheet-40
			Contd . . .

Item No. 38 (Contd)

Rest Room   long walls 2 x 2270 = 4540 mm

1 x 2693 = 2693 mm

7233 mm

Height = 3200 mm ,

RS2 (–) 120 mm

Skirting (–) 125 mm

(–) 30 mm

2958 mm

Add for sloping portion, extra height = 125 mm

Deduct

PD3 (frame fixed centrally in wall)

Height = 2130

Skirting (–) 125

2005

W4 (window fixed centrally in wall)

sq. m. Net, C.O. to Summary on **sheet-40**

Toilet portion

Long walls 2 x 2270 = 4540 mm

Cross wall 1 x 2693 = 2693 mm

7233 mm

Partition (–) 115 mm

7118 mm

Ht = 3230 mm

RS2 (–) 120 mm

Dado 1200 mm

1910 mm

Add for sloping portion, extra ht. = 125 mm

Deduct

PD3   Ht. 2130

(–) 1200

930   (fixed Centrally in wall)

W4

	7.23		
	2.96	21.40	sq. m.
2/0.50/	2.27		
	0.125	0.28	sq. m.
		21.68	sq. m.
0.50/	0.90		
	2.01	(–)0.90	
0.50/	1.20		
	1.20	(–)0.72	
		(–)1.62	sq. m.
		20.06	sq. m.
	7.12		
	1.91	13.60	
210.501	2.27		
	0.125	0.28	sq. m.
		13.88	sq. m.
0.50/	0.90		
	0.93	(–)0.42	
0.50/	1.20		
	1.20	(–)0.72	

Contd . . .

			Sheet-40
210.50	0.60		W8 (600 x 900)
	0.90	(−)0.54	
		(−)1.68	
		12.20	sq. m. Net
		109.31	B.F. from Sheet-38
		20.06	B.F. from Sheet-39
		~~141.57~~	sq. m. Total

Item No. 39

-Ditto- as item No. 36 above, but on fair face of brick work in CM (1 : 6)

Rest Room wall   2693 mm
Ver wall   2694 mm
                                5387 mm

Height   = 3200 (upto top of slab)
Sunk   30 mm
Deduct RS2 (−)   120 mm
Add for slope   125 mm
                              3235 mm
(−) Skirting (−) 125 mm
                              3110 mm

| 5.387 | | |
| 3.11 | | 16.75 |

Toilet Portion
Cross wall   2693
Partition wall   115
                          2578

Ht.   = 3235 mm
Dado (−) 1200 mm
                     2035

2.578		
2.035	5.25	
	22.00	

Deduct
For PD2, Ht   = 2100
Skirting 125 − 30 (−)   95
                                2005

| 0.501 | 1.00 | |
| | 2.005 | (−)1.00 |

W4

0.501	1.20	
		(−)0.72
		(−)1.72

sq. m. Net

Item No. 40

Rendering 15 mm thick on fair faces of brick work in
CM (1 : 6) and 5 mm in CM (1 : 4) using W.P. compound,
floating coat with sand faced plaster finish
External face of walls at lower slab level (RS2)

			Long wall 2 × 2500 = 5000
			Cross walls = 9000 mm
			14000 mm
			Height = 3200 mm
			less RS2 (−) 120 mm
			Floor 75 mm
	14.00		PB 250 mm
	3.405		3445 mm
		47.67	sq. m.

Deduct
W4

0.50/	1.20		
	1.20		
		(−) 0.72	

W8

| 2/0.50/ | 0.60 | | |
| | 0.90 | (−) 0.54 | |

Verandah opening
Length 2924 − 230 − 2694

			Height 3200 mm
			Less RB2 (−) 250 mm
	2.694		Sunken 30 mm
	2.98	(−) 8.03	2980 mm

			Step portion 250
	1.00		(−) 140
	0.11	(−) 0.11	110

| | | (−) 9.40 | |
| | | 38.27 | sq. m. Net C.O. to Sheet-42 |

External walls of DG set Room
Long walls 5270 + 230 = 5500 mm

			5500
			Cross walls 9000
			Add for projection of Cols
			4 × 2 × 85 680
			20680 mm

			Height = 4600 mm
			RS1 (−) 150 mm
		98.75	Floor (+) 75 mm
	20.68		PB (+) 250 mm
	4.775		4775 mm
			sq. m.
			C/O

Sheet-42

		98.75	sq. m. B/F

Cross wall above RS2

$$\text{Length} = 9000 \text{ mm}$$
$$\textbf{Col. projection } 4 \times 2 \times 85 = \underline{680} \text{ mm}$$
$$9680 \text{ mm}$$

$$\text{Height} = 4600$$
$$\textbf{Top of } \text{RS2} \quad (-) \underline{3325}$$
$$1275 \text{ mm}$$

	9.68	12.34	
	1.275		

Add for **Gable/sloping** portion

$$\text{Height} = \frac{5040}{2 \times 20} = 126 \text{ mm}$$

	5.04		
2/0.50/	0.126	0.64	

		111.73	sq. m.

Deduct

For W4

4/0.50/	1.20	(−) 2.88	
	1.20		

For V2

6/0.50/	1.20	(−) 2.16	
	0.60		

For RS

$$2200 + 800 = 3000$$
$$\text{Height} = \begin{array}{r} 75 \\ \underline{250} \\ 325 \text{ mm below FFL} \end{array}$$

	2.20	(−) 6.60	
	3.00		

	3.00	(−) 0.98	
	0.325		

		(−)12.62	

		99.11	sq. m. Net
		38.27	B.F. from Sheet-41
		137.38	sq. m. Total

Item No. 41

M and L keyed pointing to random rubble uncoursed masonry in CM **(1 : 4)'**

Qty same as item No. 12 (H.D. face work to masonry)

		17.16	sq. m. On sheet-11

Contd . . .

Item No. 42

Rendering 10 mm thick on concrete surfaces in CM (1 : 4), using W.P. compound

Roof surfaces
Top of RS2   length = 2500 + 600   = 3100 mm
                  Width = 9000 + 150 + 150 = 9300 mm

	3.10		
	9.30		
		28.83	sq. m.

Add for ends

21	0.23		
	0.15	0.07	

Top of RS1
         length = 5270 + 230 + 600 + 600 = 6700 mm
         W   = 9000 + 150 + 150   = 9300 mm

	6.70		
	9.30	62.31	

Top of chhajjas

51	1.50		
	0.60	4.50	**Canopy**
	2.60		
	0.90	2.34	

. 6.84 sq. m.

Edges of slabs
       RS2   3100 + 230 = 3330
                3100 + 230 = 3330
                          9300
                         15960

	15.96		
	0.12	1.92	

       RS1   6700
                9300
                16000

	32.00		
	0.15	4.80	

6.72 sq. m.   x 2
                   32000

5121	0.60		
	0.07 av	0.42	**Chhajjas/Canopy**
1121	0.90		
	0.07 av	0.13	
51	1.50		
	0.06	0.45	
21	2.60		
	0.06		1.16 sq. m.

sq. m.

Contd . . .

			Sheet-44
			Item No. 43

Supply only integral water proofing compound
For 5 mm floating coat in cm (1 : 4) Item No. 38

Cement reauired

137.38 sq. m. @ 2.51 kglsq. m. = 344.82 kg

For 10 mm rendering on roof surface in cm (1 : 4)
Item No. 40

105.93 sq. m. @ 6.77 **kg/sq** .m. = 717.15 kg

Total Qty of Cement = 1061.97 kg

W.P. compound @ 3 % of cement

= 1061.97 **x** 0.03 = **31.86** kg

| | | 32 | kg | rounded to 32 kg |

Item No. 44

Rendering 5 mm thick on concrete surfaces in cm (1 : 3)

Under side of slabs and beams

2/	2.27 2,693		Slab RS2 Rest Room and Toilet
		12.23	sq. m.
			Verandah
	2.27 **2.694**		
		6.12	sq. **m.**
	9.00 **0.60**		Proj.
		0.54	
2/	'3.33 0.15		2500 + 230 + 600 = 3300 mm
		1.00	Slab RS2
	5.04 8.54		
		43.04	
2/	9.00 0.60		Projections
		10.80	
2/	6.70 0.15		Side 5500 + 1200 = 6700
		2.01	
5/	1.50 **0.60**		**Chhajjas**
		4.50	Canopy
	2.60 **0.90**		
		2.34 82.58	sq. m.

Item No. 45

Cement Concrete floor with Type B2, 1 : 2 : 4 (40 mm graded aggregate) 75 mm thick finished even and smooth without extra cement

5.04 8.54	68.66	DG Set Room
		RS Portion
2.20 0.23	0.51	Ramp
3.00 1.20	3.60	
	72.77	sq. m.

Length = 2200 + 400 + 400 = 3000 mm

1204 mm   450

1000

Item No. 46

Terrazzo tiles 25 cm × 25 cm × 22 cm thick, with size of chips upto 6 mm, with grey cement and no pigment, set jointed and pointed in neat cement slurry in floors, and cut and polished

2.27 2.693	6.11	Rest Room
2.50 2.694	6.74	Verandah
0.90 0.23	0.21	PD3
	13.06	sq. m.

Item No. 47

Glazed ceramic white tiles (200 × 200 mm) × 7 mm thick, in floors, etc. set and jointed in white Cement to match
Toilet Portion

1.27 1.478	7.62	Passage
0.95 1.20	1.14	WC
1.20 1.20	1.44	Bath
0.90 0.23	0.21	PD3
2/ 0.80 0.115	0.18	PD8
	10.59	sq. m.

Sheet-46

			Item No. 48
			Screed bed or bedding layer of **20** mm thick for laying floor finishes, cement mortar (**1 : 4**)
		13.06	Qty same as item No. **44** (Terrazzo tiles)
		10.59	Qty same as item No. **45** (Ceramic tiles)
		23.65	sq. m. Total
			Item No. 49
			Rendering **20** mm thick in CM(1 : **3**) on other than fair faces of brick work in skirting, finished even and smooth with using extra cement
			DG Set Room
2/	5.04 0.10	1.01	
2/	8.54 0.10	1.71	
		2.72	Deduct for PD2
	1.00 0.10	(−) 0.10	RS
	2.20 0.10	(−) 0.22 (−) 0.32	
			Add for Jambs
2/	0.23 0.10	0.05	
2/	0.14 0.10	0.03	For PD2 230 − 90 = 140
		2.48	sq. m.
			Item No. 50
			Extra over rendering for skirting n. exc. **15** mm width or girh
2/	5.04	10.08	R. Metre
2/	8.54	17.08	R. Metre
		27.16	C/O

		27.16	B.F.
			Deduct for
			PD2
1/	1.00		
		(−) 1.00	
			RS
1/	2.20		
		(−) 2.20	
		(−) 3.20	
			Add for jambs
2/	0.23		RS
		0.46	
			PD2 230 − 90 = 140
2/	0.14		
		0.28	
		24.70	R. Metres

Item No. 51

Terrazzo tiles 25 cm × 125 cm × 22 mm thick with size of chips upto 6 mm and with grey cement and no pigimen, set jointed and pointed in neat cement slurry on vertical surfaces as in skirtings cut and polished

$$\underline{\text{Rest Room Girth}} \quad 2270$$
$$\underline{2263}$$
$$4963$$
$$\underline{\times 2}$$
$$9922$$

Deduct for PD3   (−) 900
Add jambs 2 × 230 (+) 460
9482

Less frame portion 2 × 90   (−) 180
9302 mm

9.30			$\underline{\text{Verandah}}$ 2 × 2500 = 5000 mm
0.125	1.16		2694 mm
			7694

PD3 2 × 900 (−) 1800

4.89			PD2 1 × 1000 (−) 1000
0.125	0.61		4894 mm
	1.77		sq. metre

Item No. 52

| 2.69 | | Rendering 10 mm thick on fair faces of brickwork in |
| 0.125 | 0.34 | CM (1 : 4), as backing coat for skirting |

4.89		Rest Room one cross wall skirting
0.125	0.65	
	0.95	

All quantity of skirting
sq. metre

			Sheet-48

Item No. 53

-Ditto- as item No. 52 above but on surface other than fair faces of brick work -ditto-

    Rest Room

		Total length 9302 mm
		Less one cross wall (item No. 50) 2693
6.61		6609 mm
0.125	0.83	
		sq. m.

Item No. 50

Extra over rendering for skirting n.exc. 15 cm width or girth

9.30	9.30	
4.89	4.89	Qty same as item No. 49 (Length)
	14.19	R. Mtre

Item No. 54

Glazed earthen ware white tiles 149 mm × 149 mm (or 152.4 mm × 152.4 mm) × 6 mm thick set and pointed in neat cement slurry and pointed in white cement to match work on vertical surfaces such as dados,

		WC portion	1200 mm
		(+)	955
		·	2155
		× 2	
		4310	
3.51		Deduct PD8 (−) 800	
1.20		3510 mm	
		Height = 1200 mm	
	4.21	sq. metre	
		Bath portion 1200 × 4 = 4800 mm	
		Deduct PD8 (−) 800 mm	
4.00		4000	
1.20			
	4.80	Height = 1200 mm	
		sq. metre	
		Lobby portion 2270 mm	
		1478 mm	
		3748 mm	
		× 2	
		7496 mm	
		Deduct for PD8 2 × 800 (−) 1600 mm	
5.90		5896 mm	
1.20			
	7.08	sq. metre Height = 1200 mm	
	16.09	sq. metre	

Item No. 53

-Ditto- as item No, 50 above, but on surfaces other than fair faces of brick work -ditto-

		16.09	sq. m. Total Qty as per item No. 54
		(−) 3.10	Deduct Qty of item No. 52 above
		11.99	sq. m. Net

Item No. 55

Cement concrete type B1, 1 : 2 : 4 (20 mm graded aggregate) in floor, 40 mm thick

Treads of steps

Length = 1000
Width = 320 mm

2/	1.00 0.32	0.64	sq. m.

Item No. 52

Rendering 10 mm thick on fair faces of brickwork in CM (1 : 4)

Risers

3/	1.00 0.14	0.42	

Sides of step

2/	0.60 0.14	0.17	

2/	0.30 0.14	0.08	

Backing coat to Dado

Toilet

	2.58 1.20	3.10 3.77	sq. m.	One cross wall 2693 mm Deduct for partition (−) 115 mm 2578 mm

Contd . . .

Sheet-50

Item No. 56

Surface excavation not exceeding 30 cm deep and averaging
14 cm deep and getting out in hard soil

For plinth protection 900 mm wide

Centre line girth 7770 + 400 + 900 = 9070 mm

8770 + 400 + 900 = 10070 mm

19140 mm

× 2

38280 mm

Deduct for Ramp (−) 3000 mm

Steps (−) 1000 mm

34280 mm

34.28 0.90	30.85	sq. metre.	

Item No. 57

M and L hard core of gauge n. exc. 63 mm, deposited,
spread and leveled in layers n. exc. 15 cm thick, watered
and rammed to a true surface using broken stone

100 mm thick below plinth protection

64.28 0.90 0.10	5.79	cu. m.	

Item No. 17

Removing excavated material n. exc. 50 m and depositing
where directed at a level n. exc. 1.5 m above the starting
point.

Average thickness of excavation = 14 cm

34.28 0.90 0.14	4.32	cu. m.	

Item No. 58

Cement concrete floor type C2, 1 : 3 : 6 (40 mm graded
aggregate) 75 mm thick including finishing concrete surface
even and smooth using extra cement

Plinth protection 75 mm thick

34.28 0.90	30.85	sq. metre	

			Sheet-51

Item No. 59

M and L priming surfaces and applying normal treatment
(for moderate condition) using hessian base felt, Type 3
grade I, in water proofing treatment over roof surface
<p align=center>Refer <u>item No. 42</u> on Sheet-43</p>

	3.10		Top of RS2
	9.30		
		28.83	
	6.70		Top of RS1
	9.30		
		62.31	
		91.14	sq. metre

Item No. 60

Plain framed paneled factory made shutter (two panel) with
lock rail and panel of 9 mm BWP commercial ply or 12 mm
veneered particle board with commercial veneering on both
faces. Size of rail and style as per IS : 1003 (Part-I), kiln
seasoned and chemically pressure treated of second class
HW rail and style, 35 mm thick.

	0.90		PD2 $\quad$ Width $\; = 1000 - (50 + 50) = 900$ mm
	2.05		$\qquad$ Height $= 2100 - 50 \qquad = 2050$ mm
		1.85	
2/	0.80		PD3 $\quad$ Width $= \;\; 900 - 100 = \;\; 800$ mm
	2.08		$\qquad$ Height $= 2130 - 50 \;\; = 2080$ mm
		3.33	
2/	0.70		**PD8** $\quad$ Width $= \;\; 800 - 100 = \;\; 700$ mm
	2.08		$\qquad$ Height $= 2130 - 50 \;\; = 2080$ mm
		2.91	
		8.09	sq. m.

Item No. 61

Butt hinges medium weight, cold rolled mild steel and fixed
Size of hinge 100 mm

For shutters, 3 hinges for each shutter

<p>$\qquad$ PD2, PD3 and **PD8**</p>

5/	3		
		15	Nos.

<p align=right>Contd . . .</p>

			Sheet-52
			Item No. 62 Aluminium alloy, anodized, sliding door bolt, with hasp, staple (bolt type) and fixing clips of sheet, cast or extruded sections and fixing bolts and sliding bolts of extruded sections or cast aluminium alloy and fixed
3/	1	2	Length of bolt 300 mm One **Alldrop** bolt for each PD2 and PD3 Nos.
			Item No. 63 Aluminium, anodized, barrel tower bolts of extruded section and fixed (a) of length 200 mm
3/	2	6	For PD2 and PD3 – 2 Nos. each from inside Nos.
			(b) of length 150 mm
2/	2	4	For **PD8,** 1 No. on each side of shutter Nos.
			Item No. 64 S and **F** extruded aluminium alloy handles, fabricated type, anodized, Size of handle 125 mm
5/	2		**2** handles for each shutter Nos.
			Item No. 65 Sheet glass, ordinary quality and glazing with oil putty in Squares n. exc. 0.5 sq. m. in each pane 4 **mm** thick
6/2/4/	0.57 <u>0.28</u>		For **W 4**
		7.66	
			For V2
6/41	0.57 <u>0.28</u>		
		<u>3.83</u>	
			sq. m.

			Sheet-53
			Item No. 66
			Figured glass, pin headed type and glazing with oil putty, in squares n. exc. 05 m each in pane, with 3 mm thick glass
2/3/	0.57 <u>0.28</u>		For W8
			sq. m.
			Item No. 67
			Preparing ceiling surfaces, plastered new surfaces and white washing **3** coats complete
			Qty same as ceiling plaster Item No. 44
		~~82·58~~	sq. m.
			Item No. 68
			-Ditto- as per item No. 67 above, but wall surfaces
		20.06	Rest Room (Item No. 38)
		12.20	Toilet portion (-ditto-)
			Rest Room and Ver and Toilet (Item No. 39)
		~~20.28~~ ~~52/54~~	sq. m.
			Item **No.** 69
			Preparing plastered surfaces of walls clear all on plastered surfaces, preparatory to distempering and distempering walls with 2 coats of dry distemper
			DG Set Room
			Qty same as in Item No. 38
	1		sq. m.
			Item No. 70
			Preparing plastered surfaces of walls and applying two coats of cement paint over a priming plastered surface with alkali resistant priming coat
			All external plastered surface
		137.38	Qty same as Item No. 40
		6.84	
		12.72	Type of **Chhajjas** and canopy, edges of **slabs/chhajjas,** etc. (Item No. 42)
		<u>1.16</u> ~~158·10~~	sq. m.

			Sheet-54
			Item No. 71
			Preparation of new previously untreated wooden surfaces of any description, not otherwise described, over 10 cms width or girth and priming coat with pink primer and 2 coats of synthetic enamel (ordinary tint)
			Wooden paneled doors
1/2/1.30/	0.90 . **2.05**		PD2
		4.80	sq. m.
2/2/1.30/	0.80 **2.08**		PD3
		8.65	sq. m.
2/2/1.30/	0.70 2.08		**PD8**
		7.57	sq. m.
		~~21.02~~	sq. m. Total
			Item No. 72
			Preparation of new or previously untreated steel surfaces of any description, over 10 cm width or girth, not otherwise described and priming with red oxide zinc chrome and two coats of synthetic enamel paint (ordinary tint)
			Door frames
			Size 105 x 60 mm
			Girth = 105
			60
			60
			125 mm
2/	5.10 0.125		PD2 1000
			~~4100~~ mm
		1.275	5100 mm
2/	5.06 **0.125**		PD3 900 + 2080 + 2080 = 5060
		1.265	
2/	4.96 0.125		PD3 800 + 2080 + 2080 = 4960
		1.24	
6/11	1.20 1.20		Guard bars to steel windows W4
		8.64	sq. m.
		12.42	sq. m. C/O

		12.42	B/F
			Guard bars to steel windows
			V2
6/1/	1.20		
	0.60	4.32	
2/1/	0.60		W8
	0.90	1.08	
		17.82	sq. m.

Item No. 73

-Ditto- as per Item No.72, but except priming coat -ditto-

Steel windows

6/2/0.50/	1.20		W4
	1.20		
		8.64	
6/2/0.50/	1.20		V2
	0.60	4.32	
2/2/0.50/	0.60		W8
	0.90	1.08	

Rolling shutters

1/2/1.10/	2.20		
	3.00	14.52	

Top cover Girth 500 mm

1/2/	2.40		
	0.50	2.40	
		30.96	sq. m.

Item No. 74

Rotational moulded polyethylene water storage Tanks (Cylindrical vertical with closed top) hoisted and fixed in position all as specified in SSR Part-I

Capacity of tank 450 litres

	1 No.	1 No.	

Sheet-56

Item No. 75

Cement concrete type C2 1 : 3 : **6 (40** mm graded aggregate), av **100** mm thick inoluding finishing C.C. surface even and smooth without using extra cement

$\frac{\pi}{4}$ /   1.00

Base for water tank, **1000** mm dia circular

0.79 —   sq. m.

Item No. 76

Supply and fix vitreous china squatting pan, **'Orissa'** pattern, size **580 x 440** mm white, with integral foot steps, including 'P' trap and provision of lime concrete bedding

1 No.

Item No. 77

Supply only Flushing cistern of pressed steel, enameled white, valve less, syphonic action type, low level, white with inlet, ball valve, float and handle including brackets and flush pipe

1 No.

10 litre capacity

Item No. 78

1 No.

Supply and fix vitreous china wash basin, white, flat back, size **550 × 400** mm, excluding taps, but including brackets

Item No. 79

Supply and fix **600** mm x **450** mm beveled edge mirror of selected quality glass, mounted on 6 mm thick commercial plywood and fixed to wooden plugs with C.P. brass screws and cup washers

1 No.

Mirror above WHB

Item No. 80

S and E Low density polyethylene (LDPE) pipes 32 mm

Outlet pipe of WHB

0.60   0.60   R. Metre

Item No. 81

M and L cast iron Nahani trap including jointing to waste pipe in run lead, **75** mm outlet

1 No.   1 No   Below WI-IB

1 No.   1 No.   In Bathroom
         2 Nos.

Contd . . .

		Item No. 82
1 No.	1 No.	M and L salt glazed stone ware gully trap, square mounted, type 'P' size of gully trap 150 × 100 mm
		Item No. 83
		S and F Cast iron soil pipe in any length without ears, with cement joints laid in floors, 100 mm bore, sand cast
		WC to through wall out let
0.45	0.45	R. Metre
		Item No. 84
		S and F CI waste pipe, in any length, without ears, with cement joint laid in floors, 75 mm bore sand cast
		NT below WHB to NT in bath room
1.90	1.90	R. Metre
		From NT thru wll
0.30	0.30	R. Metre
	2.20	R. Metre
		Item No. 85
		S and F PVC (SWR) junction single (single Tee) equal with access door
1 No.	1 No.	(a) 75 mm bore for waste pipe
1 No.	1 No.	(b) 110 mm bore for connecting soil pipe
		Item No. 86
		S and F PVC (SWR) Bends any radius
1 No.	1 No.	(a) 75 mm bore from Tee to GT
1 No.	1 No.	(b) 110 mm bore joining Tee and straight piece

		Sheet-58
		Item No. 87(a)
		S and F PVC (SWR) pipes single socketed, in any length with rubber joints fixed to wall
		110 mm bore
0.60		Pipe joining Tee and bend
	0.60	R. Metre
		Item No. 87(b)
		-Ditto- but in trenches
2.00		To MH
	2.00	R. Metre
		Item No. 88
		S and F PVC (SWR) reducer 110 mm bore
1 No.		Above Tee
		Item No. 89
		S and F PVC (SWR) pipes single socketed in any length with rubber ring joints fixed to wall **75 mm**
		Vent pipe
		Above roof leve 1 900 mm
		Upto FFL level and 3400 mm
		Jointing reducer ____
		Total 4300 mm
4.30		R. Metre
		Item No. 90
		S and F PVC (SWR) vent cowl **75 mm bore**
		Above vent pipe
		Item No. 77(a)
1 No.	1 No.	Flush pipe of polythelene of low or high density PVC 32 mm dia for low level cistern

UNIT 4 OPERATIONS OF ABSTRACTING AND BILLING

Structure

4.1 Introduction
  Objectives

4.2 Principles for Abstracting and Billing

4.3 Abstracting and Billing of Quantities already Worked Out

4.4 Summary

4.5 Answers to SAQs

4.1 INTRODUCTION

In the previous unit, you have already learnt about the operations of abstracting and billing involved in quantity surveying/estimation. Thus, the **operation of abstracting** is the process of collection of measurements of identical character and description under different trades and reducing them to units as required by the standard method of measurement and the **operation** of billing is the process of collection and entry in the form of a bill of work as separated into trades on the abstracts. The Unit prices from SSR are inserted against each item of the bill and the total value of billed quantities is arrived at. The standard form as stipulated in MES bearing No.IAFW-2264 and 2264-A pertains to Abstract of Quantities and prices. As the name of the form indicates, it combines both the operations of Abstracting and Billing. The same will be followed in exercise of estimates of a complete building. The description of all items of each trade will be written in the space prescribed for description, reference to item No. of Schedule, i.e. SSR will be inserted there below and the rate of item and unit of measurement/payment will be inserted below. Below the space for unit, Measurement book No./Take off Register No. will be indicated in space provided/indicated. After entering the quantities of every item, the total quantity will be written and the total will be reduced to required unit of measurement. The reduced total will be multiplied by the rate indicated in the abstract and the total amount of each item will be written below. At the end of last item of that trade, the amount of all the items will be written. The sum of each trade so arrived will be carried over to Summary on last page of the outer sheet. The grand total of all the trades on Summary page will indicate the estimated cost of the building/works.

Objectives

After studying this unit, you should be able to

- prepare the abstract of quantities in respect of any other building/works, when all relevant data is provided to you, and

- insert the SSR rates for every item of each trade and find out the estimated cost of fhat buildinglworks at SSR rates.

4.2 PRINCIPLES FOR ABSTRACTING AND BILLING

While abstracting and billing, the following principles shall be followed :

(a) Abstracting is done trade-wise. Before starting abstracting, squaring is done and cross-checked in Take off sheets/MBs.

(b) Ensure correct description of each item, reference to SSR rate, rate and unit is mentioned. For each item, ensure space of two columns so that the quantities on the deduction side of relevant item can also be entered where required.

(c) Reference to take off sheet/M. B. Page No. is given in the requisite column against each entry.

(d) While transferring the quantities into abstract a vertical line of pencil is run through the take off sheet/MB page against the relevant item and where same quantities are applicable for more than once, slanting line of pencil will be first run through description of each item and finally a vertical line will be run through all items.

(e) After entering the quantities a sum of it will be written against total and the total will be reduced below as required for the unit of measurement and the amount arrived by multiplication of rate and reduced quantity will be written in appropriate space below.

(f) The total amount of each trade will be written at the end of each shall be carried out on Summary page. The grand total of all the trades will be worked out and indicated at-appropriate place of Summary.

4.3 ABSTRACTING AND BILLING OF QUANTITIES WORKED OUT

The Abstracting/Billing including Summary as prepared on the prescribed proforma is given hereinafter, as Appendix 'C' at the end of this unit.

(Appendix C – 11 Sheets)

SAQ 1

Prepare an abstract and billing of quantities worked out in SAQs of Units 2 and 3 keeping in view all steps mentioned hereinbefore and the example attached as Appendix 'C'.

4.4 SUMMARY

In this unit, an attempt has been made to explain

(a) as to how an abstract of quantities is prepared after squaring the quantities of each item,

(b) as to how rates per unit for every item of each trade is inserted, and

(c) as to how the amount of each trade is worked out and ultimately the estimated cost of building/work is summarized at SSR rates,

4.5 ANSWERS TO SAQs

Refer the preceding example in this unit and prepare an abstract and billing in respect of take off and squaring of measurements of the SAQ of Units 2 and 4 and get it checked.

Appendix 'C'
(Refer Section 4.3)
IAFW 2264
Outer Sheet

Operations of
Abstracting and
Billing

MILITARY ENGINEERING SERVICES

ABSTRACT OF QUANTITIES AND PRICES

For____ Provision of **X X X X X** .

At ___GE **X X X X**

In the ___AGE **B/R X X X X** ___Sub-Division

GE ' X X X X _ Division

Abstract made by ▪ | Reference Number_____

Name__ X X X X | Bill No._____

Designation ▪ JE (Civil) |

| AE/AEE
Date ▪ **X X X X 2005** | Signatue of Engineer-in-Charge

| Date ▪ **X X X X 2005**

EARTHWORK	-1	(56)	(2)	(3)	(16)	(15)	(17)	(18)	-19	(57)
Description of work	(Surface excn n. exc 30 cm deep and averaging 15 an deep & getting out in soft soil	-ditto- but averaging 14 cm deep and Hard/dense soil	Excn in trenches n.exc 1.5 m in width apd in depth, etc. and getting out in Hard/dense soil	-ditto- in soft	Returning. filing in. including spreading, levelling and well ramming in layers n. exc. 25 a n in Hard soil	(Spreading, levelling in layers n.exc. 25 cm thick well ramming incl watering as required	Removing excavated material n.exc. 50 m & depositing where directed at level n.exc 1.5 m above the starting int in soils	-ditto- but lead exc. 200 m & n.exc 250 m in soils	-ditto- -ditto- but mcks	M and L Hard core of gauge n.exc. 63 mm, deposited. spread and levelled in layers n.exc. 15 cm thick watered and rammed to a true surface broken stone
SSR Pt-II (2004) Inem of Schedule	76	76	81	81	84	91 92	99	99 100	99 100	110
Rate Rs.	7.11	12.46	90.42	206.56	18.65	8.87 14.23 23.1	42.91	4x5.85= 42.91 23.4 66.31	4x6.83 58.59 27.32 85.91	587.35
UNIT	Square Meter	Square Meter	Cubic Meter	Cubic Meter	Cubic Meter	Cubic Meter	Cubic Metre	Cubic Metre	Cubic Metre	Cubic Metre
M.Book No. / Appx 'B'	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet
	1 210.00	50 38.35	2 50.22	3 10.25	13 23.17	13 17.16	14 31.50 50 4.32	14 9.89	14 10.25	50 5.79
Total	210.00	38.35	50.22	10.25	23.17	17.16	35.82	9.89	10.25	5.79
Reduced Total	210.00	30.35	50.22	10.25	23.17	17.16	35.82	9.89	10.25	5.79
Rs.	1493.1	378.16	4540.89	2117.24	432.12	396.4	1537.04	655.81	880.58	3400.76

TOTAL C.O. TO SUMMARY   15832.10

CONCRETE	(4)		(36)		(5)		(6)		(21)		(23)		(27)		(30)		(37)		(43)	
Description of work	Cement concrete in fdns, filling type **D2 1 : 4 : 8** (40 mm graded **aggregate**)		-Ditto- but **type** Co **1 : 3 : 6** using **12.5** mm aggregate		RCC in footings. plinth beams, cement **concrete Type B1 1 2 : 4** (20 mm graded **aggregate**)		-Ditto- -ditto- but in columns -ditto-		-Ditto- -ditto- but in beams -**ditto**-		-Ditto- **d i i** but in slabs supported on beams -**ditto**-		-Ditto- ditto- but in **Chajjas** ditto-		Providing Cement concrete in bands Type **BI** 1:2:4 (20 mm graded aggregate)		Providing CC in **Cills** **with** Concrete Type C I **1 : 3 : 6** (20 mm **graded aggregate**) etc.complete		Integral **water-proofing compound**	
SSR Pt-II '(2004) Item of Schedule	156		156 (-)139 (+)137		174		179		178		176		177		160		160		229	
Rate Rs.	1414.59		1588.37 (-)1410.85 (=)1776.78 1954.3		1911.8		2273.02		2201 00		2083.68		2261 7		2461.95		2158 31		23.03	
UNIT	Cubic Metre		Cubic Metre		Cubic Metre		**Cubic** Metre		Cubic Metre		Cubic Metre		Cubic Metre		Cubic Metre		Cubic Metre		Kg	
M.Book No./ Appx 'B'	Sheet		Sheet		Sheet		Sheet		Sheet		Sheet		Sheet		Sheet		Sheet		Sheet	
	4	6.56	37	0.16	5	14.85	5 15	0.93 3.99	18	4.77	23	13.16	29	0.48	35	0.04	37	0.34	44	32
. Total	6.56		0.16		14.85		3.71		4.77		13.16		0 48		0.04		0.34		32	
Reduced Total	6.58		0.16		14.85		3.71		4 77		13.16		0.48		0.04		0.34		32	
Rs.	9279.71		312 07		28390.23		8432.9		10498 77		27421.13		1085.62		9048		733.15		736.96	

TOTAL C.O.   TO SUMMARY   66951.02

Appendix 'C'   Sheet No-4

Description of work	BRICKWORK		STONE MASONRY			WOODWORK					
	(14)	(29)	(11)	(12)	(13)	(8)	7 (a)	7(b)	(22)	(24)	(28)
	Brickwork with Sub Class 'B' old size — straight or curved on plan exc. 6 m mean radius built in cement mortar (1 : 6)	Brickwork with Sub class 'B' old size bricks straight or curved on plan to any radius in half brick thick walls built in Cement mortar (1 : 4)	Walling of random rubble, uncoursed, well bonded, bedded and solidly hearted, built in Cement mortar (1 : 6)	Extra over stone walling for hammer dressing to face stones and dressing to face bed and joints as spd of r.r. walling uncoursed, with max depression on face from st. edge held against dressed surface n.exc. 40 mm trap st	External abgles (for quions) in facings for walling or random rubble, uncoursed	Formwork to sides of plinth beams rough finished surfaces of concrete	Formwork to side of pillars rough finished surfaces of concrete	Data-butfair finished surfaces	-Ditto- but to sides of soffits of roof beams fair finished surfaces	Formwork to soffits of suspended slabs n.exc. 200 mm thick fair finished concrete surface	Formwork to chajjas including edges fair finished surface of concrete
SSR Pt-II (2004) Item of Schedule	256	257	394	421	446	607	615	615	611	607	610
Rate Rs.	1353.92	173.77	1102.41	47.56	26.2	97.90	186.64	186.64 (+) 14.09 200.73	172.72 (+) 14.09 186.81	179.14 (+)14.09 193.23	230.75 14.09 244.84
UNIT	Cubic Metre	Square Metre	Cubic Metre	Square Metre	Running Metre	Square Metre	Square Metre	Square Metre	Square Metre	Square Metre	Square Metre
M.Book No./ Appx 'B'	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet
	12 0.19 34 2729	34 7-39	11 17.16	11 8.51	12 1.10	6 13.34	5 10.34	6 3.28 15 57.22	19 60.34	24 79.33	29 8.07
Total	27.48	7.39	17.16	851	1.10	13.34	10.34	60.50	60.34	79.33	8.07
Reduced Total	27.48	7.39	17.16	8.51	1.10	13.34	10.34	60.50	80.34	79.33	8.07
Rs.	37205.72	1284.16	18917.36	404.74	28.82	1305.99	1929.86	12144.17	11272.12	15328.94	1975.86
	TOTAL SUMMARY 38489.88		TOTAL SUMMARY 19350.92					TOTAL C.O. TO NEXT SHEET 43956.94			

Description of work	WOODWORK (25)	JOINERY (60)	BUILDER'S HARDWARE (61)	(62)	(63)		(64)	STEEL AND IRON WORK (9)	(26)	(10)
	Formwork to edges of concrete roofs n.exc.20 cm wide, fair finished concrete surface	Plain framed, panelled shutter (two panels) with lock rail & panel of 9 mm BWP comm. Plyor 12 mm veneered particle board with comm. veneering on both faces all as spd of 2nd class HW rail & style 35 mm th	Butt hinges medium wt cold rolled MS and fixed size of hinges 100 mm	Aluminium alloy, anodised sliding door bolt with hasp. Staple (bolt type) and fixing clips of sheet etc. and fixing bolts of extruded sections orcast Al alloy and fixed of length 300 mm	Aluminium anodised barrel tower bolts of extruded section and fixed (a) Length 200 mm	(b) Length 150 mm	Extruded aluminium alloy handles, fabricated type, anodised 125 mm	MS bars 10 mm dia and over, cut to length, bent to shape required including cranking, etc. binding with and including MS wire not less than 0.9 mm dia, etc. deformed or twisted bars	-Ditto- but 6 mm t 8 mm dia - ditto-deformed or twisted bars	-Ditto- but 6 mm dia and over upto dia in stirrups, spacers and binders\ deformed or twisted bars
SSR PH-II (2004) Item of Schedule	622	797	928	919	904	904	966	1196	1197	1198
Rate Rs.	26.2 1.83 28.03	1323.12	20.27	119.37	47.33	36.78	34.07	31.96	32.28	32.59
UNIT	Running Metre	Square Metre	Each	Each	Each	Each	Each	kg	kg	kg
M. Book No./ Appx 'B'	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet
	25	57.43	51	8.09	51	15	52	3	52	6	52	4	52	10	8	808.01 / 15	338.81 / 21	769.11	28	492.83 / 30	54.08 / 35	2.93	9	150.63 / 16	116.47 / 22	300.91 / 35	0.87
Total	57.43	8.09	15	3	6	4	10	1913.93	549.84	608.88
Reduced Total	57.43	8.09	15	3	6	4	10	1913.93	549.84	608.88
Rs. 43956.94 B/F	1609.76	10704.04	304.05	358.11	283.98	147.12	340.70	61 169.20	17748.84	19433.40
TOTAL TO SUMMARY	45566.70	10704.04		TOTAL TO SUMMARY			1483.96	TOTAL C.O. TO NEXT SHEE		98351.44

						Roof Covering	Floor Finishes & Pavings			
Description of work	(31) Pressed steel frames for doors with one rebate ind. **necessary fixing lugs**, h i s , *lock strike* plate, etc. complete as spd, **supplied** and fixed, size of frame 105 x 60 mm	(32) Steel **windows** with side hung shutters ind. **projecting type** hinges with steal **handle** and steel peg stays complete with glazing bars supplied and fixed	(33) Steel **windows or ventilators** fixed type **with** glazing b a n supplied and fixed	(34) S and F window guard b a n plain, fixed to tame, **conforming** to Fe-410-0 or Fe-310-0	(35) S and F steel rolling shutters w/o ball bearing as **spd incl.top cover, anchoring** tod, hasp and staple and one side coat of **orimer, erected** in **position** complete, gear operated type with level gear box and crank handle **thk. of** laths **1.25 mm**	(59) M & L priming surfaces and applying normal treatment **(for** moderate conditions) **using** hessain base felt, type 3 grade 1 in water-proofing treatment	(20) Cement concrete type **D2 1 : 4 : 8 (40** mm graded aggregate) **75** mm thick subbase	(45) Cement concrete type **B2 1 : 2 : 4 (40** mm graded aggregate) 75 mm thick **flooring finishing** c c. surface even and smooth w/o using extra cement	(55) Cement concrete **type B1 1 : 2 : 4 (20** mm graded aggregate) **40 mm** thick finishing even and smooth without using **extr** cement and making impressions of XPM **while the concrete** is green	(58) Cement concrete type **C2 1 : 3 : 6 (40 mm graded** aggregate) 75 mm thick in plinth protection, finishing even and smooth without using extra cement
SSR Pt-II (2004) Item of **Schedule**	1255	1248	1245	1155	1242	1425	1797	1795 1812	1805 1812 1813	1796 1812
Rate Rs.	165 42	980.32	807.5	33.6	1515.19	121.95	142 02 (-) 33.67 108 35	189.66 (-) 45 58 144.08 (+)6.11 150.19	55.32 29.22 6.11 9%	159.00 (-) 37.91 121.09 6.11 127.2
UNIT	Running Metre	Square Metre	Square Metre	kg	Square Metre	Square Metre	Square Metre	Square Metre	Square Metre	Square Metre
M.Book No./ Appx 'B'	Sheet 35	Sheet 38	Sheet 36	Sheet 36	Sheet 36	Sheet 51	Sheet 14	Sheet 45	Sheet 49	Sheet 50
	25.90	9.72	4.32	104.41	6 90	91.14	58.97	72.77	0.64	30.85
Total	25.90	S.72'	4.32	104 41	6.90	91.14	58.97	72.77	0.64	30.85
Reduced Total	25.90	9.72	4.32	104.41	6.90	91.14	58.97	72 77	0.64	30.85
Rs 98351.44 B/F	4284.38	9528.71	3488.4	3508 18	10454.81	11114.52	6389.40	10929.33	59 29	3924.12
		TOTAL TO SUMMARY			129615.92	11114.52		TOTAL C/O TO NEXT SHEET		21302.14

	FLOOR FINISHES AND PAVINGS					PLASTERING AND POINTING					
	(75)	(46)	(51)	(47)	(54)	(39)	(38)	(40)	(42)	(44)	(48)
Description of work	-Ditto- but 100 mm thick -ditto-	Terrazzo tiles 25 cm X 25 cm X 22mm thick with size of chips upto 6 mm, set jointed. 8 pointed in neat cement sluny in floors 8 cut 8 polished tiles with grey cement & no pigment	-Ditto- dito — but work on vertical surfaces as in skirting - ditto-	Glazed ceramic tiles (200 x 200 mm) x 7 mm thick, in floors etc. set 8 jointed in neat cement sluny and pointed in white cement to match, using white tiles	Glazed earthenware tiles 149 x 149 mm (or 152.4 x 152.4 mm) x 6 mm thick, etc. set and pointed in neat cement sluny and pointed in white cement to match, using white tiles in dados	Rendering 15 mm thick on fair faces of brick work in cement mortar (1:6) finished even 8 smooth (without using extra cement)	-Ditto- but on other than fair faces of brick -ditto-	Rendering 15 mm thick on fair faces of brickwork in cement mortar 1.6 mm 8 5 mm thick coat in cement mortar (1 : 4) using water-proofing compound 8 sand faced finish to floating coat	Rendering 10 mm thick on concrete surfaces in cement mortar (1 : 4) with WP compound including finishing even and smooth (w/o using extra cement)	Rendering 5 mm thick on concrete surfaces of ceiling in cement mortar (1:3) ind. finished even & smooth without using extra cement	Screed bed or bedding layers of mortar 20 mm thick for laying floor finishes in cement mortar (1 : 4)
SSR Pt-II (2004) item of Schedule	1796 1812	1874	1874 1883	1864 D	1864 1864 A	2051 2054 2055	2052 2054 2055	2051 2054 2056 2060	2051 2055	2051 2054 2055	2060 2061
Rate Rs.	154 6.11 165.11	319.33	319.33 28.23 347.56	380.32	438.21 23.71 461.92	42.77 11.38 6.50 60.65	51.63 11.38 6.50 69.51	42.77 11.38 13.56 6.5 44.9 119.11	51.50 6.50 58.00	59.04 (-) 15.45 47.53	55.41 12.27 67.7
UNIT	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.	S.M.
M.Book No./ Appx 'B'	Sheet 56 0.79	Sheet 45 13.06	Sheet 47 1.77	Sheet 45 10.59	Sheet 48 18.09	Sheet 40 20.28	Sheet 40 141.57	Sheet 42 137.38	Sheet 43 105.93	Sheet 44 82.58	Sheet 46 23.65
Total	0.79	13.06	1.77	10.59	16.09	20.28	141.57	137.38	105.93	82.58	23.65
Reduced Total	0.79	13.06	1.77	10.59	16.09	20.28	141.57	137.38	105.93	82.58	23.65
Rs. 21302.14 B/F	130.44	4170.45	615.18	4027.59	7432.29	1229.98	9040.53	16365.33	6143.94	3925.03	1602.05
			TOTAL TO SUMMARY		37678.09					C/O TO NEXT SHEET	39104.86

	PLASTERING & POINTING					W/W, C/W & DISTEMPERING				GLAZING	
	(49)	(50)	(41)	(52)	(53)	(68)	(67)	(69)	(70)	(65)	(66)
Description of work	Rendering **20** mm thick in **CM (1:3)** on surfaces other than fair face of brickwork finished even & smooth using **extra** cement in skirting	Extra over rendering in isolated **widths** of **skirtings** **n.exc. 15 an** lin width **or** **girth,** incl cutting to edges, **all** mitres 6 stopped ends etc.	**M & L** keyed pointing to **random rubble** **uncoursed in** cement mortar **(1:4)**	Rendering **10** mm thick on fair **faces** of **brickwork** in **C.M. (1:4)** (backing coat)	-Ditto- but as surfaces other than fair face of **brickwork**	**White** washing **3** coats **on** walls incl. preparing surfaces plastered first coat on undecorated surface	-Ditto- but **on** **ceiling -ditto-**	Distempering **walls with 2** coats of **distemper dry** **w h i i** or tinted incl. preparation of **new plastered** surfaces, preparatory to **distempering**	**M & L cement** based **painting** **walls 2 coats** incl preparing *new plastered* *surfaces.* **priming** plastered 6 other **surfaces** **with alkali** resistant priming paint	Sheet glass **ordinary** quality 6 **glazing with oil** **putty** in square **n.exc. 0.5 Sq.m. in** each pane **with 4** mm t h i i glass	Figured **glass,** pin head t ype & glazing with **oil putty** n **squares** n.exc. **0.5 sq m.in** each pane with **3 mm** thick glass
SSR **Pt-II (2004)** **Item** of Schedule	PR 2051 2054 2055 1812	2086	2151	2051	2052	2191 2197	2192 2198	2191 2194 2199	2191 2196 2201	2221	2228
Rate Rs.	71.97 W15.45 30.90 6.50 X 10.88 11.57 6.11 114.44	12.44	258.10	51.50	62.54	0.28 2.03 1.3 1.3 4.91	0.39 2.22 1.58 1.58 5.77	0.28 1.00 5.23 3.42 9.93	0.28 11.69 12.14 32	273.63	173.75
UNIT	Square Metre	Running Metre	Square Metre	Square Metre	Square Metre	Square Metre	**Square** Metre	Square **Metre**	**Square** Metre	Square Metre	**Square** **Metre**
M.Book No. Appx 'B'	Sheet 46 2.48	Sheet 46 21.16 48 14.19	Sheet 42 17.16	Sheet 47 0.95 49 3.77	Sheet 48 0.83 49 11.69	Sheet 53 52.54	Sheet 53 82.58	Sheet 53 109.31	**Sheet** 53 158.10	**Sheet** 52 11.49	Sheet 53 0.96
Total	2.48	35.35	17.16	4.72	12.82	52.54	82.58	109.31	158.10	11.49	0.96
Reduced Total	2.48	35.35	17.16	4.72	12.82	52.54	82.58	109.31	158.10	11.49	0.96
Rs.39104.86 B/F	283.94	439.88	442.73	243.08	801.76	257.97	476.49	1085.45	5059.2	3144.01	166.8
		TOTAL TO SUMMARY			41316.25				6879.11	TOTAL **TO** SUMMARY	3310.81

	PAINTING			PLUMBING. DRAINS & SANITARY FITTINGS							
	(71)	**(72)**	**(73)**	**(74)**	**(76)**	**(77)**	**(78)**	**(79)**	**77** (a)	**(80)**	**(81)**
Description of work	Wooden **surfaces** of **any** description not otherwise described. over **10 cm** width **or girth, incl** preparation of **new** surfaces, **priming** coat with pink primer **& 2** coats of synthetic enamel paint	**Steel** surfaces of any description, over **10 an** width or girth, not **otherwise** described **incl.** preparation of *new* surfaces, priming coat with red oxide. zinc **chrome** & **two** coats of synthetic enamel paint	-Ditto- but **excluding** priming coat 'ditto'	Rotational moulded water storage tanks' **(cylindrical** vert with closed top) hoisted & fixed in position all as **spd** SSR **Pt I,** of **capacity 450 litres**	Supply & **fix** water **closet** (squat **orissa pattern) complete incl.** provision of LC bedding complete **580** x 440 mm white	**Supply** only **flushing cistern** of pressed steel **enamelled white,** low level with inlet, **ball valve float** & handle in d brackets complete **10 litres** capacity	S & F WHB **viterous,** china flat back, of size 550 x 440 mm white, **incl cutting** for **pinning in** ends of brackets **etc.** complete **incl** brackets	Supply only 600 x 450 mm bevelled edge **mirror** of selected quality glass, mounted on 6 mm t h i i **comm.** Plywood & **fixed** to wooden plugs with CP brass screws & CP **wahsers**	Flush pipe of low or high **density** or PVC 32 mm **dia** for low level **cistern**	**LDPE** pipes of pressure rating of **6 kg/sq. an** of **32** mm **bore**	**M & L CI** Nahani trap with grating. **incl.** jointing to **waste pipe in runlead 75** mm **dia outlet**
SSR **Pt-II (2004)** Item of Schedule	2301	2353	2353	2795	2954 2805	2963	2979 2838	2984	2969	2901	2737
Rate Rs.	3.96 9.98 15.93 15.93 45.8	2.20 11.3 15.93 15.93 45.36	2.2'0 15.93 15.93 34.06	2128.22	607.59 402.87 1010.46	526.04	519.15 144.82 663.52	243.50	-51.59	34.96	236.98
UNIT	Square Metre	Square Metre	Metre	Each	Each	Each	Each	Each	Each 1 No.	Running Metre	Each
M.Book No./ Appx 'B'	Sheet 54 | 21.02	Sheet 55 | 17.82	Sheet 55 | 30.96	Sheet 55 | 1 No.	Sheet 56 | 1 No.	Sheet 56 | 1 No.	Sheet 56 | 1 No.	Sheet 56 | 1 No.	Sheet 58 | 1 No.	Sheet 56 | 0.60	Sheet 56 | 2 Nos.
Total	21.02	17.82	30.96	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	0.60	2 Nos.
Reduced Total	21.02	17.82	30.96	1 No.	1 No.	1 No.	1 No.	1 No.	1 No.	0.60	2 Nos.
Rs.	962.72	808.32	1054.5	2128.22	1010.46	526.04	663.97	243.00	51.59	20.98	236.98
TOTAL TO SUMMARY			2825.54							C/O	4881.74

	(82)	(83)	(84)	(85)		(86)		(87)(a)	(87)(b)	(89)(a)	(88)	(90)
Description of work	M & L SGSW gully traps round mouthed, type P1' of size 150 X 100 mm	S & F CI soil, waste & vent pipes in any length without ears, with cement joint in trenches or floors, of spun pipes of 100 mm bore	-Ditto- -ditto- but of 75 mm bore	PVC(SWR) junction single (single T) equal provided with access door (a) 75mm bore	(b) 110mm bore	S & F PVC(SWR) bends any radius (a) 75mm bore	(b) 110mm bore	S & F PVC(SWR) pipes single socketed in any length, with rubber ring joints, fixed to wall 110 mm bore	-Ditto- but laid in trenches	-Ditto- as per item No.87 (a), but 75 mm bore	S & F PVC (SWR) reducers 110 mm bore	S & F PVC (SWR) vent cowl 75 mm bore
SSR Pt-II (2004) Item of Schedule	2768	2664	2664	2702 2704	2702 2704	2699	2699	2697	2695	2697	2706	2707
Rate Rs.	89.06	451.58	388.6	62.52 19.06 81.58	110.14 28.63 138.77	41.25	69.85	164.43	146.60	90.98	76.20	11.42
UNIT	Each	Running Metre	Running Metre	Each	Each	Each	Each	Running Metre	Running Metre	Running Metre	Each 1 No.	Each 1 No.
M.Book No. Appx 'B'	Sheet	Sheet	Sheet	Sheet Qty	Sheet Qty	Sheet Qty	Sheet Qty	Sheet	Sheet	Sheet	Sheet	Sheet
	57 1 No.	57 0.45	57 2.20	57 1 No.	57 1 No.	57 1 No.	57 1 No.	58 0.60	58 2.00	58 4.30	58 1 No.	58 1 No.
Total	1 No.	0.45	2.20	1 No.	1 No.	1 No.	1 No.	0.60	2.00	4.30	1 No.	1 No.
Reduced Total	1 No.	0.45	2.20	1 No.	1 No.	1 No.	1 No.	0.60	2.00	4.30	1 No.	1 No.
Rs.4881.74 B/F	89.06	203.21	854.92	81.58	138.77	41.25	69.85	164.43	293.20	389.28	76.20	11.42

PLUMBING, DRAINS & SANITARY FITTINGS

TOTAL TO SUMMARY   7294.91

UNIT 5 ANALYSIS OF RATES

Structure

5.1 INTRODUCTION

In this unit, we shall be introducing the method of analysis of rates. We shall confine ourselves to study the basic factors affecting the analysis of rates. The topics discussed in this unit represent the initial prerequisites for clear and better understanding of course on estimation and quantity surveying.

Objectives

After studying this unit, you should be able to

- determine the cost per unit of an item of work,

- verify the reasonability of rates quoted by the contractor in tender,

- examine the most economic method of construction,

- calculate the quantity of materials for procurement action, requirement of labour as well as tools and plants for completion of item/work, and

- fix up labour contract.

5.2 FACTORS AFFECTING ANALYSIS OF RATES

The analysis of rates is the process of determination of the rate per unit of the items of work after considering the cost of materials, labour, tools/plants and equipment required.

The factors which affect the analysis of rates can be broadly classified as

(a) major factors, and

(b) minor factors.

Major Factors

There are two major factors on which the rate depends. The cost per unit is mainly shared by these two factors :

Cost of Materials

The material cost per unit price of an item is between 50% to 60%. The quantities of materials required per unit item of any work is worked out by arithmetical calculations. These quantities *are* constant for all the places and times. But the price of materials is variable from time to time **and** place-to-place. Hence, before starting the process of analysis of rates, the prices of required materials are required to be collected. **Moreover,** allowances for wastage, breakage, cutting of materials, etc. has to be made while calculating the quantity of materials.

Cost of Labour

Different type of labour is required to incorporate the **material** to complete the **item** of work. It is the most uncertain factor while determining the cost of any item of work. The output of labour varies considerably according to their skill. It also varies from place to place. The output of individual labour will differ **from** day-to-day, depending on varied things like weather, domestic life, working conditions, etc. It is, **therefore,** necessary to study the nature of work and wages paid while starting the process of analysis of rates. By assessing the amount of labour **force** and their wages, the cost of labour element is worked) out.

Minor Factors

These are required **to** be considered depending upon the nature of work and special conditions existing.

Cost of Tools and Plant

The use of plants is on increase in these days. The cost of plants has to be considered wherever possible for specific items of work, **e.g.** the cost of operating a concrete mixer has to be spread over all those items of works for which it is used. This cost has to include depreciation and maintenance expenditure along with **cost** of operator, fuel or power.

It is **difficult** to allocate use of certain tools **and plants** such as wheel barrows, ladders, etc. to individual items of work. Hence, its cost has to be considered with the overhead charges.

Cost due to Magnitude of Work

Greater the magnitude of work, lesser will be the cost, similarly lesser the magnitude of work cask will be on higher side.

Cost due to Place of Work

If the site is at a remote place, cost will be increased due to extra transportation. If the site is congested, then it will not **be** possible to stack the materials near the site. The materials have to be stacked at places away from the site and then to be transported by handcarts or

head loads. Thus, the cost of labour is increased due to double handling.

Cost due to Site Conditions

If there are restrictions on entry and exit of materials and labour, the cost per unit of an item will be higher. In addition if there are restrictions on working hours, the labour output will be reduced resulting in increase in cost per unit,

Cost due to Specifications

If superior quality of materials and use of type of labour is specified, it will result in increase in cost per unit of an item. Hence to achieve economy specifications have to be in accordance with local practice keeping in view local material and local available labour.

Overhead Charges

This will include all office expenses including salary of staff, stationery, rent, lighting, water supply, heating, postage, telephone, computer running/typing, depreciation of furniture and transport, etc. Normal expenses considered on this account are generally 5 percent.

Contractor's Profit

The element of profit varies from person to person and depends on circumstances. A contractor in need of work just to keep his staff fully occupied, may reduce his profit margin. While a contractor having work load to his capacity, would like to take new job at a comparatively high profit. A profit of 10 % is normally allowed.

5.3 IMPORTANCE OF ANALYSIS OF RATES AND ESSENTIALS OF ANALYSIS OF RATES

5.3.1 Importance

The process of analysis of rates gives us a clear idea of forces affecting the performance of any item of work. But this is never complete due to varying factors like materials, labour and its cost. However, it serves as a guide to arrive at a reasonable rate.

5.3.2 Essentials of Analysis of Rates

While working out rates for items in a bill of quantities following actions are most essential :

(a) To examine the plans, specifications, bills of quantities thoroughly to get a general idea of the scope of work.

(b) To inspect the site to get local information with regard to nearest railway station, nature of soil strata, available facilities, availability of local materials like sand, aggregate, stone bricks, timber, etc.

(c) To study the conditions regarding labour and its availability in relation to time of completion of work. Its output and that of plants and machineries.

(d) Correct information about rates of materials, wages of labours, etc.

5.4 LABOUR OUTPUT AND FACTORS AFFECTING OUTPUT

5.4.1 Categories of Labour

Labour is generally classified'in the following three categories :

- (a) Unskilled labour
- (b) Semi-skilled labour
- (c) Skilled labour

The labour wages vary from place to place. The Central Govt and State Govt fixes minimum fair wages for all above categories from time to time and it is mandatory on the part of the contractor to pay the wages accordingly. The contractor has to pay more wages due to scarcity or non-availability. Hence, while carrying out analysis of rates, prevailing wages of various labours from the concerned area has to be first ascertained.

5.4.2 Labour Output

It can be defined as a quantity of work, which an average labour can do in one working day of eight hours. It is also termed as Labour constant. IS : 7272 (Part-I) gives recommendations for labour output constants for building work and can be relied upon as a basis. Labour constants are also available in standard books on estimating by British and Indian authors.

Labour constants are only indicative. Actual labour outputs differ in fairly wide range depending on conditions of work like climate, weather, fatigue, resting time, incentive, incidental hold ups, preparatory work, nature of organisation, efficiency of labour/supervision and quality.

5.4.3 Labour Constants

The standardized labour constants in respect of some of the trades being dealt hereinafter are as under :

Concrete Work

Sl. No.	Description of Work	Unit of Work	Category of Labour	Labour Constant (of *08* Hours) Per Unit of Work

[Note : Labour constants giuen in items 1 and 2 below are for isolated structures upto 10 Metre height without using lifts/hoists, and with small size mixing plants, applicable to average work site conditions in India. For large and sophisticated mixing plants, and better management, it should be possible to reduce the constants substantially.]

				Machine mixed cement concrete	Hand mixed cement concrete
01.	Mixed concrete delivered on banker	CU. m	Mazdoor	0.50	1.00
			Bhisti	0.10	0.10
			Mixer Operator	0.07	—
			Mixer Machine	0.07	—

[**Note** : Item **2** below does not include for mixing time given in item 01. Lead from the mixing platform to the place of pouring concrete is assumed up to 30 m.]

Sl. No.	Description of Work	Unit of Work	Category of Labour	Labour Constant (of 08 Hours) Per Unit of Work
02.	Conveying, pouring, consolidating and curing concrete (excluding mixing time) in the following :			Labour days (of 8 hours) per unit
	Un-reinforced foundations	cu. m.	Mason	0.10
			Mazdoor	1.13
			Bhisti	0.60
			Vibrator (Machine and Operator time)	0.07
	Un-reinforced sub-bases of floors	cu. m.	Mason	0.17
			Mazdoor	1.33
			Bhisti	0.70
			Vibrator	0.07
	Reinforced foundations, footings, bases of columns, basement ground slabs, underreamed piles and plinth beams (excluding **reinforcement/formwork**)	cu. m.	Mason	0.17
			Mazdoor	1.50
			Bhisti	0.80
			Vibrator (ditto)	0.07
	Reinforced suspended floor, roof, landing and canopy slabs (ditto)	cu. m.	Mason	0.24
			Mazdoor	2.00
			Bhisti	0.80
			Vibrator (ditto)	0.07
	Reinforced **chhajjas** up to **15** cm in thickness (ditto)	cu. m.	Mason	0.30
			Mazdoor	3.00
			Bhisti	0.80
			Vibrator (ditto)	0.10
	Reinforced beams, lintels and cantilevers (other than plinth beams) (ditto)	cu. m.	Mason	0.20
			Mazdoor	2.50
			Bhisti	0.80
			Vibrator (ditto)	0.07
	Reinforced pillars and columns (ditto)	cu. m.	Mason	0.23
			Mazdoor	3.00
			Bhisti	0.80
			Vibrator (ditto)	0.10
	Reinforced staircases, **fins,** water **tanks** (up to **1200 litres) chullah** hoods, fascias, **parapets** and railings, domes, vaults, shell roofs, folded plates and the like (ditto)	cu. m.	Mason	0.30
			Mazdoor	3.80
			Bhisti	0.80
			Vibrator (ditto)	0.07

Formwork and Centering

(a) **Formwork** is required to be initially fabricated. Thereafter it can be used between 6 to 16 times again, where repetitive operations are

possible. The labour and material constants as well vary widely with the number of uses possible in the same or different sites of work. For non-repetitive shapes/sizes the constants will have to be worked out for single use.

There are three distinct operations involved in respect of formwork. The first is fabrication for first use, second is fixing in place for the first and the last each subsequent reuse and stripping, cleaning, preparing for each subsequent use.

Where readymade steel forms and props are used as in the case of soffits of slabs, very negligible time will be required in initial fabrication and number of reuses will be several times more than the possible reuses of timber/plywood form work.

(b) **Note for Labour Constants**

The labour constants given below are for each sq. m. of area of formwork in contact with concrete and included for fabricating, erecting, propping, stripping, cleaning and reusing and taken into consideration 16 uses after initial fabrication. They are not applicable for readymade steel forms.

SI. No.	Item	Category of Labour	Labour Constant In Days (of 08 Hours) Per sq. m. of Form Work
01.	Foundations, footings, bases of columns, plinth beams and mass concrete	Carpenter	0.13
		Mazdoor	0.13
02.	Column shafts, other than circular or curved on plan	Carpenter	0.25
		Mazdoor	0.20
03.	-do- but circular or curved on plan	Carpenter	0.38
		Mazdoor	0.25
04.	Walls/pertitions and square/rectangular shafts and chimneys	Carpenter	0.25
		Mazdoor	0.20
05.	Sides and soffits of beams/lintels	Carpenter	0.30
		Mazdoor	0.20
06.	Soffits of slabs for floor/roof/landing	carpenter	0.23
		Mazdoor	0.20
07.	Soffits of slabs and folding plates up to 30° inclination	Carpenter	0.34
		Mazdoor	0.25
08.	Slabs/folding plates cast t'an inclination of more 30° (area of soffit, measured)	Carpenter	0.57
		Mazdoor	0.50
09.	Edges of slabs and breaks in floor (upto 20 cm depth)	Carpenter	0.07
		Mazdoor	0.05
10.	-do- above 20 cm in depth	Carpenter	0.06
		Mazdoor	0.05
11.	Staircase (soffits/edges/risers of steps and waist slab)	Carpenter	0.30
		Mazdoor	0.17
12.	Vertical fins/sun breakers, louvers, etc.	Carpenter	0.56
		Mazdoor	0.50
13.	Chullah hoods, weather shades, chhajjas, corbel and the like	Carpenter	0.45
		Mazdoor	0.40
14.	Comicdmouldings, 20 cm depth, 40 cm girth upto 10 cm projection	Carpenter	0.16
		Mazdoor	0.16

Reinforcement for Concrete

The operations involved are cutting, bending, fabricating, placing in position and tying with MS wire at each intersection, using **round/deformed/tor** steel bars as reinforcement. A labour constant of 1 day per quintal of reinforcement for a team of one Blacksmith and one Mazdoor, irrespective of diameter of bar and location, can be adopted in general.

Brickwork

The materials required for brickwork are, bricks and cement mortar of different proportions

(a)　The labour required for mixing mortar is as under :

Mixing of Mortar

St No.	Description of Work	Unlt of Work	Category of Labour	Labour Days (of 08 Hours) Per Unlt Cement Mortar
01.	Mixing mortar by hand, any proportion	CU. **m.**	Mazdoor	**1.00**
			Bhisti	**0.10**
02.	Mixing cement mortar by machine, in any proportion	CU. m.	Mazdoor	**0.36**
			Bhisti	**0.10**
			Mixer Machine	**0.07**
			Mixer Operator	**0.07**

(b)　The labour constants for some of the items of constructing brick masonry are as under :

Brickwork

Sl. No.	Descrlptlon of Work	Unit of Work	Labour Constant in Days (of 08 Hours) Per Unit of Work		
			Mason	Mazdoor	**Bhlstl**
	Note : Labour constants given below for mason's time may be reduced by **6%** when using modular bricks.				
03.	Brickwork, one brick or more in thickness, in cement, or lime or cement line mortar (excluding labour in mixing the mortar), in :				
	(a)　foundations and plinth	cu. m.	**0.82**	**1.60**	**0.20**
	(b)　superstructure	cu. **m.**	**0.98**	**1.93**	**0.20**
04.	**Add** to constants in Item **4(b)** for brickwork in :				
	(a)　**square/rectangular** pillars	cu. m.	**0.54**	**0.27**	—
	(b)　circular pillars (including **cutting/dressing** bricks)	cu. **m.**	**1.42**	**0.35**	—
	(c)　wall, curved on plan to less than **6 m** radius (ditto)	cu. M.	**0.26**	**0.53**	—
05.	Brickwork in half brick thick walls using old size bricks (ditto)	sq. m.	**0.13**	**0.21**	
06.	Brick walls with bricks laid on edge using old size **bricks** (ditto)	sq. m.	**0.17**	**0.19**	
07.	Honeycombed half brick thick wall using old size bricks (ditto)	sq. m.	**0.20**	**0.17**	
08.	Cutting, **toothing** and bonding new brick wall to existing	sq. m.	**0.20**	**0.10**	
09.	Laying DPC 15 to **20 mm** thick **with** cement mortar (excluding labour in mixing of mortar)	sq. m.	**0.01**	**0.01**	

Stone Masonry

The material required for stone masonry are quarried stone, headers or bond stones and cement mortar of different proportions,

The labour constants for some of the items of stone masonry work are as under :

Sl. No.	Description of Work	Unit of Work	Labour Constant in Days (of 8 Hours) Per Unit of Work	
			Mason	**Mazdoor**
01.	Random rubble (RR) masonry, uncoursed, laid by in retaining walls, abutments, etc.	cu. m.	0.47	0.94
02.	RR masonry in foundations and plinth (excluding labour in mixing mortar) for			
	(a) foundations/plinth in any kind of moartar	cu. m.	0.60	1.62
	(b) superstructure in any kind of mortar	cu. m.	0.75	2.00
03.	Extra labour over Items 2(a) or (b) for			
	(a) work brought up to courses	cu. m.	0.20	–
	(b) walls curved on plan to a radius less than 6 m	cu. m.	0.20	0.40
	(c) work in square or rectangular columns	cu. m.	0.58	0.27
	(d) work in unwursed polygonal masonry	cu. m.	0.08	–
	(e) work in uncoursed squared rubble masonry	cu. m.	0.43	0.13
	(f) work in regular coursed, squared rubble masonry	cu. m.	0.85	0.20
	(g) work in block-in-course masonry	cu. m.	1.26	0.38
	(h) work in ashlar masonry	cu. m.	2.99	0.80
Note :	Labour for facework given in items below is to be allowed for each finished face of stone walling.			
04.	Facework to RR masonry (uncoursed or brought up to courses) for hammer dressing to face/beds/joints of face stones in :			
	(a) limestone or sandstone	sq. m.	0.05	0.02
	(b) granite or trap stone	sq. m.	0.10	-0.05
05.	Facework to polygonal rubble walling (uncoursed or brought up to course) for hammer dressing to face/beds/joints of face stones in			
	(a) limestone or sandstone	sq. m.	0.06	0.02
	(b) granite or trap stone	sq. m.	0.12	0.05
06.	Facework to squared rubble walling (uncoursed or brought up to course) for hammer dressing to face/beds/joints of face stones in :			
	(a) limestone or sandstone	sq. m.	0.15	0.08
	(b) granite or trap stone	sq. m.	0.30	0.15
07.	Facework to regular coursed squared rubble masonry for dressing to face/beds/joints of face stones in :			
	(a) limestone or sandstone	sq. m.	0.27	0.14
	(b) granite or trap stone	sq. m.	0.54	0.25
08.	Facework to block-in-course masonry, regular coursed for dressing to face/bed/joints of face stones in :			
	(a) limestone or sandstone	sq. m.	0.54	0.25
	(b) granite or trap stone	sq. m.	1.10	1.45

09.	Facework for ashlar masonry in :			
	(a) limestone or sandstone	sq. m.	0.54	0.25
	(b) granite or trap stone	sq. m.	1.10	0.50
10.	Extra over items of facework for external angles (for quoins and jambs) in :			
	(a) RR/polygonal rubble uncoursed or brought up to courses	m	0.08	0.02
	(b) squared rubble masonry uncoursed/brought up to course	m	0.10	0.02
	(c) squared rubble regular course masonry	m	0.11	0.02
	(d) block-in-wurse masonry	m	0.22	0.03
	(e) ashlar masonry	M	0.50	0.06
11.	Cutting opening through stone walls for doors, windows, etc. for enlarging existing openings, converting existing windows to doors and the like, including shoring/underpinning as required and removing debris off the premises	sq. m	0.35	0.70
12.	Forming jambs (in course/uncoursed masonry) to newly cut opening in existing walls, including cutting, toothing and bonding to old work, facing and pointing to match existing (each face of jamb)	sq. m.	0.40	0.65
13.	Cutting, toothing and bonding new brick or stone walls to existing wall built in lime or cement mortar (measured for vertical face of new wall in contact with old)	sq. m.	0.23	0.12

5.5 AVERAGE OUTPUT OF MIXER AND LABOUR REQUIRED FOR MIXING

(a) Machine mixing is always better from quality point of view and cheaper than hand mixing, when concreting is required in quantities in excess of 20 cubic metres at one stretch.

(b) The capacity of a concrete mixing machine is indicated by a system of double numbers, such as 4001300, 3001210, 2801200, etc. denoting capacity per batch in litres of dry and wet mix. When the capacity of concrete mixer is expressed by a single number such as 300, it denotes volume of wet mix produced per batch in litres.

(c) Concrete mixers normally cater for an over loading of about 10 % over their rated capacity. When needed to allow for use of full (i.e. avoiding fraction) number of 50 kg cement bag to be used per batch.

(d) The suffix using alphabets appended to the stated capacity denote the type of mixer, e.g. HF for Hand Fed, BL for Batch Loading type, T for Tilting, NT for Non Tilting, RD for Reversible Drum, etc.

(e) Concrete mixers are mostly diesel driven or electrically driven. The contractors who restrict their operations to particular urban areas prefer electrically driven varieties, while others will prefer diesel driven kind.

(f) Where batching is done by volume, the capacity of concrete mixer chosen should be such it will consume one or more whole bag of 50 kg cement per batch. The average labour required for one cu. metre of concrete has been indicated in concrete work hereinbefore.

5.6 MATERIALS FOR DIFFERENT ITEMS OF WORK

5.6.1 Cement Constants

Cement constants worked out and published by CBRI, Roorkee and Cancrete Association of India are given below. These constants include an allowance of 2.5% for wastage and are in use in MES department for working out estimgted requirement of cement.

These constants are applicable for ordinary Portland cement, Portland pozzolana cement, Portland slag cement, high alumina cement, Sulphate resisting cement and Portland white cement for purposes of estimating, analyzing prices and for approving rates payable to contractors.

The cement constants for some of the items are given below :

Description of Item	Mix by Volume	Unit	Cement Constant In Kg
Cement Concrete Mixed cement concrete delivered on banker	1 : 1.5 : 3	cu. m.	402.83
	1 : 2 : 4	cu. m.	308.53
	1 :	cu. m.	268.55
	1 : 2.5 : 5	cu. m.	253.18
	1 : 3 : 6	cu. m	213.20 ·
	1 : 4 : 8	cu. m.	161.95
	1 : 5 : 10	cu. m.	129.15
	1 : 7 : 12	cu. m.	104.55
Mortars Cement and sand mortar	1 : 1	cu. m.	1058.83
	1 : 2	cu. m.	699.05
	1 : 3	cu. m	493.03
	1 : 4	cu. m.	382.33
	1 : 6	cu. m.	254.20
	1 : 8	cu. m.	152.70
Brick Work Brick work in well burnt bricks built in cement and sand mortar using old size bricks	1 : 3	cu. m.	123.00
	1 : 4	cu. m.	95.84
	1 : 6	cu. m.	64.06
	1 : 8	cu. m.	47.93
-ditto- but using modular size bricks	1 : 3	cu. m.	113.30
	1 : 4	cu. m.	87.90
	1 : 6	cu. m.	58.40
	1 : 8	cu. m.	44.30
Stone Manonry Walling of random or polygonal rubble, uncoursed or brought up to courses in cement mortar	1 : 3	cu. m.	147.60
	1 : 4	cu. m.	114.80
	1 : 6	cu. m.	75.34
	1 : 9	cu. m.	58.94
Planterlng 10 mm thick rendering or screeding on brick or concrete surfaces in cement and sand mortar	1 : 2	sq. m.	11.79
	1 : 3	sq. m.	8.41
	1 : 4	sq. m.	6.77
	1 : 6	sq. m.	4.46
-Ditto- but on stone masonry surfaces or lathing	1 : 2	sq. m.	15.68
	1 : 3	sq. m.	11.17
	1 : 4	sq. m.	8.41
Add or deduct for each 5 mm thickness over or under 10 mm on concrete, brick, lathing or stone masonry surfaces (cement mortar)	1 : 6	sq. m.	5.64
	1 : 2	sq. m.	4.77
	1 : 3	sq. m.	3.38
	1 : 4	sq. m.	2.51
	1 : 6	sq. m.	1.69

Pointing			
Raking out joints to a depth of **10** mm and providing flush, keyed or struck pointing in cement mortar, on brick surfaces	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**2.51** **1.69** **1.39**
Raking out joints to a depth of **10** mm and providing flush, keyed or struck pointing, to random rubble, masonry **uncoursed** or brought up to courses **(20** mm thick joints) with cement and sand mortar	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**5.02** **3.95** **2.83**
-Ditto- but to squared rubble coursed or uncoursed masonry	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**3.95** **2.82** **2.26**
Raking out joints to a depth of **10** mm and providing bastard tuck or mason's V joint pointing to random rubble masonry, uncoursed or brought up to courses	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**6.15** **4.46** **3.64**
-Ditto- but to squared rubble, coursed or **uncoursed** masonry	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**5.02** **3.64** **2.82**
Raking out joints to a dept of **10 mm** providing flush, keyed or struck pointing to block in course, or **ashler** or concrete block walling, with cement and sand mortar	**1 : 2** **1 : 3** **1 : 4**	sq. m. sq. m. sq. m.	**1.39** **1.13** **0.85**

5.6.2 Material Constants

The material constants in respect of some of the items of work are given below.

Mortar and Concrete

Water

Water required for mortar and concrete varies from **26** to **36** litres per bag **(50** kg) of cement depending on the mix preparation of mortar or concrete, moisture content of aggregate and the water cement ratio to be adopted.

Shrinkage

- Cement shrinks by **15** to **30** %, when wetted

- Sand shrinks by **20** to **30** %, when wetted

- Dry cement **&** sand mix shrinks by **25** to **35** % when wetted

- Dry cement concrete mix shrinks by **20 %,** when wetted

Cement Mortar

For requirement of cement for various mixes of cement mortar refer cement constants given hereinbefore. Requirement of water may be taken as **140 litres** per cu. m. of mortar.

Sand required per cu. m. of cement sand mortar is as under :

Mix by Volume	Sand in cu. m.
1 : 1	0.7125
1 : 2	0.95
1 : 3	1.07
1 : 4	1.07
1 : 6	1.07
1 : 8	1.07

Note : Quantity of sand is exclusive of wastage.

Cement Concrete

Cement constants for requirement of cement for various mixes of concrete, the table given hereinbefore may be referred. The requirement of coarse and fine aggregate is indicated below and adds 2.5 % to allow for wastage.

Mix by Volume Cement : Sand : Aggregate	Size of Coarse Aggregate (Graded) Used	Coarse/Fine Aggregate Required Per cu. m. of Concrete	
		Sand in cu. m.	Crushed Stone in cu. m.
1 : 1 : 2	20 mm	0.38	0.75
1 : 1.5 : 3	20 mm	0.42	0.83
1 : 2 : 4	20 mm	0.44	0.88
1 : 3 : 6	40 mm	0.45	0.90
1 : 4 : 8	40 mm	0.47	0.95
1 : 5 : 10	40 mm	0.47	0.95

Reinforcement

Quantity of steel for different sections will be worked out from actual measurements or drawing supplied. Wastage of steel will depend on the size of off cuts and the possibility of using off cuts in situation like chhajjas, canopies, etc. Wastage of steel in reinforcement varies from 2 to 10%.

Binding wire for reinforcement may be taken as 0.9 to 1.3 kg per quintal of reinforcement.

Formwork and Centering

While analyzing rates for formwork and centering, assessment of number of times the timbet can be used assumes great importance. Normally assumption upto 16 uses depending on the nature and magnitude of work is made.

The quantities of materials, including wastage, required for 10 sq. m. of formwork in different situations are given below and these are for first or

single use. Allow for nails and spikes at the rate of 4 to **5** kg for first use and 1 kg for each subsequent use for 10 sq. m. of formwork.

Materials required per 10 sq. m. of **formwork** including **5%** wastage.

Sl. No.	Situation Where **Formwork is** to be Provided	**Boarding in** sq. m.	**Scantilings or Battens in** cu. m.	**Balies or Struts in Metres**
1.	Foundations, footings, bases of columns and mass concrete	11.00	0.064	13
2.	Soffits of suspended landing/roof/floor slabs upto **200** mm thick	10.50	0.105	82
3.	-Ditto- but exceeding **200 mm** in thickness	10.50	0.118	100
4.	Walls, partitions, parapets and the like	10.50	0.034	28
5.	Columns, piers, **etc.**	13.70	0.060	38
6.	-Ditto- but circular on plan	12.00	0.110	54
7.	Sides and soffits of beams, lintels and the like	11.50	0.060	
8.	Edges of slabs and breaks in suspended floors	20.00	0.060	—
9.	Staircases	10.50	0.070	11
10.	**Chullah** hoods, chhajjas, etc.	11.50	0.013	5

5.6.3 Brickwork

While constructing brickwork, the quality of bricks and mortar required for one cubic meter of brickwork has to be worked out.-As the brick sizes differ widely, the quality of bricks and mortar also differ. The basis of calculations for material constants for brickwork is as under :

(a) Dimensions of modular size bricks have been taken as 19 x 9 x 9 cm with frog of 10 x 4 x 1 cm size.

(b) Dimensions of old size bricks have been taken as 9 x **4.375** x **2.75** inches, i.e. **22.86** x 11.11 **x 6.985 cms** with a frog of 12.7 x 5.1 x 1 cm size.

(c) Thickness of joints has been taken as 1 cm throughout.

(d) The constants are applicable for cubical contents of brick work measured for nominal thickness of walls, i.e. one brick thick wall using modular bricks as 20 cm thick and that using old size bricks measured as **23** cm thick.

(e) For brickwork measured in square metres for half brick thick walls etc. the consideration about nominal thickness/actual thickness of wall in above does not apply.

Material Constant

Type of Brickwork	Unit	Material Constants for Brickwork (Without Wastage), Using					
		Modular Bricks		Old Size Bricks		Old Size Brick Tiles	
		Bricks in Nos.	Mortar in cu. m.	Bricks in Nos.	Mortar in cu. m.	Brick Tiles in Nos.	Mortar in cu. m.
20 cm (nominal) thick wall using modular bricks, or 23 cm (nominal) thick walls using old size bricks or old brick tiles	cu. m.	500	0.224	455	0.246	655	0.272
Half brick thick walls, or walls half brick tile thick	sq. m.	50	0.017	53	0.023	77	0 026
Brick on edge walls, or walls brick tiles on edge	sq. m.	–		35	0.009	35	0.0054
Honeycomb brickwork half thick, or half brick tile thick	sq. m.	36	0.0064	38	0.0082	55	0.011
Honeycomb brickwork one thick, or one tile thick	sq. m.	75	0.0144	77	0.0179	112	0.0230
Honeycomb brickwork laid on edge, (i.e. thickness of wall equal to the thickness of brick or thickness of brick tile)	sq. m.	–	–	25	0.0040	25	0.0025

Note : In the constants given above an adequate allowance has been made for the mortar joint at the periphery of the honeycomb brick/walling, etc.

Stone Masonry

For constructing stone masonry, the quantity of stones, headers/through stones and mortar required for one cubic metre of masonry has to be worked out. The table indicating the same for different types of masonry is as under :

Type of Stone Masonry	Materials Required Including Wastage			Notes
	Quarry Stones in cu. m.	Headers/Through Stones in Nos.	Mortar in eu. m.	
Random rubble, polygonal rubble or squared rubble masonry, uncoursed or brought upto course	1.10 to 1.15	7	0.30	Higher requirement of quarry stones for squared rubble regular coursed masonry and ashlar masonry is due to wastage in dressing the stones to the required heights and shapes
Squared rubble, regular coursed masonry	1.15 to 1.25	7	0.28	
Ashlar masonry	1.30 to 1.40	7		

5.7 MARKET RATE FOR MATERIALS AND LABOURS

Market rate for some of the materials are given below :

Note : The rate mentioned below are approximate and may vary from place to place and time to time. The same are required to be assessed at the time of execution/analysis.

Sl. No.	Description of Item	Unit	Rate Rs.
1.	Cement	Bag. of 50 kg	130/- to 150/-
2.	Rubble	cu. m.	200/- to 250/-
3.	Bricks (Old Size)	1000 Nos.	1800/- to 2100/-
4.	Sand (Local)	cu. m.	550/- to 750/-
5.	Sand (Fine)	cu. m.	600/- to 800/-
6.	Coarse Graded Aggregate		
	(a) 40 mm	cu. m.	350/-
	(b) 20 mm	cu. m.	425/-
	(c) 12.5 mm	cu. m.	320/-
	(d) Tor Steel/TMT Steel	kg	28 to 30/-
	(e) M. S. Binding Wire	kg	35/-

Market rate for some categories of labour (08 hours of working period in day time).

Note : The rates mentioned below are approximate and the same are required to be assessed at the time of analysis/execution.

Sl. No.	Description of Item	Unit	Rate Rs.
1.	**Unskilled**		
	(a) Bhisty	Per day	110/-
	(b) Mate	Per day	110/-
	(c) Mazdoor	Per day	100/-
2.	**Semi Skilled**		
	(a) Blacksmith	Per day	150/-
	(b) Carpenter Boy (Helper)	Per day	110/-
3.	**Skilled**		
	(a) Carpenter	Per day	200/-
	(b) Mason (Stone/brickwork/concrete Work)	Per day	200/-
	(c) Mixer driver	Per day	150/-
	(d) Plasterer	Per day	250/- to 300/-

5.8 ANALYSIS OF RATES OF CERTAIN ITEMS OF WORK

5.8.1 Brickwork

Example 5.1

Brickwork in well burnt old size bricks in super structure straight or curved on plan exceeding 6 metres radius built in cement mortar (1 : 6).

Solution

Unit : Cubic Metre

(A) **Material**

(i) Bricks   455 Nos.

Add 5% wastage $\dfrac{23 \text{ Nos}}{478 \text{ Nos}}$

@ $\dfrac{1700}{1000 \text{ Nos.}}$ = Rs. 812.60

(ii) Cement Mortar $(1:6)$ 0.246 M³

Cement $= 0.246 \times \dfrac{254.20\,\text{kg}}{\text{m}^3} = 62.53\,\text{kg} \ @ \dfrac{2.70}{\text{kg}} = \text{Rs. } 168.83$

Sand $- \qquad 0.246 \times 1.07 = 0.0263\,\text{m}^3$

Add 5 % wastage $\underline{0.01}$

$0.27\,\text{m}^3 \ @ \ \text{Rs. } 600 = \text{Rs } 162.00$
$\qquad\qquad\qquad \text{m}^3$

(iii) Water $-$ lump sum $= \text{Rs. } 10.00$

$\text{Total} = \textbf{Rs.1153.43}$

(B) Labour

(i) Mason $\qquad$ 0.98 @ **Rs.200/-** per day = Rs. 196.00

(ii) **Mazdoor** $\qquad$ 1.93

Mortar mixing $\underline{0.25}$

$\qquad\qquad\qquad$ 2.18 @ **Rs.100/-** per day = Rs. 218.00

(iii) **Bhiṣti** $\qquad$ 0.20

Mortar mixing 0.02

0.10×0.246

$\qquad\qquad\qquad \underline{0.22}$ @ **Rs.110/-** per day = Rs. 24.20

$\text{Total} = \textbf{Rs. 438.20}$

(C) T & P $-$ Lump Sum $\qquad\qquad = \text{Rs. } 10.00$

$(A) + (B) + (C) \qquad\qquad = \text{Rs.}1601.63$

Add overheads and profits **(+)15%** = Rs. 240.24

$\qquad\qquad\qquad\qquad\qquad \textbf{Rs. 1841.87}$

∴ The required rate is Rs. 1841.87 per m³.

Example 5.2

Brick work with well burnt old size bricks, straight or curved on plan to any radius in half brick thick walls built in CM $(1:4)$.

Solutior

Unit $-$ Per square metre

(A) Material

(i) Bricks $\qquad$ 53 Nos.

Add 5 % wastage $\underline{\text{03 Nos.}}$

$\qquad$ 56 Nos. @ $\dfrac{\text{Rs. }1700}{1000\ \text{Nos.}} = \text{Rs. }95.20$

(ii) Cement mortar $(1 : 4) - 0.023 \, m^3$

    (a)   Cement $- \, 0.023 \, x \, \dfrac{382\,233}{m^3} = 8.79 \, kg \, @ \, \dfrac{2.70}{kg} = Rs. \, 23.73$

    (b)   Sand $- 0.023 \, x \, 1.07 = 0.0246$

    Add 5 % wastage $\dfrac{0.0012}{0.0258 \, m^3} @ \dfrac{600}{m^3} = Rs. \, 15.48$

(iii) Water $-$ Lump sum $= \underline{Rs. \quad 1.00}$

                             Total $= \underline{\textbf{Rs.135.41}}$

(B) Labour

(i)   Mason $-$ 0.13 @ Rs. **200/-** per day $= Rs. \, 26.00$

(ii)   Mazdoor   0.21

       Mixing mortar $\underline{0.023}$

       (1×0.023) 0.233 @ **Rs.100/-** per day $= Rs. \, 23.30$

(iii)   Bhisti   0.04

       Mortar mixing $\underline{0.0023}$

       (0.1×0.023) 0.0423 @ **Rs.110/-** per day $= \underline{Rs. \, 4.65}$

                             Total $= \underline{\textbf{Rs.28.21}}$

(C) T & P Lump Sum $= \textbf{Rs.1.00}$

(A) + (B) + (C) $= Rs. \, 164.62$

Add overheads and profits (+) 15 % $= \underline{Rs. \quad 24.69}$

                 Rate $= \underline{\textbf{Rs 189.31}}$

$\therefore$ The required rate is Rs. 189.31 per square metre.

5.8.2 Stone Walling

Example 5.3

Analysis of rate for walling of random rubble, uncoursed, well. bonded, bedded, and solidly hearted, built in cement mortar $(1 : 6)$, in foundation and plinth.

Solution ·

Unit $-$ cubic metre

(A) Material

(i) **Quarry** stones   1.15 m^3 @ Rs. **200/-** Per m^3 $= Rs. \, 230.00$

(ii) **Headers/through** stones $-$ 7 Nos. @ Rs. 5/- each $= Rs. \quad 35.00$

(iii) Cement mortar $(1 : 6) - 0.30 \, m^3$

    (a)   Cement $-$ 0.30 $\times$ 254.20 kg $=$ 76.26 kg

           @ Rs. 2.70 per kg $= Rs. \, 205.90$

    (b)   Sand $-$ 0.30 x 1.07 $=$ 0.321 m^3

          Add 5 % wastage $= \underline{0.016}$

                   0.337 m^3 @ Rs. 550/- Per m^3 $= Rs.185.35$

(c)   Water (Lump sum) = <u>Rs.   5.00</u>
                            Total = <u>Rs. **661.25**</u>

(B)   Labour

  (i)   Mason 0.60 @ **Rs.200/-** per day = Rs. 120.00

  (ii)   **Mazdoor**   1.62

         Mortar mixing   <u>0.30</u>
            (0.30 **x** 1)   1.92 @ Rs.1001- per day   = Rs. 192.00

  (iii)   Bhisti 0.30 **x** 0.10 = 0.03 @ **Rs.110/-** per day <u>= Rs.   3130</u>
                                              Total = <u>Rs. **315.30**</u>

(C)   Tools and **Plants** (Lump Sum)   = **Rs.   5.00**

  (A) + (B) + (C)   = Rs. 981.55

  Add overheads and profits (+) 15 %   = <u>Rs.   147.23</u>
                                     Total = <u>Rs. **1128.78**</u>

  ∴ The required rate is Rs. 1128.78 per cu. metre.

SAQ 1   **?**

Analyse the rate for walling of random rubble **uncoursed,** well bonded,
bedded and solidly hearted, built in cement mortar (1 : 8) in super structure.

5.8.3 Concrete work

Example 5.4

Analysis of rate **for** cement concrete in foundations, filling and mass
concrete, Type D2 1 : 4 : 8 (40 mm graded aggregate).

Solution

Unit – cubic metre

(A)   Materials

  (i)   Cement 161.95 kg @ **Rs.2.70** per kg   = Rs. 437.27

  (ii)   Coarse sand 0.47 cu. m. **x** 1.025
          @ **Rs.550/-** **per** kg   = Rs. 264.96

  (iii)   Coarse **Aggregate** 40 **mm** graded
          0.95 **x** 1.025 **x Rs.350/-** per cu. m.   = Rs. 340.81

  (iv)   Water (for mixing **and** curing) lump sum = <u>Rs.   5.00</u>
                                     Total = <u>Rs. **1048.04**</u>

(B) Labour

(i) Mason 0.10 @ Rs. 2001-,per day   = Rs. 20.00

(ii) **Mazdoor** 1.13 + 0.50 (for machine mixed concrete)

     = 1.63 @ Rs.1001- per day   = Rs.163.00

(iii) Bhisti = 0.60 + 0.10 = 0.70 @ **Rs.110/-** per day   = Rs. 77.00

(iv) Mixer operator 0.07 @ Rs,**150/-** per day   = <u>Rs. 10.50</u>

                  Total = **<u>Rs. 270.50</u>**

(C) Tools and Plants

Machine Mixer including fuel − 0.07
@ **Rs.800** per day   = Rs.   56.00

(A) + (B) + (C)   = Rs.   374.54

Add overheads and profit (+) 15%   = <u>Rs.   206.18</u>

                Total = **<u>Rs. 1580.72</u>**

∴ The required rate is **Rs.1580.72** per cu. metre.

SAQ 2   **?**

Analyse rate for Cement concrete in foundation, **filling** and mass concrete,
Type E2 1 : 5 : 10 (40 mm graded aggregate)

Example 5.5

Analysis of rate for reinforced cement concrete in **slabs** supported on walls,
beams and columns in floors, roofs, landings and the like with cement
concrete type B1 1 : 2 : 4 (20 mm **graded** aggregate).

Solutions

Unit-Cubic Metre

(A) Material

(i) Cement − 308.53 kg @ 2.70 per kg   = Rs.   833.03

(ii) Coarse sand 0.44 x 1.025 @ Rs. 6001- per cu. m. = Rs. 270.60

(iii) Coarse aggregate (20 mm **graded**)
       0.88 x 1.025 x Rs. 425 per cu. m.   = Rs. 383.35

(iv) Water (for mixing and curing) Lump sum   = <u>Rs.   10.00</u>

                Total = **<u>Rs. 1496.98</u>**

(B) Labour

(i) Mason − 0.24 @ **Rs.200/-** per day   = Rs. 480.00

(ii) **Mazdoor** 2.00 + 0.50 = Rs. 2.50
     @ Rs.**100/-** per day   = Rs. 250.00

(iii) Bhisti 0.80 + 0.10 = 0.90 @ Rs.110/- per day = Rs. 99.00

(iv) Mixer operator 0.07 @ Rs.150/- per day = Rs. 10.50

(v) Vibrator operator 0.07 @ Rs.100/- per day = Rs. 7.00

Total – **Rs. 846.50**

(C) Tools and Plants

(i) Machine mixer with fuel 0.07 @ **Rs.800/-** per day = Rs. 56.00

(ii) Vibrator with fuel 0.07 @ Rs. 3001- per day = Rs. 21.00

Total = **Rs. 77.00**

(A) + (B) + (C) = Rs. 2420.48

Add overhead and profits (+) 15 % = Rs. 363.07

Total = **Rs.** 2783.55

∴ The required rate is 2783.55 per cubic metre.

SAQ 3

Analyse rate for RCC in foundations including rafts, footings, foundation beams, plinth beams, bases for columns, **etc.** with cement concrete Type B_1 1 : 2 : 4 (20 mm graded aggregate).

5.8.4 Formwork

Example 5.6

Analysis of rate for **formwork** to soffits of suspended slabs such as roof slabs, floor slabs, landings and similar work not exceeding 200 mm thick (horizontal or sloping).

Solution

Unit – square metre

(A) Material

(For 10 sq. metres) assuming 16 uses.

(i) Boarding $\frac{1050}{16}$ sq. m. x 0.02 thick = 0.013 125 cu. m.

(ii) Scatlings or battens $\frac{0\ 105}{16}$ m³ = 0.0065625 cu. m.

Total = 0.0196875 cu. m.

'0.197 @ **Rs.15000/-** per cu. **m.** = Rs. 295.50

(iii) Ballies - 82 ÷ 16 = 5.125 RM @ Rs. 15/- per RM = Rs. 76.88

(iv) Nails - 1.25 kg @ Rs. 401- per kg = Rs. 50.00

Total = Rs. 422.38

Cost of Material per sq. m. = Rs. 42.24

(B) Labour (for One sq. m.)

    (i)   Carpenter 0.23 @ Rs. 2001- per day = Rs. 46.00

    (ii)   Helper 0.20 @ Rs.110/- per day   = Rs. 22.00
                             Total = **Rs. 66.00**

(C) Tools and Plants (Lump Sum)   = Rs. 2.00

             (A) + (B) + (C)   = Rs. 110.24

Add overheads and profits (+) 15 %   = Rs. 16.54
                       Total = **Rs. 126.78**

The required rate is Rs. 126.78 per square metre.

SAQ 4

Analyse rate for formwork to sides of concrete foundations, footings, bases of columns, raft and raft beams, and plinth beams and similar work, vertical or to batter.

5.8.5 Steel Reinforcement

Example 5.7

Analysis of rate for deformed or twisted bars 10 mm dia and over, cut to length, bent to shape required including cranking, bending spirally, hooking ends and binding with M. S. wire not less than 0.9 mm dia, etc. complete.

Solution

    Unit – Quintal

(A)   Material

    Assuming 10 % wastage

    (i)   Reinforcement 1.10 Quintal @ Rs. 30001- per Quintal
                             = Rs. 3300.00

    (ii)   Binding wire – 1 kg @ Rs.35/- per kg   = Rs. 35.00
                         Total = Rs. **3335.00**

(B)   Labour

    (i)   Blacksmith 1 day @ Rs.150/- per day = Rs. 150.00

    (ii)   Mazdoor 1 day @ Rs. 1001- per day   = Rs. 100.00
                        Total = Rs. **250.00**

(C)   Tools and Plants (Lump Sum)   = **Rs. 10.00**

             (A) + (B) + (C)   = Rs. 3595.00

Add overheads and profits (+) 15 % = Rs. 539.25
                 Total = Rs. **4134.25**

∴ The required rate is Rs. 4134.25 per Quintal or Rs. 41.34 per kg.

5.9 SUMMARY

In this unit, an attempt has been made to explain the subject of Analysis of Rates in a simple manner. This covers the syllabus for Civil Engineering Diploma courses. As effort has been made to concentrate on method and procedure giving various examples. The examples cannot comprise all types of work in a building or a work and are intended only to help in understanding of the general principles involved. The students are advised to study analysis of rates in respect of other trades by referring to standard books on the subject.

5.10 ANSWERS TO SAQs

Refer relevant preceding text and other useful document of MES to get the answers of the SAQs.

UNIT 6   PRORATA (PROPORTIONAL RATE)

Structure

6.1 INTRODUCTION

In previous unit you have learnt about analysis of rates, thereby the method of preparation of rates of different items of works. Similarly, during last semester you have also got introduction to MES Standard Schedule of Rates – Part-I and II. So you are now aware that SSR Part-I deals with specifications of materials and workmanship in respect of all trades of building/civil Engineering works.
IS specifications and codes of practice, now cover quite a wide range of building materials and construction techniques. The provisions made in IS specifications and codes of practice have been considered and incorporated in the SSR to the extent they are applicable. SSR Part-II deals with the rates of items for all trades of building/civil engineering works. The units of measurement of these items are as per standard method of measurement stipulated by I.S. SSR Part I and II published by MES forms part of tender/contract documents concluded by MES department. Generally, there is hardly any contract without deviations, and deviations are to be priced as per contract provisions. The same are priced as per rates of items applicable for the deviation works. A situation may arise when there is no rate of items for deviation work available in SSR. In such contingencies a method is evolved to prepare a rate based on rate of similar item of SSR, which is termed as prorata. You will be studying the method of preparations of the same hereinafter.

Objectives

After studying this unit, you should be able to

- conceptualise the notion of prorata or proportional rate,

- prepare prorata for concrete work, concrete flooring and joinery etc., and

- prepare prorata in respect of items of different trades of building works in SSR Part-11.

6.2 STANDARD SCHEDULE OF RATES

6.2.1 SSR : Standard Schedule of Rates

It is a document containing detailed description of all the items of works together with their current rates but the quantities are not mentioned therein. These rates are inclusive of materials, labours, transportation charges, profit, etc. and are revised every **year/five** year if need arises. In case of tendering for works, the contractors are usually asked to quote at what percentage up or down the schedule of rates they will be prepared to execute the work.

6.2.2 Application of rates

The rates in the SSR are intended to apply to every description of work that may be required in the construction and maintenance of building of all kinds, or any work carried out under the agency of MES, also fortifications, roads, runways, parade and landing grounds, drainage, water supply, electrical wotks and for other works where made applicable.

6.3 PROPORTIONAL RATES CONCEPT

Subject to the over riding provisions of the conditions of contract, payment of work not specifically mentioned in the SSK shall be made as follows :

Proportional (or Prorata) Rates based on analogous items in the SSR.

Similar Items of Equivalent Value

If there are analogous items in the SSR for articles **and/or** workmanship of similar character and of equivalent value, then the rates equal to the rates of such items.

Similar Items Differing Value

If there are analogous items in the SSR for articles **and/or** workmanship of similar characters but differing in particulars and value, then at rates for the item as modified by the applicable price variations, which shall be determined on the same basis for the items in SSR and the new items or where applicable at direct PRORATA rates derived from the relevant SSR items.

The item or **items** of SSR on which a rate is based shall be stated in the analysis or make up of the rate.

Any percentage **applicable** to SSR rates shall equally apply to the proportional rates also.

6.4 PREPARATION OF PRORATA W. R. T. SSR PART II (2004)

6.4.1 Concrete

Example 6.1

Prepare a proportional rate for providing cement concrete in surface channels and drains with **type** C1 1 : **3** : 6 (20 mm graded aggregate).

Solution

Unit per Cu Metre

(a) Rate of CC Type C2 1 : 3 : 6 (40 mm graded aggregate)
Rs. 1624.67 Per cu. m. in surface channels and drains as per SSR ▪
items No. 157.

(b) Rate of mixed cement concrete delivered on banker
Rs. 1437.75 Per cu. m. (supply only) Type C1 1 : 3 : 6 (20 mm graded
aggregate) as per SSR item No. 138.

(c) Rate of mixed CC delivered on banker Type C2
Rs. 1410.85 Per cu. m. 1 : 3 : 6 (40 mm graded aggregate) as per SSR
item No. 139.

(d) Difference in rate between mixed cement concrete delivered on
banker between Type C1 1 : 3 : 6 (20 mm graded aggregate) and
C2 1 : 3 : 6 (40 mm graded aggregate) Rs. 1437.75 — Rs. 1410.85
= Rs. 26.90 Per cu. m.

(e) ∴ The required rate of cement concrete Type C1 1 : 3 : 6 (20 mm
graded aggregate) in surface Channels and drains is (a) + (d), i.e.
Rs.1624.67 + 26.90 = Rs. 1651.57 Per cu. m.

Answer

The rate of cement concrete Type C1 1 : 3 : 6 (20 mm graded aggregate) in
surface channels and drain = Rs. 1651.57 per cubic metre.

SAQ 1

(a) Prepare a proportional rate for providing cement concrete in surface
Channels and drain with Type B1, 1 : 2 : 4 (20 mm graded aggregate).

(b) Prepare a proportional rate for cement concrete in foundations, filling
and mass concrete with Type C1, 1 : 3 : 6 (20 mm graded aggregate).

6.4.2 Concrete Flooring

Example 6.2

Prepare a proportional rate for providing cement concrete in floor with Type
B1 (20 mm graded aggregate), 50 mm thick finished even and smooth using
extra cement.

Solution

Unit : Per sq. metre

(a) Rate of cement concrete type B1 1 : 2 : 4 (20 mm
Rs. 55.32 Per sq. m. graded aggregate) 25 mm thick in flooring as
per SSR item No. 1805.

(b) Rate of cement concrete Type B1 1 : 2 : 4) (20 mm
Rs. 29.22 Per sq. m. graded aggregate) for each extra 15 mm thick as
per SSR item No. 1805.

(c) Rate of cement concrete Type B1 1 : 2 : 4 (20 mm graded aggregate) for extra 25 mm thick 29.22 × 25/15 = Rs. 48.70 Per sq. m.

(d) Rate of cement concrete Type B1 1 : 2 : 4 (20 mm graded aggregate) for 50 mm thick in flooring will be (a) + (c), i.e. Rs. 55.32 + Rs. 48.70 = Rs. 104.02 Per sq. m.

(e) Rate of finishing concrete surface even and smooth using extra cement as per SSR Item No. 1812 Rs. 10.88 Per sq. m.

(f) Hence, the required rate is (d) + (e), i.e. Rs. 104.02 + Rs. 10.88 = Rs. 114.90 Per sq. m.

Answer

The P.R. for providing cement concrete in floor with Type B1 (20 mm graded aggregate), 50 mm thick finished even and smooth using extra cement = Rs. 114.90 per sq. m.

SAQ 2

(a) Prepare a proportional rate for cement concrete in floor Type B2 1 : 2 : 4 (40 mm graded aggregate) 80 mm thick finished even and smooth without using extra cement.

(b) Prepare a proportional rate for cement concrete in sub floor Type C2 1 : 3 : 6 (40 mm graded aggregate) 65 mm thick.

6.4.3 Joinery

Example 6.3

Prepare a proportional rate of fully glazed window 28 mm thick, second class hard wood shutter divided into squares with plain mitred and rebated sash bars any numbers with 75 mm wide stiles and rails and 40 mm thick sash bars, supplied and fitted to chowkats.

Solution

Unit – Per sq. m.

(a) Rate of glazed and skeleton shutters, 25 mm thick of second class hard wood open rebated and prepared to receive glass, gauze, etc. divided into squares, with plain mitred and rebated sash bars any number with 75 mm wide stiles and rails as specified in SSR Part-I, Section 8, clause 8.20(b) and fitted to chowkats.

SSR Item No. 778	for 1st cl. HW		Rs. 1052.70 Per sq. m.
SSR Item No. 780	for 1st cl. HW	(–)	Rs. 128.14 Per sq. m.
			Rs. 924.56
Deduct 50 % for 2nd cl. H.W. (–)			Rs. 462.28
			Rs. 462.28 Per sq. m.

(b)   All as per (a) above but 30 mm thick

SSR Item No. 778   for 1st cl. HW   Rs. 1172.27 Per sq. m.

SSR Item No. 780   for 1st cl. HW   (−)   Rs. 152.04 Per sq. m.

                                                                          Rs. 1020.23 Per sq. m.

Deduct 50 % for 2nd cl. H.W.(−)   Rs. 510.115 Per sq. m.

                                                                          Rs. 510.115 Per sq. m.

(c)   Rate for 5 mm thick as per (b) − (a),

i.e. Rs. 510.115 − Rs. 462.28   Rs. 47.845 Per sq. m.

(d)   Rate for 2 mm thick as per (c) above will be

$$\frac{48.845 \times 2}{5}$$ Rs. 19.14 Per sq. m.

(e)   Rate for 28 mm thick glazed window shutter is (b) − (d),

i.e.   510.115 − 19.14 = Rs. 490.975 Per sq. m.

Solution

The rate of PR for providing fully glazed window 28 mm thick, second class HW shutter divided into square with plain mitred and rebated sash bars any number with 75 mm wide stiles and rails and 40 mm sash bars , supplied and fitted to chowkats is Rs. 490.98 Per sq. m.

SAQ 3   [?]

Prepare a PR of fully glazed skeleton shutters, open rebated and prepared to receive glass, gauze, etc. (without sash bars), edges of framing, plain, fitted with cut and mitred beads for securing glass etc., size of members of shutters as specified in SSR Part-I, Section-8, clause 8.20(a) supplied and fitted to chowkat, 32 mm thick of 1st class H.W.

Example 6.4

Prepare a proportional rate of factory made shutters, plain framed, panelled shutter (two panels) with lock rail and panels of 12 mm veneered particle board with commercial veneering on both faces, the size of rail and stile as per IS : 1003 (Part-I) kiln seasoned and chemically pressure treated, of second class HW rail of stile, thickness of shutter 30 mm.

Solution

Unit − Per square metre

(a)   The rate of Factory made shutter of second class HW, as specified above of 35 mm thick as per Item No. 797 of SSR Part-I1   −
= Rs.1323.12 Per sq. m.

(b) Same as per (a) above but 40 mm in thickness
= Rs. 1426.93 Per sq. m.

(c) The rate for difference of 5 mm thickness of shutter is (b) – (a), i.e.
1426.93 – 1323.12 = Rs. 103.81 Per sq. m.

(d) The rate for 30 mm thick shutter as specified in (a) above will be
(a) – (c), i.e. 1323.12 – 103.81 = Rs. 1219.31 Per sq. m.

Solution

The rate of P.R. for providing factory made shutters, plain framed, panelled shutters (two panels) with lock rail and panels of 12 mm veneered particle board with commercial veneering on both faces, the size of rail and stiles as per IS : 1003 (Part-I) kiln seasoned and chemically pressure treated of second class HW rail of stiles and thickness of shutters 30 mm is Rs. 1219.31 per sq. m.

SAQ 4

Prepare a P.R. for providing 35 mm thick flush shutter, solid core, Construction with block board core and plywood face panels, commercial types both sides.

6.5 SUMMARY

In this unit an attempt has been made to explain as to what is Standard Schedule of Rates and

(a) as to how rates in SSR are applied

(b) as to when there is no item exists in the SSR, how rate can be derived from other similar/analogous items in the SSR, termed as "Pro rata" and that such rates are treated as Schedule Rates

(c) as to how proportional rates in respect of certain items of concrete work, concrete flooring and joinery derived with examples.

From this you should be able to derive proportional rates in respect of other items of other section of SSR Part-II.

6.6 ANWERS TO SAQs

Refer relevant preceding examples and follow the steps given therein to get the answers to SAQs.

UNIT 7 STAR RATE (SPECIAL RATE)

Structure

7.1 INTRODUCTION

In previous unit you have learnt about, when there is no item exists in the SSWSchedule 'A' how a rate can be derived from other rates in the SSWSchedule 'A', termed as "Pro rata". At times, a situation may arise, when neither any item in the SSWSchedule 'A' for pricing exists nor any suitable item exists in SSWSchedule 'A' for derivation of proportional rate. Thus if any work, rate for which can not be obtained by above methods, has been ordered on the contractor, the rate has to be decided by the competent authority on the basis of cost to the contractor at Site of Works plus certain percentage to cover all overheads and profits. The rate so prepared shall be termed as STAR RATE. You will be studying the method of preparation of the same hereinafter.

Objectives

After studying this unit, you should be able to

- conceptualise the notion of star rate,

- prepare star rate for AC sheet in roofing, barbed wire fencing etc., and

- prepare star rates in respect of other items of building works.

7.2 CONCEPT OF STAR RATE

Thus where none of the foregoing methods, i.e. application of rates in the SSR or proportional rates prepared from rates in SSR is applicable and the prices have necessarily to be based on the amount of labour expended and the value of materials incorporated, rates to be paid shall be fixed in accordance with the conditions of contract.. The rates so fixed are termed as Star Rates and shall be shown as net.

The rate so prepared by the AGE contracts shall be recommended by the Garrison Engineer, technically checked by DCWE (Contracts) of CWE Office/ Director (Contracts) of CE Office and approved by Competent authority like CWE/CE.

Any percentage applicable to SSR rates shall not apply to the work priced at Star Rates.

7.3 METHOD OF PREPARATION OF STAR RATE

For proper assessment of star rates, the Executive Engineer, i.e. the Garrison Engineer is case of MES shall demand the; contractor to produce all original receipted priced vouchers of materials, muster rolls of labour utilized, time sheets showing the time consumed by the concerned labour for that item of work, and other connected documents as may be necessary. In cases the rates are based on muster rolls and time sheets of labour employed, then such documents are required to be put to the Engineer-in-Charge on the very day the labour is engaged for his check. The Engineer-in-Charge has to certify to that effect by putting his signature thereon.

On the rates so prepared, a certain percentage as per contract conditions shall be added to cover all overheads and profit. In MES plus 15% is added to cover contractor's overheads and profit at present.

7.4 PREPARATION OF STAR RATE

7.4.1 AC Sheet in Roofing

| Example 7.1 |

Prepare a Star Rate for material and labour AC corrugated sheet roofing with 6 mm thick sheets fixed with 8 mm dia GI J bolts and washers:

Solution

Unit : Per square metre

(A) Materials

(a) AC corrugated sheet charminar make 6 mm thick (Rate adopted as per paid voucher No. _____ dated _____ of M/s Hyderabad Industries Sales, Office Pune-29, inclusive of all taxes and transport Octroi, etc. Rs. 99.00 per sq. metre)

$$1.10 \times 99.00 = \text{Rs. } 108.90$$

(b) 8 mm dia GI J bolts 150 mm long including washers (Rate adopted as per paid voucher mentioned in (a) above Rs. 3.50 each) $\qquad 1.10 \times 3.50 = \quad$ Rs. <u>3.85</u>

Total Rs. <u>112.75</u>

(B) Labour

(a)	Carpenter 0.11 day @ Rs. 200.00 per day	Rs. 22.00.
(b)	Helper 0.11 day @ Rs.110.00 per day	Rs. 12.10.

Total <u>Rs. 34.10</u>

(C) Tools and Plants L. S. Rs. 2.50

Total (A) + (B) +(C) = Rs.112.75 + 34.10 + 2.50 = Rs.149.35

Add Overheads and profit @ 15 % on above = Rs. 22.40

Total<u>Rs.171.75</u>

Add water charges @ Rs.3.75 per Rs. 1,000/- of work done (as per contract conditions) Rs. 0.64

Total<u>Rs.172.39</u>

The required rate is Rs. 172.39 per sq. metre.

Prepared by me   **Sd/x** x x

                        AGE (Contracts)

Certified that the rates of materials have been verified through independent market enquiry by me and found reasonable and accounted is actual as per site. It is also certified that the actual, labour consumed for execution at site has been watched by me and accounted for.

S d x x x   **Sd/x** x x

Signature of Contractor   Engineer-in-Charge

                             AGE B/R

<div align="center">Star Rate No. 1</div>

Contract Agreement No.   :   X X X
Name of Work   :   Provision of ----------------------
Name of Contractor   :   X X X

Sl. No.	Description of Star Rate	Star Rate No.	Rate/Unit	Remarks
1.	Material and labour AC corrugated sheet roofing with 6 mm thick sheets fixed with 8 mm dia GI J bolts and washers	01	172.39 Sq. M.	The rate is net approximate . financial effect is (+) Rs. 17,2391-

Recommended by   :   Sd/x x x

                            Garrison Engineer

Technically checked   :   S d l x x x

                            DCWE (Contracts)
                            CWE _____

Approved by   :   Sd/x x x

                            CWE _____

Agreed and Accepted   :   S d x x x

                            Contractor

SAQ 1   **?**

(a) Prepare a Star Rate for Supply and fix glass reinforced translucent corrugated. Sheeting 2 mm thick with two corrugation side lap fixed with 6 mm dia GI J bolts and washers.
     Data : width _____ mm, Rate Rs. _____

(b) Prepare a Star Rate for Supply and fix GI corrugated MS sheeting 0.63 mm thick with one and half corrugation side lap, fixed with 6 mm dia J bolts and washers. Data : Width – 800 mm, Rate – Rs. 40.00 per kg (including all taxes, octroi, Transport, etc.)

(c) Prepare a Star Rate for supply and fix Aluminium corrugated sheeting alloy 0.56 mm thick with two corrugation side lap fixed with J type GI bolts and washers. Data : Width _____ mm, Rate Rs. _____.

7.4.2 Barbed Wire Fencing

| **Example 7.2** |

Prepare a Star Rate for supplying and fixing of Galvanised two strand steel barbed wire 2.24 mm dia barbed with 2 mm dia barbs at 75 mm spacings and straining and fixing to any type of standard rails, including securing or tying at crossings with & provision of galvanized MS staples as directed. (Each line of wire to be measured).

Solution

Unit – Per 100 running metre

(A) Material

(a) Barbed wire 100 RM @ 0.12 kg/rm

12 kg (+) 5 %wastage, i.e. 12.6 kg @ Rs.55.00 Per kg Rs. 693.00

(Rate adopted as per voucher No. _____ dated _____

M/s Pooja Agencies, inclusive of all taxes, transport and octroi).

(b) GI MS staples 1 % of above   Rs. 6.93

                Total Rs. 699.93

(B) Labour

(a) Blacksmith 0.15 @ Rs.150.00 per day   Rs. 22.50

(b) Helper 0.75 @ Rs.110.00 per day   Rs. 82.50

                Total Rs. 105.00

(C) Tools and Plants

Lump Sum   Rs. 5.00

Total of (A) + (B) + (C) = Rs. 699.93 + Rs. 105.00 + Rs. 5.00

                = Rs. 809.93

Add Overheads and Profits @ 15 % on (A + B + C) above Rs. 121.49

                Total Rs. 931.42

Add Water charges @ Rs.3.75 per Rs.1,000/- of work done Rs. 3.49

(as per contract conditions)   Total Rs. 934.91

∴ The required rate is Rs. 934.91 per 100 running metre

Prepared by me   Sd/x x x

                AGE (contracts)

Certified that the rates of material have been verified through independent market enquiry by me and found reasonable and accounted for is actual as per site. It is further certified that the actual labour consumed for execution at site has been watched by me and accounted for.

Sd/x x x   Sd/x x x

Signature of Cantractor   Engineer-in-Charge

Contract Agreement No.   :   X X X
Name of Work   :   Provision of -------------------
Name of Contractor   :   X X X

Sl. No.	Description of Star Rate	Star Rate No.	Rate/Unit	Remarks
1.	Supplying and fixing of galvanised two stand steel barbed wire 2.24 mm dia barned with 2 mm dia barns at 75 mm spacing and straining and fixing to any type of standard rails including securing or tying at crossings with and provision of galvanised M. S. staples as directed.	02	934.91 100 running Metre	The rate is net approximate financial effect is (+) Rs. 23,373/-

Recommended by   :   Sd/x x x

                                 Garrison Engineer

Technically checked   :   Sd/x x x

                                 DCWE (Contracts)

                                 CWE _____

Approved by   :   Sd/x x x

                                 CWE _____

Agreed and accepted   :   Sd/x x x

                                 Contractor

7.5 SUMMARY

In this unit, an attempt has been made to explain

(a)   as to when there is neither any item exists in SSR/Schedule 'A' nor the rate can be derived from any SSR/Schedule 'A' items, a special rate called Star Rate has to be prepared for pricing such work.

(b)   and that such rates are not treated as Schedule rates.

(c)   as to how Star Rates in respect of AC sheet in roofing and Barbed wire in fencing are prepared with examples.

From this you should be able to prepare STAR RATES in respect of other special items of works not covered in Contract/SSR Part-II.

7.6 ANWERS TO SAQs

Refer the relevant preceding examples and get the data and rates from the market wherever not mentioned, then follow the steps mentioned to get the answers to SAQs.

UNIT 8   REQUISITION FOR REPAIR

Structure

8.1   INTRODUCTION

In this unit, we shall be introducing the method of carrying out repair works through contract agency like term contract.

In **MES,** yearly term contracts are concluded for a specific area having sizeable number of buildings. These buildings are required to be maintained properly to keep them in habitable condition. For that purpose certain works like periodical services, normal repairs, **additions/alterations** by way of minor works are required to be carried out. These works can either be carried out by department **labour** or through term contracts. For carrying out repair works through term contract (TC). Certain procedure is requited to be followed as per standing instructions laid down by the department. For carrying out repair works requisitions are required to be prepared and ordered on Term Contractor. Their progress is required to be watched and interim running payments during currency and final bills on completion are required to be paid to the term contractor as per system and procedures laid down by the department. All these **aspects will** be discussed in this unit and requisitions for certain repair works will be prepared for clear and better understanding of subject.

Objectives

After studying this unit, you should be able to

* prepare a requisition for any type of repair woks to be carried **out in** a building or group of buildings.

8.2   REQUISITION FOR REPAIR WORKS

As per general conditions of contract, any single work, job or service ordered on a Term Contract (TC) **shall** not exceed Rs. **60,000/-,** subject to certain reservations stipulated in Contract **conditions.**

The minor work upto Rs. 3,0001- and repair works are ordered on T.C. contractor through a Work Order slip (IAFW-1823-A) and ordinary requisition (IAFW-2158 and 1833). In case of urgent work, urgent requisition (IAFW-1817) is used instead of IAFW-1833. Minor works exceeding Rs. 3,0001- but not exceeding Rs. 60,0001- are ordered through Work Order (IAFW-1823) and measured as work proceeds in Measurement Book (M.B.), and on completion abstracted and priced, billed and paid.

8.2.1 Ordinary Requisition

In the ordinary requisition, the procedure followed is as under :

(a) Items of repairs are detailed in "Requisition Details" Form IAFW-2158 in triplicate. The cost is shown in pencil on the duplicate copy only.

(b) The approximate cost is entered against each item on IAFW-2158 and the total of all items recorded. This is carried to IAFW-1833.

(c) The items of repair works are entered in IAFW-1833 (in duplicate in ink).

(d) GE or Sub Division Officer sanctions and allots funds, UA verifies and Engineer-in-charge enters in construction account. A watch over the progress of work is kept by maintaining a Register of Requisitions (IAFW-1787). The GE keeps a consolidated register which includes carbon copy of IAFW-IAFW-1823-A from each Sub Division Officer, pasted on or reproduced on a Bound book called Orders on Contractors (IAFW-2160).

(e) The triplicate copy of IAFW-2158 with work order slip IAFW-1823-A is sent by Engineer-in-charge to contractor for execution.

(f) The completed work is checked and requisition details are revised where necessary by Engineer-in-charge in presence of Contractor. All copies of IAFW-2158 are corrected. The payment to contractor is based on these Corrected copies of requisitions.

(g) The revised and completed IAFW-2158 (original) and IAFW-1833 (Original) are attached to original Final Bill, similarly the duplicates are attached to duplicate copy of Final Bill.

8.2.2 Urgent Requisitions

In case of urgent repairs on the Term Contractor, the procedure is same as above except the order slips and details of work to be carried.out are sent immediately to the contractor and the cost reported to GE as soon as possible for entry in the requisition Register.

8.3 TYPICAL REQUISITION DETAILS

In this part we will study preparation of requisitions for repair works pertaining to different trades of building works.

8.3.1 Repairs of Brickwork

Example 8.1

Prepare a requisition for repairs to brick compound wall 23 cm thick 30 metres in length and 1.5 Metres in height above GL; with PCC coping on top.

(Base – SSR 2004, Part-II, Contractor's percentage (+) 2 %)

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			(a) Demolition of Cement Concrete (unreinforced) of any description and in any position. PCC coping L = **30.00 M + 0.02 = 30.02** W = **25** Cms Thickness = **5** Cms				
30.02 0.25 0.05		0.38		cu. m	3841	220.58	83.82
			(b) Demolition of brick work built in cement mortar				
30.00 0.23			L = **30.00 M** W = **0.23 M** H = 1.5 M (−) 0.05				
1.45		10.01	**1.45 M**	cu. m	3824	186.54	1867.27
			(c) Brickwork with sub class 'B' bricks (Old size bricks) straight or curved on plan, exc **6 M** radius built in Cement mortar **(1:6)**				
30.00 0.23 1.45		10.01		cu. m	256	1353.92	13552.74
			(d) Providing, cement concrete in copings with type **C1, (20** mm, graded aggregate) **1:3:6**				
30.02 0.25 0.05		0.38		cu. m	160	2156.31	819.40
						Total Rs.	16323.23
						Add C. P. (+) 2 % Rs.	326.46
						Grand Total Rs.	16649.69
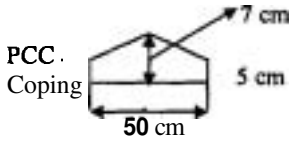
8.3.2 Repairs of Stonework

| Example 8.2 |

Prepare a requisition for repairs to stone masonry compound wall, 38 cm thick, 1.5 metres in height above GL and 30 metres in length, with PCC coping 50 cm in width and thickness of 5 cm at end and 7 cm in centre.

(Base – SSR 2004, Part-II, C. P. + 5 %).

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			(a) Demolition cement concrete **(unreinforced)** of any description and in any position.				
30.12			L = 30.00 m + 0.12 = 30.12	cu. m	3841	220.58	198.52
0.50			W = 0.50 m				
0.06			H = $\frac{5+7}{2}$ = 6 cm av.				
	0.90		(b) Dismantling of stone masonry built in cement mortar including all quoins				
30.00			L = 30.00 m				
0.38			W = 0.38 m				
1.50			H = 1.5 M (excluding coping)				
			(c) Walling of **random** rubble, uncoursed, well bonded, bedded and solidly hearted, built in cement mortar **(1 : 6)** **20** mtrs of wall built with new stones	cu. m	3824	186.54 +34.04 220.58	3771.92
	17.10						
20.00							
0.38							
1.50							
			(d) Ditto- as per item No. **3** above but except stone built with old stones balance **10** mtr -of wall	CU. m	394	1102.41	12567.47
	11.40						
10.00							
0.38							
1.50							
				CU. m	395	666.21	3797.40

					(e) Providing cement concrete in copings with type **C1** (**20** mm graded aggregate) 1 : 3 : 6. Qty same **as** item No. **1**				
			0.90			cu. m.	160	2156.31	1940.68
					(f) Extra over stone walling for hammer dressing to face stones and dressing to face beds and joints **as** specified of random rubble walling with maximum depression on face from straight edge held against the dressed surface not exceeding **40** mm for granite or trap stones				
2/	30.00 1.50								
			90.00		both faces				
2/	1.00 0.30								
			0.60 90.60		both edges	sq. m	421	47.56	4308.94
					(g) External angles for quoins in facings for walling				
4/	1.50								
			6.00			r. mtr	446	26.20	157.20
					(h) M and L keyed pointing to random rubble masonry in cement **mortar** (1 : 4) **Qty** same as item No. **(f)**.				
	90.60								
			10			sq. m	2151	258.10	2338.39

Total Rs.	29080.52
Add C.P. (+) **15 % Rs.**	1454.03
Grand Total Rs.	30534.55

8.3.3 Repairs of PCC Flooring

Example 8.3

Prepare a requisition for repairs to PCC floor 1 : 2 : 4 B1, **40** mm thick with glass dividing strips 3 mm thick, 38 mm wide, finished even and smooth using extra cement in building **No.P/1** and **P/2P/1** building consists of 4 rooms of 3.60 x 3.20 m each **P/2** building consists of 3 rooms of 3.30 x 4.20 m each.

Base – SSR 2004 (Pt-II).

Contractor's percentage (+) 7%.

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			(a) Demolition of cement (unreinforced) in ground floors not exceeding 15 cm thickness (below or above ground level).				
4/	3.60 3.20 0.04		P/1 Building				
		1.84					
3/	3.30 4.20 0.04		P/2 Building				
		1.66 3.50		cu. m.	3839	186.54	652.89
			(b) Cement concrete type B1, 1 : 2 : 4 (20 mm graded aggregate) 40 mm thick finished even and smooth using extra cement				
4/	3.60 3.20		P/1 Building				
		46.08					
3/	3.30 4.20		P/2 Building				
		41.58 87.56		sq. m.	1805 1812	55.32 29.22 95.12	8338.22
			(c) Glass dividing strips, 3 mm thick and inserted in position to conform to design, width of strip 38 mm				
4/2/	3	28.80	P/1 Building				
4/2/	3.20	25.60					
3/3/	3.30	29.70	P/2 Building				
3/21	4.20	25.20 109.3		r. mtr	3840	8.76	957.47
					Total Rs.		9948.58
					Add C. P. (+) 7% Rs.		696.40
					Grand Total Rs.		10664.98

8.3.4 Repairs to Joinery

Example 8.4

Prepare a requisition for replacement of **4** Nos. of door shutters of size **0.95 x 2.05** m with **2** Nos. of new **40** mm thick panel shutters and **2** Nos. of flush shutters **40** mm thick fixed in the same openings without disturbing frames using old builders hardware except butt hinges (shutters of second class Hard wood).

Base – **SSR 2004** (Part-11).

Contractor's percentage – (+) **35%.**

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
4/	1	4 Nos.	**Item (1)** Taking down shutters of any description exceeding 1 sq. m. and not exceeding **2** sq. m. each and removing to store.	Per leaf	872	15.65 16.74 32.39	129.56
2/	0.95 2.05	3.90	**Item (2)** Plain, framed, panelled shutters (any number of panels) with panels of veneered particle board medium density, with commercial face veneers, supplied and fitted to chowkats, **40** mm thick of second class **H.W.**	sq. m.	792 (–) 50%	1754.97 877.485 877.485	3422.19
2/	0.95 2.05	3.90	**Item (3)** S/F flush shutters, solid core, construction, with block board core and plywood face panels, commercial type both sides, **40** mm thick	sq. m.	801	1089.26	4248.11
4/		12 Nos.	**Item (4)** Butt hinges, medium weight, cold rolled, mild steel and fixed, size of hinges **100 mm**	Each	928'	20.27	243.24
4/	1	4 Nos.	**Item (5)** Fixing only mild steel barrel tower bolts, stone enameled, black with bright bolt, **200** mm long fixed in repairs	Each	909 910	9.81 2.76 12.57	50.28

139

								8093.38
			Item (6)					
			Fixing only mild steel pressed handles, oval type stove **enamelled** blade fixed in repairs, **size** oflhandle **125** mm					
4/	2	8 Nos.			Each	967 968	4.47 1.21 5.68	
								45.44
			Item (7)					
			Fixing only mild steel sliding door bolts, plate type, stove enamelled black with bright bolt, etc. fixed in repairs. Length of bolt **300** mm					
4/	1	Nos.			Each	920 921	10.75 2.76 13.51	
								54.04
			Item (81)					
			Painting to wooden surfaces of any description not otherwise described, over **10** cm width or girth including preparation of new surfaces, priming coat with pink primer **and** two coats of synthetic **enamel** paint. Panelled doors, shutters					
2/2/1.30/	0.95 2.05	10.13						
2/2/1.20/	0.95 2.05	9.35 19.48	Flush door shutters		sq. m.	2301	3.96 9.98 15.93 15.93 45.80	892.18

Total Rs.		9085.04
Add C.P. (+) 3% Rs.		272.55
Grand Total Rs.		9357.59

8.3.5 Repairs of Plaster

Prepare a requisition for repairs to internal plaster of 3 rooms of a building, size 6.5 × 3.2 m each, having ona door of size 1.2 × 2.10 m and 4 windows of size 0.60 × 1.20 m fixed centrally in the walls. The height of room 3.10 m and 0.10 m high skirting, new plaster 10 mm thick in cement mortar (1 : 6) above skirting and skirting of 15 mm thick in cement mortar (1 : 4), finished smooth with extra cement.

Base — SSR 2004 Part-11.

Contractor's percentage = (+) 6%.

			Description of Item	Unit	Reference to SSR Item	Rate Rs Ps.	Amount
			Item 1				
			Taking down cement plaster on brick walls including raking out joints, hacking for key, scrubbing down with water etc. complete				
			L = **6.5 m**				
			W = **3.2 m**				
			9.7 × 2 = 19.40 m				
31	19.40		**Rooms**				
	3.10		HT = **3.10 m**				
		180.42	_Deduct for_				
310.51	1.20		Doors				
	2.10						
		(–) 3.78					
3/4/0.5/	**0.60**	**(–) 4.32**	**Windows**				
	1.20	172.32	**Net**				
			Item 2				
			Rendering **10** mm thick on other than fair face of brick work, in cement mortar **(1 : 6),** finished even and smooth without using extra cement	sq.m.	2113	11.29	1945.49
31	19.40		Ht ‾ 3.10 m				
	3.00		(–) **0.10** Skirting				
			3.0 m				
		174.60	Rooms				
			Deduct for				
310.501	1 20		Door				
		(–) **3.60**					
3/4/0.50	0.60		windows				
	1.20	(–) **4.32**					
		166.68	**Item 3**	sq.m.	2052	52.63	
					2056	**58.13**	9689.11
			Rendering **15** mm thick on surfaces **other** than fair face of brick work in cement mortar **(1 : 4),** finished even and smooth using extra cement				
			For **skirting**				
31	19.40		Rooms				
	0.10		_Deduct for_				
		5.82	Doors				
310.501	1.20				2052	62.54	354.45
	0.10				2054	13.56	
		(–) **0.18**		sq.m	2055 ⎤		
		4.34			1812 ⎦		
					$\dfrac{6.50}{6.11} \times 10.88 =$	81.67	

			Item 4				
			Extra over rendering for work in skirting, not exceeding **15** cm in width, including cutting to edges, all mitres and stopped ends **etc.**	–			
31	~~19.40~~	58.20					
3/0.50/	1.20		Deduct for Doots				
		(–) 1.80					
		56.40		r.mtr.	2086	12.44	701.62
			Item 5				
			White washing on walls, including preparing new surfaces and applying three coats of white wash Qty same as item No. **2**				
		166.68		sq.m.	2191	0.28	
					2197	2.03	
						1.82	
						~~1.82~~	
						5.95	991.75

Total Rs.		13682.75
Add **C.P.**(+) 6% Rs.		820.95
Grand Total **Rs.**		14503.37

8.3.6 Repairs to Roof Covering

Example 8.5

Prepare a requisition for repairs to Mangalore tile roofing of building No. P-10, roof length – 21.20 rm, sloping length 3.6 m on each side of ridge.

Base- SSR- 2004 (Part-11), Contractor's percentage (+) 2%.

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			Item No. 1				
			Dismantling single layer of Mangalore pattern tiles in **roofing**				
1/2/	21.20	152.64		sq. m.	3862	8.28	1263.39
	3.60						
			Item No. 2				
			M and L roof tiles. **Mangalore** pattern, Interlocking at side joints, laid dry				
11	21.20		One side fixed with new tiles				
		76.32		sq.m.	1374	94.00	7174.08

				Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			Item 3 Ditto- as per Item No. **2** above but except tiles other side fixed with old serviceable tiles				
	76.32		Qty same as item No. **2**	sq.m.	1374	16.45	1255.46
			Item 4 M and L Ridges or hip tiles to suit Mangalore pattern of roof tiles, bedded jointed in Cement mortar (1 : 6)				
	21.20	21.20		r.mtr	1378	36.25	761.98
						Total Rs.	10455.38
					Add **C.P.**(+) **2%** Rs.		209.11
					Grand Total Rs.		10664.49

Example 8.6

Prepare a requisition for repairs to AC sheets in roof and ridges in building P-10, mentioned in (a) above.

Base – SSR – 2004 (Part-IT), Contractor's percentage – Nil.

Solution

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
1/2/	21.20 3.60	152.64	**Item 1** Dismantling of Asbestos Cement (corrugated, semi-corrugated, etc.) sheets in roof coverings	sq.m.		6.23	950.95
			Item 2 M and L 6 mm thick, asbestos cement cormgated or semi-cormgated sheets in roof fixed with L type or J type cranked hook bolts				
1/	21.20 3.60	76.32	One side with new sheets	sq.m.	1336	207.98	15873.03
			Item 3 Ditto- as per item No.2 above, but except sheets other side with old sheets				
11		76.32	Qty same as item No. 2 above	sq.m.	1336	23.89	1823.28
			Item 4 M and L Asbestos cement two piece Serrated ridge for corrugated or semi-corrugated sheets fixed with L type or J type cranked hook bolts				
	15.00	15.00		r.mtr	1342	166.17	2492.55

			Item 5 -Ditto- **as** per item **No.4** above but except accessory				
1/	6.20	6.20	21.20 (–) 15.00 = 6.20 R.Mtr	r. mtr	1342	14.86	92.13
						Total Rs.	21231.94
					Add C.P. (+) Nil Rs.		-------
					Grand Total Rs.		21231.94

Example 8.7

Prepare a requisition for Repairs to CGI sheet roofing and PGI ridges
in Building No. P-10 mentioned in (a) above.

Base – SSR-2004 (Part-II), Contractor's percentage = (+) 6%.

Solutions

			Description of Item	Unit	Reference to SSR Item	Rate Rs. Ps.	Amount
			Item 1 Dismantling of plain or corrugated steel sheeting, **any** gauge, thickness, in roof covering				
1/2/	21.20 3.60	152.64	CGI roofing	sq. m.			
1/	21.20 0.45	9.54 162.18	PGI Ridge	sq. m.	3860	4.60	746.03
			Item 2 S and F class-3 galvanised corrugated mild steel Sheeting with two corrugation side lap, fixed with L type or J type cranked hook bolts, thickness of Sheet				
1/2/	21.20 3.60	152.64	0.63 mm.	sq. m.	1322 1324	301.70 (+) 6.85 308.55	47097.07
			Item 3 S/F plain class 3 galvanised mild steel sheeting in ridges, shed				47843.10
1/	21.20 0.45	9.54	of thickness 0.63 mm	sq. m.	1331-A	241.51	2304.01
						Total Rs.	50147.11
					Add C. P. (+) 6 % Rs.		3008.83
					Grand Total Rs.		$3155.94