

Government of Nepal National Reconstruction Authority Singhadurbar, Kathmandu Nepal

# NORMS FOR RATE ANALYSIS OF RETROFITTING MASONARY BUILDING



March 2021



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# PREAMBLE

The National Reconstruction Authority (NRA), as a 'Special Purpose Vehicle' (SPV), has been mandated with the coordination and implementation of Nepal's recovery and reconstruction after the devastating Gorkha Earthquake of 2015. Together with a number of partners – Government line agencies, earthquake affected households, donors, Nepal Rastra Bank, commercial banks, and international and local NGOs – NRA has achieved



huge successes, whilst overcoming numerous challenges faced along the way, during its five years tenure to date. More recently, the Government of Nepal (GoN) extended NRA's time period for an additional one year.

NRA intends to capture and document its experiences, learning, and best practices. NRA has and continues to compile and expand a comprehensive Institutional Memory, and, in recent months, as part of the process of ensuring a sustained legacy of its contribution to Nepal's post-disaster history, published its own 'NRA Experience Paper on Retrofitting of Private Housing'. These initiatives maintain and sustain the dialogue around post-disaster retrofitting, engage all interested parties including both practitioners and academics, show a clear drive towards continued learning and sharing of knowledge, and promote the accumulation and compilation of these into documentary form that can play a valuable role – not just for Nepal but for other countries that like ours, suffer from naturally-triggered disasters.

The retrofitting norms for rate analysis was inspired by reflection and discussion with numerous stakeholders – both in and outside of government – and has been supported equally in its elaboration by these actors. It was also essentially driven due to NRA's own experience of facing the post-earthquake retrofitting without having such an all-encompassing set of information, guidance, and practices on which it had to base its own intervention; thus, it was felt imperative to provide this for future generations.

We believe that readers of this paper will not just take away ideas, but in addition, expand on them and apply the learning that they acquire from this. We also trust that through further dissemination – in professional networks around the globe, we can all benefit from our experiences and learning in Nepal, and be better prepared for facing all future disasters, together. My thanks to you all.

#### Sushil Gyewali

Chief Executive Officer National Reconstruction Authority

# ACKNOWLEDGEMENTS

I would like to express most profound gratitude to NSET, Build Change, UNDP, and HRRP – Nepal for their initiation and continuous involvement during the preparation of this norms for rate analysis of retrofitting masonry building.



NRA CEO Mr. Sushil Gyawali deserves a special thanks for encouraging such kind of retrofitting norms for rate analysis with

tireless energy and commitment. Without his leadership to NRA over the past five years, this kind of solidarity and smooth operation of the activities and knowledge sharing would not have been possible.

A special note of cordial thanks to Mr. Jhapper Singh Vishwokarma, Mr. Bipin K Gautam, Ms. Liva Shrestha, Ms. Pragya Pradhan, Dr. Ramesh Guragain, Mr. Ranjan Dhungel, Ms. Bhubaneswari Parajuli for their support and suggestions during the discussions on critical issues which were required to finalize retrofitting norms for rate analysis.

My sincere thanks to Mr Deepak Saud, Mr Laxmi Prasad Bhatta, Mr Dev Raj Paudel, Mr Binaya Paudel, Mr Jnananjan Panda, Ms Nitisha Kafle, Mr Ayush Baskota and Mr Manish Raj Gouli for their continuous work on preparation of retrofitting norms for rate analysis and to Mr Manohar Ghimire, NRA's Under Secretary & ICNR Secretariat's Member Secretary and Mr Sandeep Gurung, the Assistant Conference Expert for facilitating and expediting the process.

I would hereby, make most of the opportunity by expressing sincere thanks to all personnel involved, both directly and indirectly, for their valuable contribution to the preparation of this paper. I am confident that this manual will be a valuable resource for all the practitioners of Nepal's retrofitting activities.

Mani Ram Gelal Secretary National Reconstruction Authority

## FOREWORD

I would sincerely like to congratulate everyone involved in the development of the 'Norms for Rate Analysis of Retrofitting Masonry Building' which has been published by the National Reconstruction Authority. This norms for rate analysis document will further support the implementation of the interventions of vulnerable houses that need seismic retrofitting.



Every effort from technical personnel, expertise, and the government sector is required to support households to retrofit unsafe structures so that partially damage houses constructed by different typology could be safe and budget friendly. This retrofitting norms for rate analysis has been developed for technical staff to support them in the retrofitting cost analysis of masonry structures which would support general public to guide households through the retrofit process.

I look forward to seeing the retrofitting implemented across the earthquake affected districts and all vulnerable houses in the country and to seeing the impact that it will have. This represents another positive step forward in the construction process, and will support households to retrofit their home so that it is safe, compliant, and resilient in the face of future disasters. Additionally, I trust that this retrofitting norms for rate analysis contributes to the build-up and sharing of knowledge and continues to pave the way forward toward the safe housing, and to the consolidation of NRA's documented legacy for Nepal.

#### Dr Chandra Bahadur Shrestha

NRA Executive Member & ICNR Convener National Reconstruction Authority

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DRAFT RETROFITTING NORMS FOR RATE ANALYSIS

## INTRODUCTION

The 'Norms for Rate Analysis of Retrofitting Masonry Building' is prepared by the Retrofitting Technical Working Group (R-TWG) led and facilitated by Housing Recovery and Reconstruction Platform (HRRP) and comprising reconstruction stakeholders working in the area of retrofitting in March 2020. The document serves as a standard for the calculation of labor, materials and tools that are required for different items of retrofitting of load-bearing masonry structures. The implementation of retrofitting works during Gorkha Earthquake housing retrofitting scaled with the retrofitting works before 2015 Gorkha earthquake are the basis of standardizing processes which adopt the empirical method for the study. Further, the existing items for new construction as mentioned in Government norms are also considered while detailing on item works.

#### Background

The 2015 Gorkha Earthquake had widespread damages, especially in the private housing sector; more than half the total losses was incurred in private houses. Nearly 900,000 houses have been identified by the National Reconstruction Authority as beneficiaries of the national reconstruction program, 78,033 of whom are retrofitting beneficiaries. To fulfill the need for technical assistance to such beneficiaries, the National Reconstruction Authority (NRA) led the process and collaborated with several partner organizations for conduction of various awareness and capacity building activities.

One of the key aspects that need to be considered while undertaking a retrofitting activity is the cost of the interventions. A general understanding states that any retrofitting activity would only be feasible if the cost of retrofitting falls under 30% of the total construction cost of the building (except in cases of buildings of historic, cultural or religious values). Furthermore, as most of the damaged buildings are situated in the rural areas, the cost of retrofitting is much more significant, owing to the economic condition of the target beneficiaries. As such, a crucial step in implementing a retrofitting process is the cost estimation for retrofitting works.

A R-TWG was formed on December 20, 2019 in close coordination with the NRA, CLPIU Building to speed up retrofitting of buildings in earthquake affected areas through standardization of technical documents, solutions and approaches related to retrofitting. This group consisted of partner organizations, namely, National Society for Earthquake Technology (NSET), Build Change, UNDP and HRRP who were actively working in retrofitting in the earthquake affected districts of Nepal with occasional engagement of NRA, CLPIU Building officials and other partners organisations such as Earthquake Safety Solutions (ESS), CRS. Retrofitting Norms for Rate Analysis is one of the main documents prepared by the R-TWG

### **Objective of the Study**

This document is prepared to support the retrofitting cost analysis of masonry structures. This is intended to be used by engineers and mid-level technicians for cost calculation of retrofitting works. Moreover, this document could also support the NRA, CLPIU Building and the Department of Urban Development and Building Construction (DUDBC) to speed up retrofitting of buildings, both in post-earthquake recovery as well as earthquake risk mitigation beyond reconstruction across the country.

#### Rationale

The process of strengthening buildings using retrofitting is not new in Nepal. Retrofitting of buildings started in Nepal in the late 1990s, with school buildings. More than 25 years later, 300 or more schools have been retrofitted. Over the course of time, the technology slowly proliferated into the public as well as private sector, with several hundreds of institutional, government and private houses being retrofitted. However, many of these retrofitting interventions were largely carried out in RC frame or brick cement buildings in the urban cities in Kathmandu Valley. Retrofitting of rural buildings, typically of stone masonry buildings was not a major priority until the 2015 Gorkha Earthquake. This led to a serious gap in knowledge, as no standardized norms or analysis of rates were available for retrofitting interventions. Particularly rates for more specialized tasks in retrofitting such as plaster scraping, placement of GI wire mesh and GI wires, anchorage and repair works were not standardized, and thus used randomly, though rates for works like brick soling, reinforcements, concreting and plastering were generally adopted from new construction. This created an inconsistency in rate analysis and estimation of retrofitting interventions across the country, and created confusion among engineers eventually resulting delay in urban reconstruction in the absence of a national standardized norm.

#### Scope and Basis of Work

The document covers stone and brick masonry buildings (both with mud and cement mortar) typology for splint and bandage, containment reinforcement (CR) system / local failure jacketing and strong back method being implemented by partner organizations. Moreover, the results are based upon observation of individual line items in a certain time frame from partner organizations (Build Change, NSET, UNDP and ESS). The retrofitting components which are common as in the new construction such as excavation, pcc, brick work, etc have been adopted from standard governmental norms for new construction. Further, this document has followed the same format of the Government Standard Norms documents.



Figure 1: Splint and bandage



Figure 2: Strong-back method



Figure 3: Containment Reinforcement (CR) system

(Photo credit: NRA)

## **DEVELOPMENT PROCESS**

With the dire need to speed up reconstruction in earthquake affected areas, a Retrofit - Technical Working Group (R-TWG) was formed to consolidate and develop various documents and resource materials to support the NRA CLPIUs and all partner organizations in retrofitting interventions. Among various objectives and tasks of the R-TWG was to standardize norms for retrofitting of masonry buildings using techniques as prescribed in the NRA Repair and Retrofit Manual and retrofitting techniques adopted and implemented by partner organizations.

## **METHODOLOGY**

The series of activities that carried out during the consolidation process are in the following sequence:

- Collection and compilation of norms and rate analysis used by different organizations in estimation of retrofitting interventions.
- Study of government's existing norms and standards for new construction.
- Detail review of collected materials.
- Discussion and consensus building on the various line items pertaining to retrofitting of masonry buildings and standardized formats.
- Collection and compilation of actual human resources used for different specialized tasks in retrofitting from several sample retrofit sites.
- Averaging of rates (human resources, materials) based on actual field scenario in reference to previous retrofitting works done in Nepal before 2015 earthquake.
- Conducting several internal meetings with partner organizations to discuss and get feedback on the document.
- Sharing sessions with CLPIU-Building and other stakeholders for wider consultation.
- Shared with technical experts for their opinions and comments



Figure 4: Interaction meeting with CLPIU buildings Figure 5: Discussion during working session



(Photo credit: HRRP/CRS)

### WAY FORWARD

As norms are formulated after a series of trails, the document further needs to be sent to the engineers and mid-level technicians at local level for its degree of reliability. Further, there is a need of a formation of core working group of experts for its continuous review, wider coverage and dissemination. Also, the government department needs to take initiation in the approval process of norms.



Figure 6: Way Forward (Photo credit: NRA)

# Draft Retrofitting Norms for Rate Analysis

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Work	Description	Descripti	on Sheet
Group	Description	Item No.	Page No.
А	Site Clearance and Protection Works	A1 - A12	14 - 20
В	Excavation and Backfilling	B1 - B2	20 - 21
С	Shoring works	C1 - C2	21 - 22
D	Masonry works	D1 - D6	22 - 25
E	Concrete & Rebar Works	E1 - E4	25 - 27
F	Formwork	F1	27
G	Wiremesh Works	G1 - G6	28 - 30
н	Plaster Works	H1 - H5	31 - 33
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FOR \*\*\*\*\* DISTRICT

Α	Work Group A : Site Clearance	and Pro	otectio	n Work	S
	Items	Page No.		ate alysis	Unit
1	Providing and fixing the 500 gauge polythene sheet	14	NRs.		sq.m
2	Removing of existing door and windows shutter and its fixture	15	NRs.		No.
3	Demolition of wall BMC and storage within haulage of 10m	15	NRs.		cum
4	Demolition of wall BMM and storage within haulage of 10m	16	NRs.		cum
5	Demolition of wall SMM and storage within haulage of 10m	16	NRs.		cum
6	Demolition of wall SMC and storage within haulage of 10m	17	NRs.		cum
7	Demolition of existing PCC flooring	17	NRs.		cum
8	Demolition of Rigid floors (reinforced conrete slab)	18	NRs.		cum
9	Demolition of roof Light-CGI roofing including truss element	18	NRs.		sq.m
10	Demolition of roof Heavy-slate/clay/cement tiles including truss element	19	NRs.		sq.m
11	Stripping and Raking of of Exsiting mud plaster from SMM/BMM	19	NRs.		sq.m
12	D	20	NRs.		sq.m.
	r				
В	Work Group B : Excavation	on and B	ackfill	ing	
	Items	Page No.		ate Iysis	Unit
1	Earthwork in excavation in ordinary to mixed/ hard soil	20	NRs.		cum
2	Backfilling Works	21	NRs.		cum

С	Work Group C : Sho	oring wo	rks		
	Items	Page No.		ate Iysis	Unit
1	Providing Wooden Props for Shoring purpose	21	NRs.		cum
2	Providing Wooden while Shifting of Openings	22	NRs.		cum

Work Group D : Mas	sonry wo	orks	
Items	Page No.	Rate Analysis	Unit
Laying of stone mud mortar masonry wall	22	NRs.	cum
Laying of brick mud mortar masonry wall	23	NRs.	cum
Laying of masonry wall of stone in cement mortar 1:6	23	NRs.	cum
Laying of masonry wall of brick in cement mortar 1:6	24	NRs.	cum
Flat Brick soling	24	NRs.	sqm
Stone soling	25	NRs.	sqm
	Items Laying of stone mud mortar masonry wall Laying of brick mud mortar masonry wall Laying of masonry wall of stone in cement mortar 1:6 Laying of masonry wall of brick in cement mortar 1:6 Flat Brick soling	ItemsPage No.Laying of stone mud mortar masonry wall22Laying of brick mud mortar masonry wall23Laying of masonry wall of stone in cement mortar 1:623Laying of masonry wall of brick in cement mortar 1:624Flat Brick soling24	ItemsNo.AnalysisLaying of stone mud mortar masonry wall22NRs.Laying of brick mud mortar masonry wall23NRs.Laying of masonry wall of stone in cement mortar 1:623NRs.Laying of masonry wall of brick in cement mortar 1:624NRs.Flat Brick soling24NRs.

Е	Work Group E : Concret	e & Reb	ar Woi	rks	
	Items	Page No.		ate alysis	Unit
1	Providing, mixing and laying P.C.C. in 1:2:4 ratio	25	NRs.		cum
2	Providing, mixing and laying R.C.C. in 1:2:4 ratio	26	NRs.		cum
3	Providing, mixing and laying R.C.C. in 1:1.5:3 ratio	26	NRs.		cum
4	Providing high strength deformed bars (HYSD) of grade Fe:415	27	NRs.		metric ton
	·				
F	Work Group F :I	ormwoi	' <b>k</b>		
	Items	Page No.		ate alysis	Unit
1	Providing, fitting and fixing standard formwork	27	NRs.		sq.m

G	Work Group G : Wire	emesh V	/orks	
	Items	Page No.	Rate Analysis	Unit
1	Cutting and laying SWG10 welded wire mesh and mesh size 50mmx50 mm	28	NRs.	sq. m
2	Cutting and laying SWG10 welded wire mesh and mesh size 25mmx25 mm	28	NRs.	sq.m
3	Cutting and laying SWG12 welded wire mesh and mesh size 50mmx50mm	29	NRs.	sq.m
4	Cutting and laying SWG14 welded wire mesh and mesh size 31 mmx31 mm	29	NRs.	KG
5	Cutting and laying SWG12 welded wire mesh and mesh size 25mmx25mm	30	NRs.	sq.m
6	Cutting and laying SWG15 welded wire mesh and mesh size 20mm x 20mm	30	NRs.	sq.m
				,

н	Work Group H :Pla	ster Wo	rks	
	Items	Page No.	Rate Analysis	Unit
1	Cement plaster works over on walls, with cement sand mix (1:4) and 12.5 mm thick	31	NRs.	sq.m
2	Cement plaster works over GI wire mesh / chicken wire mesh on Stone Masonry walls, with cement sand mix (1:3) and 30 mm thick	31	NRs.	sq.m
3	Cement plaster works over GI wire mesh / chicken wire mesh on Stone Masonry walls, with cement sand mix (1:3) and 20 mm thick	32	NRs.	sq.m
4	Cement plaster works over GI wire mesh / chicken wire mesh on Stone masonry walls, with cement sand mix (1:3) and 35 mm thick	32	NRs.	sq.m
5	Cement plaster works over GI wire mesh / chicken wire mesh on Stone masonry walls, with cement sand mix (1:3) and 40 mm thick	33	NRs.	sq.m

1	Work Group I : Contain	iment/Ja	cketin	g	
	Items	Page No.		ate Iysis	Unit
1	Providing 12G GI Wire @ 100mm c/c	33	NRs.		sq.m
2	Fixing 4mm dia G.I wire in specified location attached with each corss link hook placed at specified interval	34	NRs.		Rm
	·				·

J	Work Group J :Anch	orage W	/orks		
	Items	Page No.		ate Iysis	Unit
1	Throughout anchoring of SWG 10 (3.15) mm wire at 600 mm c/c with staggered layout for connection of jacketing mesh on both sides of wall	34	NRs.		nos
2	Anchorage of 4.75 mm bar with staggered layout at 600 mm c/c for connecting splints and bandages on both sides of wall	35	NRs.		nos
3	Cast In-situ Concrete Shear Connector for all belts in 450 mm thick wall with 8mm TOR rod and infill of Concrete 1:2:4	35	NRs.		
K	Work Group K :Through Concrete, Dov	1	1		r Splicing
	Items	Page No.		ate Iysis	Unit
1	Providing 150mm thick and 450mm deep Through concrete	36	NRs.		1 no.
2	Providing 150mm thick and 450mm long dowel	36	NRs.		1 no.
3	Providing the timber splicing	37	NRs.		cum
L	Work Group L :Replacement of Hear	-	1		lateria
	Items	Page No.		ate Iysis	Unit
1	Providing wooden frames as light gable	37	NRs.		cum
2	Providing and fixing 24 Gauge CGI Sheet as light material.	38	NRs.		sq.m
M	Work Group M :Roof and con	nection	Improv	vement	
	Items	Page No.		ate Iysis	Unit
1	Connection of Rafter and Purlin	38	NRs.		per connection
2	Connection of sill plate with ring beam	39	NRs.		per connection
3	Connection of Ridge Beam and Timber Post	39	NRs.		per connection

Α

1

Providing and fixing the 500 gauge polythene sheet with adhesive tape and nail for protection of door/ window frame with its fixtures of (on which shutter has removed) by covering it, including removing it after completion of the work and cleaning thoroughly all complete as original condition or as per instruction by the Engineer.

		Rate A	nalysis for '	1 sq.m		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Resources Total
Mannawar	Skilled	Md	0.05			
Manpower	Unskilled	Md	0.05			
Material	Polythene Sheet (500 gauge)	sq.m	1.1			
	Nails		Ls			
Damage recovery (30%)						
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
Rate per 1 sq.m				Total Cost		

A 2 Removing of existing door or window shutters and its fixtures (not frame), its safe storage before construction and reinstate it after retrofitting including cleaning and fixing, all complete as original condition or as per instruction by the Engineer.

		Rate	Analysis for	Nos		
Elements	Particulars	Unit	Quantity	Unit Price	Total	Elemer Tota
Manpower	Skilled	Md	0.25			
for removing & safe storage	Unskilled	Md	0.25			
Labor for	Skilled	Md	0.5			
reinstate & cleaning	Unskilled	Md	0.5			
Damage recovery (30% )						
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
				<b>T</b>     <b>C</b>		
Rate per 1				Total Cost		
Nos Demolition of				cement mortar a		
Nos Demolition of debris includi		ion of d	ebris, clean	cement mortar a ing the site etc.		
Nos Demolition of debris includi	ng , transportat	ion of d and in	ebris, clean	cement mortar a ing the site etc. y the Engineer.		
Nos Demolition of debris includi	ng , transportat	ion of d and in	ebris, clean struction by	cement mortar a ing the site etc. y the Engineer.		lete as p Resour
Nos Demolition of debris includi drawing detai Resources Manpower	ng , transportati Is, specification	ion of d and in Rate A	ebris, clean struction by analysis for	cement mortar a ing the site etc. y the Engineer.	all comp	lete as p Resour
Nos Demolition of debris includi drawing detai Resources	ng , transportati ls, specification <b>Particulars</b>	ion of d and in Rate A Unit	ebris, clean struction by analysis for Quantity	cement mortar a ing the site etc. y the Engineer.	all comp	lete as p Resour
Nos Demolition of debris includi drawing detai  Resources Manpower for demolition and	ng , transportati Is, specification Particulars Skilled	ion of d and in Rate A Unit Md	ebris, clean struction by analysis for Quantity O	cement mortar a ing the site etc. y the Engineer.	all comp	lete as p Resour
Nos Demolition of debris includid drawing detai Resources Manpower for demolition and disposing Damage recovery	ng , transportati Is, specification Particulars Skilled	ion of d and in Rate A Unit Md	ebris, clean struction by analysis for Quantity O	cement mortar a ing the site etc. y the Engineer.	all comp	lete as p Resour
Nos Demolition of debris includid drawing detai Resources Manpower for demolition and disposing Damage recovery (30%) Tools (3%	ng , transportati Is, specification Particulars Skilled	ion of d and in Rate A Unit Md	ebris, clean struction by analysis for Quantity O	cement mortar a ing the site etc. y the Engineer.	all comp	lete as p Resour
Nos Demolition of debris includid drawing detai Resources Manpower for demolition and disposing Damage recovery (30%) Tools (3%	ng , transportati Is, specification Particulars Skilled	ion of d and in Rate A Unit Md	ebris, clean struction by analysis for Quantity O	cement mortar a ing the site etc. y the Engineer. 1 Cum Unit Price	Total	
Nos Demolition of debris includid drawing detai Resources Manpower for demolition and disposing Damage recovery (30%) Tools (3%	ng , transportati Is, specification Particulars Skilled	ion of d and in Rate A Unit Md	ebris, clean struction by analysis for Quantity O	cement mortar a ing the site etc. the Engineer.	Total	lete as p Resour

Demolition of the existing brick masonry wall in mud mortar and disposing debris Α including, transportation of debris, cleaning the site etc. all complete as per 4 drawing details, specification and instruction by the Engineer.

	Rate A	analysis for	1 Cum		
Particulars	Unit	Quantity	Unit Price	Total	Resourc Total
Skilled	Md	0			
Unskilled	Md	1.06			
			Actual Cost		
			Overhead Cost	(%)	
			Total Cost		
	Skilled	Skilled Md Unskilled Md	Particulars     Unit     Quantity       Skilled     Md     0       Unskilled     Md     1.06	Skilled       Md       O         Unskilled       Md       1.06         Image: Control of the second	Second

Demolition of the existing stone masonry wall in mud mortar and disposing debris Α including, transportation of debris, cleaning the site etc. all complete as per 5 drawing details, specification and instruction by the Engineer.

						1	
			Rate A	nalysis for <sup>-</sup>	1 Cum		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
		Skilled	Md	0			
	Manpower	Unskilled	Md	1.06			
	Damage recovery (30% )						
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 Cum				Total Cost		
Rs.							

#### A 6

Demolition of the existing stone masonry wall in cement mortar and disposing debris including, transportation of debris, cleaning the site etc. all complete as per drawing details, specification and instruction by the Engineer.

		Rate A	Analysis for	1 cum		
Resource	Particulars	Unit	Quantity	Unit Price	Total	Resourc Total
Mappower	Skilled	Md	0			
Manpower	Unskilled	Md	2.12			
Damage recovery (30%)						
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
Rate per 1 cum				Total Cost		
				1		

# A Demolition of existing P.C.C. slab in perfect line, level and disposing the debris including transportation of debris, cleaning the site all complete as per drawing, specification and instruction by the Engineer.

		Rate A	nalysis for	1 Cum		
Resource	Particulars	Unit	Quantity	Unit Price	Total	Resource Total
Mappower	Skilled	Md	0			
Manpower	Unskilled	Md	4			
Damage recovery (30% )						
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
ate per 1 um				Total Cost		

A Demolition of existing R.C.C. slab in perfect line, level and disposing the debris including transportation of debris, cleaning the site all complete as per drawing, specification and instruction by the Engineer.

			Rate A	nalysis for 1	1 Cum		
	Resource	Particulars	Unit	Quantity	Unit Price	Total	Resource Total
	Mappower	Skilled	Md	0			
	Manpower	Unskilled	Md	11			
	Damage recovery (30% )						
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (.	%)	
	Rate per 1 Cum				Total Cost		
Rs.							

A Dismantel of existing roof truss with CGI sheet, surface cleaning and disposing the debris including transportation, etc all complete as per drawing details, specification and instruction by the Engineer.

			Rate A	nalysis for <sup>-</sup>	1 sq.m		
	Elements	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	0.03			
	Manpower	Unskilled	Md	0.04			
	Damage recovery (30%)						
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 sq.m				Total Cost		
Rs.							

A 10 Dismantel of existing tile roofing , surface cleaning and disposing the debris including transportation, etc all complete as per drawing details, specification and instruction by the Engineer.

			Rate A	nalysis for	1 sq.m		
	Resource	Particulars	Unit	Quantity	Unit Price	Total	Resource Total
	Mappower	Skilled	Md	0.054			
	Manpower	Unskilled	Md	0.081			
	Damage recovery (30% )						
	Tools (3% labor)						
				<u> </u>	Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 sq.m				Total Cost		
Rs.							

A Stripping off the existing mud plaster on the masonry wall, raking out the mud
 A mortar to a depth of 10 mm at joint, surface cleaning and disposing the debris
 11 including transportation, etc all complete as per drawing details, specification and instruction by the Engineer.

		Rate A	nalysis for	1 sq.m		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Resourd Total
Manpower for scrapping	Unskilled	Md	0.06			
Manpower for raking & cleaning	Unskilled	Md	0.06			
Damage recovery (30%)						
Tools (3% labor)						
				Actual Cost		
				Overhead Cost (	(%)	
Rate per 1 sq.m				Total Cost		

A Stripping off the existing cement plaster on the Masonry wall, raking out the cement mortar to a depth of 10 mm at joint, surface cleaning and disposing

	cement mortal to a depth of to min at joint, surface cleaning and disposing
12	the debris including transportation, etc all complete as per drawing details,
	specification and instruction by the Engineer.

			Rate A	nalysis for 1	sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower for scrapping	Unskilled	Md	0.108			
	Manpower for raking & cleaning	Unskilled	Md	0.108			
	Damage recovery (30% )						
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (.	%)	
	Rate per 1 sq.m				Total Cost		
Rs.					I		
	·						
В 1	dressing of sic	les and proper	compa	ction to tre	rd soil in foundat nch bed, disposin uctions by the En	g of exe	-
	dressing of sic	les and proper	compacificatio	ction to tree on and instr	nch bed, disposin uctions by the En	g of exe	-
	dressing of sic	les and proper	compacificatio	ction to tre	nch bed, disposin uctions by the En	g of exe	-
	dressing of sic complete as p Resources	les and proper er drawing, spec	compacification	nalysis for	nch bed, disposing uctions by the En	g of exo gineer.	Elements
	dressing of sic complete as p	les and proper er drawing, spec Particulars	compacification	nalysis for Quantity	nch bed, disposing uctions by the En	g of exo gineer.	Elements
	dressing of sic complete as p Resources	des and proper der drawing, spec Particulars Skilled	compacification	nalysis for Quantity	nch bed, disposing uctions by the En	g of exo gineer.	Elements
	dressing of sic complete as p Resources Manpower Damage recovery	des and proper der drawing, spec Particulars Skilled	compacification	nalysis for Quantity	nch bed, disposing uctions by the En	g of exo gineer.	Elements
	dressing of sic complete as p Resources Manpower Damage recovery (30%) Tools (3%	des and proper der drawing, spec Particulars Skilled	compacification	nalysis for Quantity	nch bed, disposing uctions by the En	g of exo gineer.	Elements
	dressing of sic complete as p Resources Manpower Damage recovery (30%) Tools (3%	des and proper der drawing, spec Particulars Skilled	compacification	nalysis for Quantity	nch bed, disposing uctions by the En I Cum Unit Price	g of exe gineer. Total	Elements
	dressing of sic complete as p Resources Manpower Damage recovery (30%) Tools (3%	des and proper der drawing, spec Particulars Skilled	compacification	nalysis for Quantity	Actual Cost	g of exe gineer. Total	Elements

B 2	Backfilling W	orks					
			Rate A	nalysis for	1 Cum	1	
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Skilled	Md	0			
		Unskilled	Md	0.5			
	Damage recovery (30% )						
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 Cum				Total Cost		
Rs							
C 1	=100mmx100		i <mark>ng</mark> , Wa		nd Floors (Raker Ommx100mm@3.3	3m spac	cing,
		1	Rate A	nalysis for	1 Cum		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Skilled	Md	7.5			
		Unskilled	Md	3.8			
		Timber	cum	1.1			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (%)		
	Rate per cum	Note: One elem for 3 times.	ent wil	l be used	Total Cost		

# Providing Timber shoring while Shifting of Openings (125\*125 sq mm horizontal wooden posts with vertical support @ 1 m spacing, Vertical Posts @ 100 \*100 sq mm)

		Rate A	Analysis for	1 cum		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Element: Total
Mappower	Skilled	Md	4.9			
Manpower	Unskilled	Md	4.9			
	Timber	cum	1.1			
	Nails (2 inches)	kg	1.2			
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
Rate per cum	Note: One elem for 3 times.	nent wil	l be used	Total Cost		

# D Stone masonry work in mud mortar including supply of hard stone blocks preparing mud mortar and construction of the wall upto 5m high haulage distance upto 30m

	1	Rate A	nalysis for	1 cum		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Element Total
N.4	Skilled	Md	1			
Manpower	Unskilled	Md	2.25			
	Block Stone	cum	1			
Material	Bond Stone	cum	0.1			
	Soil	cum	0.42			
	Water	litre	70			
Tools (3% labor)						
				Actual Cost		
				Overhead Cost (%)		
Rate per 1 cum				Total Cost		

Good quality local chimney made brick work in mud mortar in perfect line, leveland finishing including , curing, raking out green mortar from joints and cleaning

2	the brick face before stopping the work and proper bonding with existing masonry
	all complete as per drawing, specification and instruction by the Engineer.

	Rate Analysis for 1 cum								
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total		
		A)Skilled	Md	1					
	Manpower	B)Unskilled	Md	1.7					
		C)Unskilled	Md	0.2					
		Brick	nos	560					
	Material	Soil	cum	0.42					
		Water	littre	100					
	Tools for Scaffolding	3% of C)							
	Tools (3% labor)								
					Actual Cost				
					Overhead Cost	(%)			
	Rate per 1 cum				Total Cost				
					1				
Rs.									
Rs. D 3		-			g supply of hard vall upto 5m high				
D	preparing mu	-							
D	preparing mu	-	nstruct		vall upto 5m high				
D	preparing mu	-	nstruct	ion of the v	vall upto 5m high				
D	preparing muc upto 30m Resources	d mortar and co	nstruct Rate A	ion of the v	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m	d mortar and co Particulars	Rate A	ion of the v analysis for Quantity	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources	d mortar and co Particulars Skilled	Rate A Unit Md	ion of the v analysis for Quantity 1.95	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources	d mortar and co Particulars Skilled Unskilled	Rate A Unit Md Md	ion of the v malysis for Quantity 1.95 2.06	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources	d mortar and co Particulars Skilled Unskilled Cement	Rate A Unit Md Md MT	ion of the v malysis for Quantity 1.95 2.06 0.07	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources Manpower	d mortar and co Particulars Skilled Unskilled Cement Sand(river)	Rate A Unit Md Md MT cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources Manpower	<b>Particulars</b> Skilled Unskilled Cement Sand(river) Block stone	Rate A Unit Md Md MT cum cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3 1.1	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources Manpower	A mortar and co Particulars Skilled Unskilled Cement Sand(river) Block stone bond stone	Rate A Unit Md Md MT cum cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3 1.1 0.1	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources Manpower Material Tools (3%	A mortar and co Particulars Skilled Unskilled Cement Sand(river) Block stone bond stone	Rate A Unit Md Md MT cum cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3 1.1 0.1	vall upto 5m high	haulage	e distance Elements		
D	preparing muc upto 30m Resources Manpower Material Tools (3%	A mortar and co Particulars Skilled Unskilled Cement Sand(river) Block stone bond stone	Rate A Unit Md Md MT cum cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3 1.1 0.1	Vall upto 5m high	Total	e distance Elements		
D	preparing muc upto 30m Resources Manpower Material Tools (3%	A mortar and co Particulars Skilled Unskilled Cement Sand(river) Block stone bond stone	Rate A Unit Md Md MT cum cum	ion of the v malysis for Quantity 1.95 2.06 0.07 0.3 1.1 0.1	Vall upto 5m high	Total	e distance Elements		

Good quality local chimney made brick work in cement sand mortar (1:6) in perfect
 D line, level and finishing including , curing, raking out green mortar from joints and

4	cleaning the brick face before stopping the work and proper bonding with existing
	masonry all complete as per drawing, specification and instruction by the Engineer.

			Data A	nolucio for	1		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
		A) Skilled	Md	1.5			IUtai
	Manpower	B) Unskilled	Md	2.2			
	i lanpowoi	C) Unskilled	Md	0.7			
		Cement	bags	1.4			
	Material	Brick	nos	560			
		Sand	cum	0.3			
		water	litre	100			
	Tools for Scaffolding (3% of C)						
					Actual Cost		
					Overhead Cost	(%)	
	Rate per 1 cum				Total Cost		
s.					1		
5	Dry flat brick	soiling					
			Rate Ar	halysis for 1	0 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Skilled	Md	0.5			
	hanpower	Unskilled	Md	1			
	Material	Brick	nos	420			
	Hateria	Sand(river)	cum	0.71			
	Tools (3% labor)						
					Actual Cost		
			Overhead Cost (%)				

Rs.

D 6	Dry stone layi	ng (soling)					
			Rate A	analysis for	1 cum		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Skilled Unskilled	Md Md	1 3.5			
		Stone	cum	1.1			
	Material	Sand	cum	0.25			
	riaterial	Jana	Cum	0.23			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 cum				Total Cost		
Rs.							
E 1	aggregate(10/ line, level and	20mm) down	with pr ng pro	oper comp	for foundation, k action and compl all complete as pe	etion to	perfect
			Rate A	nalysis for	1 cum		
	Elements	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Skilled	Md	1			
	Inalipower	Unskilled	Md	4			
		Cement	Bags	6.4			
	Material	Aggregate	cum	0.86			
	inaterial	Sand	cum	0.445			
		Water	ltr	150			
					Actual Cost		
		1		Overhead Cost (	%)		
	Rate per 1 cum				Total Cost		
Rs.							

Providing, mixing and laying R.C.C. in 1:2:4 ratio for foundation, beam with stone
 aggregate(10/ 20mm) down with proper compaction and completion to perfect

2 line, level and finishing including proper curing all complete as per drawing, specification and instruction by the Engineer.

			Rate A	nalysis for	1 cum		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappowor	Skilled	Md	0.8			
	Manpower	Unskilled	Md	7			
		Cement	Bags	6.4			
	Material	Aggregate	cum	0.86			
	Materia	Sand	cum	0.445			
		Water	ltr	150			
					Actual Cost		
					Overhead Cost (.	%)	
	Rate per 1 cum				Total Cost		
Rs.							

Providing, mixing and laying R.C.C. in 1:1.5:3 ratio for foundation, beam with stone aggregate(10/ 20mm) down with proper compaction and completion to

E stone aggregate(10/ 20mm) down with proper compaction and completion to
 3 perfect line, level and finishing including proper curing all complete as per drawing, specification and instruction by the Engineer.

		Rate A	nalysis for	1 cum		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Skilled	Md	0.8			
Manpower	Unskilled	Md	7			
	Cement	Bags	8			
Material	Aggregate	cum	0.86			
Material	Sand	cum	0.43			
	Water	ltr	200			
Tools (3% labor)						
				Actual Cost		
				Overhead Cost (	%)	
Rate per 1 cum				Total Cost		

Providing high strength deformed bars (HYSD) of grade Fe:415 approved reinforcement confirming to IS: 1786 - 1985 for R.C.C work and approved bar

bending schedule including straightening, cutting, bending, placing and binding in position by binding wires all complete as per drawing, specification and instruction by the Engineer.

		Ra	te Analy:	sis for 1 met	tric ton		
	Elements	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	12			
	Manpower	Unskilled	Md	12			
	Material	TMT Rod	Metric ton	1.05			
		Binding Wire	kg	10			
					Actual Cost		
					Overhead Cost	(%)	
	Rate per 1 metric ton				Total Cost		
Rs.							

Providing, fitting and fixing standard formwork of shuttering local wood including
 all necessary metal/wooden props, bracing, wedges and nails etc. and careful
 removal of form works at approved time for all type of R.C.C. works all complete as

per specification and instruction by the Engineer.

			Rate An	alysis for 1 s	q.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	0.267			
	Manpower	Unskilled	Md	0.4			
	Matarial	Wooden Form	cum	0.07			
	Material	Nails	kg	0.25			
	Damage recovery (30% )						
	Tools (3% labor)						
		·			Actual Cost		
					Overhead Cost	(%)	
	Rate per 1 sq.m				Total Cost		
s.	0						

Providing, cutting and laying SWG10 welded wire mesh and mesh size 50x50 G mm including anchoring it on the wall with 4.75mm bar by drilling and fixing with 1 cement slurry as per drawing details, specification and instruction by the Engineer. Rate Analysis for 1 sq.m Elements Elements **Particulars** Unit Quantity Unit Price Total Total Skilled Md 0.09 Manpower Unskilled Md 0.12 Wiremesh Material 1.1 sq.m Tools (3% labor) Actual Cost Overhead Cost (...%) Total Cost Rate per 1 sq.m Rs. Providing, cutting and laying SWG10 welded wire mesh of mesh size 25x25m as G 2 per drawing details, specification and instruction by the Engineer. Rate Analysis for 1 sq.m Elements Total Resources **Particulars** Unit Unit Price Quantity Total Skilled Md 0.09 Manpower Unskilled Md 0.12 Material Wiremesh 1.1 sq.m Tools (3% labor) Actual Cost Overhead Cost (...%) Total Cost Rate per 1 sq.m Rs.

G mn 3 cei

Providing, cutting and laying SWG12 welded wire mesh and mesh size 50x50 mm including anchoring it on the wall with 4.75mm bar by drilling and fixing with cement slurry as per drawing details, specification and instruction by the Engineer.

			Rate /	Analysis for	1 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
		Skilled	Md	0.09			
	Manpower	Unskilled	Md	0.12			
	Material	Wiremesh	sq.m	1.1			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 sq.m				Total Cost		
Rs.					·		

### G Providing, cutting and laying SWG14 (2.03mm) welded wire mesh of mesh size 31mmx31mm as per drawing details, specification and instruction by the Engineer

	Rate Analysis for 1 sq.m								
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total		
	Mannautor	Skilled	Md	0.12					
	Manpower	Unskilled	Md	0.23					
	Material	Wiremesh	sq.m	1.1					
	Tools (3% labor)								
					Actual Cost				
					Overhead Cost (%)				
	Rate per 1 sq.m				Total Cost				
۲s.									

G 5					ire mesh of mestion and instruction		e Engineer
			Rate /	Analysis for	1 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	0.09			
	Manpower	Unskilled	Md	0.12			
	Material	Wiremesh	sq.m	1.1			
	Tools (3% labor)						
				Actual Cost			
					Overhead Cost	(%)	
	Rate per 1 sq.m				Total Cost		
Rs.					1		
G 6					welded wire me nd instruction by		
			ils, spe		nd instruction by		
			ils, spe	cification a	nd instruction by		
	20x20m as ported	er drawing deta	Rate /	Analysis for	nd instruction by 1 sq.m	the Eng	ineer. Elements
	20x20m as p	er drawing deta Particulars	Rate /	Analysis for Quantity	nd instruction by 1 sq.m	the Eng	ineer. Elements
	20x20m as ported	er drawing deta Particulars Skilled	Rate / Unit Md	Analysis for Quantity 0.09	nd instruction by 1 sq.m	the Eng	ineer. Elements
	20x20m as portion of the second secon	er drawing deta Particulars Skilled Unskilled	Rate / Unit Md Md	cification a Analysis for Quantity 0.09 0.12	nd instruction by 1 sq.m	the Eng	ineer. Elements
	20x20m as portion of the second secon	er drawing deta Particulars Skilled Unskilled	Rate / Unit Md Md	cification a Analysis for Quantity 0.09 0.12	nd instruction by 1 sq.m	the Eng	ineer. Elements
	20x20m as portion of the second secon	er drawing deta Particulars Skilled Unskilled	Rate / Unit Md Md	cification a Analysis for Quantity 0.09 0.12	nd instruction by 1 sq.m Unit Price	the Eng	ineer. Elements
	20x20m as portion of the second secon	er drawing deta Particulars Skilled Unskilled	Rate / Unit Md Md	cification a Analysis for Quantity 0.09 0.12	1 sq.m Unit Price	the Eng	ineer. Elements

Cement plaster works over on walls, with cement sand mix (1:4) and 12.5 mm thick or as per existing plaster thickness in perfect line, level and plumb, making grooves

H or as per existing plaster thickness in perfect line, level and plumb, making grooves
 1 on boundary of existing plaster and new plaster including cleaning and wetting the surface and curing all complete as per specification and instruction by the Engineer.

		F	Rate An	alysis for 10	0 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	12			
	Manpower	Unskilled	Md	16			
	Matarial	Cement	bags	10.8			
	Material	Sand	cum	1.5			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 sq.m				Total Cost		
Rs.							

### H Cement plaster works over GI wire mesh / chicken wire mesh on Brick walls, with 2 cement sand mix (1:3) and 30 mm thick

		F	Rate An	alysis for 10	)0 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mannower	Skilled	Md	16			
	Manpower	Unskilled	Md	16			
	Material	Cement	bags	30			
	Material	Sand	cum	3			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (	%)	
	Rate per 1 sq.m				Total Cost		
Rs.					·		

#### H Cement plaster works over GI wire mesh / chicken wire mesh on Brick walls, with 3 cement sand mix (1:3) and 20 mm thick

			Rate An	alysis for 10	)0 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	15			
	Manpower	Unskilled	Md	15			
	Material	Cement	bags	20			
	Material	Sand	cum	2			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost	(%)	
	Rate per 1 q.m				Total Cost		
Rs.							
(S.			·				
нс				-	en wire mesh on	Stone m	asonry
н с		er works over GI nent sand mix (		-		Stone m	asonry
нс		nent sand mix (	1:3) and	35 mm thi	ick	Stone m	lasonry
H C 4 w		nent sand mix (	1:3) and	-	ick	Stone m	asonry Elements Total
H C 4 w	valls, with cen Resources	nent sand mix ( F	1:3) and Rate An	alysis for 10	i <b>ck</b> )0 sq.m		Elements
H C 4 w	valls, with cen	nent sand mix ( F Particulars	1:3) and Rate An Unit	alysis for 10 Quantity	i <b>ck</b> )0 sq.m		Elements
H C 4 w	Resources	nent sand mix ( F Particulars Skilled	Rate An Unit Md	alysis for 10 Quantity 0.391	i <b>ck</b> )0 sq.m		Elements
H C 4 w	valls, with cen Resources	nent sand mix ( F Particulars Skilled Unskilled	Rate An Unit Md Md	<b>35 mm th</b> alysis for 10 <b>Quantity</b> 0.391 0.781	i <b>ck</b> )0 sq.m		Elements
H C 4 w	Resources	nent sand mix ( F Particulars Skilled Unskilled Cement	Rate An Unit Md Md bags	<b>35 mm th</b> alysis for 10 <b>Quantity</b> 0.391 0.781 0.437	i <b>ck</b> )0 sq.m		Elements
H C 4 w	Resources Manpower Material Tools (3%	nent sand mix ( F Particulars Skilled Unskilled Cement	Rate An Unit Md Md bags	<b>35 mm th</b> alysis for 10 <b>Quantity</b> 0.391 0.781 0.437	i <b>ck</b> )0 sq.m		Elements
H C 4 w	Resources Manpower Material Tools (3%	nent sand mix ( F Particulars Skilled Unskilled Cement	Rate An Unit Md Md bags	<b>35 mm th</b> alysis for 10 <b>Quantity</b> 0.391 0.781 0.437	ick D0 sq.m Unit Price	Total	Elements
H C 4 w	Resources Manpower Material Tools (3%	nent sand mix ( F Particulars Skilled Unskilled Cement	Rate An Unit Md Md bags	<b>35 mm th</b> alysis for 10 <b>Quantity</b> 0.391 0.781 0.437	ick 00 sq.m Unit Price	Total	Elements

ŀ	ł	
Ę	5	

# 40mm (Double Layer) Plastering work @ 1:3 Cement Mortar at the location of welded wiremesh and GI Wire jacketing (First layer of 25mm and second layer of 15mm.)

	Rate Analysis for 100 sq.m							
Resou	irces	Particulars	Unit	Quantity	Unit Price	Total	Elements Total	
Mappa	014/01/	Skilled	Md	16				
Manpo	Swer	Unskilled	Md	35				
Mate	rial	Cement	bags	42				
Mate	fidi	Sand	cum	4.29				
Tools labo								
					Actual Cost			
					Overhead Cost	(%)		
Rate pe sq.m	er 1				Total Cost			
5.								

	P	alysis for 1 s	am area			
Resources	Particulars	Unit	Quantity	Unit Price	Total	Elemen Total
	Skilled	Md	0.06			
Manpower	Unskilled	Md	0.06			
Material	12G GI Wire	kg	1.012			
Tools (3% labor)						
				Actual Cost		
				Overhead Cost	(%)	
Rate per 1				Total Cost		
sq.m						

l 2		Fixing 4mm dia G.I wire in specified location attached with each corss link hook placed at specified interval								
			Rate A	analysis for	10 rm					
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total			
	Manpower	Skilled	Md	0.179						
	Manpower	Unskilled	Md	0.357						
	Material	4mm GI Wire	kg	1						
	Tools (3% labor)									
					Actual Cost					
					Overhead Cost	(%)				
	Rate per 1 rm				Total Cost					
Rs.										
	1									
J 1	_	nchoring of SW( nection of jacke			re at 600 mm c/c h sides of wall	with sta	aggered			
	_	_				with sta	aggered			
	_	_	ting m		h sides of wall	with sta	aggered			
	_	_	ting m	esh on botl	h sides of wall	with sta Total	aggered Elements Total			
	Resources	nection of jacke	ting m Rate A	esh on botl	h sides of wall 1 nos.		Elements			
	layout for con	Particulars	ting m Rate A Unit	analysis for Quantity	h sides of wall 1 nos.		Elements			
	Resources	Particulars Skilled	Rate A Unit MD	analysis for Quantity 0.017	h sides of wall 1 nos.		Elements			
	Iayout for con         Resources         Manpower         Materials	Particulars Skilled Unskilled SWG 10(3.15)	Rate A Unit MD MD	Analysis for Quantity 0.017 0.017	h sides of wall 1 nos.		Elements			
	Iayout for con         Resources         Manpower	Particulars Skilled Unskilled SWG 10(3.15) mm wire Drilling	Rate A Unit MD MD	Analysis for Quantity 0.017 0.017	h sides of wall 1 nos.		Elements			
	Iayout for con         Resources         Manpower         Materials	Particulars Skilled Unskilled SWG 10(3.15) mm wire Drilling Machine	Rate A Unit MD MD	Analysis for Quantity 0.017 0.017	h sides of wall 1 nos.		Elements			
	Iayout for con         Resources         Manpower         Materials	Particulars Skilled Unskilled SWG 10(3.15) mm wire Drilling Machine	Rate A Unit MD MD	Analysis for Quantity 0.017 0.017	1 nos. Unit Price	Total	Elements			
	Iayout for con         Resources         Manpower         Materials	Particulars Skilled Unskilled SWG 10(3.15) mm wire Drilling Machine	Rate A Unit MD MD	Analysis for Quantity 0.017 0.017	1 nos. Unit Price	Total	Elements			

J 2

Anchorage of 4.75 mm bar with staggered layout at 600 mm c/c for connecting splints and bandages on both sides of wall

		Rate A	Analysis for	1 nos.		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
Mappower	Skilled	MD	0.025			
Manpower	Unskilled	MD	0			
	Cement	Bags	0.002			
Material	Sand	cum	0.000			
	4.75 mm rebar	kg	0.03			
Tools (3%	Drilling Machine					
labor)	Drilling Bit					
				Actual Cost		
				Overhead Cost	(%)	
Rate per 1				Total Cost		
no.						

#### J Cast In-situ Concrete Shear Connector for all belts in 450 mm thick wall with 8mm J TOR rod and infill of Concrete 1:2:4 (Include making hole of 4"\*4")

			Rate A	nalysis for 1	0 nos.		
Reso	urces	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
Мара		Skilled	MD	0.056			
Manp	ower	Unskilled	MD	0.083			
		Steel -8mm dia.	Kg	0.16			
Mat	erial	Cement	Bag	0.011			
		Sand	cum	0.001			
		Aggregate	cum	0.002			
					Actual Cost		
					Overhead Cost	(%)	
Rate p	er 1				Total Cost		
no.							

		Rate A	nalysis for 1	0 nos.		
Resources	Particulars	Unit	Quantity	Unit Price	Total	Eleme Tota
	Skilled	Md	0.5			
Manpower	Unskilled	Md	2.5			
	Cement	bags	0.7			
Mahavial	Sand	cum	0.04			
Material	Aggregate	cum	0.08			
	Rebar (7mm)	kg	2			
				Actual Cost		
				Overhead Cost	(%)	
Rate per 1 no.				Total Cost		
-	) Omm thick and 45 element using reb		-	for anchoring th	e new el	ement v
-	)mm thick and 45 element using reb		-	for anchoring th	e new el	ement v
-	lement using reb	ar and	-		e new el	ement v
-	lement using reb	ar and	concrete		e new ele	Eleme
the existing e Resources	element using reb	ar and	concrete nalysis for 1	0 nos.		Eleme
the existing e	Particulars	Rate A	concrete nalysis for 1 Quantity	0 nos.		Eleme
the existing e Resources	Particulars Skilled	Rate A Unit Md	concrete nalysis for 1 Quantity 0.6	0 nos.		Eleme
the existing e Resources Manpower	Particulars Skilled Unskilled	Rate A Unit Md Md	concrete nalysis for 1 Quantity 0.6 2.5	0 nos.		Eleme
the existing e Resources	Particulars          Skilled         Unskilled         Cement	Rate A Unit Md Md bags	concrete nalysis for 1 Quantity 0.6 2.5 1	0 nos.		Eleme
the existing e Resources Manpower	Particulars          Particulars         Skilled         Unskilled         Cement         Sand	Rate A Unit Md Md bags cum	concrete nalysis for 1 Quantity 0.6 2.5 1 0.04	0 nos.		Eleme
the existing e Resources Manpower	Particulars          Particulars         Skilled         Unskilled         Cement         Sand         Aggregate	Rate A Unit Md Md bags cum cum	<b>concrete</b> nalysis for 1 <b>Quantity</b> 0.6 2.5 1 0.04 0.08	0 nos.		Eleme
the existing e Resources Manpower	Particulars          Particulars         Skilled         Unskilled         Cement         Sand         Aggregate	Rate A Unit Md Md bags cum cum	<b>concrete</b> nalysis for 1 <b>Quantity</b> 0.6 2.5 1 0.04 0.08	0 nos. Unit Price	Total	ement v Eleme Tota
the existing e Resources Manpower	Particulars          Particulars         Skilled         Unskilled         Cement         Sand         Aggregate	Rate A Unit Md Md bags cum cum	<b>concrete</b> nalysis for 1 <b>Quantity</b> 0.6 2.5 1 0.04 0.08	0 nos. Unit Price	Total	Eleme

3	Providing	g the timber spli	cing fo	or the wood	en posts with sp	licing me	ember
			Rate A	nalysis for	1 cum		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Mappower	Skilled	Md	31			
	Manpower	Unskilled	Md	3			
		Soft Wood	cum	1.1			
	Material	12 mm bolt/ Threaded rod	kg	183			
		Nuts and washers each	nos.	610			
	Drilling Works (1% of total cost)						
					Actual Cost		
				Overhead Cost	(%)		
	Rate per cum				Total Cost		
	cum						
Rs.							
Rs. L 1		oden frames as li	ght ga	ble			
L		oden frames as li		<b>ble</b> analysis for	1 cum		
L		oden frames as li Particulars			1 cum Unit Price	Total	Elements
L	Providing woo		Rate A	analysis for		Total	
L	Providing woo	Particulars	Rate A	analysis for Quantity		Total	
L	Providing woo	<b>Particulars</b> Skilled	Rate A Unit Md	Analysis for Quantity 16.82		Total	
L	Providing woo	<b>Particulars</b> Skilled Unskilled	Rate A Unit Md Md	Quantity 16.82 5.61		Total	
L	Providing woo	<b>Particulars</b> Skilled Unskilled Timber	Rate A Unit Md Md cum	Quantity 16.82 5.61 1.1		Total	Elements Total
L	Providing woo Resources Manpower Material Tools (3%	<b>Particulars</b> Skilled Unskilled Timber	Rate A Unit Md Md cum	Quantity 16.82 5.61 1.1		Total	
L	Providing woo Resources Manpower Material Tools (3%	<b>Particulars</b> Skilled Unskilled Timber	Rate A Unit Md Md cum	Quantity 16.82 5.61 1.1	Unit Price		
L	Providing woo Resources Manpower Material Tools (3%	<b>Particulars</b> Skilled Unskilled Timber	Rate A Unit Md Md cum	Quantity 16.82 5.61 1.1	Unit Price		

L 2	Providing and	l fixing 24 Gauge	CGI S	heet as ligh	t material.		
		-	Rate Ai	nalysis for 1	0 sq.m		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
		Skilled	Md	1.1			
	Manpower	Unskilled	Md	1.25			
		CGI Sheet (24 Gauge)	sqm	12			
	Material	Nails	kg	0.5			
		Washer	nos	55			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (.	%)	
	Rate per 1 sq.m				Total Cost		
Rs.					·		
M 1	Connection of	f rafter and purli	n with	12G GI Wire	à		
		Rate	Analy	sis for 40 co	onnections		
	Resources	Particulars	Unit	Quantity	Unit Price	Total	Elements Total
	Manpower	Unskilled	Md	1			
	Material	12G GI Wires	kg	1.2			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost (.	%)	
	Rate per connection				Total Cost		
Rs.							

M 2	Connection of Plain GI Sheet	-	ng bea	ım (1000mr	m x 75mm double	e folded	24 Gauge
			A	- f			
	Resources	Particulars	sis for 30 co Quantity	Unit Price	Total	Elements Total	
		Skilled	Md	1			
	Manpower	Unskilled	Md	2			
	Matavial	Plain Gl Sheet	sqm	4.5			
	Material	Nails (1.5")	kg	1.5			
	Tools (3% labor)						
					Actual Cost		
					Overhead Cost	(%)	
	Rate per				Total Cost		
	connection						
Rs.							
M 3	Connection o	f Ridge Beam an	d Timb	er Post wit	h Plain Gl Strap (	24 Gaug	le)
	Connection o			er Post wit		24 Gaug	je)
	Connection o					24 Gaug Total	je) Elements Total
	Resources	Rate	e Analy	/sis for 3 co	nnections		Elements
		Rate Particulars	e Analy Unit	vsis for 3 co Quantity	nnections		Elements
	<b>Resources</b> Manpower	Rate Particulars Skilled	e Analy Unit Md	vsis for 3 co Quantity 0.25	nnections		Elements
	Resources	Rate Particulars Skilled Unskilled	e Analy Unit Md Md	vsis for 3 co Quantity 0.25 1	nnections		Elements
	<b>Resources</b> Manpower	Rate Particulars Skilled Unskilled Plain GI Sheet	e Analy Unit Md Md sqm	vsis for 3 co Quantity 0.25 1 0.412	nnections		Elements
	Resources Manpower Material Tools (3%	Rate Particulars Skilled Unskilled Plain GI Sheet	e Analy Unit Md Md sqm	vsis for 3 co Quantity 0.25 1 0.412	nnections		Elements
	Resources Manpower Material Tools (3%	Rate Particulars Skilled Unskilled Plain GI Sheet	e Analy Unit Md Md sqm	vsis for 3 co Quantity 0.25 1 0.412	nnections Unit Price	Total	Elements
	Resources Manpower Material Tools (3%	Rate Particulars Skilled Unskilled Plain GI Sheet	e Analy Unit Md Md sqm	vsis for 3 co Quantity 0.25 1 0.412	nnections Unit Price	Total	Elements

## CALCULATION/OBSERVATION FOR NORMS CALCULATION

Н3	20mm (Double Layer) Pla welded wiremesh and Gl	-	-	0 1:3 Ce	ement M	lortar at the location of
	Area (sq.m)	100				
	Thickness (mm)	20				
	Ratio	1:3				
	Plaster volume (cum)=	2				
	Increasing plaster vol- ume by 30% for dry volume					
	Total volume=	2.6				
			cum	kg	bags	
	Cement =	0.65	0.65	936	19	
	Adding 10% for slurry and wastage				21	
	Sand=	1.95	cum			
		2.145	cum			
	Adding 10% for wastage	2.145	cum			
	Skilled Manpower	16 On observation it was found that of a day can plaster a wall panel of h and width 10 feet, which is equal t sq ft(6.25 sq m). Hence, for 100 so required.				all panel of height 7 feet nich is equal to around 68
	Unskilled Manpower	16	the ski cemer necess is also	illed on it mort sary too respos	e in carr ar using ols like s sible for	wer is required to support rying and preparing 1:3 rich cement, sand, water and pade. Further, the manpower spraying slurry and supply- red material to the skilled
H2	30mm (Double Layer) Pla welded wiremesh and GI	-	-		ement M	lortar at the location of
	Area (sq.m)	100				
	Thickness (mm)	30				
	Ratio	1:3				
	Plaster volume (cum)=	3				
	Increasing plaster vol- ume by 30% for dry volume					
	Total volume=	3.9				
	Cement =	0.975	0.975	1404	29	
	Adding 10% for slurry and wastage				32	
	Sand=	2.925	cum			
	Adding 10% for wastage	3.218	cum			

	Skilled Manpower	15	On observation it was found that one mason in a day can plaster a wall panel of height 7 feet and width 10 feet, which is equal to around 72 sq ft(6.66 sq m). Hence, for 100 sqm 15 MDs are required.
	Unskilled Manpower	15	The unskilled manpower is required to support the skilled one in carrying and preparing 1:3 rich cement mortar using cement, sand, water and necessary tools like spade. Further, the manpower is also resposible for spraying slurry and supply- ing/hauling of prepared material to the skilled one.
G1		-	VG10 welded wire mesh and mesh size 50x50 mm tion and instruction by the Engineer.
	Skilled Manpower	0.09 MD	While cutting and installing a GI Welded Wire Mesh over surface of wall, it has been observed that skilled manpower is necessary to intially place, temporarily anchor and help other unskilled masons. For all these works total time taken for 1 sqm area is 44 minutes.
	Unskilled Manpower	0.12 MD	Unskilled Manpower are required to remove the existing internventions like joist, roofing materials, nailing wire mesh over walls and other purposes. For all these works total time taken for 1 sqm area is around 58 to 60 minutes.
J2	Anchorage of 4.75 mm ba splints and bandages on		staggered layout at 600 mm c/c for connecting des of wall
	Total time required for preparation, placing and fixing of anchorages.		
	For preparation of an- chorage bar	4	min- utes
	For drilling of holes	2	min- utes
	For placing and tamper- ing rich cement mortar inside the hole	6	min- utes
	Total time required	12	min- utes
	Hence, converting it into man days, as skilled manpowers are used:		
	Skilled manpower re- quired	0.025	MD
	Drilling Works		

	Drilling Machine	3		Rate of renting each drilling machine	
	Drilling Bit	2		is around NPR 500 per day. Such ma- chines are used for around 8-10 days and their are around 1000 anchorage holes in an average Nepali building. Hence ((500*8)/1000) gives about Npr 3 per hole for drilling machine. Likewise, for drilling bit, an average bit when made locally from rods will cost NPR 800. Since 3-4 such bits are sufficient for a building in normal cases, per hole cost for 1000 holes is around NPR 2.	
J1	layout for connection of j			mm wire at 600 mm c/c with staggered on both sides of wall	
	Total time required for preparation, placing and fixing of anchorages.				
	For drilling of holes	8	min- utes	In General this is done by 2 set of masons who sit at inner and outer side of walls.	
	For placing and tamper- ing rich cement mortar inside the hole	8	min- utes		
	Total time required	16	min- utes		
	Hence, converting it into man days, as skilled manpowers are used:				
	Skilled manpower	0.017	MD	Divided the number into a skilled and un- skilled masons	
	Unskilled manpower	0.017	MD		
	Drilling Works				
	Drilling Machine	3		Rate of renting each drilling machine	
	Drilling Bit	2		Rate of renting each drilling machine is around NPR 500 per day. Such ma- chines are used for around 8-10 days and there are around 1000 anchorage holes in an average Nepali building. Hence ((500*8)/1000) gives about Npr 3 per hole for drilling machine. Likewise, for drilling bit, an average bit when made locally from rods will cost NPR 800. Since 3-4 such bits are sufficient for a building in normal cases, per hole cost for 1000 hole is around NPR 2.	
11	Providing 12G GI Wire @	100mm	c/c for	prevention of local failure	
	Skilled Manpower	0.06	of wall power other u	cutting and installing a GI wire over surface , it has been observed that skilled man- is necessary to intially place, wind and help unskilled masons. For all these works total aken for 1 sqm area is 30 minutes.	

Unskilled Manpower	0.06	existing of the	g intern wire me	vention sh. For	are required to remove the s like binding and tying up all these works total time s around 30 minutes.
For quanity of material for which wire is placed at 100 mm c/c a sq m area the length is 23 m. (1 extra m is for binding works)					

C1	Providing Wooden Props for Shoring of Walls and Floors							
	Assuming elevation area of shoring = $(10m \times 5m i.e 10m \text{ length of building and } 5m \text{ height of building})$							
	No. of Raker (100mmx100mmx2440mm)	4	no.					
	Wall Plate (100mmx100mmx3962mm)	4	no.					
	Cleat(75mmx100mmx300mm)	4	no.					
	Total volume of timber	0.27	cum					
	Skilled	2	Md					
	Unskilled	1	Md					
	For 1 cum of timber shoring	1	cum					
	Timber	1.1	cum					
	Skilled	7.5	Md					
	Unskilled	3.8	Md					
	Oliskilled	5.0	Ind					
		5.0						
C2	Providing Wooden while Shifting of Openings (125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @	mm horizo	ontal wooden					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq	mm horizo	ontal wooden					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @	mm horizo	ontal wooden					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m	mm horizo	ontal wooden sq mm )					
C2	Providing Wooden while Shifting of Openings (125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm)	mm horizo 100 *100 8	no.					
C2	Providing Wooden while Shifting of Openings (125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm) Horizontal Member (125mmx125mmx4000mm)	mm horizo 0 100 *100 8 4	no.					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm) Horizontal Member (125mmx125mmx4000mm) Total volume of timber	mm horizo 100 *100 8 4 0.41	no. no. cum					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm) Horizontal Member (125mmx125mmx4000mm) Total volume of timber Skilled	mm horizo 100 *100 8 4 0.41 2	no. cum Md					
C2	Providing Wooden while Shifting of Openings (125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm) Horizontal Member (125mmx125mmx4000mm) Total volume of timber Skilled Unskilled	mm horizo 100 *100 8 4 0.41 2 2	no. cum Md Md Md					
C2	Providing Wooden while Shifting of Openings (125*125 sq posts with vertical support @ 1 m spacing, Vertical Posts @ Assuming length of shoring = 4m and height of floor = 2m Vertical Member (100mmx100mmx2000mm) Horizontal Member (125mmx125mmx4000mm) Total volume of timber Skilled Unskilled Nails	mm horizo 100 *100 8 4 0.41 2 2 0.5	no. no. cum Md Md kg					
C2	Providing Wooden while Shifting of Openings (125*125 sq         posts with vertical support @ 1 m spacing, Vertical Posts @         Assuming length of shoring = 4m and height of floor = 2m         Vertical Member (100mmx100mmx2000mm)         Horizontal Member (125mmx125mmx4000mm)         Total volume of timber         Skilled         Unskilled         Nails         For 1 cum of timber shoring	mm horizo 0 100 *100 8 4 0.41 2 2 0.5 1	no. no. no. cum Md Md kg cum					
C2	Providing Wooden while Shifting of Openings ( 125*125 sq         posts with vertical support @ 1 m spacing, Vertical Posts @         Assuming length of shoring = 4m and height of floor = 2m         Vertical Member (100mmx100mmx2000mm)         Horizontal Member (125mmx125mmx4000mm)         Total volume of timber         Skilled         Unskilled         Nails         For 1 cum of timber shoring         Timber	mm horizo 100 *100 8 4 0.41 2 2 0.5 1 1.1	no. no. no. cum Md Md kg cum cum					

G2		-	G10 welded wire mesh and mesh size 25x25 mm on and instruction by the Engineer.					
	Skilled Manpower=	0.09	While cutting and installing a GI Welded Wire Mesh over surface of wall, it has been observed that skilled manpower is necessary to intially place, temporarily anchor and help other un- skilled masons. For all these works total time taken for 1 sqm area is 44 minutes.					
	Unskilled Manpower	0.12	existing als, nail poses. I	intervention ing wire mes	ns like jois sh over wa works tot	ired to remove the t, roofing materi- alls and other pur- al time taken for 1 minutes.		
G6	<b>G6</b> Providing, cutting and laying SWG15 welded wire mesh and mesh size 20x as per drawing details, specification and instruction by the Engineer.							
	Skilled Manpower	0.09	While cutting and installing a GI Welded Wire Mesh over surface of wall, it has been observed that skilled manpower is necessary to intially place, temporarily anchor and help other un- skilled masons. For all these works total time taken for 1 sgm area is 44 minutes.					
	Unskilled Manpower	0.12	Unskilled Manpower are required to remove the existing interventions like joist, roofing materials, nailing wire mesh over walls and other purposes. For all these works total time taken for 1 sqm area is around 58 to 60 minutes.					
H1	Cement plaster works ov	er on wal	ls, with c	ement sand	mix (1:4)	and 12.5 mm thick		
	Area (sq.m)	100						
	Thickness (mm)	12.5						
	Ratio	1:4						
	Plaster volume (cum)=	1.25						
	Increasing plaster vol- ume by 35% for dry volume							
	Total volume=	1.688						
			cum	kg	bags			
	Cement =	0.338	0.338	486	9.72			
	Adding 10% for slurry and wastage				10.692			
	Sand=	1.35	cum		_			
	Adding 10% for wastage	1.485	cum					
	Skilled Manpower	12	a day c and wid	observation it was found that one mason ir ay can plaster a wall panel of height 9 feet width 10 feet, which is equal to around 90 t(8.36 sq m). Hence, for 100 sqm 12 MDs ar uired.				

	Unskilled Manpower	16	The unskilled manpower is required to support the skilled one in carrying and preparing 1:4 rich cement mortar using cement, sand, water and necessary tools like spade. Further, the man- power is also resposible for spraying slurry and supplying/hauling of prepared material to the skilled one.					
H5	40mm (Double Layer) Pl welded wiremesh and GI	-	-	:3 Cement	Mortar at t	he location of		
	Area (sq.m)	100						
	Thickness (mm)	40						
	Ratio	1:3						
	Plaster volume (cum)=	4						
	Increasing plaster vol- ume by 30% for dry volume							
	Total volume=	5.2						
			cum	kg	bags			
	Cement =	1.3	1.3	1872	38			
	Adding 10% for slurry and wastage				42			
	Sand=	3.9	cum					
	Adding 10% for wastage	4.29	cum					
	Skilled Manpower	16	a day c and wid	that one mason in I of height 7 feet qual to around 70 00 sqm 16 MDs are				
	Unskilled Manpower	35	The unskilled manpower is required to support the skilled one in carrying and preparing 1:3 cement mortar using cement, sand, water ar necessary tools like spade. Further, the man power is also resposible for spraying slurry a supplying/hauling of prepared material to t skilled one.					
K1	150mm thick and 450mm vent wall delamination	n deep Th	nrough co	oncrete pla	aced in exis	ting wall to pre-		
	Concrete Work For one no.							
	Volume (cum)	0.01						
	Ratio (Mix=M20)	1:1.5:3						
	Skilled	0.01	Md					
	Unskilled	0.06	Md					
	Cement	0.06	bags					
	Sand	0.003	cum					

	Aggregate	0.01	cum						
	Rebar Work For one no.								
	7mm rebar length re-	0.565	m						
	quired								
	Unit weight (kg/m)	0.30							
	Total kg	0.17	kg						
	Skilled	0.002	Md						
	Unskilled	0.002	Md						
	Rebar (7mm)	0.18	kg						
	Creating Holes in ex- isting wallls for placing through concrete								
	Skilled	0.04	Md						
	Unskilled	0.19	Md						
	Total Material and La- bour Required			For 10 no.	Factor				
	Skilled	0.05	Md	0.50	1.00	0.50			
	Unskilled	0.25	Md	2.50	1.00	2.50			
	Cement	0.06	bags	0.64	1.10	0.70			
	Sand	0.003	cum	0.03	1.10	0.04			
	Aggregate	0.01	cum	0.07	1.10	0.08			
	Rebar (7mm)	0.18	kg	1.79	1.10	1.97			
К2	150mm thick and 450mm long dowel for anchoring the new element with the ex- isting element using rebar and concrete								
	Concrete Work For one no.								
	Volume (cum)	0.01							
	Ratio (Mix=M20)	1:1.5:3							
	Skilled	0.01	Md						
	Unskilled	0.06	Md						
	Cement	0.06	bags						
	Sand	0.003	cum						
	Aggregate	0.01	cum						
	Rebar Work For one no.								
	12mm rebar length re- quired	0.99	m						
	Unit weight (kg/m)	0.89							
		0.00	kg						
	Total kg	0.88	ng						
	Total kg Skilled	0.88	Md						
	-		_						

	1					
	Creating Halas in av					
	Creating Holes in ex- isting walls for placing					
	dowels					
	Skilled	0.04	Md			
	Unskilled	0.18	Md			
	Total Material and			For 10 no.	Factor	
	Labour Required					
	Skilled	0.06	Md	0.60	1.00	0.60
	Unskilled	0.25	Md	2.50	1.00	2.50
	Cement	0.06	bags	0.64	1.10	0.70
	Sand	0.003	cum	0.03	1.10	0.04
	Aggregate	0.01	cum	0.07	1.10	0.08
	Rebar (12mm)	0.92	kg	9.24	1.10	10.16
K3	Timber splicing for the w	ooden po	sts with	splicing men	nber	r
	Soft Wood (730mm x 150mm x 75mm x 2)					
	Volume	0.016	cum			
	12mm bolt/threaded rod	3.00	kg	According		
	Nut/Washer	10.00	Nos.	to site		
	Skilled	0.500	Md	experience		
	Unskilled	0.04	Md			
	For 1 cum of Timber					
	Volume	1.1	cum			
	12mm bolt/threaded rod	183	kg			
	Nut/Washer	610	nos			
	Skilled	31	Md			
	Unskilled	3	Md			
L1	Providing wooden frames	s as light	gable			
	Creating timber light gable frame (50mmx- 100mm)					
	Vertical(50mmx100m- mx750mmx6no.)	0.023	cum			
	Horizontal(50mmx- 100mmx2500mmx3no.)	0.038	cum			
	Inclined(50mmx100m- mx2920mmx2no.)	0.029	cum			
	Total on two sides	0.178	cum			
	Skilled	3	Md			
	Unskilled	1	Md			
	Nails	3	kg			
	For 1 ours of Timber					
	For 1 cum of Timber					

Timber	1.1	cum		
Skilled	16.82	kg		
Unskilled	5.61	nos		
Nails	16.82	Md		

H5	40mm (Double Layer) Plastering welded wiremesh and GI Wire jack	-	:3 Cement	: Mortar a	at the loca	tion of		
	Area (sq.m)	100						
	Thickness (mm)	40						
	Ratio	1:3						
	Plaster volume (cum)=	4						
	Increasing plaster volume by 30% for dry volume							
	Total volume=	5.2						
			cum	kg	bags			
	Cement =	1.3	1.3	1872	38			
	Adding 10% for slurry and wast- age				42			
	Sand=	3.9	cum					
	Adding 10% for wastage	4.29	cum					
G4	Providing, cutting and laying SWG10 welded wire mesh and mesh size 31x31 mm as per drawing details, specification and instruction by the Engineer.							
	Skilled Manpower	0.06 MD	While cutting and installing a GI Welded Wire Mesh over surface of wall, it has been observed that skilled manpower is necessary to intially place, temporarily anchor and help other unskilled masons. For all these works total time taken for 1 sqm area is 28 to 30 minutes.			Vertical seismic strap 200 mm ( 8" approx) wide		
	Unskilled Manpower	0.18 MD	required existing joist, roo material mesh ov purpose	d Manpov I to remo internver ofing s, nailing ver walls a s. For all otal time				

#### Annex 1: Volume of work referred for determination of retrofitting norms

S.N.	Line Items	Unit	TOTAL
1	Labor for removing and Safe Storage	LS	16
2	Demolition of the staircase and disposing debris including , transportation of debris, cleaning the site etc. all complete as per drawing details, specification and instruction by the Engineer.	LS	12
3	Demolition of existing P.C.C. Floor in perfect line, level and disposing the debris including transportation of debris, cleaning the site all complete as per drawing, specification and instruction by the Engineer.	cum	14.29
4	Stripping off the existing mud plaster on the wall, raking out the mud mortar to a depth of 10 mm at joint, surface cleaning and disposing the debris including transportation, etc all complete as per drawing details, specification and instruction by the Engineer.	sqm	3222.06
5	Earthwork in excavation in ordinary to mixed/hard soil in foundation including dressing of sides and proper compaction to trench bed, disposing of excess soil all complete as per drawing, specification and instructions by the Engineer.	cum	60.75
6	Backfilling works after completion of concreting works	cum	38.46
7	Providing and laying flat stone soling with voids filled with sand in foundation in line and level all complete as per drawing, specification and instruction by the Engineer.	sqm	80.95
8	Providing, mixing and laying P.C.C. in 1:1.5:3 ratio for foundation, flooring, beam with stone aggregate 20mm down with proper compaction and completion to perfect line, level and finishing including proper curing all complete as per drawing, specification and instruction by the Engineer.	cum	17.248
9	Providing, fitting and fixing standard formwork of shuttering local wood including all necessary metal/wooden props, bracing, wedges and nails etc. and careful removal of form works at approved time for all type of R.C.C. works all complete as per specification and instruction by the Engineer.	LS	16
10	Providing, cutting and laying SWG12 welded wire mesh and mesh size 50x50 mm including anchoring it on the wall with 4.75mm bar by drilling and fixing with cement slurry as per drawing details, specification and instruction by the Engineer.	sqm	455.82
11	Providing, cutting and laying SWG10 welded wire mesh and mesh size 50x50 mm including anchoring it on the wall with 4.75mm bar by drilling and fixing with cement slurry as per drawing details, specification and instruction by the Engineer.	sqm	1822.35
12	Providing high strength deformed bars (HYSD) of grade Fe:415 approved reinforcement confirming to IS: 1786 - 1985 for R.C.C work and approved bar bending schedule including straightening, cutting, bending, placing and binding in position by binding wires all complete as per drawing, specification and instruction by the Engineer.	MT	1.96

S.N.	Line Items	Unit	TOTAL
13	SWG 12 Wire mesh making and jackting with mesh size 100mm *100mm	sqm	1439
14	4.75mm anchorage rod	kg	995.219
15	SWG 10(3.24mm)G.I wire @600 c/c for connecting inner and outer mesh.	MT	1.22
16	Cement plaster works over GI wire mesh and jacketing part of whole outer surface of wall with cement sand mix (1:3) and 30 mm thick or as per existing plaster thickness in perfect line, level and plumb, making grooves on boundary of existing plaster and new plaster including cleaning and wetting the surface and curing all complete as per specification and instruction by the Engineer.	sqm	1599.25
17	Cement plaster works over GI wire mesh and jacketing portion of inner wall with cement sand mix (1:3) and 20 mm thick or as per existing plaster thickness in perfect line, level and plumb, making grooves on boundary of existing plaster and new plaster including cleaning and wetting the surface and curing all complete as per specification and instruction by the Engineer.	sqm	1623.785
18	75 mm thick PCC(1:2:4) for floor finish in the excavated part on floor for tie beam	sqm	102.44
19	Addition of cross walls according to necessary design conditions	cum	8.57
20	Scaffolding Works	No.	16

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