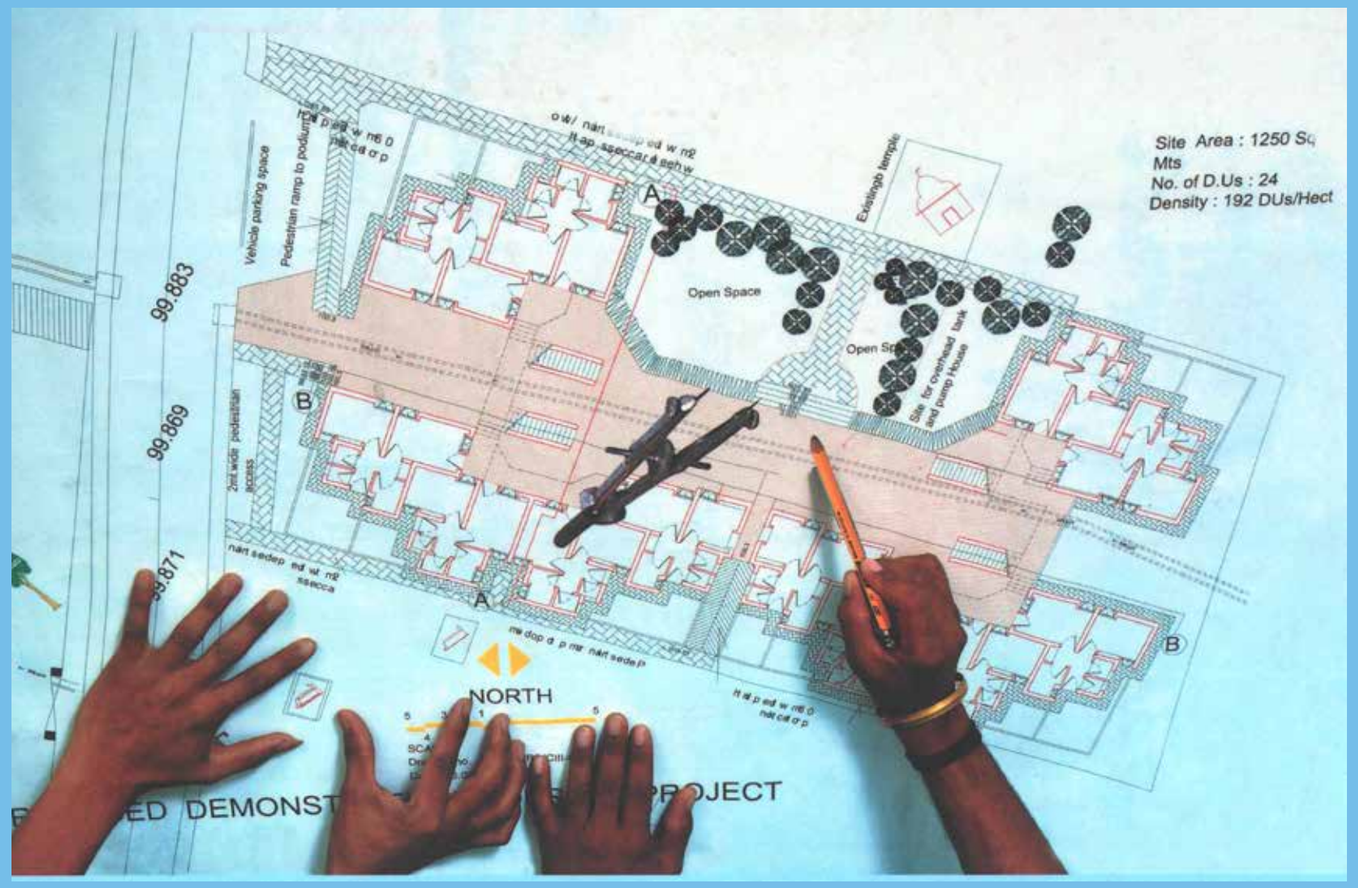
DESIGN PACKAGE

Using Alternate Building Materials & Technologies



BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

Ministry of Housing & Urban Poverty Alleviation Government of India

SOUTH ZONE

DESIGN PACKAGE

Using Alternate Building Materials & Technologies

South Zone

bmtpc
Building Materials & Technology Promotion Council
Ministry of Housing & Urban Poverty Alleviation
Government of India

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Building Materials & Technology Promotion Council (BMTPC)
Ministry of Housing & Urban Poverty Alleviation, Government of India
Core-5A, 1st Floor, India Habitat Centre, Lodhi Road,
New Delhi - 110 003 (India).
Phone: +91-11-2463 8096, Fax: +91-11-2464 2849,
E-Mail: bmtpc@del2.vsnl.net.in; Website: www.bmtpc.org

and

Society for Environment Protection (SEP)
6-A, Kalamwadi Society, Nr. Shreyas Crossing, Paldi,
Ahmedabad-380 007 (Gujarat)
Phone: +91-79-6513 7987, Mobile: 9327201215
Fax: +91-11-24642849
E-Mail: admin@sepindia.org, Website: www.sepindia.org

Foreword

With the demographic growth and massive urbanization, the housing and infrastructure demand pose a major challenge. Housing activity has received a phenomenal thrust in the last decade, with quantum jump in large scale housing projects. This is also linked with major increase in Housing Finance supply. However, the housing needs of Weaker Sections, Low Income Group and Middle Income Groups continue to face difficulties with the steep increase in construction costs due to rise in input costs for steel, cement, joinery and other building materials including labour costs.

Therefore, there is an imperative need to find ways by which housing can be made within the affordable reach of the various stakeholder groups. Affordable housing, within the socio-economic context, would need major technological interventions such as using appropriate and cost effective technologies so that the cost of construction can be brought down. At the same time, the alternate options should also lead to safe, durable, strong, functional, acceptable housing. There are many time tested and proven technological options, which may help in bringing the construction cost down from 15 to 20%. However, there is a major gap between the availability of the technology options and the accessibility of the same in the housing delivery process.

An equally important concern is the lack of awareness about these technology options at the level of Public and private construction agencies, practicing professionals, artisans dealing with house construction and from the general public. At the same time, there have been many initiatives to propagate and apply some of these technology options in the field through the work of BMTPC, Padmashree Laurie Baker & few likeminded professionals, NGOs, Building Centres and few educational institutions. In view of the fact that the general awareness has not been raised to the desired level to make an impact, these technologies have not got into mainstream practice.

The Government through National Urban Housing and Habitat Policy, 2007 aims to promote cost effective building materials and technologies with a view to bring down the cost of EWS/LIG houses. It is pertinent to mention here that disaster resistant technology and achieving Green Rating for buildings are mandatory and therefore, adoption of alternate, environment friendly, energy efficient technologies has become need of the hour. In the context of the massive housing initiatives from the Government of India, State Governments under various programmes as well as shortage of housing in affordable sector, an urgent need is now felt around the country to rejuvenate the efforts for propagation and dissemination of cost effective options and introduce appropriate technical interventions so as to close the gap between availability of technology and application of the same increasingly in mass housing initiatives.

As a process to help mainstream the time proven technologies, BMTPC undertook initiative of development of Design Packages on alternate house building technologies for various regions of the country having different geo- climatic condition and topography. The design package includes a cluster of 60 houses having carpet area of 25 sqm. each with two habitable rooms, kitchen & toilet, a primary school, a community centre & shops/kiosks with on-site infrastructure development and are customized to the local needs and includes regional specific appropriate technologies. The most important aspect is that this effort is not for demonstration but for mass level application of the cost effective technologies which are based on local materials, time tested and being financially viable with respect to conventional technologies.

The Design Package envisages to facilitate wide spread dissemination and adoption of proven cost effective and sustainable building materials and construction technologies as an alternate to the conventional, in a manner and by a strategy that will promote knowledge, confidence and create enabling environment for the large scale adoption of such materials and technologies in different geo-climatic regions of the country, thus making housing cost effective, accessible and sustainable.

Specific emphasis has been laid in selecting the proven and cost effective technologies for developing the Design Packages which are appropriate in the context of the selected zones of the country. In preparation of design package, apart from economy; regional context, disaster resistant features, gender context, disable friendly features, etc. has also been considered. The Design Packages also provide detailed quantities of materials, actual Rate analysis of cost effective technologies, etc. so as to provide all the basic information to help in adopting the packages directly.

So far, BMTPC has developed Design Packages using Alternate Building Materials & Technologies for West/Central Zone, South Zone, North Zone (Plain), North-East Zone, East Zone and North Zone (Hilly). The Design Package for South Zone is being presented here.

The Design Package for South Zone has been developed in close association with Society for Environment Protection (SEP), Ahmedabad. I place on record my gratitude and deep appreciation for Mr. Dipan Shah and his team in SEP for doing such commendable work. I am also thankful to Shri A.R. Santhakumar, Former Dean (Civil Engineering), Anna University and Former Emeritus Professor, IIT, Madras, for structural proof checking of the Design Package. The efforts of my Council's officers Mr. J.K.Prasad, Chief (BM), Mr. S.K. Gupta, Dy.Chief(TDE&IC), Mr. Dalip Kumar, Sr.Field Officer (DC&E) and Ms. Veena Sachdev, Architect to bring the document to printable form are laudable.

I sincerely hope that the Design Package will be helpful to various stakeholders in the construction sector in designing a project using cost effective and alternate building materials & technologies and would go a long way in mainstreaming these alternate technologies into conventional construction practices.

17th Day of October, 2012
New Delhi

Dr. Shailesh Kr. Agrawal
Executive Director, BMTPC

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Executive Summary

Building Materials and Technology Promotion Council (BMTPC) intended to develop a design package which is customized to the local needs and includes regional specific appropriate technologies. The package which include a cluster of 60 houses of about 25 sq. m each, school, community hall and commercial spaces specifically designed so as to include cost effective technology in the same. The most important aspect of the project was that it is not been considered as a demonstration project but does include only those technologies which are local and are proven over time. Also, the technology should compete by being financially feasibility with respect to conventional technologies.

It was decided that once such regional packages are developed, they could be marketed to respective State Government. This will be a big leap in main streaming of cost effective technologies.

It was found during study that alternative technology may save 20-30% of construction cost due to material and workmanship. Apart from that there are multiple indirect benefit like less wastage of material, embodied energy benefits, insulation properties and aesthetics etc.

Design

- Design consideration is based on region specific weather, locally available material and all minute details to save cost.
- Physically disabled friendly design
- Low cost material and technology
- Green technologies such as rain water harvesting
- Maximum open spaces and optimum amenities
- According to DCR, NBC and other applicable standards
- Design of residential units for 60 families
- Design of school for approx. 160 students
- Design of community hall for approx. 150 persons
- Design for 3 shops
- Module based planning for ease in construction
- Layer wise detailed design for rat trap bond
- Additional play ground, stage, sitting arrangements, trees, parking for township
- Design is developed as grid-block pattern to reduce construction cost, compact design
- School is equipped with library, Office, separate toilet block, staff room
- Community center is equipped with doctor health cabins, large halls, 3 shops, storage space and separate toilets
- Shops are placed on road frontage and have separate entrance.
- School is placed in such a way that community open space can be utilized as school ground.

Technology

- Rat trap bond as walling material saves at least 20% cost than conventional English bond wall
- Filler slab as roofing material saves at least 25% cost than conventional concrete slabs
- Precast RCC joist frames than wooden frames, Steel shutters + plywood doors does add to savings
- Rain water harvesting to re-use of collected roof and ground water
- Brick masonry load bearing structure instead of concrete
- Fly-ash bricks considered instead of red clay bricks giving higher strength.
- Exposed plumbing and electrical design consideration for less maintenance cost in future and ease in installation
- Flooring would be IPS floor to save cost, less maintenance and good finishes.
- Lime pozzolona plaster instead of double coat mala and sand faced plaster for interior and exterior respectively
- White wash with color pigments instead of distemper painting
- Wall mounted toilet fixtures to avoid sunk slab and filling to reduce cost.
- Additional 75mm partition to have storage spaces in residential units
- Platform provision in Kitchen

Costing

Cost saving due to alternative technology	
Foundation	30%
Walling	25%
Roofing	25%
Door and window	30%
Flooring	25%
Finishing	50%

Summary of Cost

S.No.	DESCRIPTION OF WORKS	AMOUNT (Rs.)
A	**Civil Work Cost**	
i.	Housing Blocks	11,005,879.38
ii.	School Building	1,338,136.19
iii.	Community Hall	1,691,089.18
	Total Cost of Civil Work	**14,035,104.75**
B	**Plumbing Work Cost**	
i.	Housing Blocks + School building + Community Hall	2,446,941.00
	Total Cost of Plumbing Work	**2,446,941.00**
C	**Electrical Work Cost**	
i.	Housing Blocks	1,106,993.00
ii.	School Building	81,790.00
iii.	Community Hall	117,812.00
iv.	External Work	220,662.00
	Total Cost of Electrical Work	**1,527,257.00**
D	**Landscaping Work**	**280,702.10**
	Total of Civil, Plumbing and Electrical and Landscaping	**18,290,004.85**
	Contingency 10%	**1,829,000.48**
	Total	**20,119,005.33**

1 Introduction

In last two to three decades, cost effective appropriate technologies have cross the borders of laboratory and research organizations and have reached real construction sites. Many experimental and demonstrative projects have been constructed across the country proving the strength and feasibility of these technologies. Realizing the fact, Ministry of Housing and Urban Poverty Alleviation when formulated National Urban Housing and Habitat policy 2007 for realizing the goal of affordable housing for all; greater emphasis was given on the use of cost effective technology.

A number of cost effective appropriate materials and technologies have been developed, standardized and are being used in the field with success over the years. Many of them have even proved themselves in the test of time. BIS has also included many of these technologies under their umbrella and are working towards covering the remaining so that minimum standardization is achieved and a standard specification for the same is evolved.

Housing, next to food and clothing is the most important need of a human being. Besides giving shelter from natural calamities and man-made hazards, the house reflects his socio-economic status in society. For most families, housing is perhaps a major goal of family saving effort. It must be durable, as it is an outcome of a long drawn process of saving and aspiration. It must at least respond to some extent, to the changing family needs and at times of a family emergency or need, be utilized as an economic asset in the market.

Housing is a bundle of goods and services. It is not the product of uni-sectoral efforts. Housing production includes a multitude of tasks like land acquisition, development, laying infrastructure, site planning and architectural design on pre-conceived concepts of affordable densities, to provide for shelter, social and physical infrastructure, project finance and finally construction and delivery of the same.

It is within this context that a need was felt to look at ways of optimizing shelter cost. The usual practice involved in this area till the recent past by architects has been:

1. Reduce area of the house to the minimum possible level
2. Reduce the finishing specification of flooring, external and internal walls, fittings etc.

The cost of shelter can be broken up as building element costs as shown in table below. These are indicative and based on single storied structure with a particular set of specifications.

Cost break up of a shelter	
Foundation	10%
Walling	30%
Roofing	25%
Door and window	15%
Flooring	10%
Finishing	10%

It is apparent that there are several other ways of optimizing shelter cost such as:

- By optimal architectural design in the form of cluster layout, cluster and unit plan, to achieve maximum sharing of walls and common areas.
- By optimal unit design with respect to optimized shape of rooms, minimizing circulation and maximizing shared walls.
- By using alternative, cost effective construction systems for building elements like foundation, wall, roof, opening, door, window, flooring and finishing.
- By adopting green technologies in terms of natural lighting, rain water harvesting etc.

Yet; there is lot to be done to actually transfer these time tested, proven technology into the real field. As a one more process so as to help main stream the time proven technologies, Building Materials and Technology Promotion Council (BMTPC) undertook development of a design package which is customized to the local needs and includes regional specific appropriate technologies. The package which include a cluster of 60 houses about 25 sqm. each, school, community hall and commercial spaces specifically designed so as to include cost effective technology in the same. The most important aspect of the project was that it is not been considered as a demonstration project but does include only those technologies which are local and have are proven over time. Also, the technology should compete by being financially feasibility with respect to conventional technologies.

It was decided that once such regional packages are developed, they could be marketed to respective state government. This will be a big leap in main streaming of cost effective technologies.

In the present document, the design details of Tamil Nadu are presented.

While developing the present design package a specific care has been taken so as to choose only those Cost effective technologies which are appropriate in context and are proven over time. While developing the entire design package, apart from economy, regional context, disaster resistant features, gender context, disable friendly features, etc is also been considered. The document also attempts to compare the cost of construction with conventional technology so as to clearly reflect the advantages of using cost effective technologies.

Further as a part of this document, detail quantities, actual Rate analysis of cost effective technologies, etc. are also included so as to impart all the basic information to the prospective client so as to adopt the package directly.

It will be important to mention here that, though the document is developed with specific focus to Tamil Nadu, the technology selected are generic to southern region and hence it has potential to be adoptable for Andhra Pradesh, Karnataka and Kerala. It's needless to say that any such adaptation will require revisiting the cost and also may require minor adaptation to design viz-a-viz climate and local context.

2 Region and Base Assumptions

a. Brief description of the region

According to BMTPC "Alternate house building technologies" scheme, the design proposals are invited from following regions.

Zone	Region
North Eastern Zone	Assam, Manipur, Meghalaya, Nagaland, Tripura, Arunachal Pradesh, Mizoram, Sikkim
North Zone (Hilly)	Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Western U.P
North Zone (Plain)	Punjab, Haryana, Union Territory of Chandigarh, National Capital Region Delhi
West Zone	Rajasthan, Gujarat, Maharashtra & Madhya Pradesh
East Zone	West Bengal, Bihar, Orissa & Eastern U.P
South Zone	A.P., Karnataka, Tamil Nadu, Kerala, Goa and U.T. of Daman & Diu, Dadra & Nagar Haveli, Andaman & Nicobar Island, Lakshadweep, Pondicherry

South zone comprises mainly of four neighboring states, and scattered union territories.

Kerala: Population over 33 million, generally tropical wet and hot weather

Tamil Nadu : Population over 66 million, generally tropical wet and hot and semi arid climate

Karnataka: Population over 52 million, generally semi arid and tropical wet and dry weather

Andhra Pradesh: Population over 84 million, generally dry and composite weather

The design parameters in terms of geo-climatic data, hazard proneness are discussed in following sections.

Map showing southern region of India – as indicated:

Tamil Nadu lies in southern most part of India. It has bay of Bengal on the eastern side and bordered by states of Kerala in the west, Karnataka in northwest, Andhra Pradesh in north and Puducherry in east. Tamil Nadu is situated on the south coast of India between 13°33' N to 8°04' N latitude and 76°15'E to 80°21'E longitude.

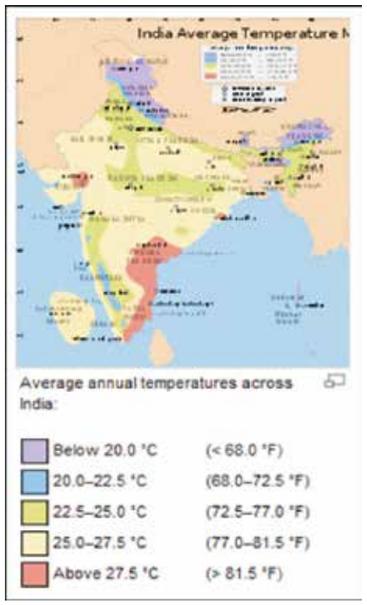
The population of the Tamil Nadu State was 66,396,017 as per the 2001 census data. Its official and primary language is Tamil. Tamil Nadu is the most urbanized state in India. There are 32 districts, 10 municipal corporations and 152 municipalities in the state. About 44 per cent population of Tamil Nadu resides in urban areas.

Tamil Nadu has both the Eastern Ghats and Western Ghats meeting at Nilgiri Hills at its north, while Kanyakumari which is southern most part of Indian peninsula is a meeting place of Arabian Sea, Bay of Bengal and Indian Ocean. The Western Ghats dominate the entire west border with Kerala and effectively blocks south western monsoon clouds. That leaves Central and South-Central parts of the State dryer than other regions of State. Eastern parts are fertile coastal plains and northern parts are mix of hills and plains. Eastern coastline of Tamil Nadu is 910 kilometers long.

b. Agro Climatic Zones of Tamil Nadu

Depending on the rainfall and climate its divided in to seven agro-climatic zones; north-east, north-west, west, southern, high rainfall, high altitude hilly, and Cauvery Delta.

Tamil Nadu has varied ecosystems ranging from rain forests to dry deciduous forests and thorn scrub forest to tropical dry broadleaf forest to beaches, salt marshes, mangroves, and coral reefs.



c. Geo-climatic conditions

Tamil Nadu has dry sub humid to semi arid climate. Temperature ranges from maximum 45 degrees in plains and 32.5 degrees in hills to minimum 13.1 degrees in plains and 3 degrees in hills.

Being in southern most part of India, summer is hotter in most part

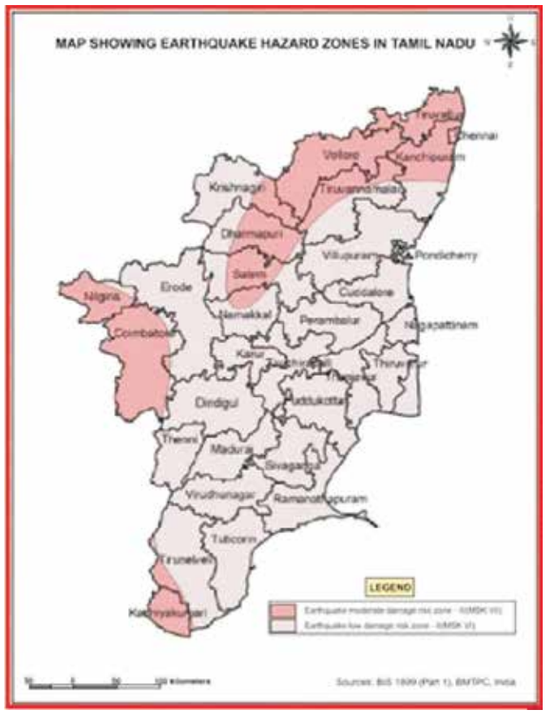
of the states except the hills in north and west. While winter is very light cool for most region but for the hilly region which has cold winters.

Tamil Nadu receives south-western monsoon from June to September with strong south-west winds and north-eastern monsoon from October to December with dominant north-east winds. Normal rainfall is 945 mm of which 48% is north east monsoon and 32% is south west monsoon.

It is heavily dependent on monsoon rains to recharge its water resources and highly prone to acute water scarcity and severe drought.

d. Hazard Proneness of the region

Tamil Nadu is prone to Earthquake, cyclones, floods and droughts. Tamil Nadu falls mostly in zone II of low seismic hazard with western hilly areas in zone III of low to moderate seismic hazard.



- About 62 cyclones originating the Bay of Bengal have struck the Tamil Nadu coast and have caused major damage to the settlements and infrastructure over the last 120 years.
- The cyclone map of the state is shown below:

e. Space planning and product mix assumptions

✓ Building Type: Housing - 60 dwelling units
School
Community Centre
Shops/kiosks

Structure: Single Storey or G+3/multi-storied

Space: Two habitable rooms, kitchen and bathroom

Area: 25 sq.mt. Minimum carpet area

Cluster Design/Master Planning: Roads/Water supply/Drainage/ Rain water harvesting/Renewable energy resources/common green areas

Green Building/Sustainable Features to be implemented complying to the Green Building norms

✓ Design Basis & Assumptions based on experience and Codal requirements:

1. Location of the site: Ruban (areas between the rural and urban development). We are assuming towns in the vicinity of the big cities which are been taken as one of the focus of developed by the government.
2. The site location will be selected in the TP scheme so as to get benefits of the existing municipality drainage lines and water supply. Assuming the connection for water supply and discharge of waster will be supported by municipal lines.
3. G+2 load bearing structures, optimizing the horizontal vs. vertical development as single storey development would require more land and hence high cost.
4. Alternative building materials and technologies to be incorporated which are proven viable and feasible. Various alternative technologies for building envelope were studied for feasibility.
5. Sustainable design features to be incorporated along with Universal design / design for differently abled / children friendly design / Gender friendly spaces / Disaster resistant features will be incorporated.
6. Solar based stand alone street lights can be incorporated for renewable energy use.
7. 60 nos. of Dwelling Units: Assuming 4.5 members per family hence total population 270.
8. Assuming two children per family hence school serving for 120 students minimum is required.
9. School and Community Centre will be operated only during the day time.
10. Use of natural light & ventilation is the priority.
11. Individual units will have storage tanks for potable water. Rain water harvesting to be done at individual or cluster level as appropriate.
12. The National Building Code 2005 will be followed and complied to. A detail note on the NBC 2005 requirements is given in the following section.

✓ **NBC 2005 Requirements:**

1. Development Control Rules and General Building Requirements:

   We would follow Annex C – special requirements for low income houses in urban areas and Annex E and F, if required. Combination of these or urban low income would be used as governing clause for the design assumptions.

Sr. No.	Clause No.	Specifications
1	9.6	Group housing
	9.6.2	No limit to floors and height – refer table.
	9.6.3.1	4.5 people per unit

	9.6.3.2	Basement to be 33.33 to 50% for parking, storing without counting in far
	9.6.3.3	One car parking for every two flats upto 90 sq.mt.
2	Off street parking	Scooter 1.5 sq. mt, cycle 1 sq.mt.
3	12	Requirements of parts of buildings
	12.1	Plinth - 450 mm above surrounding gl.
	12.1.2	Interior courtyards & covered parking - Raised 150 mm
	12.2	Rooms
		Height – not less than 2.75 m.
		Headroom under a beam – 2.4 m.
		Educational bldg. – 3.6 m, in cold regions – 3 m.
	12.2.2	Size
		2 rooms- 1st ≥ 9 sq.mt. and ≥ 2.5 m, 2nd ≥ 6.5 sq.mt. and ≥2.1 m
	12.2.3	Kitchen ≥ 4.5 sq.mt., minimum width 2.1 m.
		Refer 15.1.1 & 15.1.2 ≥ 2.4 sq.mt. and ≥ 1.2 m for alcove and 3.3 sq.mt. and ≥ 1.5 m for separate kitchen
	12.5	Ledge / loft
		Height
		Minimum head room – 2.2 m, max. Height – 2.2 m. Shall mot cover more than 25% area shall not interface with ventilation
	12.7	Store room
		Height ≥ 2.2 m.
		Size ≥ 3 sq.mt.
	12.11	Parapets
		1 m to 1.2 m above ffl.
	12.13	Boundary/compound wall
		1.5 m above the centre line of front street.
		Upto 2.4 m allowed but if only open types of walls 0.9 m open.

	12.18	Staircases
		Row housing ≥ 0.75 m
		Residential ≥ 1 m
		Educational ≥ 1.5 m
		Tread ≥ 25 cm without nosing
		≥ 190 for residential buildings
		≥ 150 for others
		12 per flight
		Headroom < 2.2 m
		Handrails to be provided
	12.19	Roofs
		Drains and water harvesting
		Refer part 9 – plumbing & sanitation section -1
	12.2	Lighting & ventilation
		1/10 of floor area for dry hot
		1/6 of floor area for wet hot
		1/8 intermediate of the above two
4	Bathroom	Minimum size 1.75 x 1.37 m.
5	Openings	Minimum width of Doors 900mm
		Minimum sill level for windows 800mm
6	Floors	It should be non slippery and common level in the unit

2. Fire & Life Safety
3. Structural Requirements

   Section 1 - Loads, Forces and Effects

   Imposed Loads on Floor–Table 1 Imposed Floor Loads for Different Occupancies (Clause 3.3.1)

   Imposed Loads on Roof–Table 2 Imposed Loads on Various Types of Roofs (Clause 3.4.1)

   Section 2 - Soil and Foundations

   Section 4 - Masonry

   Section 5 - Concrete (Plain & Reinforced Concrete)

   Section 6 - Steel
4. Multi-Hazard Risk

✓ **Area Break-up:**

Sr. No.	DEVELOPABLE AREA				
1	Dwellings	60 units	25 sq.m/ unit	Total Plot Area = 2250 sq.mt.	Carpet area derived as per NBC 2005
2	Educational Unit	4 Classrooms	@ 1 sq.m per student for 30 students x 4	120 sq.mt.	As per SSA rules – School development Planning
3	Commercial Shops	3 units	9 sq.mt./ unit	27 sq.mt.	
4	Community Centre	1 unit	300 sq.mt./ unit	300 sq.mt.	
Sr. No.	Amenities/Infrastructure				
5	Roads			227.76 sq.mt.	10 % of total Plot Area
6	Common Area			380.58 sq.mt.	16 % of total Plot Area

f. Engineering design assumptions

Technologies adopted:

a) Foundation:

Normally in Tamil Nadu, the SBC ranges from 15-20 which suggests that the soil typology is good for any type of foundations to be adopted i.e. Load-bearing, Frame or Composite structure. For the calculation purpose Limit bearing capacity of the soil is assumed at 12.5.

b) Walling:

I. Rat trap bond:

Rat trap bond is an alternate brick bonding system for English and Flemish bond. This is economical, strong and aesthetic. It can help save 25% of the total number of bricks and 40% of mortar. It is simple to build and has better insulation properties.

Depending on the local availability, materials can vary from brick to laterite or granite to construct the wall.

Where brick is used, burnt country bricks of good quality are selected for our buildings, which are not plastered, on both the inside and the outside. The walls are pointed with cement mortar.

Rat Trap Bond saves consumption of bricks by 18% and cement by 24% as compared to conventional English bond in addition to being lighter by 25% in weight.

In addition, these are structurally stable and if laterally reinforced by header courses at plinth, sill, lintel and below the roof slabs can mitigate disasters well. Also, these may be reinforced with vertical steel bars at corners to stiffen the system and connect the foundations, walls and roofs together as a monolithic unit. The walls have 25% less dead-weight and hence the foundations, depending on the bearing capacity of the soil, can conveniently be redesigned to save bricks, steel once again.

Besides, the rat-trap walling system provides an added advantage of insulation. The interiors remain cooler in summer and warmer in winters, which is also so very necessary to the Tamil Nadu climate. These also have an aesthetically pleasing look and need no plastering on the outside face.

c) **Roofing:**

Looking at the cost, quality concerns of an RCC roof and required time frame alternative roofing system of Precast Joist with precast bricks panel is used.

It is about 10% economical than conventional RCC slab. It reduces concrete and instead uses bricks for panels to make spanning members. High degree of quality control is possible as precast members – joists and panels are made off site with proper monitoring.

It uses the regular good quality masonry bricks. It can utilize fired bricks, stabilized mud bricks or fly ash bricks to make precast brick panel.

As main spanning members are precast; it saves both the cost and time consumed by on site form work for RCC.

This also reduces dead load on the structure by about 8%.

So walls and foundation can be designed accordingly

Joists are made off site with simple masonry or plank formwork with appropriate reinforcement and M20 concrete. Reinforcement and size depends on the clear span of the joist. Similarly brick panels are made off site on a platform with bricks, 6 mm steel and 1:3 cement mortar.

Brick panel is size is adjustable with maximum size defined as 540 x 1200 mm. Casted joists and panels are cured for 21 days minimum and than stored in the yard.

For making a roof, precast joists are laid over the masonry wall as per the details and panels are laid over them. Over the panels 35 mm thick screed concrete is done with 6 mm dia steel bars as top temperature reinforcement. From the second day of casting it is cured for minimum of 21 days.

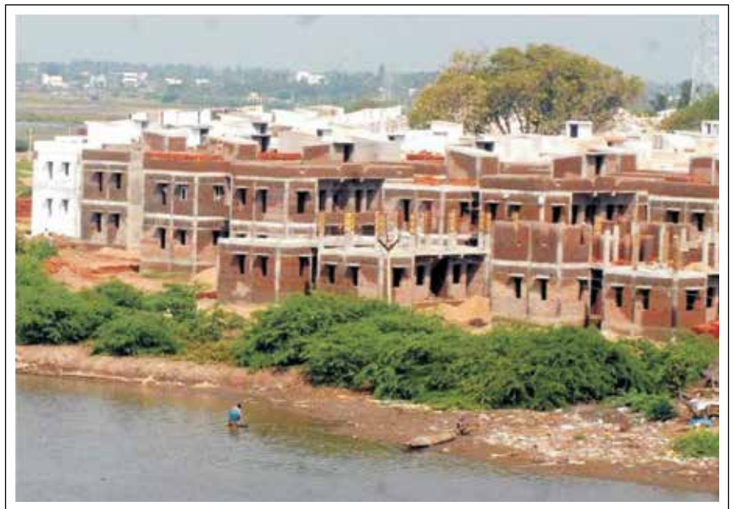
Reduction in the use of steel and concrete makes these technology energy efficient over the conventional RCC slab. This also results in economizing this technology.

g. Conventional material and technology used in the region

Systems which rely on a small range of mass produced items with specific pre-determined properties. Construction is based on modern civil engineering practice. The product is not always contextual, but requires comparatively lesser maintenance and claims for long life durability.

These are some examples of the housing for poor in the state. Housing for poor / low cost housing is mostly done by Tamil Nadu Slum Clearance Board; which employes standard construction technology utilizing cement and RCC.

The view of the newly constructed Tamil Nadu Slum Clearance Board Houses inaugurated in Pillayarpatti in Thanjavur on Saturday. Photo : M. Srinath



View of partially constructed Tsunami House in Nagapattinam District on Wednesday: File Photo

Building Component	Conventional Systems
Foundations	• Cement replaces lime for mortar and lean concrete in vernacular system and 1:4:8 mix use for the lean concrete base for load bearing structures • Concrete 1:2:4 (M15) for column footings and base with appropriate plinth beam for frame structures. • Under reamed piles for black cotton soil

Walls	• 230 mm thick brick work in 1:6 cement mortar for load bearing walls using the English or Flemish bond. • 115 mm thick brick work in 1:4 cement mortar for non-load bearing walls • 75 mm thick brick work for partition walls • 225 mm thick for non- load bearing cavity walls with the net cavity of 75 mm in between frames structures • 350 mm thick random rubble masonry wall in 1:6 cement mortar
Roofs	• Corrugated galvanized iron sheets on steel or timbre frame work
Roof/ intermediate slab	• Reinforced concrete slabs • Reinforced cement concrete slabs and beams for frame structures
Spanning elements for openings	• RCC lintels • RCC lintels cum chajja
Door cum window frames	• Frames of teak wood, deodar, sal and cham woods • Mild steel sections • Pressed steel section • Extruded aluminum sections
Door panels	• Flush door panels with commercial or decorative veneer • Aluminum sections as styles with plywood or glass inserts • Teak wood, deodar, sal and kail styles with ply wood or glass inserts.

h. Alternate material and technology used in the region

A middle of the road approach which acknowledges local skills and materials on one end of the scale, rationalizes its use to suit specific needs and adopts a rational engineering practice which is within the realm of sound design. It leads to cost-effective solutions which may also climatically more suitable.

Materials

Improvement of Mud

During post tsunami reconstruction, mud houses are most effective since they are environmental friendly, cool in summer and warm in winter. Mud is only a material available everywhere in abundance free of cost and is being used as building material from centuries. But such types of houses are temporary in nature, prone to erosion by heavy rains. The disadvantages of mud can be overcome by suitable improvement in design and construction techniques.

Stabilization

The strength of mud is improved by adding cement, lime, bitumen or fibers and it also becomes resistant to water, its main enemy.

Cement stabilized mud blocks, using 3 to 10% cement by weight molded in mechanical machines are better than adobe mud bricks.

Non-erodible mud plaster

Central Building Research Institute, India has developed an economical but effective process to protect mud walls by applying non-erodible mud plaster. Non-erodible mud is prepared by mixing bitumen cutback (Bitumen & Kerosene oil mixture) with a specified mud plaster. Soil should consist of clay 20-25%, sand 40-45% and remaining part may be silt, peat, loam etc, but it should be free from organic matter. Bitumen of 80/100 grade penetration and kerosene oil are mixed in the proportion of 5:1 (by weight) for preparing cutback. 64 kg of cutback is required for one cubic meter of soil. Non-erodible mud plastered walls are resistant to water erosion.

Terra-cotta skin to mud walls

Center for Science for Villages, Wardha, India has developed technique of providing potter made tile lining to mud-walls protecting them from rain and moisture. In place of potter made tiles, Kiln-fired brick or tiles may also be used to protect mud walls from rains. These tiles/bricks can be fixed with mud mortar & pointed with cement mortar.

Improved Thatch Roof

An effective treatment for rendering the thatch roof fire resistant and water repellent has been evolved by Central Building Research Institute. It involves plastering of thatch layers by the specified mud plasters. Top & bottom of the thatch roof is plastered with non-erodible mud plaster, which makes it durable & fire resistant too.

Flyash-sand Lime Bricks

These are produced from flyash and sand and lime used as binder. These bricks are cheap, and have good crushing strength.

Clay Flyash Burnt Bricks

These are produced from flyash and clay and are stronger than conventional clay bricks. These consume less energy, provide better thermal insulation and solve the problem of disposal of waste material flyash & thus are environmental friendly.

Flyash based lightweight Aerated concrete walling and roofing blocks

A process of mixing flyash, quick lime/cement and gypsum, foaming agents such as aluminum powder / bio-proteins produces these. These are cheap and lightweight blocks mostly used for non-load bearing partition walls.

Cement Bonded Fiber Roofing Sheets

Cement bonded fiber roofing sheets are made by profitably utilizing coir waste coconut pith, wood wool etc., in combination with cement as binder for production of corrugated or plain roofing sheets. These sheets require less cement and so they are cheaper than other roofing sheets available in the market.

Clay Red Mud Burnt Bricks

These are produced from alumina red mud or bauxite, an industrial waste of aluminum producing plants in combination with clay.

Gypsum Based Ceiling Tiles, Panel Blocks and Door/Window Shutters

There are manufactured from calcined gypsum obtained by processing phosphor-gypsum an industrial waste of fertilizer plants. The panels are strong, lightweight, resistant to fire and works as a thermal insulation and cost of the product is cheaper.

Precast Stone Blocks

These are of larger size than brick and are manufactured by using waste stone pieces of various sizes with lean concrete of 1:3:6 mix.

Precast Hollow Concrete Blocks

These are manufactured by using lean concrete mixes through block making machines. The cavity in blocks provide better thermal protection and these also do not need external or internal plastering.

Precast RCC Door and Window Frames

These are cheaper, stronger fire resistant, termite resistant and sustain temperature & humidity.

Precast Plank and Joist Flooring/Roofing

These are precast RC planks, supported over precast RCC joists. Cost saving is up to 20% and time saving in construction is up to 12%.

Holo-Pan Sysytem

The holo-pan system can be used only in six standard pre fabricated components and they are:

- Wall
- Roofing/floors
- Door/window
- Collar units
- Parapet units
- Partially precast beams

Overall cost of hollow pan system is less and speed of construction is more. A flat can be constructed in 1.5 days time. They are useful for post earthquake reconstruction phase. One crane is required to lay the prefabricated panels at respective positions.

Rice Husk as Building Material

India alone produces about 20 million tones of rice husk annually. Rice husk ash has been found to be a useful building material. It can be mixed with cement up to 20% without affecting strength and thus cost of construction can be reduced and problem of disposal of this ash can also be solved by using it.

Ferro cement

Ferro-cement is a thin walled versatile high strength cement based composite material made of cement mortar reinforced with one or more layers of wire mesh closely bound together to create a stiff structure unit with high performance. The desired compressive strength of ferro-cement is generally 25 N/mm^2 at 28 days & mix ratio recommended is 1:2 to 1:2.5 ;(cement: coarse sand) and water/cement ratio should be 0.4 by weight. It can be used in the construction of pre cast toilet units, water tanks cycle sheds.

Technology

Building Component	Alternative Systems
Foundations	• Random rubble masonry in mud mortar placed in excavation over thick sand bed. Rubble pointing above ground level in stabilized cement mortar. • Use of lean cement concrete mix 1:8:16 for base with brick masonry in 1:6 cement mortar footings. • Use of lean cement concrete mix as above for base and over burned bricks masonry in cement lime mortar (1:2:12) footings. • Arch foundations in place of spread foundations
Walls	• 220 mm thick modular brick work in 1:6 cement mortar • 230 mm thick brick work in 1:6 cement mortar using bricks from black cotton and inferior soil stabilized with fly-ash. • 230 mm thick rat-trap bond brick work in 1:2:12 cement lime mortar. • 190 mm thick CBRI bond brickwork in 1:6 cement mortar • 150 mm thick waffle wall in brickwork in 1:4 cement mortar. • 200 mm thick reconstituted stone block masonry in 1:6 cement mortar. • 200 mm thick hollow concrete block masonry in cement mortar. • 200 mm thick solid concrete masonry in 1:6 cement mortar. Block having decorative veneer of stone chips, marble chips or stone pieces used for external wall • 230 mm thick compressed mud blocks masonry in mud mortar. • 230 mm thick stabilized mud blocks masonry (4% cement or lime) in stabilized mud mortar. • Sand lime brick walls in 1:6 cement mortar. • 200 mm FAL-G sand block with 1:6 cement mortar.
Roofs	• Nubian domes and vaults in brick or stabilized mud block with appropriate mortar. • Upgraded thatch roof on appropriate frame work. • Pre-cast RCC “L” panel • Frame work of timber and steel, replaced by steel tubes or secondary timber. • Covering material like corrugated coir cement sheet, corrugated asphaltic sheets, improved burnt country tiles or micro concrete tiles on appropriate frame work. • Burnt clay tube roofing in vault form.
Roof/ intermediate slab	• Precast RCC cored units in M15 concrete. • Precast RCC channel units in M15 concrete • Precast Waffle units in M15 concrete • Partly precast RCC planks and joist in M15 concrete. • Partly precast RCC joist and brick panels • Partly precast RCC in hollow concrete blocks • Thin RCC ribbed slabs • Clay joist and block • Ferro cement channels • Brick or Mangalore tiles filler slab • Brick funicular shell on edge beam • Bamboo reinforced concrete • Brick funicular shells with RCC edge beams • Sand stone slabs on RCC joists • Brick jack arched over RCC joist
Spanning elements for openings	• Brick arches : Flat, semi circular and segmented • Precast thin lintel and lintel cum chajja • Brick arch with sand stone chajja • Ferro cement chajjas
Door cum window frames	• Precast RCC frames with wood insert • Resin bonded saw dust frame • Poly vinyl chloride frame • Fiber reinforced plastic frame • Pivoted arrangement for doors and windows • Wood pieces embedded in walls as frames
Door panels	• Plantation timber styles with particle board inserts. • Medium density fiber board doors. • Cement bonded particle board • Plantation timber style with rice husk board inserts • Red mud polymer panel doors. • Ferro cement doors • Poly vinyl chloride doors panels.

3 Systems and Justifications

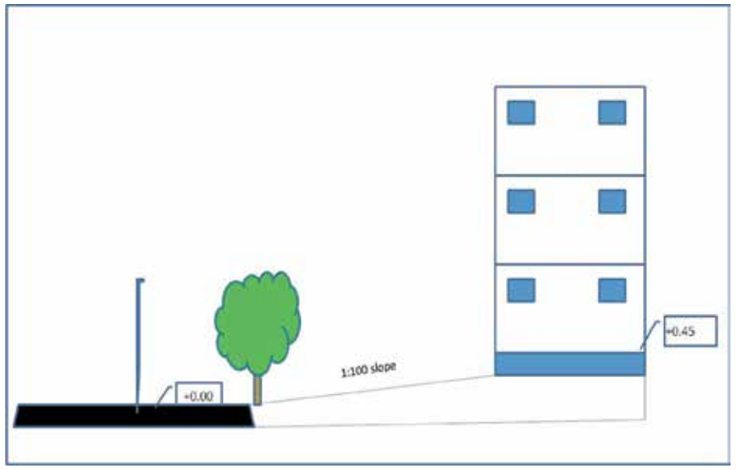
a. Site level physical assumptions and justifications

Shape

Shape of the plot is assumed as rectangular. This would help in proper utilization of space which would not be there in irregular shape plot layout.

Levels

Road level is considered as +0.00 level as shown in figure below. Building plinth level is +0.45 and ground between both is considered to be 1:100 slope to allow excess rain water flow towards road.

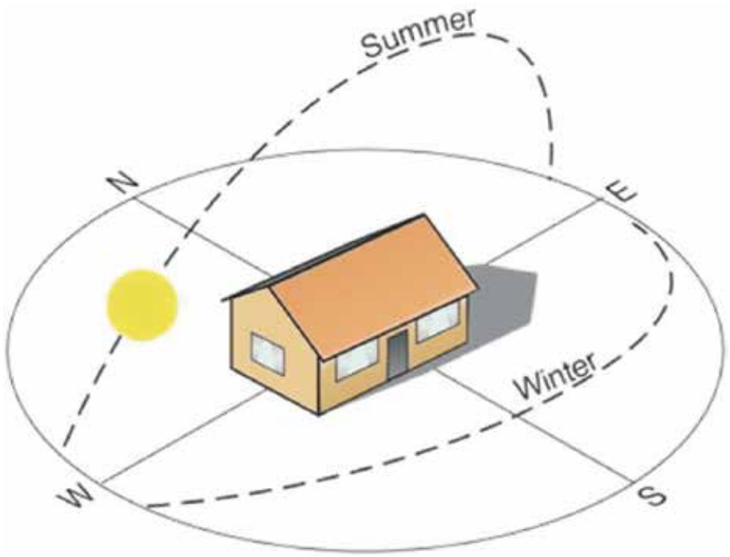


Orientation

Orientation of buildings is kept north south as possible due to the fact that the sun is lower in the sky in Winter than in Summer allows to capture free heat in Winter and reject the heat in Summer as shown in following diagram.

Roads

Internal road is kept as 6.00 mts. width for vehicular and pedestrian circulation. The width is kept considering fire vehicle movement provision.



Water and drainage

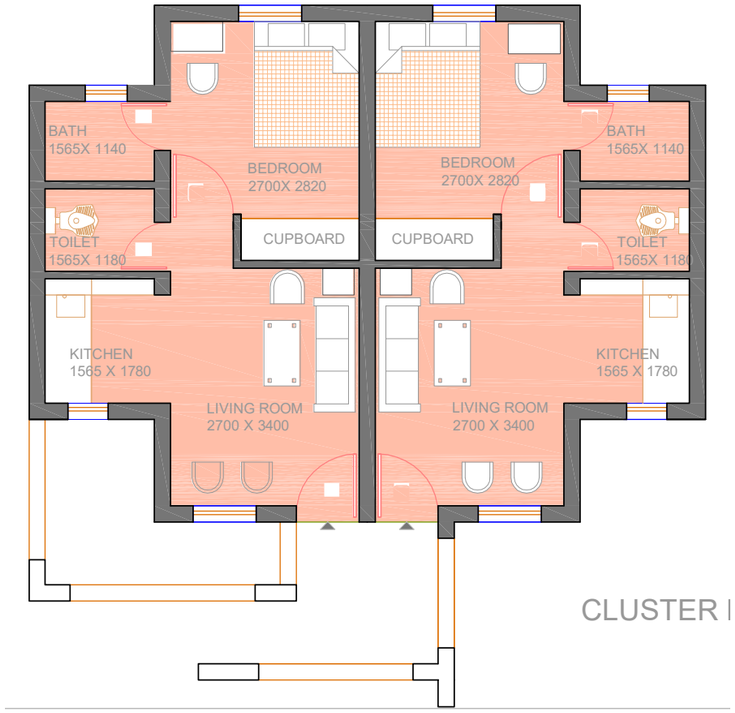
Water and drainage inputs and outputs are as shown below.

Water – the design is considered as a loop covering entire site. Two municipal connections would require which would supply water to all seven water tanks of the colony. Both connections would be taken from road side.

Drainage – it is also considered in loop system. Two outputs are given on road side which would further connect to municipal sewer.

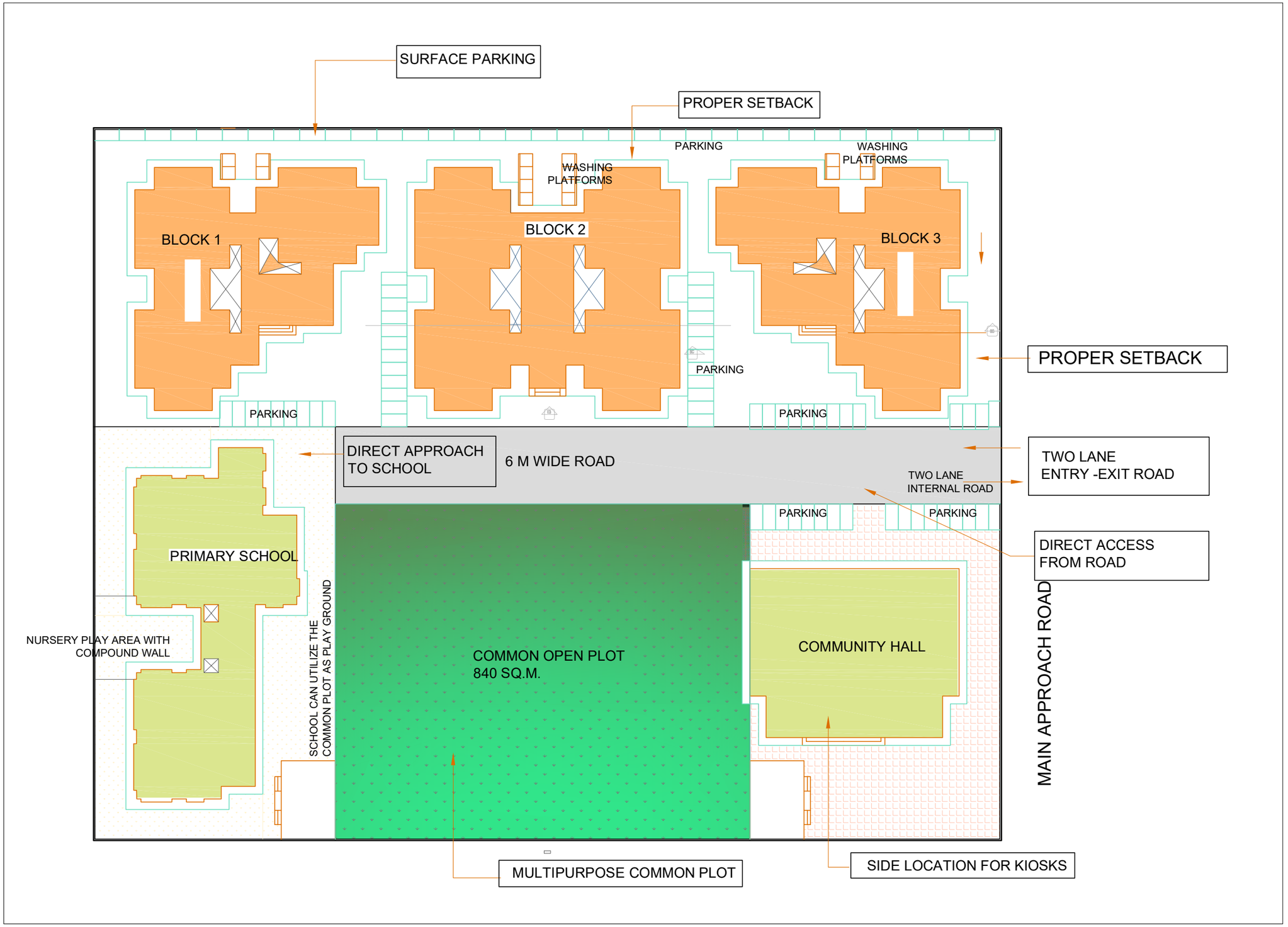
b. Architectural design and justification

Unit explanation



The unit has around 25 sq.mt of carpet area with two habitable rooms, separate kitchen, bath and wash. Kitchen platform is provided and a storage space.

Site plan explanation



c. Cost saving measures in design

Unit cluster

Four unit cluster has been designed to save cost by providing common walls and common interaction spaces. This cluster is replicated to form other blocks of the township. Block B and C are eight unit clusters. It will further save cost in construction.

Typical design

All floor level plans are typical and replicable due to common cluster design. It is to save cost of building units, formwork and typical spans of slabs.

A stair case is provided for 12 units cluster, common terrace to all units in block are some of the cost saving measures in the design.

Built up area and carpet area conversion

Carpet area calculation (Sq.m)
Drawing room – 9.18
Kitchen – 3.20
Bed room – 7.61
Toilet – 1.75
Cupboard & Passage – 1.62
Bath – 1.74
Total carpet area is **25.11** sq.mt
Built up area is **31.10** sq.mt
Super built up area is **37.31** sq.mt for block 1&3
Total carpet against super built up loading is **33%** & **32.7%** respectively.

Local materials and technology

The entire design package is developed on basis of cost effective technologies as much as possible. The building height is optimized and restricted to G+2 structure to avoid cost implication of more floors. Cavity in walls as rat trap bond would decrease the cost by 30% in masonry related works. All slabs would be having filler materials in terms of hollow concrete blocks or Mangalore tiles to decrease the cost. Foundations are lighter and with optimized depth.

d. Energy saving measure in design

Walling/Roofing System

The walls having cavity throughout the section will serve the purpose of insulating the building during the early and later hours of the day. Roof having mixed type material use will act as a thermal barrier and will resist heat penetration in the building. Horizontal chajjas to shade the openings will obstruct direct sunlight. In all, these parameters will majorly cut the heat gains through the building envelope. Providing proper shading to the building walls through appropriate trees and landscaping elements will result in no requirement of cooling, hence the major component of energy consumption is eliminated.

Door/window/opening

The openings are of appropriate size placed in the north direction wherever possible resulting in appropriate lighting required for living with minimum heat gains. Also minimum opening on the south side are planned. Openings on the east and west side are planned to get light and cross ventilation. The opening sizes are restricted upto 40% of the total gross opaque area to have optimized intake of light vs. the heat gains through opening. Hence sufficient natural light is harvested reducing the demand on artificial lighting.

Rain water harvesting

Rain water harvesting and percolation from the whole site area is proposed in order to keep recharging the water aquifer. This will keep the water table level constant and the depth of the withdrawal of water is maintained hence the expense of withdrawing the water from a greater depth is avoided.

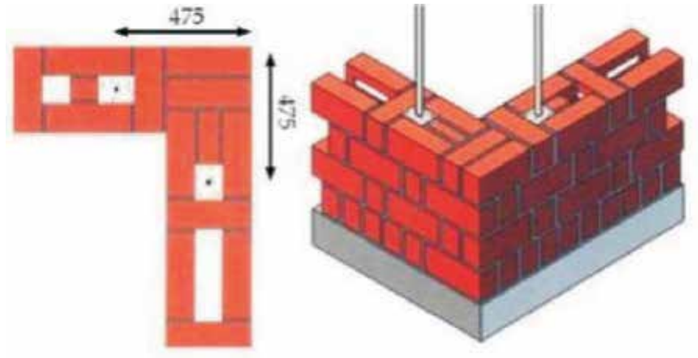
e. Hazard resistance measures in design

Fire – extra water tank per block

Extra water tanker of 5000 liters is provided to each block as per NBC code. It is to meet additional water demand whenever fire accidents occur.

The buildings are designed for zone III region for Earthquake. Additional provisions of corner reinforcement is introduced as per the requirement including continuous lintels. Corner reinforcement in Rat Trap Bond masonry

In brick masonry, two reinforcements are provided instead of one (as shown in figure) for corner reinforcement. This will strengthen the wall against dynamic load of earthquake.



Continuous Lintel band

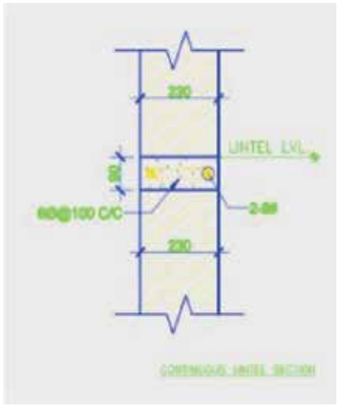
Lintel band is kept continuous for all floor, to have additional structural safety.

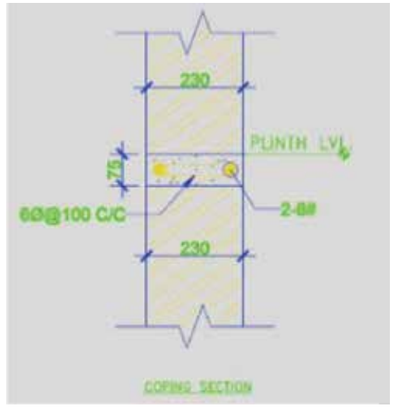
Coping

Coping is provided to have structural safety against earthquake and also to avoid termite and moisture from soil. It is kept 0.45 mts up from ground level.

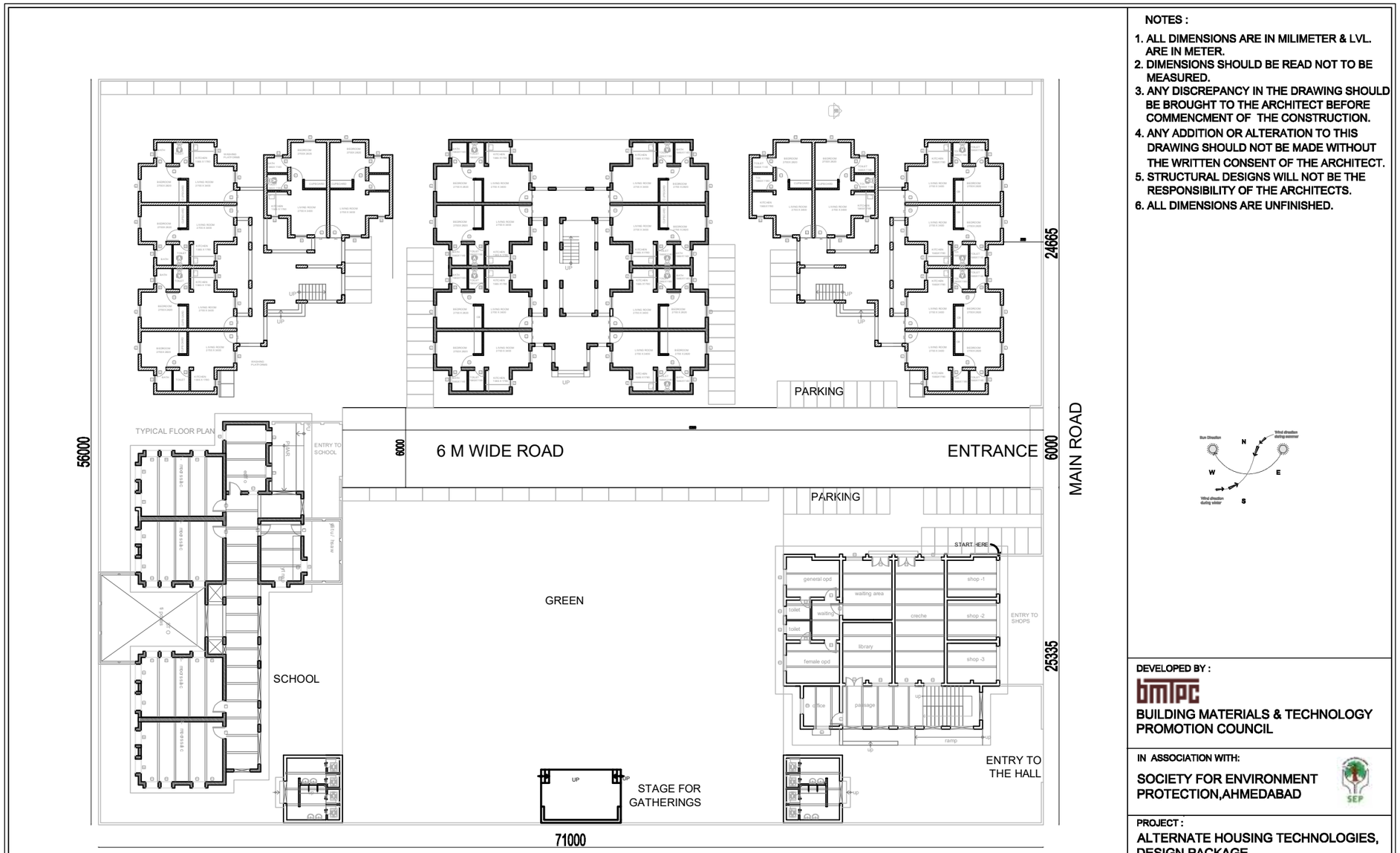
Typical design beam

The overall design is kept simple with repetitive plans and typical floor layouts. Only 3 beams are kept to support slabs.





a. Master plan layout



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PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
LAYOUT PLAN

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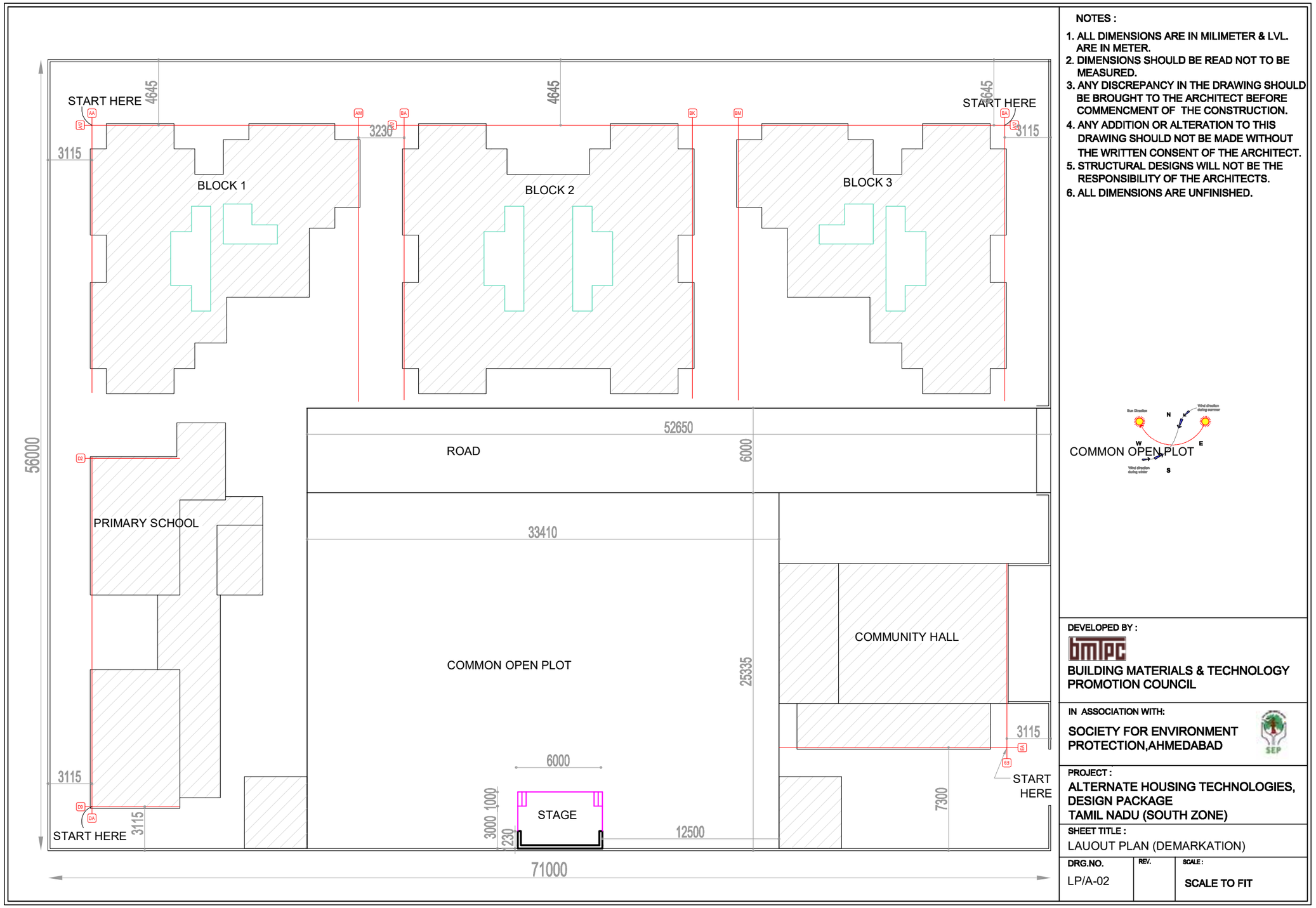
Site plan demarcation



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COMMON OPEN PLOT

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LAUOUT PLAN (DEMARKATION)

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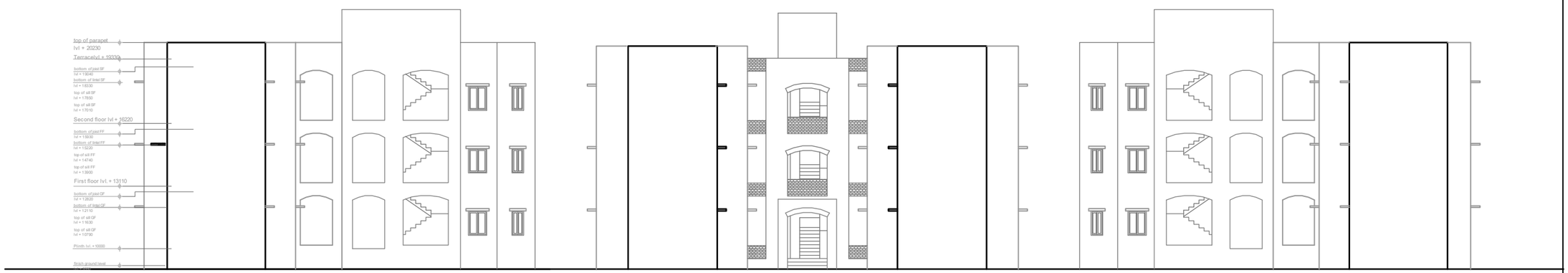
Site Elevation & Section



ELEVATION

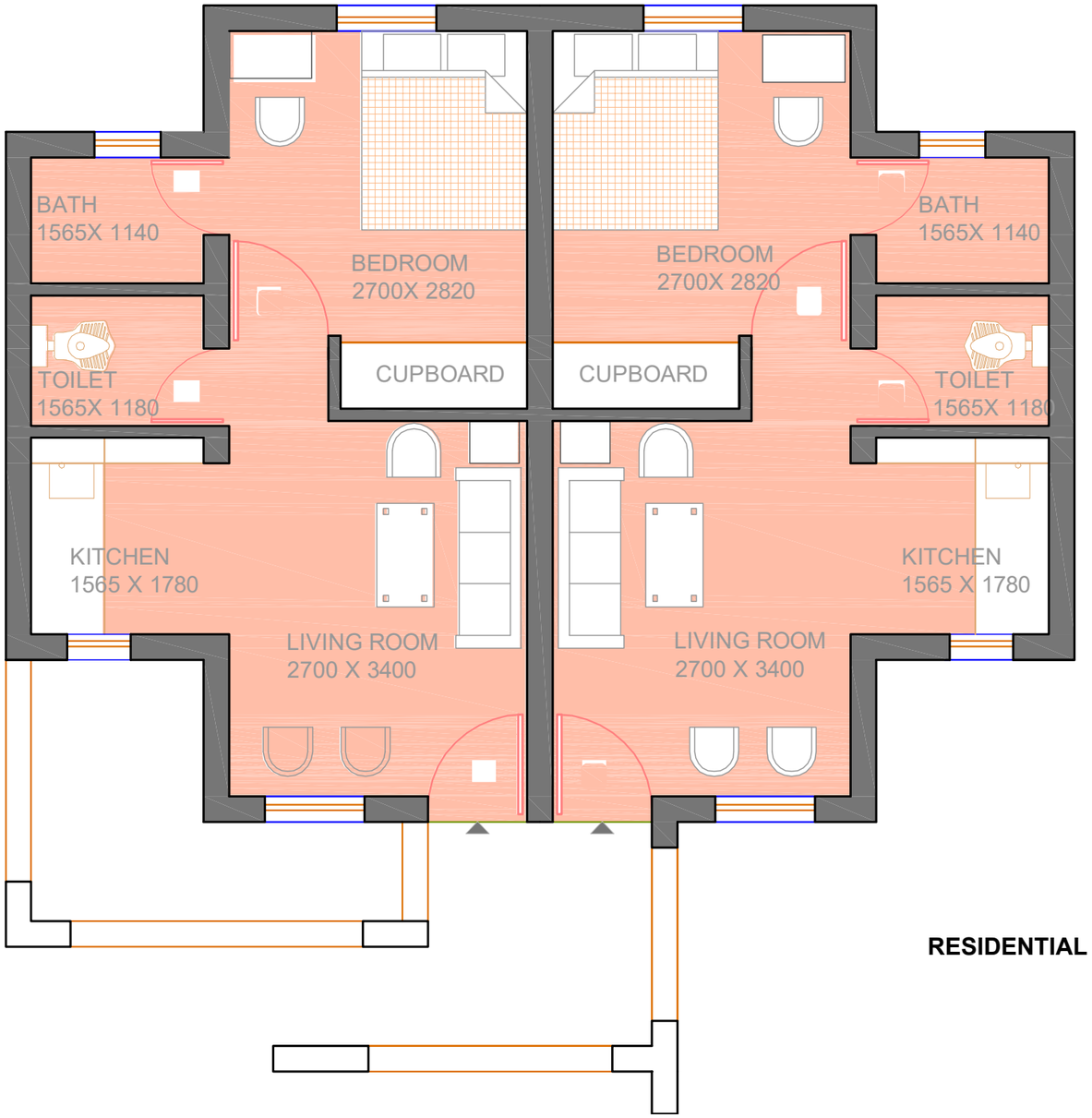
SITE SECTION

I. Residential Unit

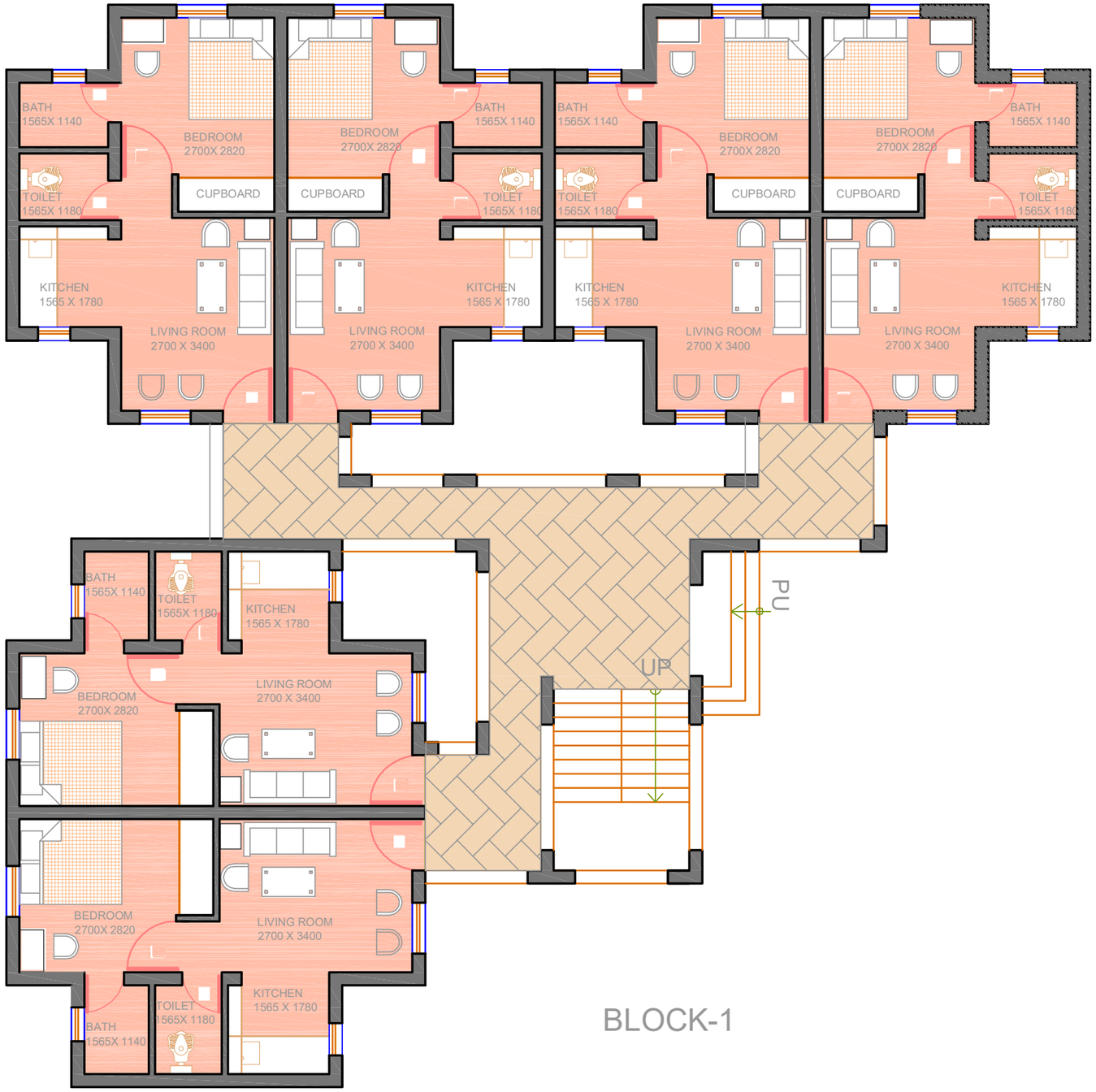
a. Architectural Drawings

i. Plans

ii. Elevations & Sections



RESIDENTIAL UNIT PLAN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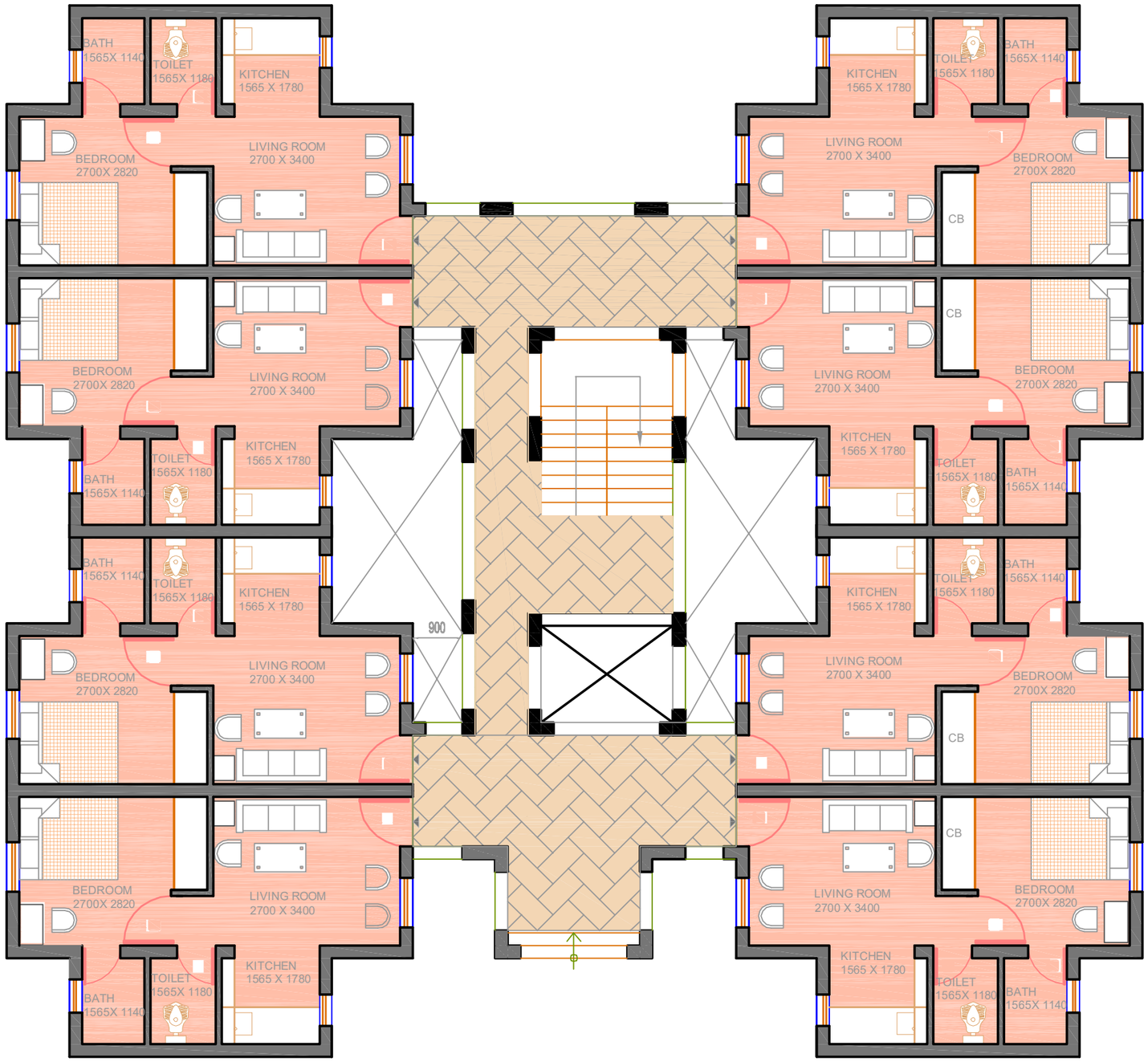
BEDROOM
2700X 2820
CUPBOARD
TOILET
1565X 1180
KITCHEN
1565 X 1780
LIVING ROOM
2700 X 3400
PU
UP
BLOCK-1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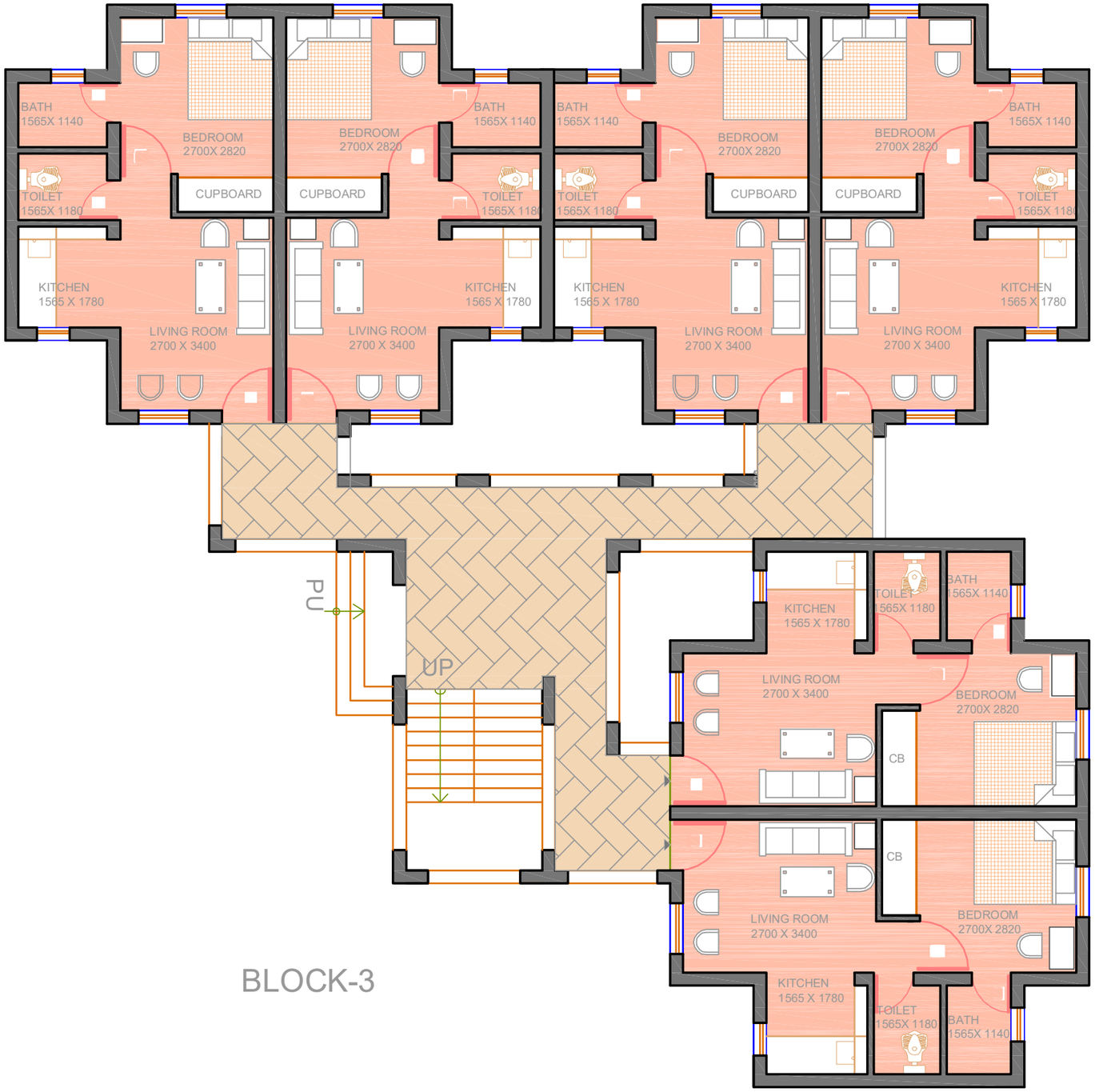
CB
900

BLOCK-2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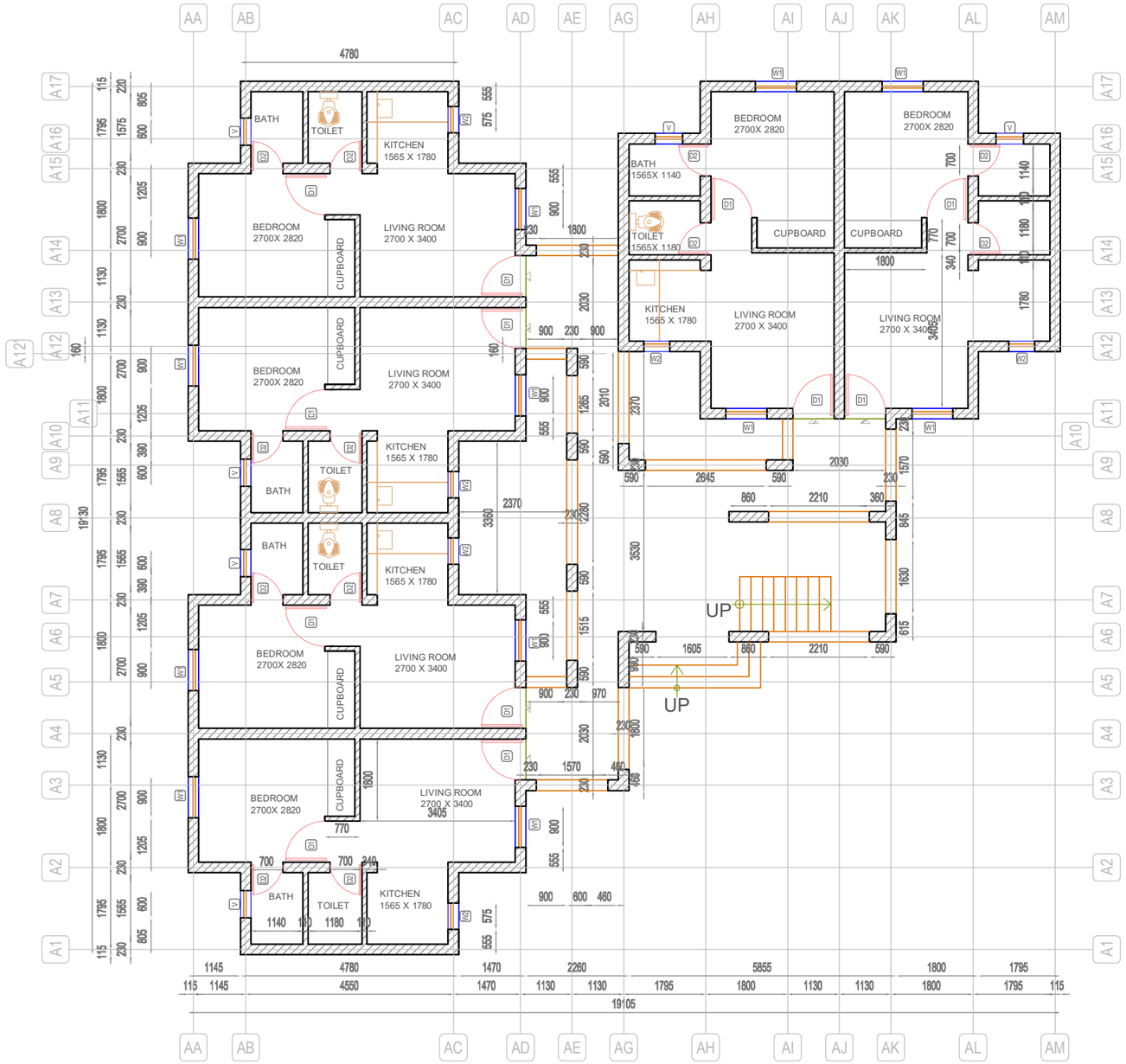
CB

BLOCK-3



TYPICAL FLOOR PLAN

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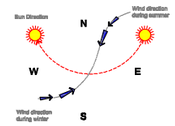

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GROUND FLOOR PLAN(BLOCK-1)

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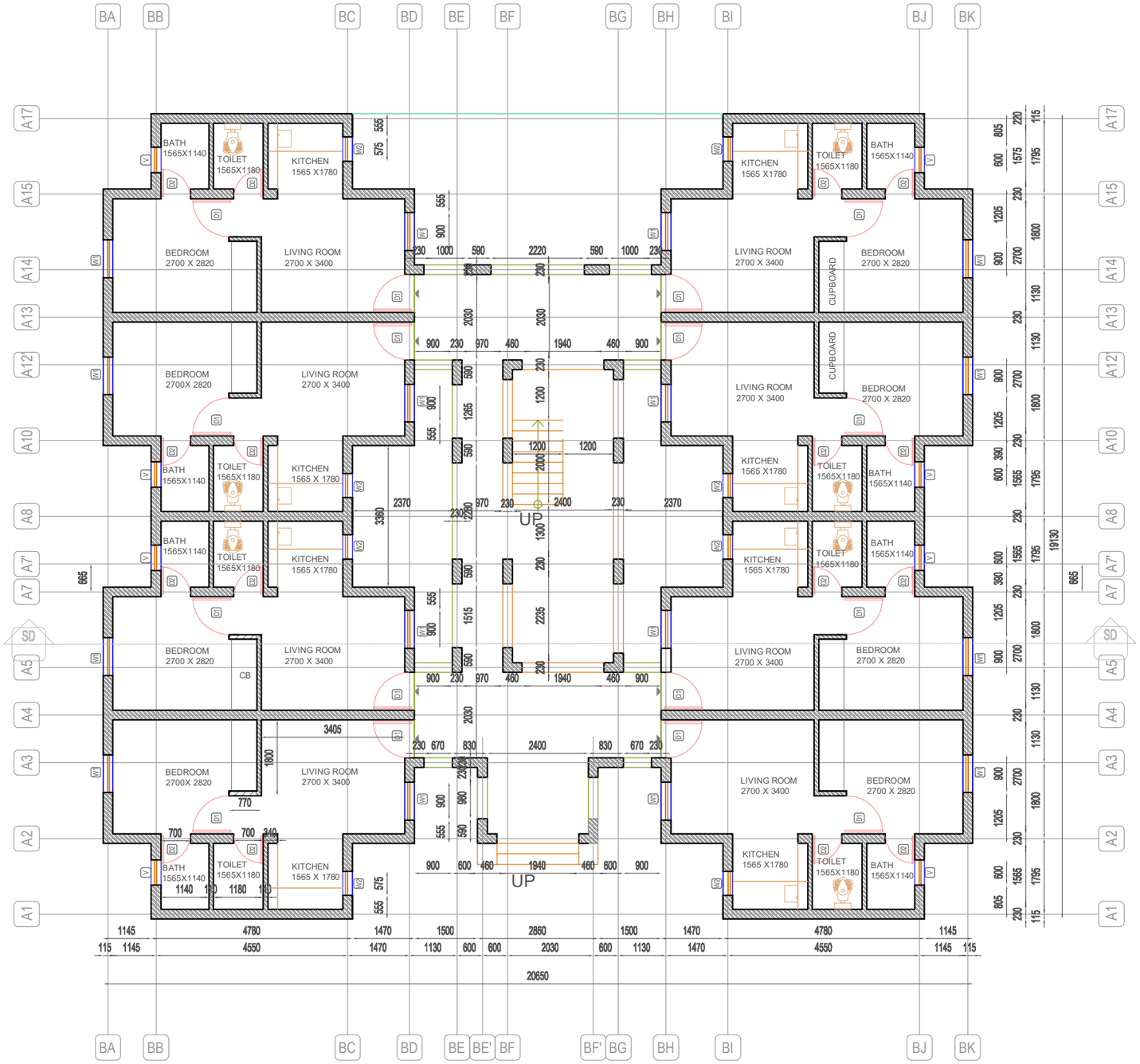

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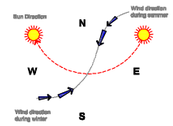

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SHEET TITLE :

GROUND FLOOR PLAN(BLOCK-2)

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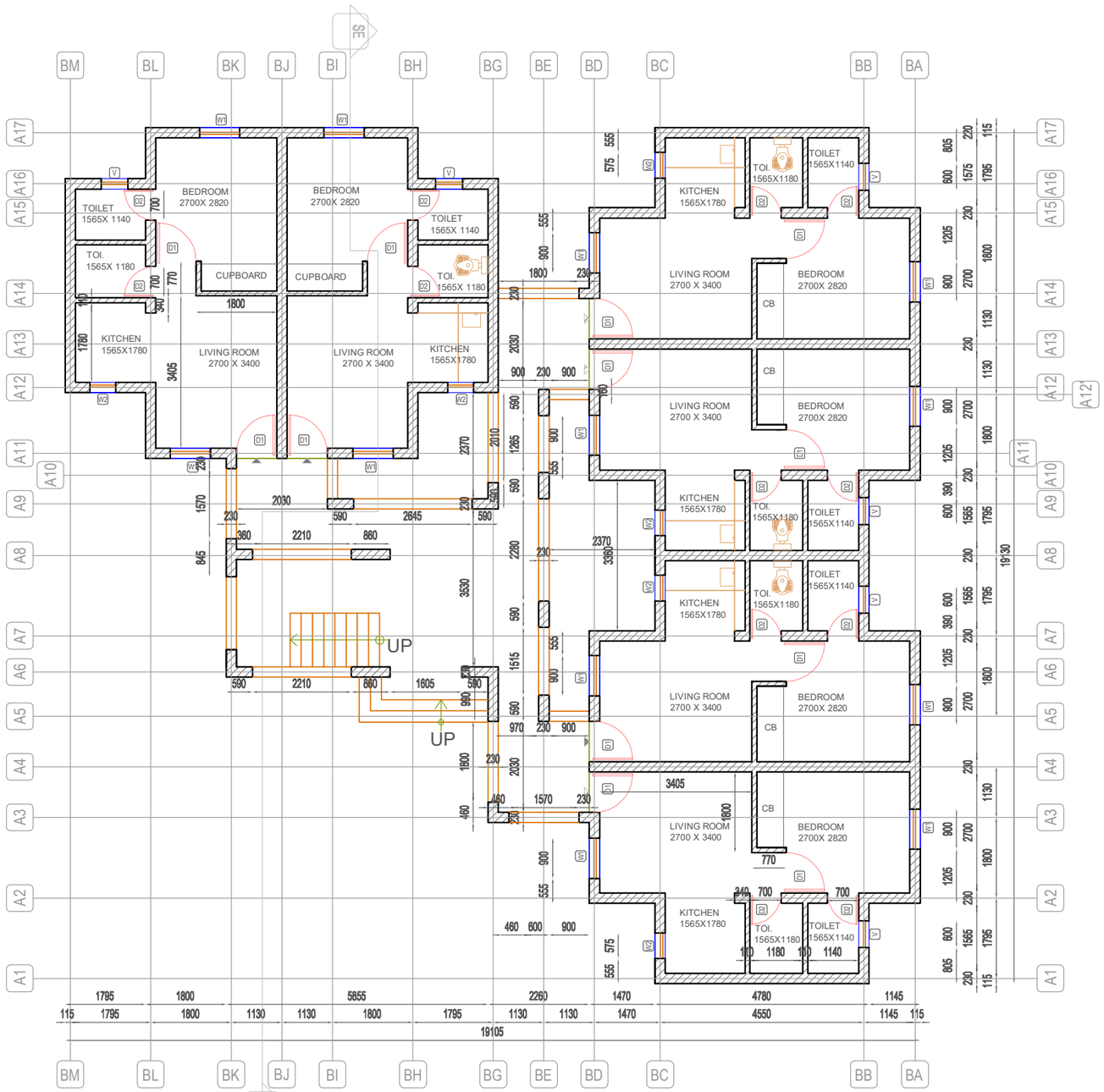
RU/A-02		SCALE TO FIT



TYPICAL FLOOR PLAN

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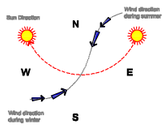

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SHEET TITLE :

GROUND FLOOR PLAN(BLOCK-3)

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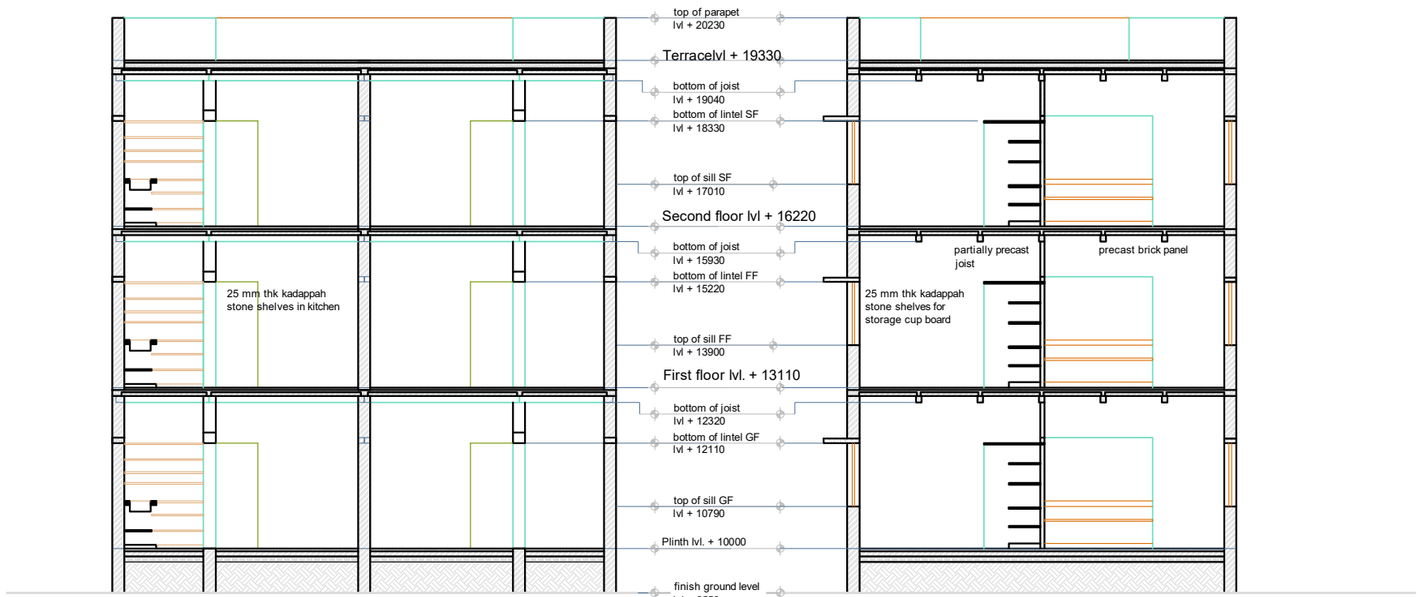
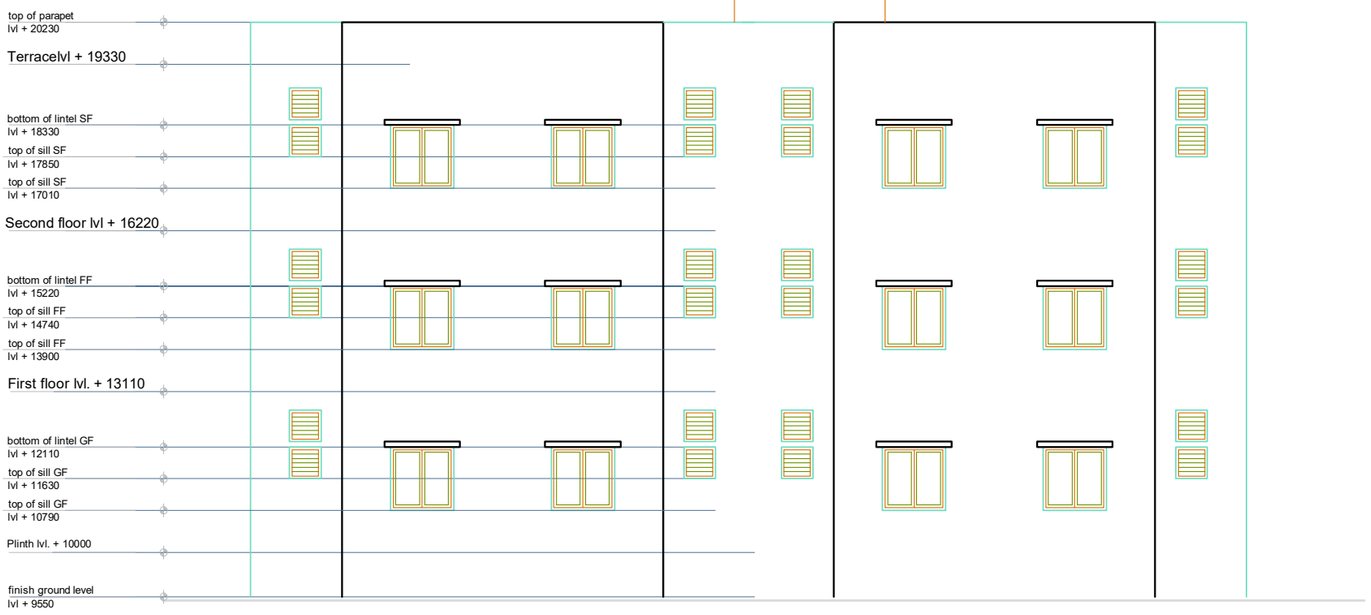
RU/A-03		SCALE TO FIT



SECTION AA'

SECTION BB'



ELEVATION

NOTES :

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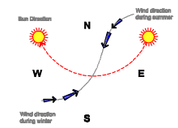
3. ANY DISCREPANCY IN THE DRAWING SHOULD BE BROUGHT TO THE ARCHITECT BEFORE COMMENCMENT OF THE CONSTRUCTION.
4. ANY ADDITION OR ALTERATION TO THIS DRAWING SHOULD NOT BE MADE WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.
5. STRUCTURAL DESIGNS WILL NOT BE THE RESPONSIBILITY OF THE ARCHITECTS.
6. ALL DIMENSIONS ARE UNFINISHED.



DEVELOPED BY :

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

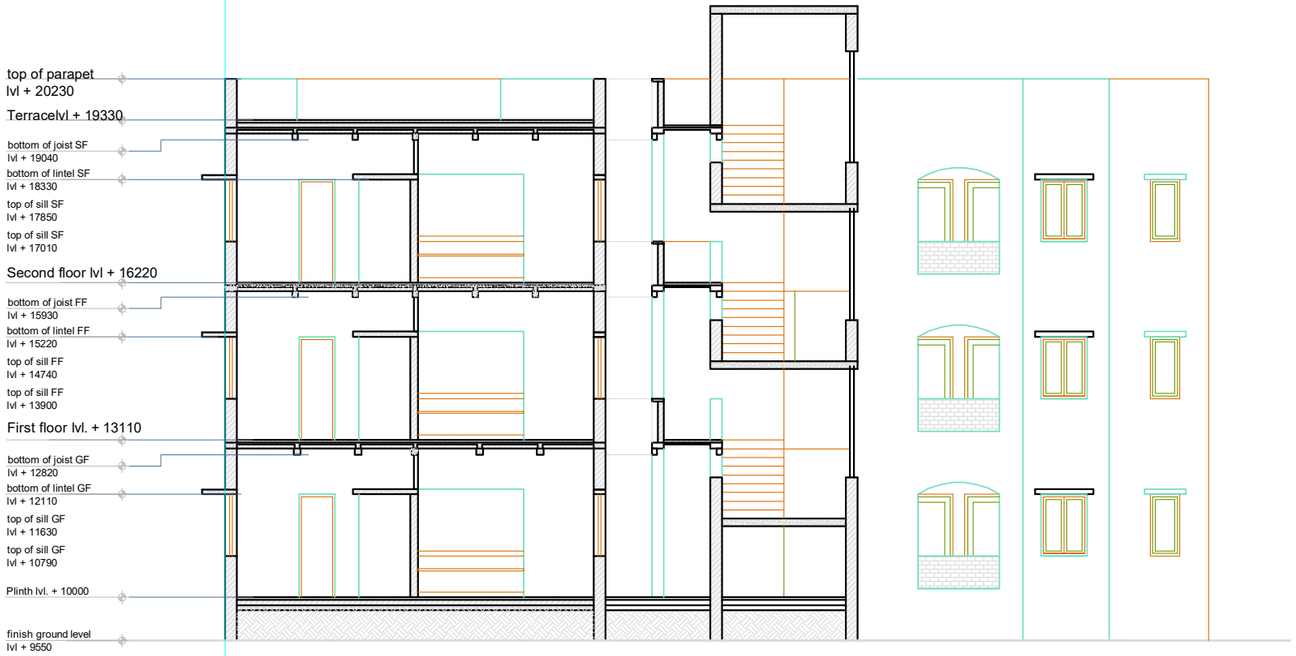
PROJECT :

ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

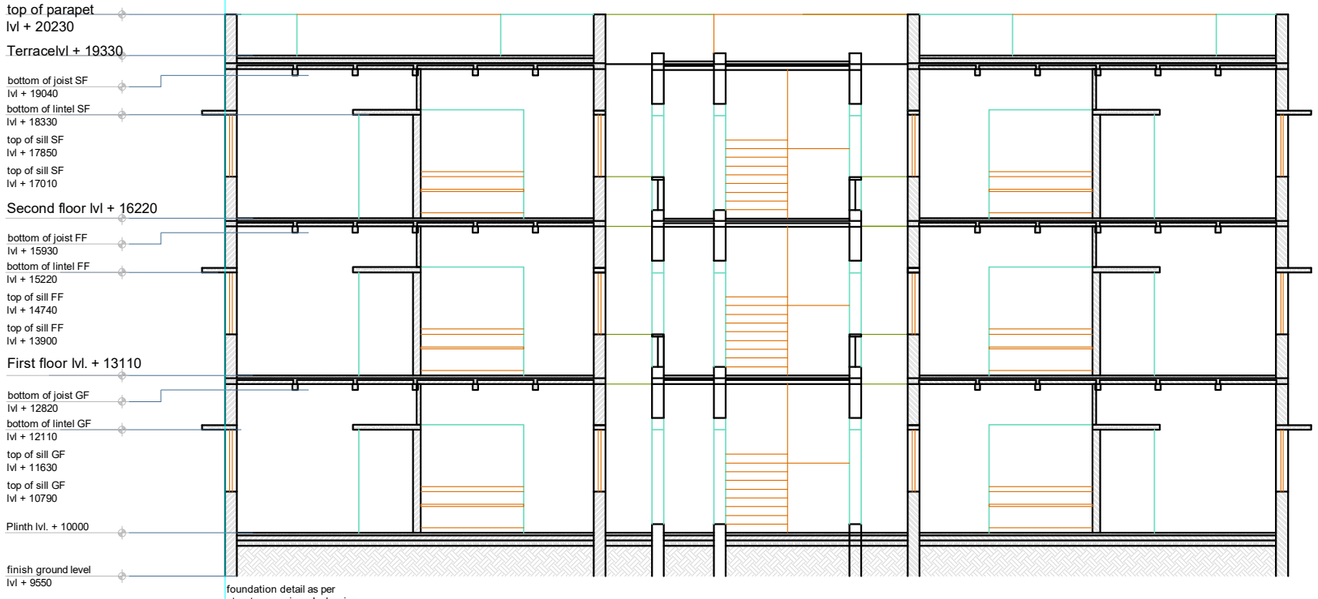
SHEET TITLE :

ELEVATION &SECTION (BLOCK-1)

DRG.NO.	REV.	SCALE :
RU/A-04		SCALE TO FIT



SECTION CC'



SECTION DD'

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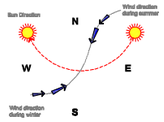

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IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

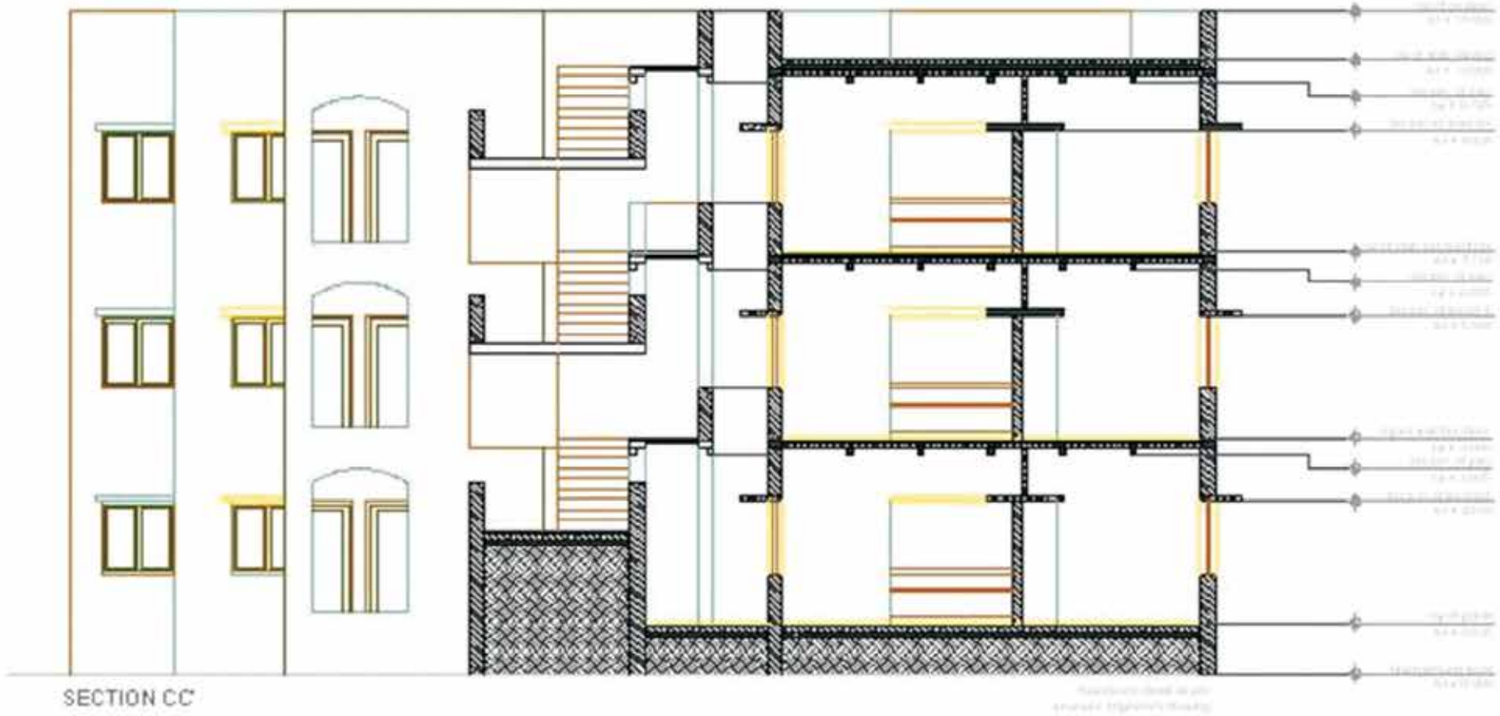
PROJECT :

ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

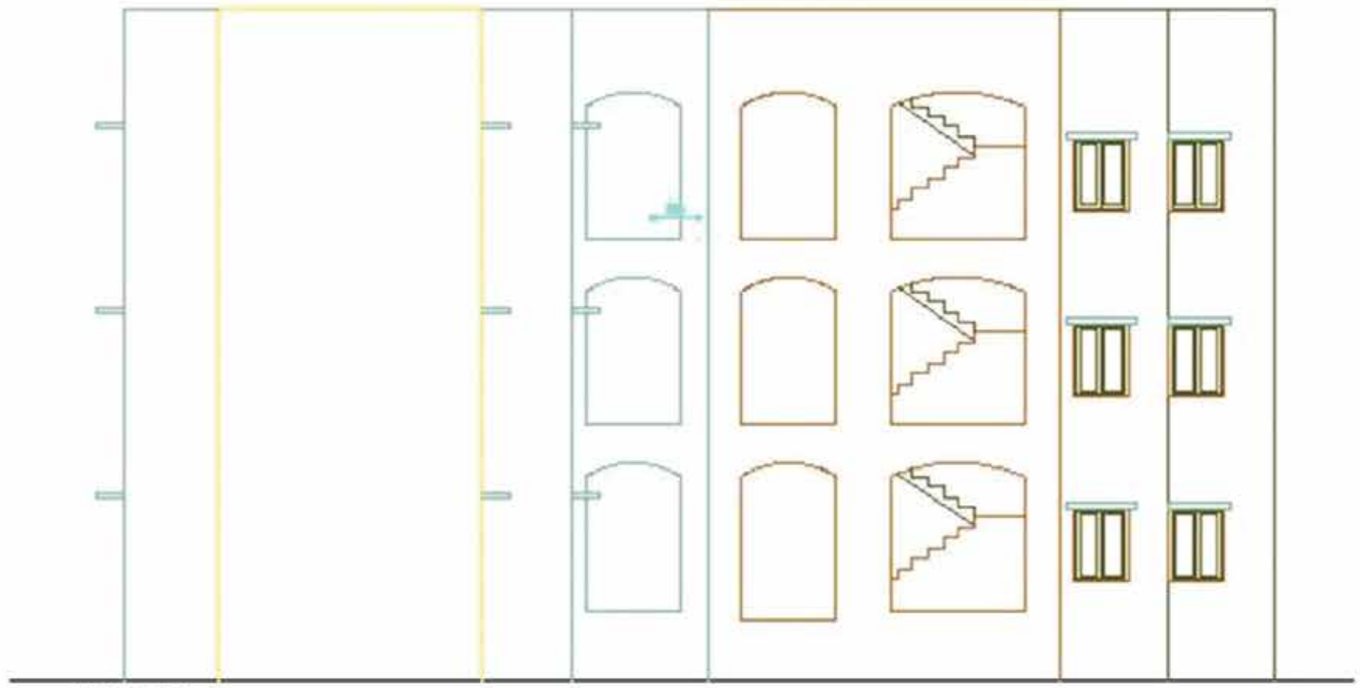
SHEET TITLE :

SECTION C&D (BLOCK-2)

DRG.NO.	REV.	SCALE :
RU/A-06		SCALE TO FIT



SECTION CC'



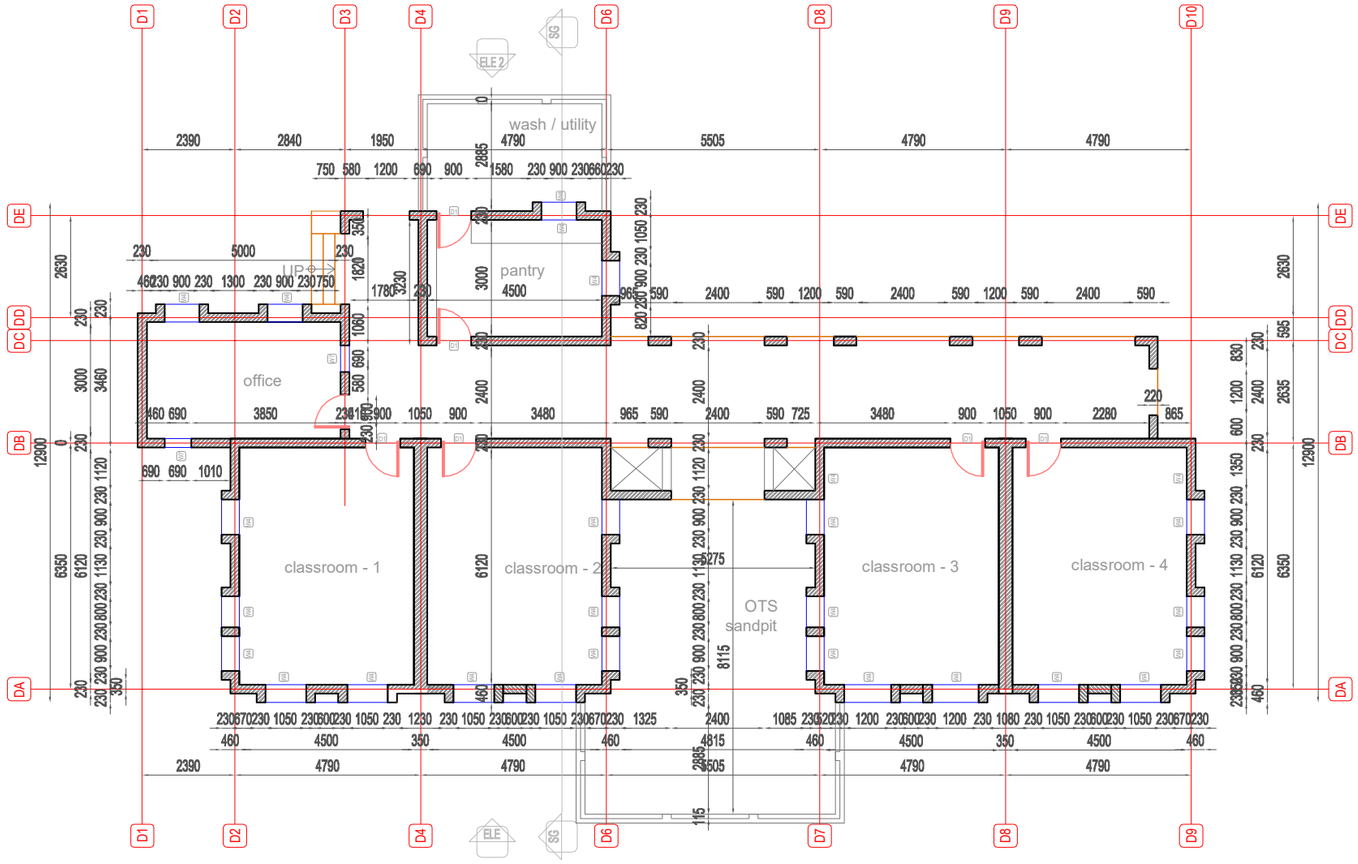
ELEVATION - 4

2. School

a. Architectural Drawings

i Plans

ii Elevations & Sections



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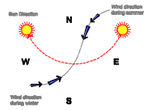


DEVELOPED BY :

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

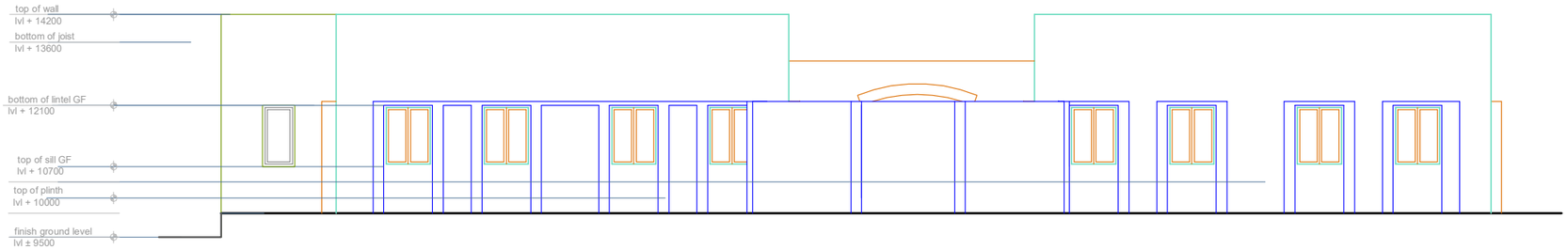
PROJECT :

ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

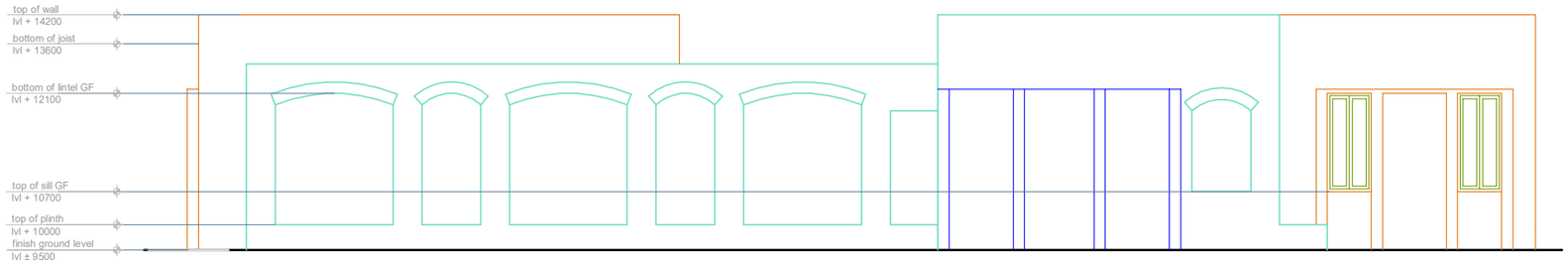
SHEET TITLE :

FLOOR PLAN (SCHOOL)

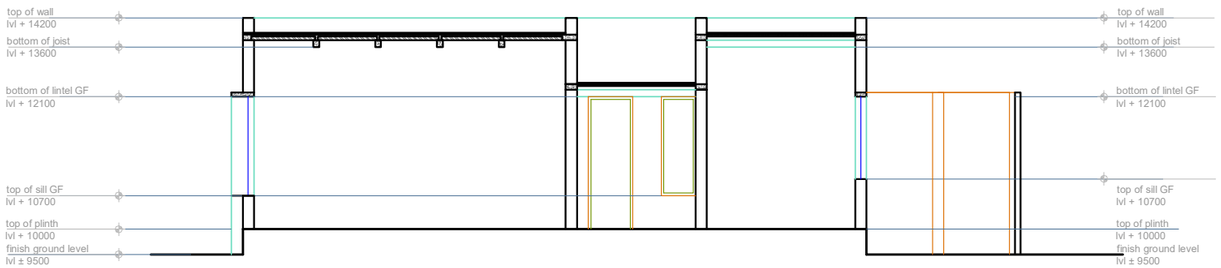
DRG.NO.	REV.	SCALE :
SC/A-01		SCALE TO FIT



ELEVATION 1



SECTION



ELEVATION 2

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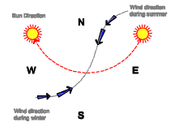

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IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :

ELEVATION &SECTION (SCHOOL)

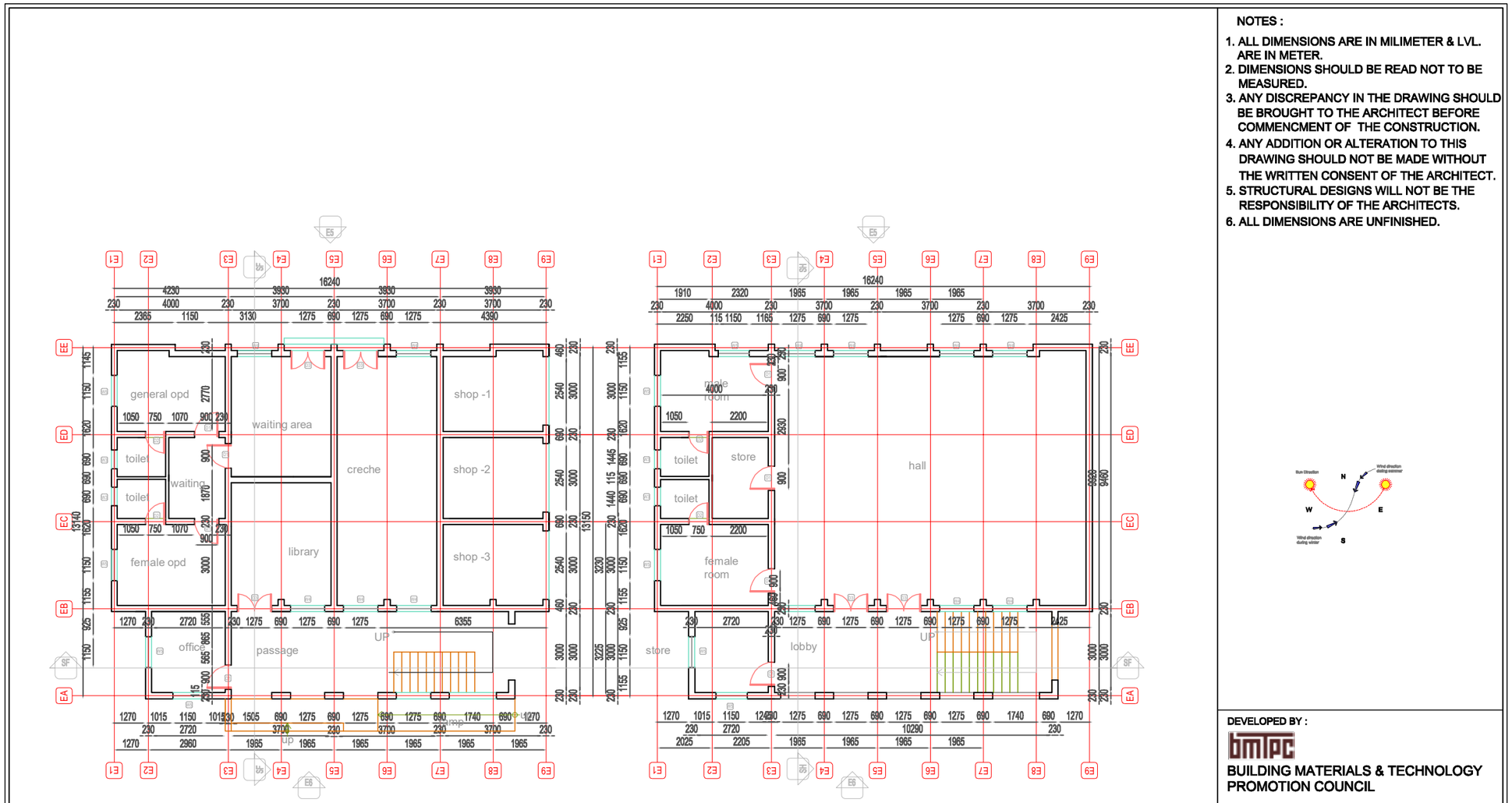
DRG.NO.	REV.	SCALE :
SC/A-02		SCALE TO FIT

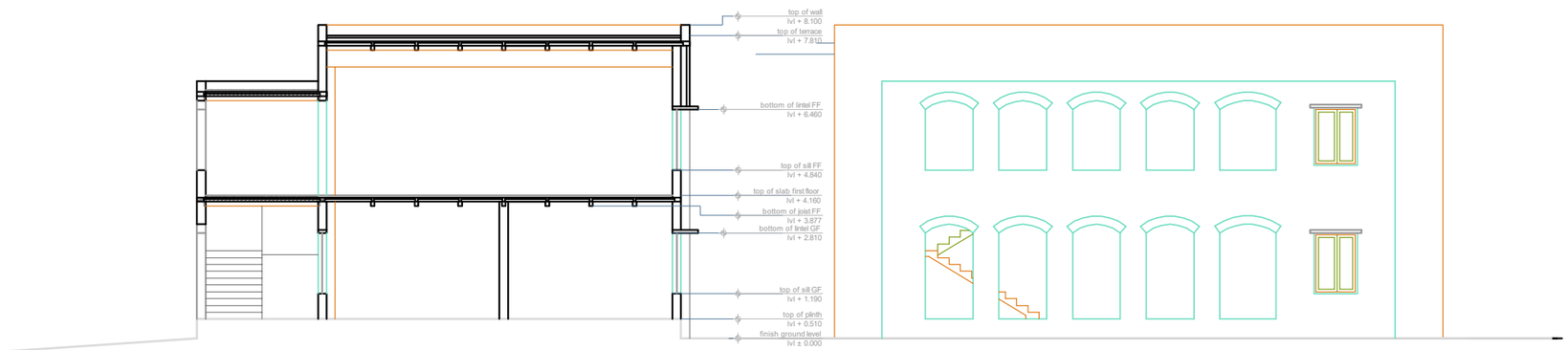
3. Community Centre & Kiosks

a. Architectural Drawings

i Plans

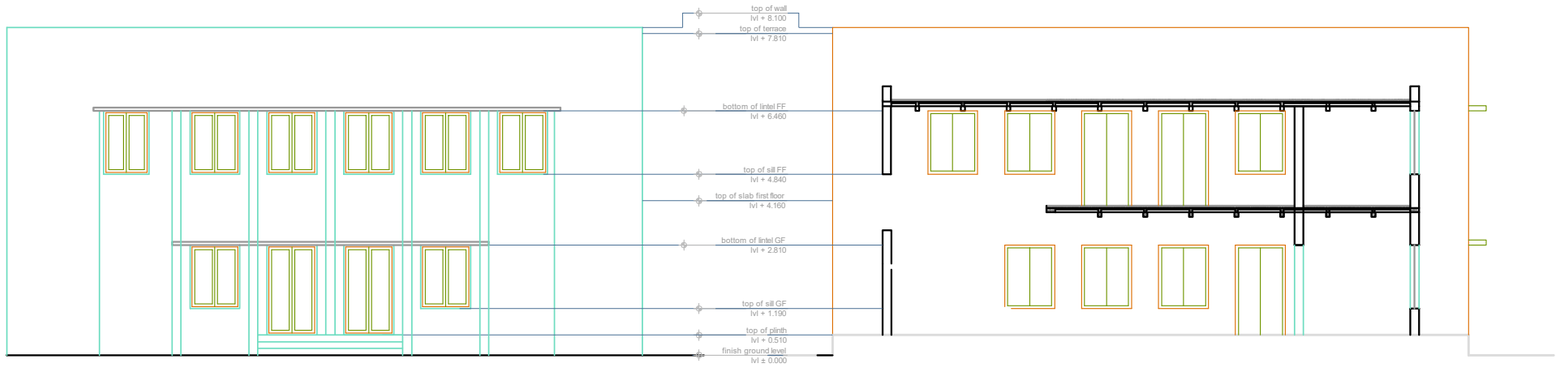
ii Elevations & Sections





section HH'

elevation 6



elevation 5

section FF'

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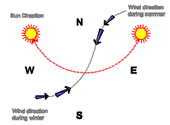

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IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

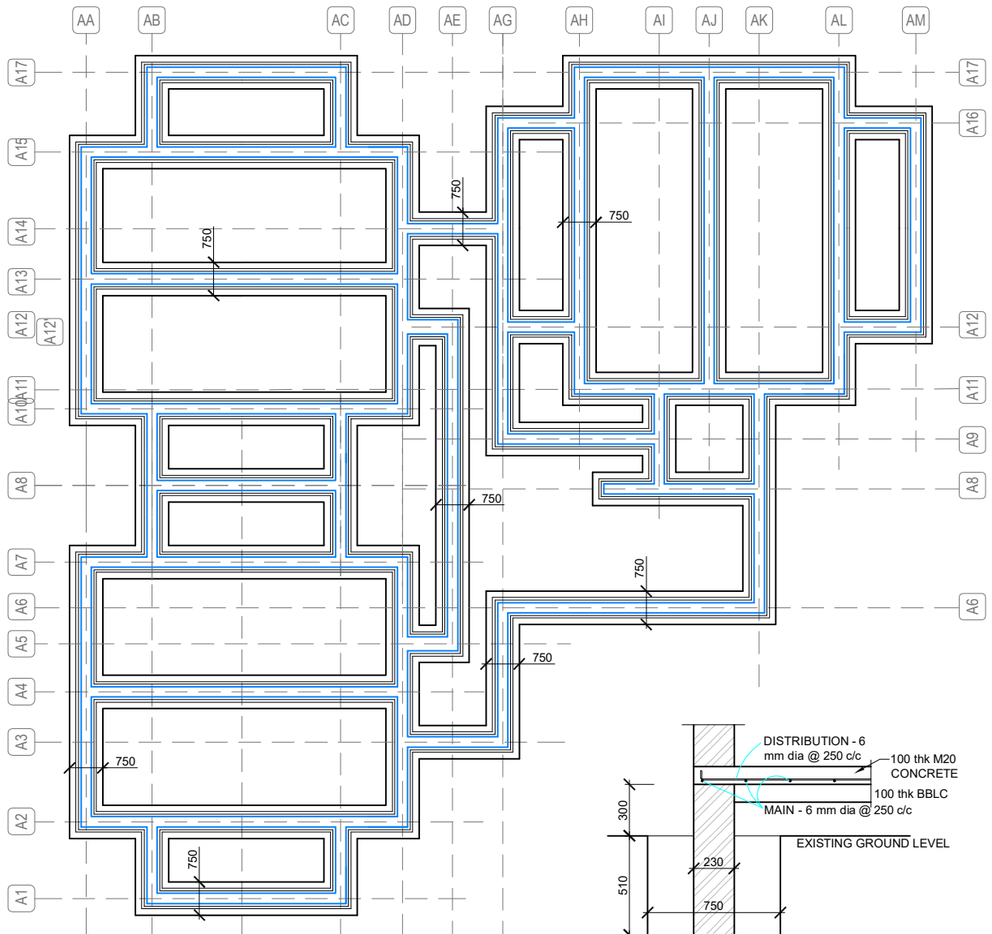
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :

ELEVATION & SECTION(COMUNITY CENTER & KIOSKS)

DRG.NO.	REV.	SCALE :
CC/A-02		SCALE TO FIT

Drawing showing Foundation Plan for Residential Building (Block 1)



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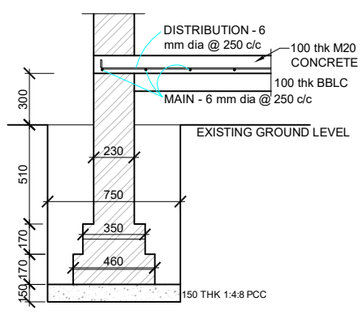
3. SOIL BEARING CAPACITY TAKEN IS 12.5 TON/SQ.M AT 1.0M DEPTH FROM Natural Ground Level.
4. TOP OF SOIL SHALL BE WELL RAMMED AND CONSOLIDATED BEFORE EXECUTION.
5. ALL THE BUILDING MATERIALS MUST CONFIRM WITH THE I.S. SPECIFICATIONS.
6. CONSTRUCTION JOINTS IN COLUMN SHALL BE AT THE BOTTOM OF BEAMS UNLESS MENTIONED.
7. ALL CONCRETE IS M20 WHICH SHALL BE MACHINE MIXED AND VIBRATED.
8. GRADATION OF AGGREGATES 67%- 20mm TO 10mm, 33%-BELOW 10mm.
9. COLUMN'S AND BEAM'S VERTICAL FACES CAN BE REMOVED ONLY AFTER 24 HOURS.
10. MAXIMUM QUANTITY OF WATER PER 50kg OF CEMENT SHALL BE 25 LITERS.
11. IN CASE OF BEAMS, MINIMUM DISTANCE BETWEEN TWO PARALLEL BARS SHALL BE 25 mm (UNLESS OTHERWISE MENTIONED IN DETAIL DRG.) PROVIDE SPACERS IF NEEDED.
12. CUBE TEST MUST BE CARRIED OUT FROM EVERY BATCH OF CONCRETE & TEST RESULTS OF 7&28 DA'S SUBMITTED TO THE CONSULTANTS, IF CONTRACTOR FAILS TO DO SO, CONSULTANTS SHALL NOT BE RESPONSIBLE FOR ANY INFERIOR STRENGTH OF STRUCTURE.
13. SUPERVISION IS NOT CONSULTANTS RESPONSIBILITY.
1 PUZZOLONA CEMENT NOT TO BE USED FOR ANY STRUCTURAL CONCRETE.

ABBREVIATION
NGL NATURAL GROUND LEVEL
MTS. METERS
I.S. INDIAN STANDARDS



TYPICAL FOUNDATION DETAIL

DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

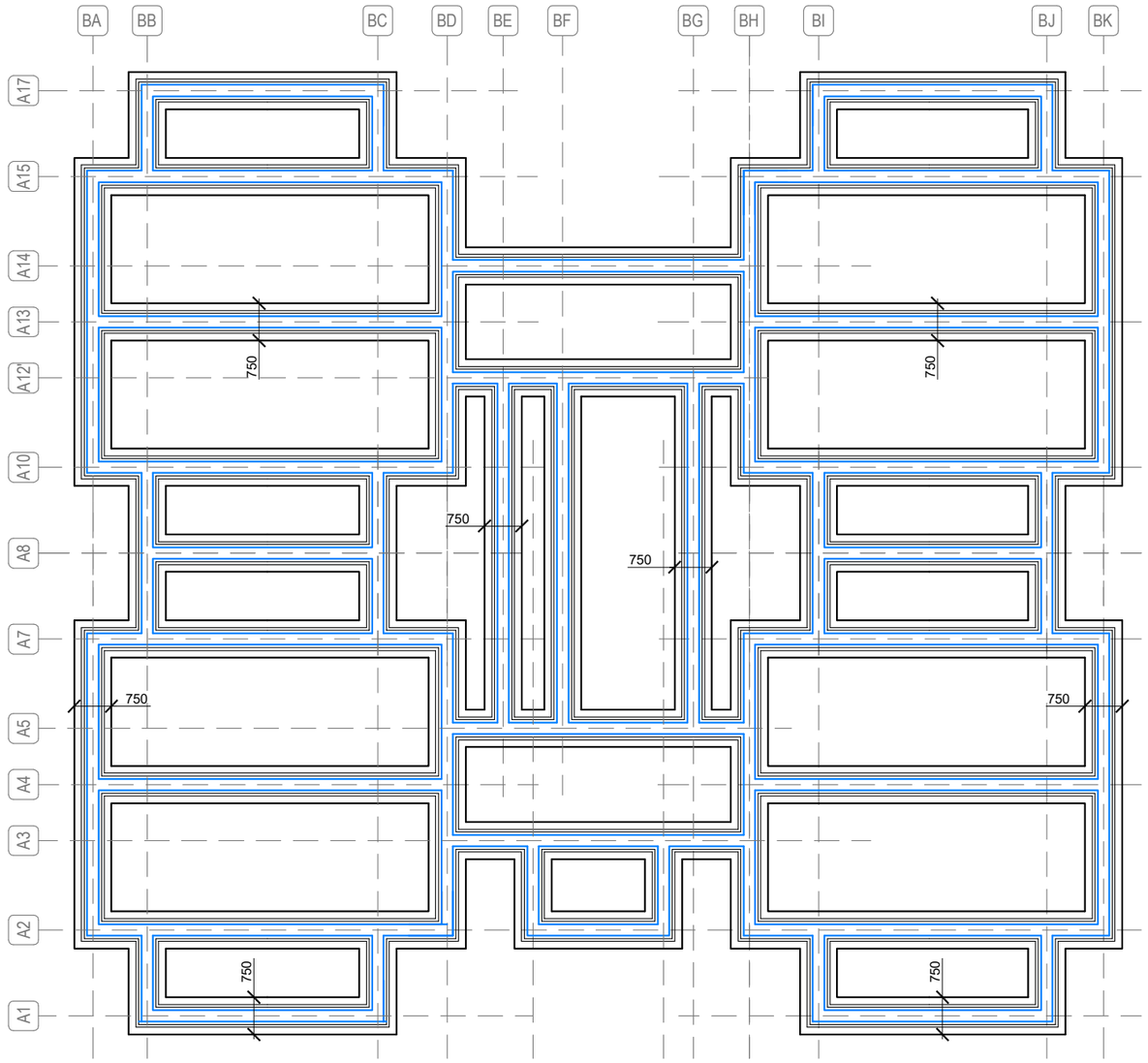
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
FOUNDATION PLAN(BLOCK-1)

DRG.NO.	REV.	SCALE :
RU/S-01		SCALE TO FIT

Drawing Detailed Foundation Plan for Residential Building (Block 2)



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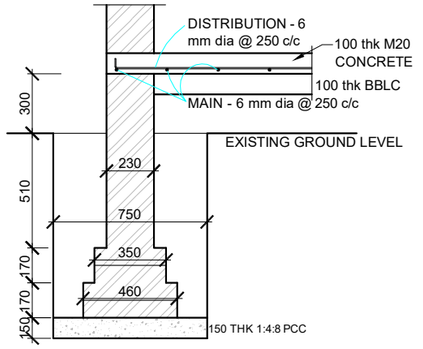

TYPICAL FOUNDATION DETAIL

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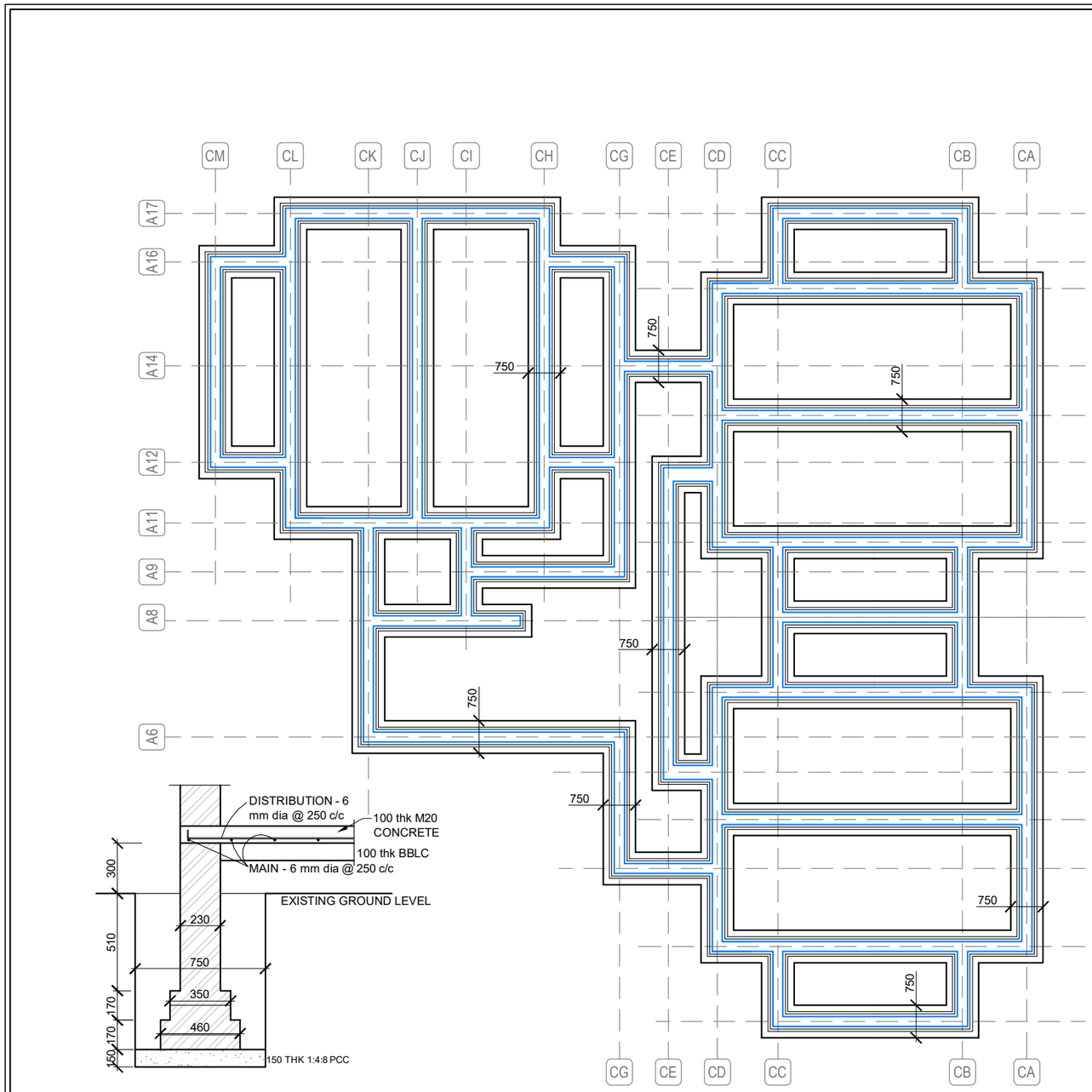
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
FOUNDATION PLAN(BLOCK-2)

DRG.NO.	REV.	SCALE :
RU/S-02		SCALE TO FIT

Drawing showing Detailed Foundation Plan for Residential Building (Block 3)



TYPICAL FOUNDATION DETAIL

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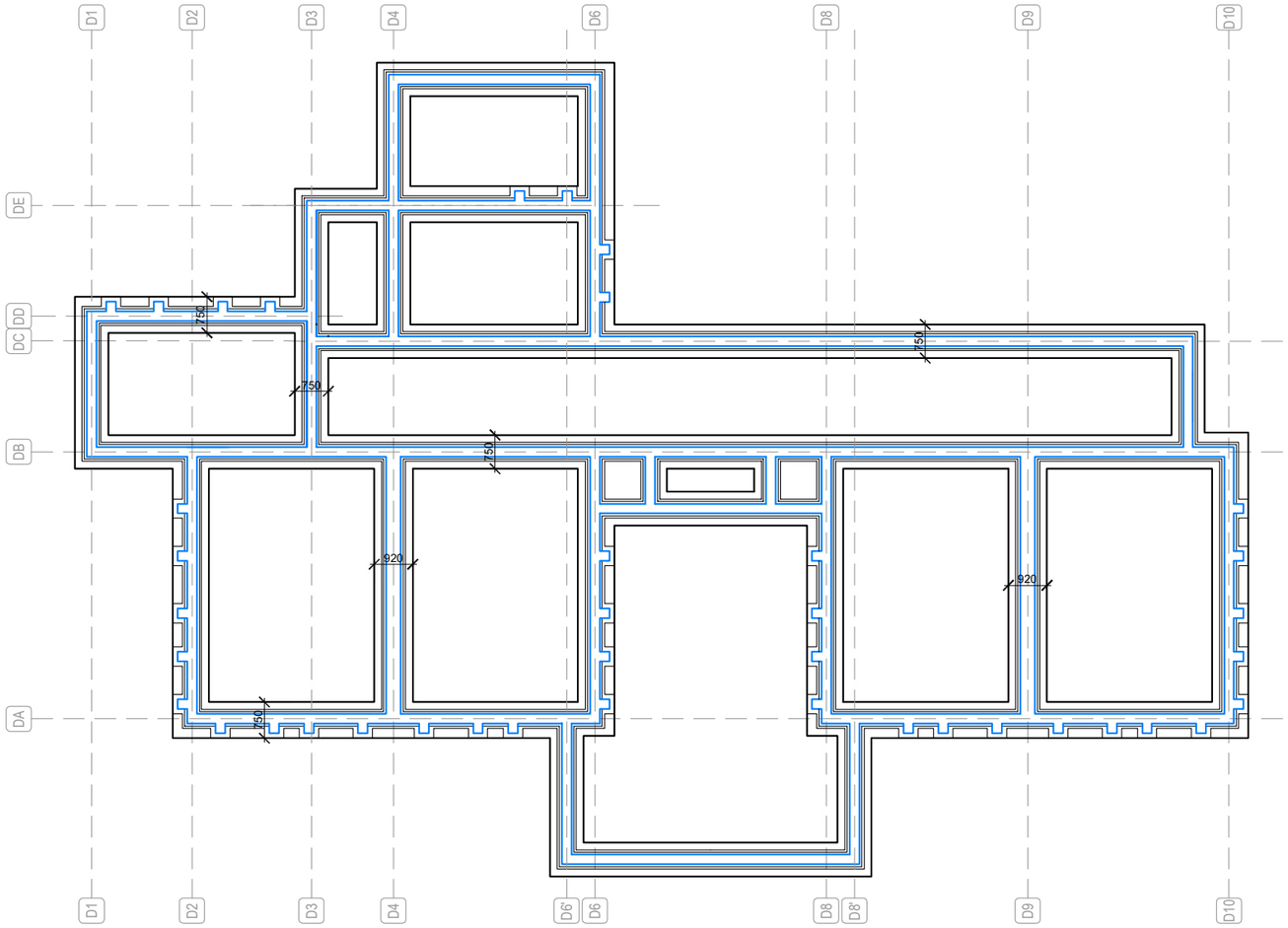
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
FOUNDATION PLAN(BLOCK-C)

DRG.NO.	REV.	SCALE :
RU/S-03		SCALE TO FIT

Drawing showing Foundation Plan for School



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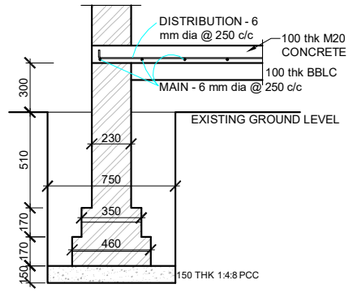

TYPICAL FOUNDATION DETAIL

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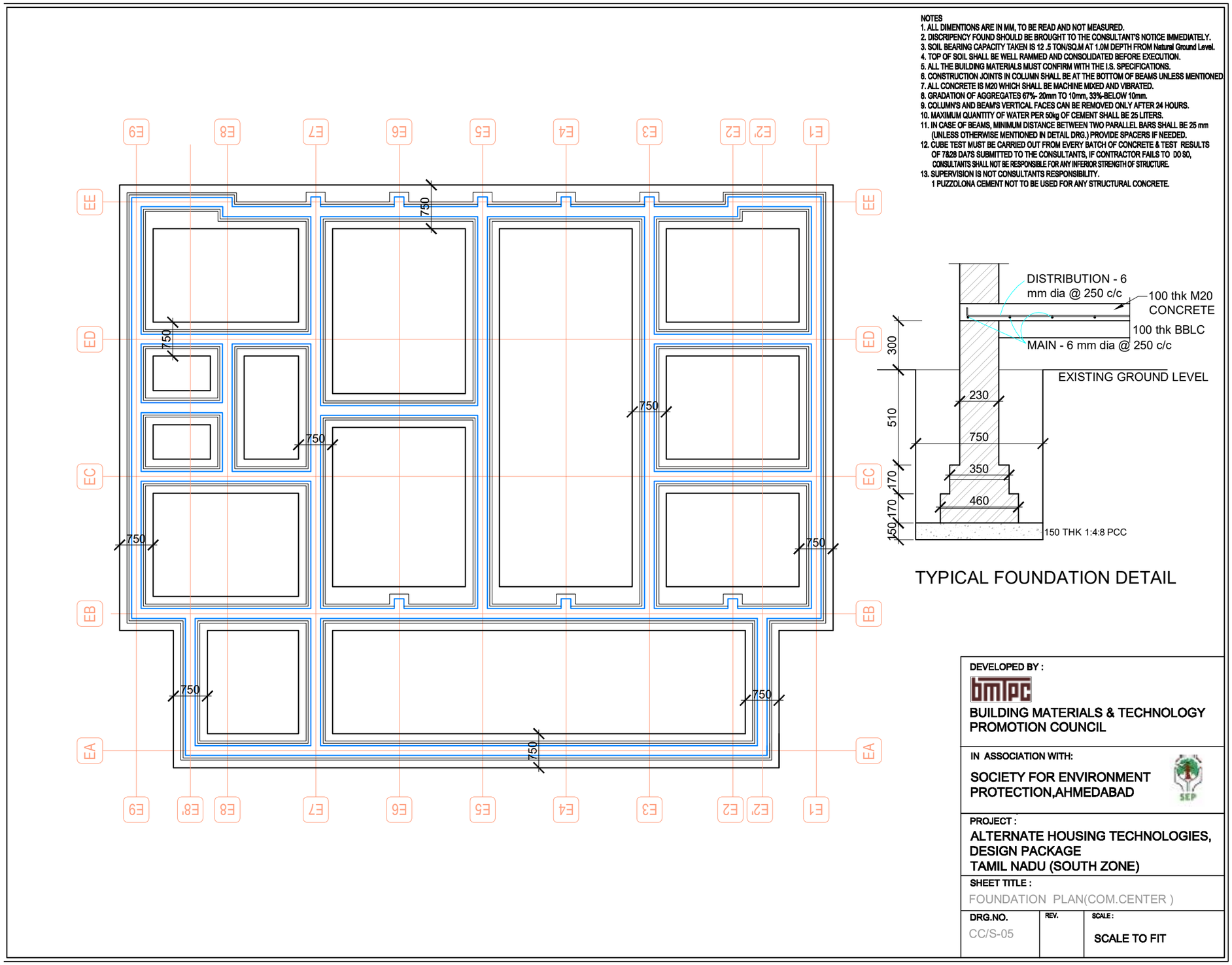
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
FOUNDATION PLAN(SCHOOL)

DRG.NO.	REV.	SCALE :
SC/S-04		SCALE TO FIT

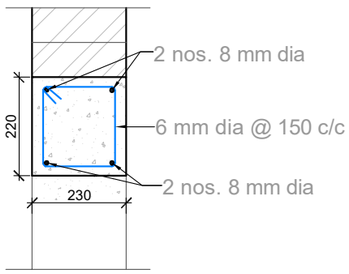
Drawing showing Foundation Plan for Community Hall and Kiosk



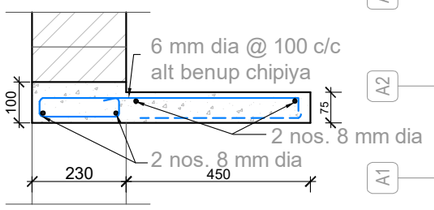
Drawing Showing Structural details of lintel level plan for residential building- Block 1

CONTINIOUS LINTEL

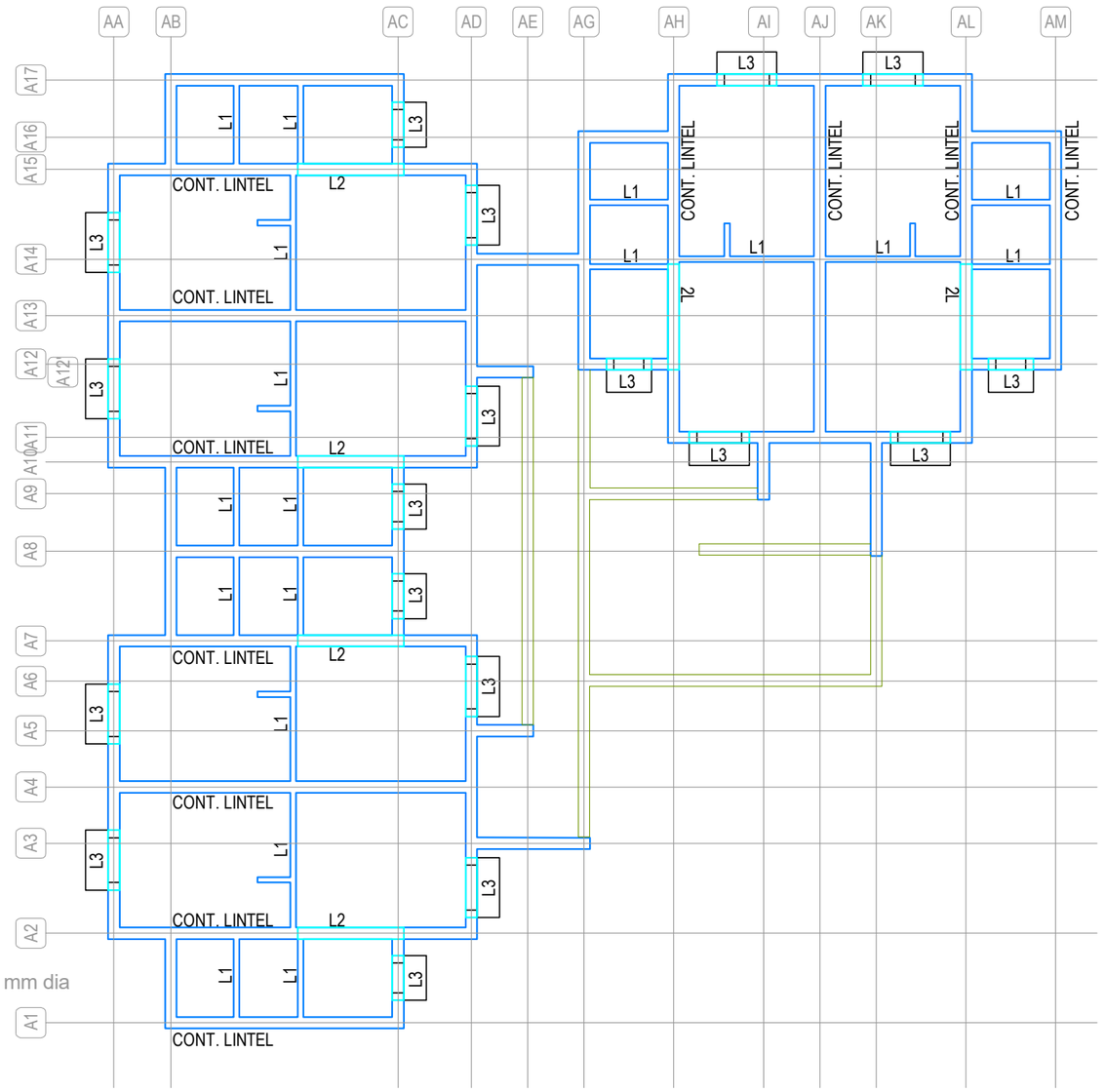
LINTEL- L1



LINTEL- L2



LINTEL- L3



PLAN AT LINTEL LEVEL

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7. ALL CONCRETE IS M20 WHICH SHALL BE MACHINE MIXED AND VIBRATED.
8. GRADATION OF AGGREGATES 67%- 20mm TO 10mm, 33%-BELOW 10mm.
9. COLUMN'S AND BEAM'S VERTICAL FACES CAN BE REMOVED ONLY AFTER 24 HOURS.
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DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
LINTEL PLAN(BLOCK-1)

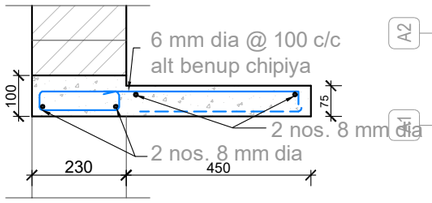
DRG.NO.	REV.	SCALE :
RU/S-06		SCALE TO FIT

Drawing zShowing Structural details of lintel level plan for residential building- Block 2

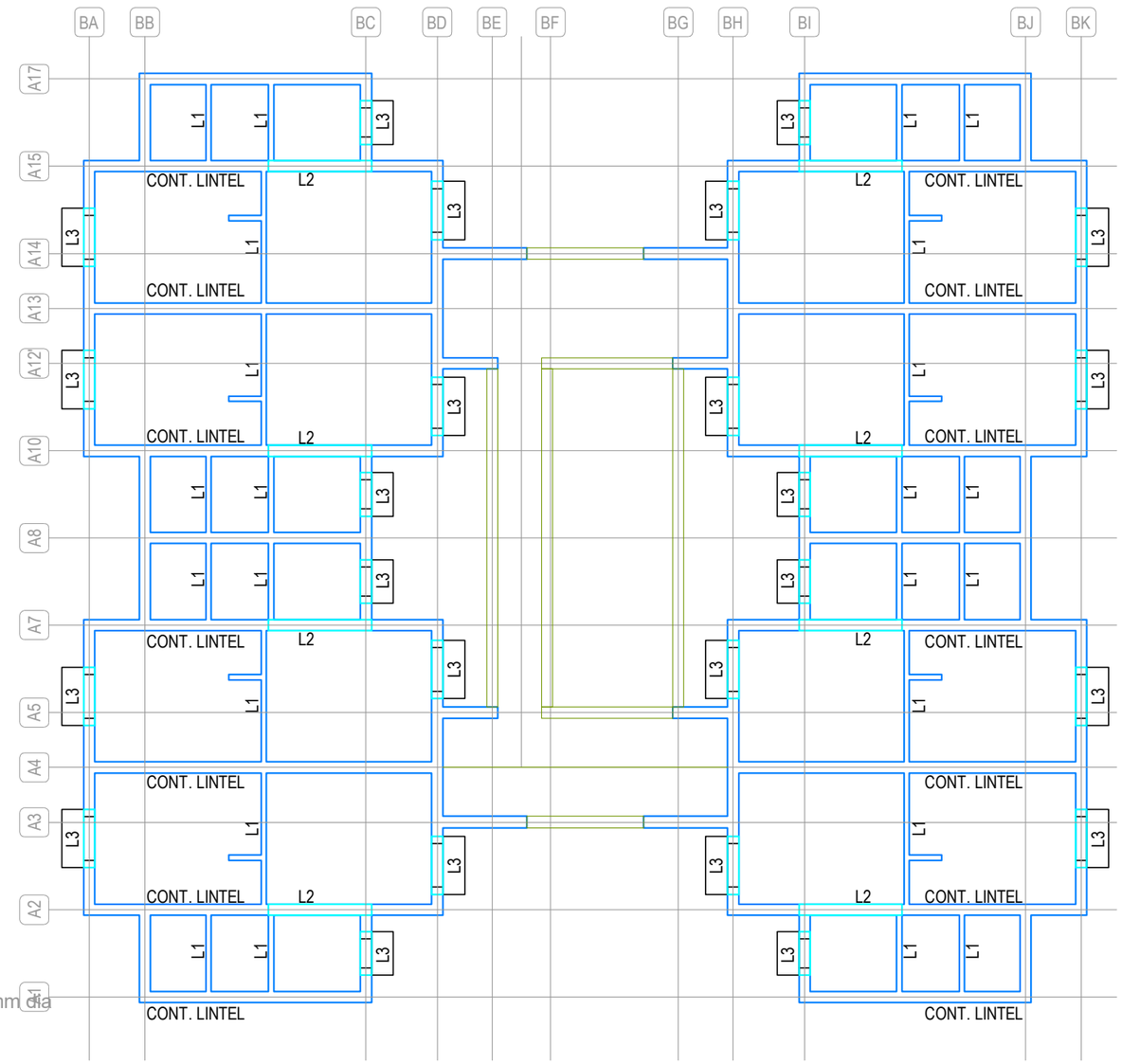
CONTINIOUS LINTEL

LINTEL- L1

LINTEL- L2



LINTEL- L3



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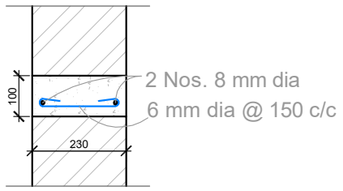
PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
LINTEL PLAN(BLOCK-2)

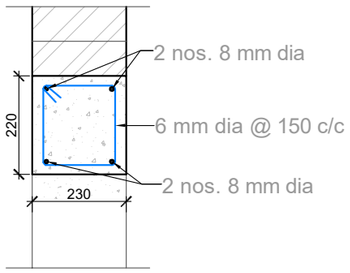
DRG.NO.	REV.	SCALE :
RU/S-07		SCALE TO FIT

Drawing Showing Structural details of lintel level plan for residential building- Block 3

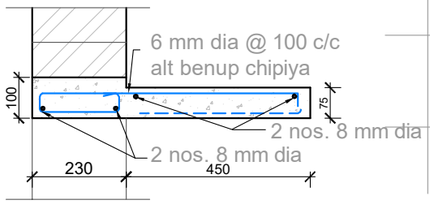


CONTINIOUS LINTEL

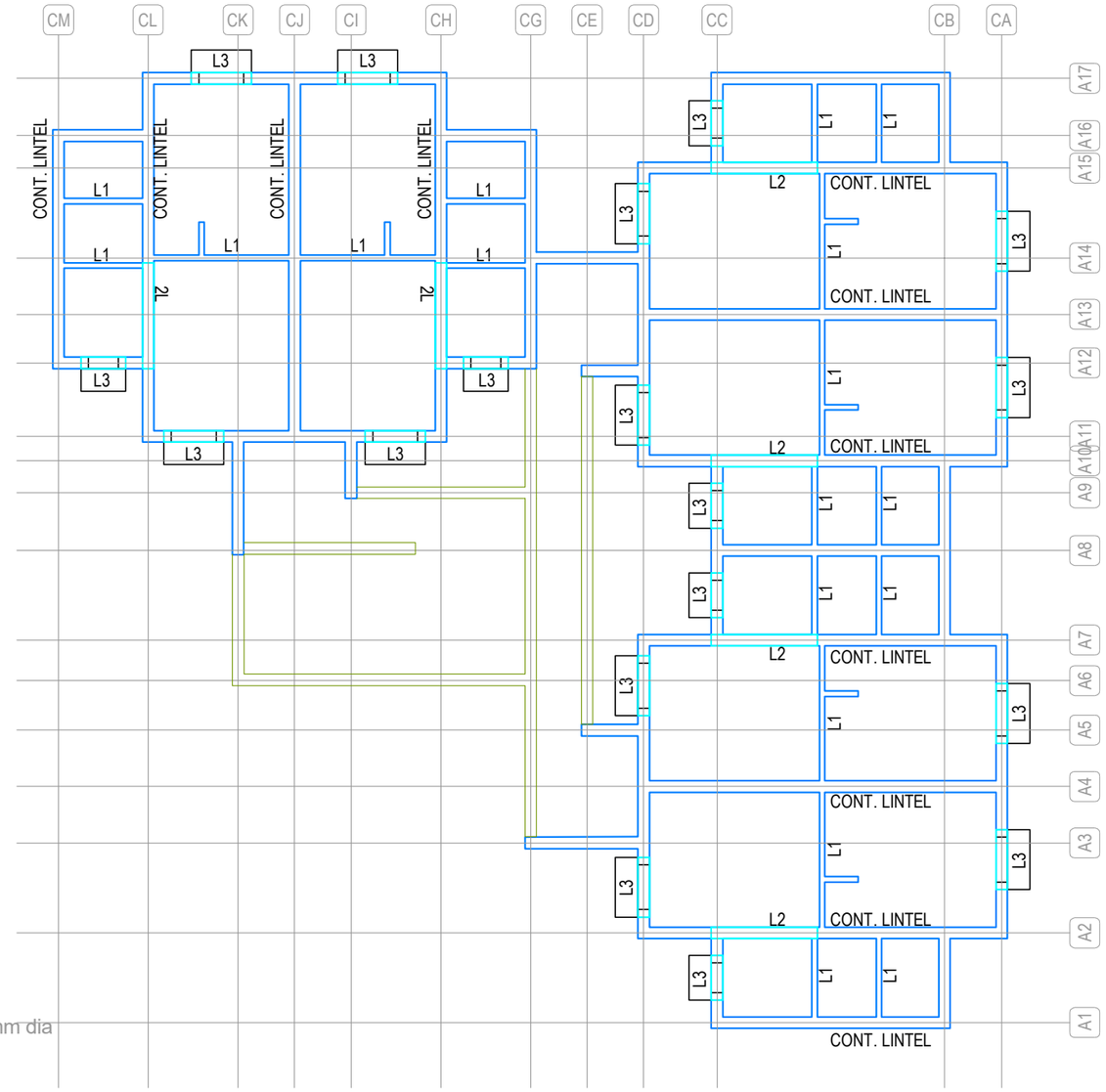
LINTEL- L1



LINTEL- L2



LINTEL- L3



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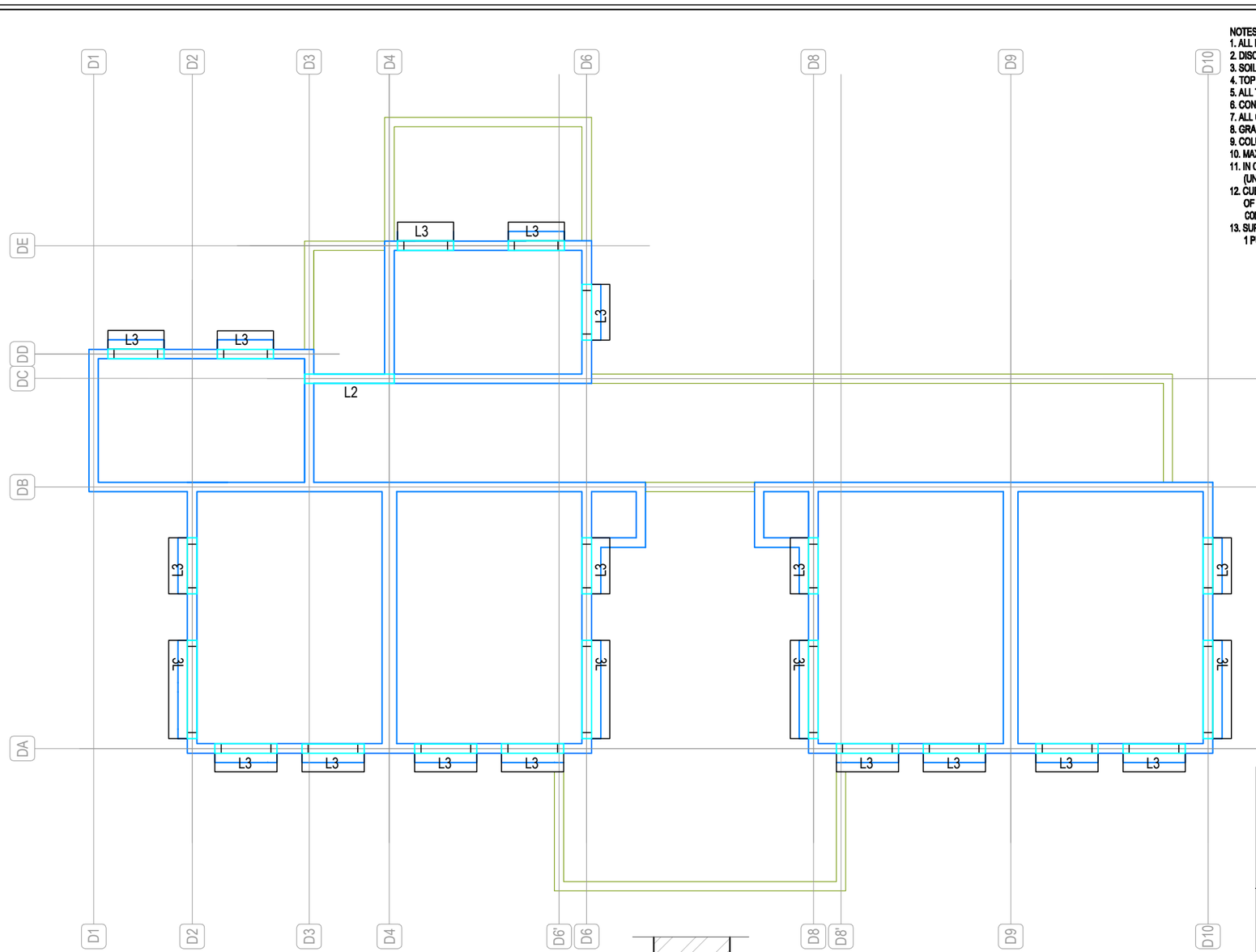
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
LINTEL PLAN(BLOCK-3)

DRG.NO.	REV.	SCALE :
RU/S-08		SCALE TO FIT

Drawing Showing Structural Details of Lintel Level Plan For School



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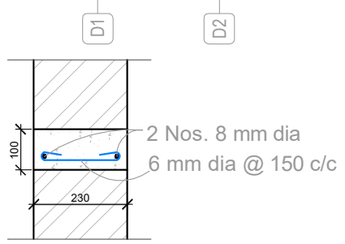
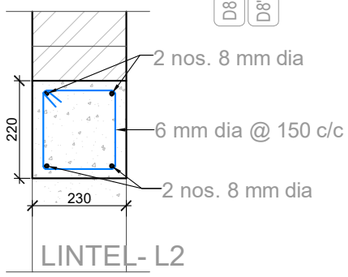
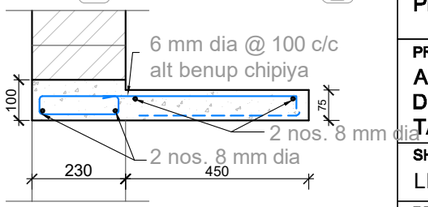


CONTINIOUS LINTEL

LINTEL- L1



LINTEL- L2



LINTEL- L3

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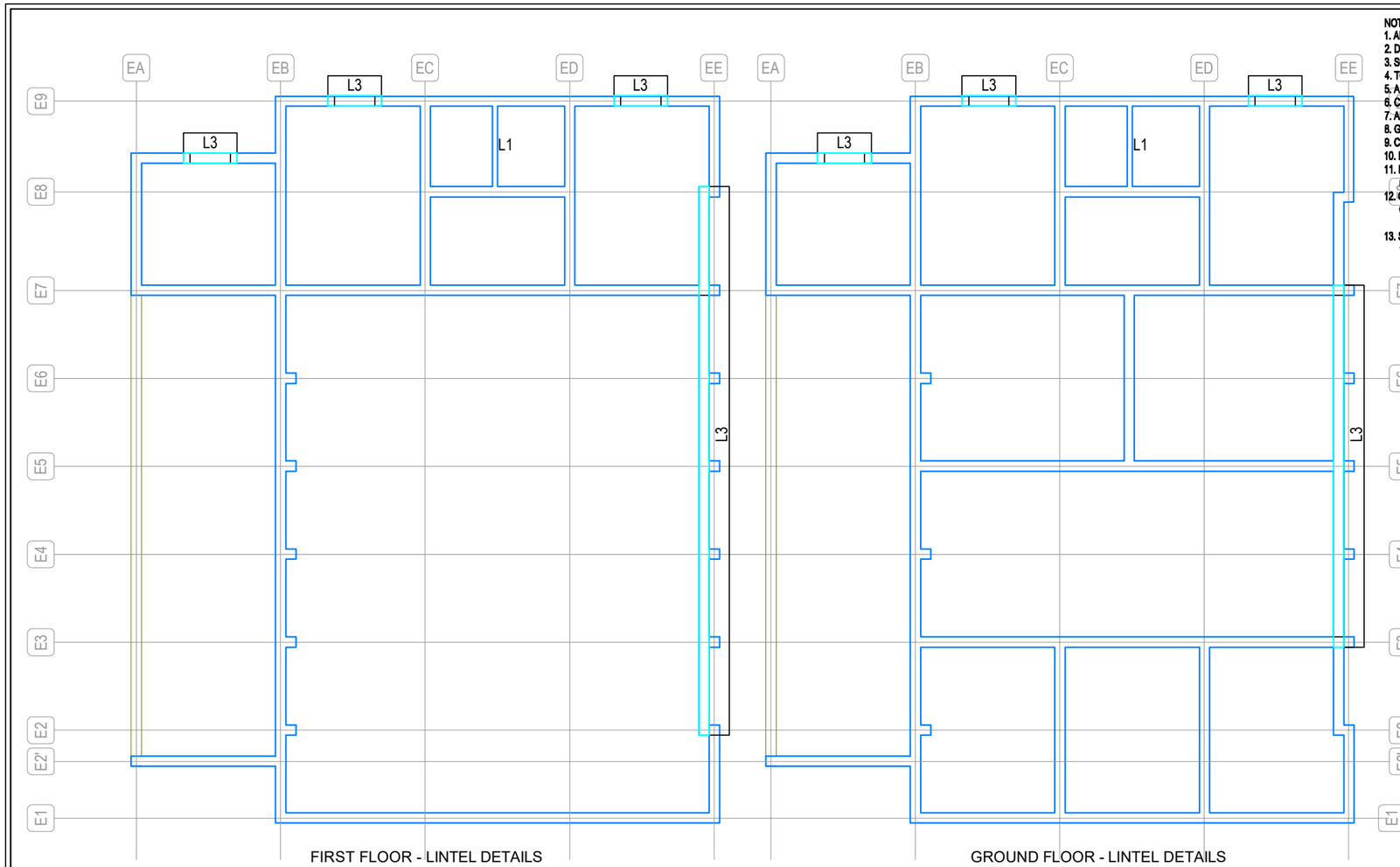
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
LINTEL PLAN(SCHOOL)

DRG.NO.	REV.	SCALE :
SC/S-09		SCALE TO FIT

Drawing Showing Structural Details of Lintel Level Plan For Community Hall and Kiosk



FIRST FLOOR - LINTEL DETAILS

GROUND FLOOR - LINTEL DETAILS

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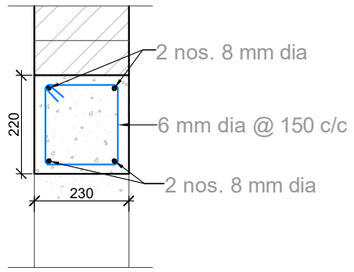

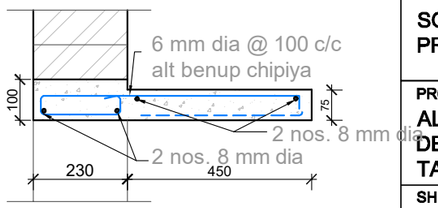

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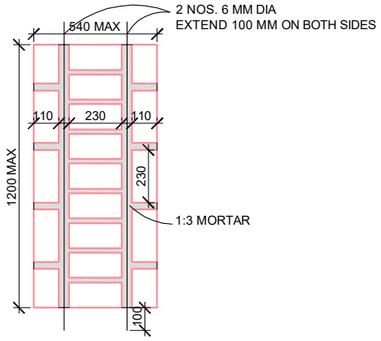
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

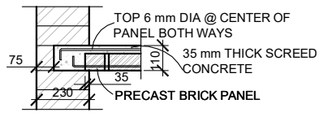
SHEET TITLE :
LINTEL PLAN(COM.CENTER)

DRG.NO.	REV.	SCALE :
RU/S-10		SCALE TO FIT

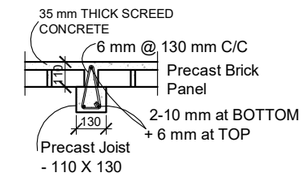
Drawing Showing Structural Details of Floor And Slab for Residential Buildings- Block 1



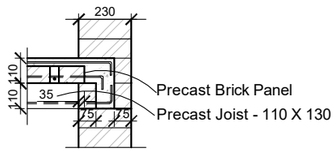
BRICK PANEL DETAIL



JUNCTION OF WALL AND PANEL



JUNCTION OF JOIST AND PANEL



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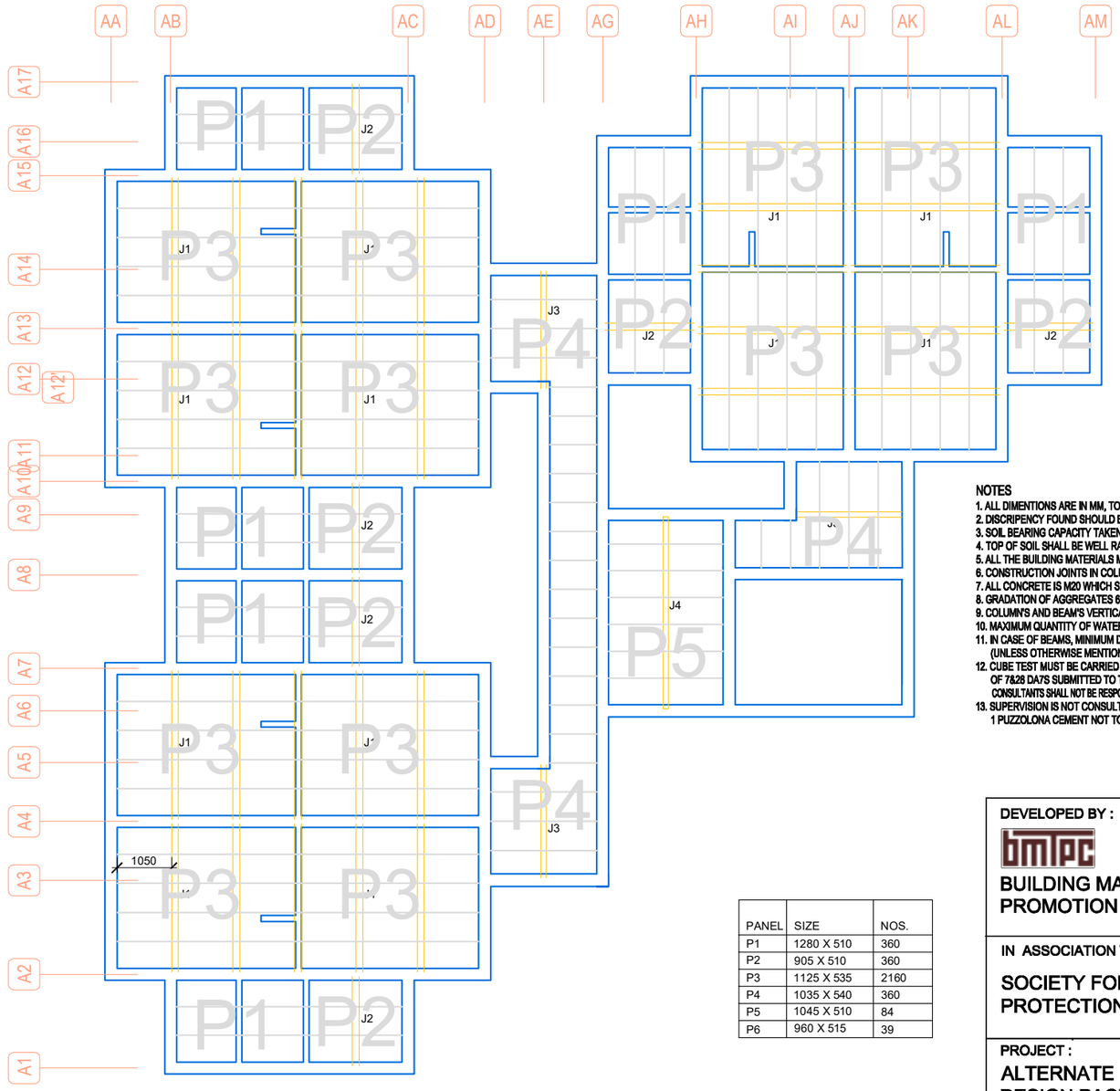

SLAB DETAILS
ALL FLOORS - ROOF
BLOCK -1

PANEL	SIZE	NOS.
P1	1280 X 510	360
P2	905 X 510	360
P3	1125 X 535	2160
P4	1035 X 540	360
P5	1045 X 510	84
P6	960 X 515	39

JOIST	SIZE	LENGTH	TOP REINFORC.	BOTTOM REINFORCE.	STIRRUP	NOS. REQD.	C/C DIST.
J1	110 X 130	2850	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	300	1175
J2	110 X 130	1720	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	60	Center of the bay
J3	110 X 130	2180	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	42	Center of the bay
J4	140 X 130	3680	6 MM -1 NO	16 MM - 2 NO	6 MM @ 130 C/C	6	Center of the bay

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SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

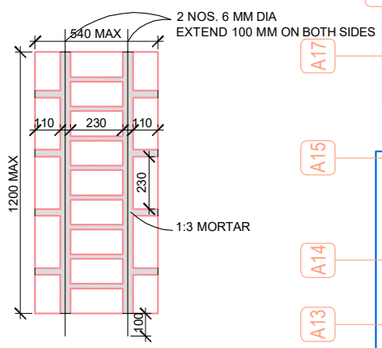
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :

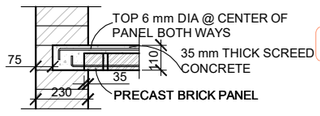
ROOF PLAN(BLOCK-1)

DRG.NO.	REV.	SCALE :
RU/S-11		SCALE TO FIT

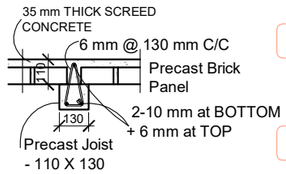
Drawing Showing Structural Details of Floor And Slab For Residential Buildings- Block 2



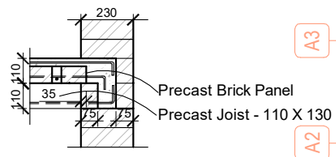
BRICK PANEL DETAIL



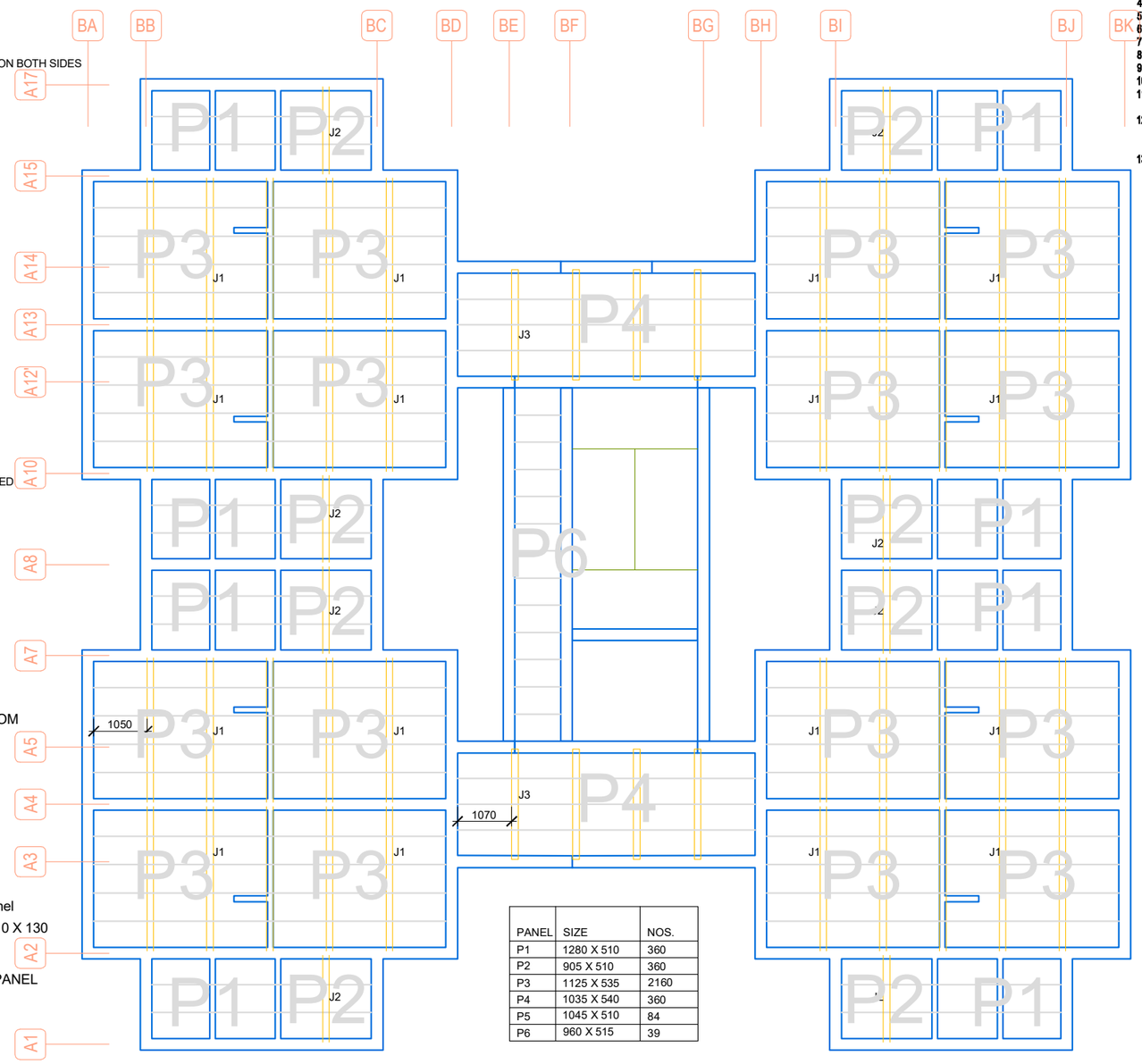
JUNCTION OF WALL AND PANEL



JUNCTION OF JOIST AND PANEL



JUNCTION OF JOIST WALL AND PANEL



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SLAB DETAILS
ALL FLOORS - ROOF
BLOCK -2

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J2	110 X 130	1720	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	60	Center of the bay
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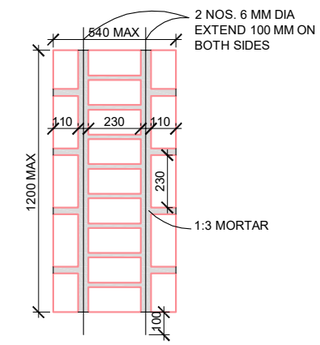
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

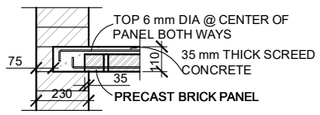
SHEET TITLE :
ROOF PLAN(BLOCK-2)

DRG.NO.	REV.	SCALE :
RU/S-12		SCALE TO FIT

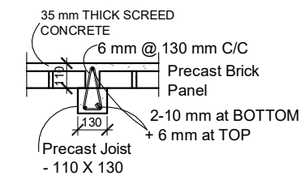
Drawing Showing Structural Details of Floor and Slab for Residential Buildings- Block 3



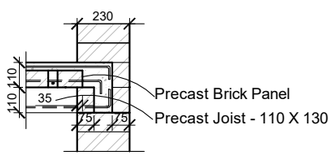
BRICK PANEL DETAIL



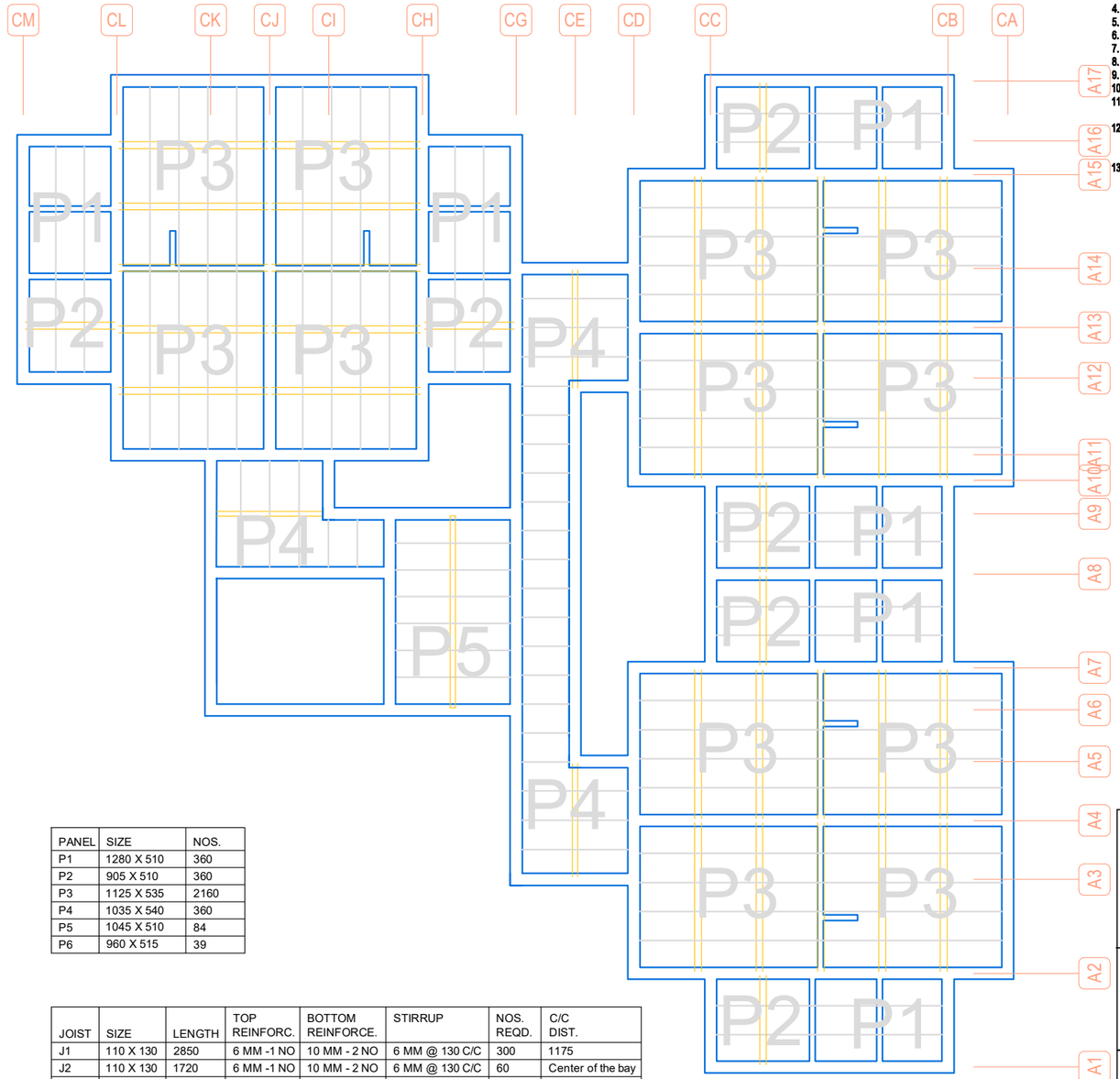
JUNCTION OF WALL AND PANEL



JUNCTION OF JOIST AND PANEL



JUNCTION OF JOIST WALL AND PANEL



PANEL	SIZE	NOS.
P1	1280 X 510	360
P2	905 X 510	360
P3	1125 X 535	2160
P4	1035 X 540	360
P5	1045 X 510	84
P6	960 X 515	39

JOIST	SIZE	LENGTH	TOP REINFORC.	BOTTOM REINFORCE.	STIRRUP	NOS. REQD.	C/C DIST.
J1	110 X 130	2850	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	300	1175
J2	110 X 130	1720	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	60	Center of the bay
J3	110 X 130	2180	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	42	Center of the bay
J4	140 X 130	3680	6 MM -1 NO	16 MM - 2 NO	6 MM @ 130 C/C	6	Center of the bay

SLAB DETAILS
ALL FLOORS - ROOF
BLOCK -3

NOTES

1. ALL DIMENTIONS ARE IN MM, TO BE READ AND NOT MEASURED.
2. DISCRIPENCY FOUND SHOULD BE BROUGHT TO THE CONSULTANT'S NOTICE IMMEDIATELY.
3. SOIL BEARING CAPACITY TAKEN IS 12 .5 TON/SQ.M AT 1.0M DEPTH FROM Natural Ground Level.
4. TOP OF SOIL SHALL BE WELL RAMMED AND CONSOLIDATED BEFORE EXECUTION.
5. ALL THE BUILDING MATERIALS MUST CONFIRM WITH THE I.S. SPECIFICATIONS.
6. CONSTRUCTION JOINTS IN COLUMN SHALL BE AT THE BOTTOM OF BEAMS UNLESS MENTIONED.
7. ALL CONCRETE IS M20 WHICH SHALL BE MACHINE MIXED AND VIBRATED.
8. GRADATION OF AGGREGATES 67%- 20mm TO 10mm, 33%-BELOW 10mm.
9. COLUMN'S AND BEAM'S VERTICAL FACES CAN BE REMOVED ONLY AFTER 24 HOURS.
10. MAXIMUM QUANTITY OF WATER PER 50kg OF CEMENT SHALL BE 25 LITERS.
11. IN CASE OF BEAMS, MINIMUM DISTANCE BETWEEN TWO PARALLEL BARS SHALL BE 25 mm (UNLESS OTHERWISE MENTIONED IN DETAIL DRG.) PROVIDE SPACERS IF NEEDED.
12. CUBE TEST MUST BE CARRIED OUT FROM EVERY BATCH OF CONCRETE & TEST RESULTS OF 7&28 DAYS SUBMITTED TO THE CONSULTANTS, IF CONTRACTOR FAILS TO DO SO, CONSULTANTS SHALL NOT BE RESPONSIBLE FOR ANY INFERIOR STRENGTH OF STRUCTURE.
13. SUPERVISION IS NOT CONSULTANTS RESPONSIBILITY.
    1 PUZZOLONA CEMENT NOT TO BE USED FOR ANY STRUCTURAL CONCRETE.

DEVELOPED BY :

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

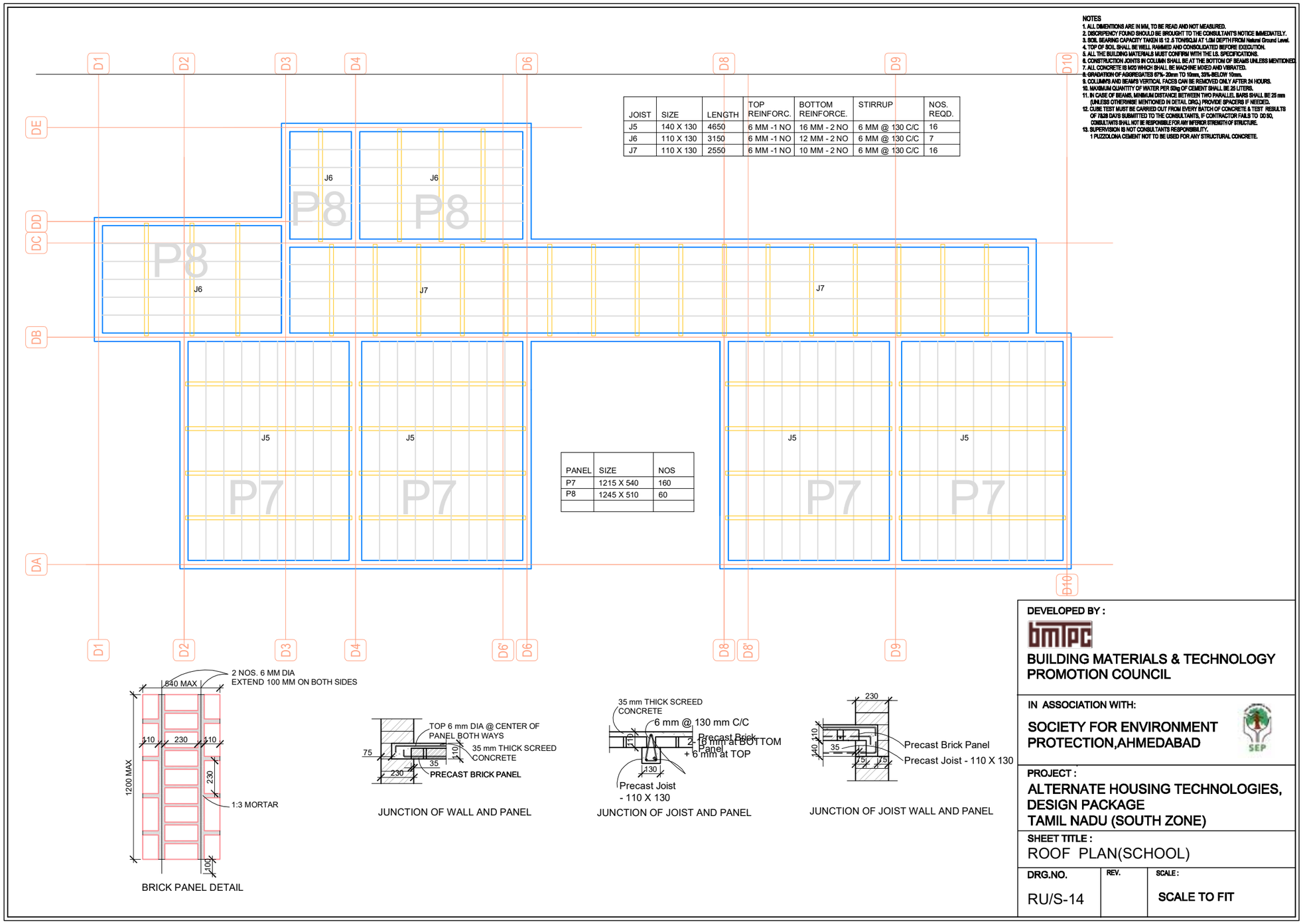
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :

ROOF PLAN(BLOCK-3)

DRG.NO.	REV.	SCALE :
RU/S-13		SCALE TO FIT

Drawing Showing Structural Details of Floor And Slab For School



JOIST	SIZE	LENGTH	TOP REINFORC.	BOTTOM REINFORCE.	STIRRUP	NOS. REQD.
J5	140 X 130	4650	6 MM -1 NO	16 MM - 2 NO	6 MM @ 130 C/C	16
J6	110 X 130	3150	6 MM -1 NO	12 MM - 2 NO	6 MM @ 130 C/C	7
J7	110 X 130	2550	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	16

PANEL	SIZE	NOS
P7	1215 X 540	160
P8	1245 X 510	60

NOTES
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BRICK PANEL DETAIL

JUNCTION OF WALL AND PANEL

JUNCTION OF JOIST AND PANEL

JUNCTION OF JOIST WALL AND PANEL

DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

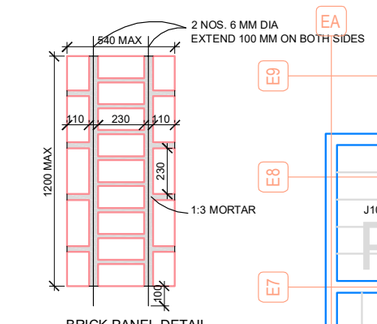
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

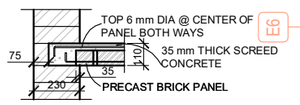
SHEET TITLE :
ROOF PLAN(SCHOOL)

DRG.NO.	REV.	SCALE :
RU/S-14		SCALE TO FIT

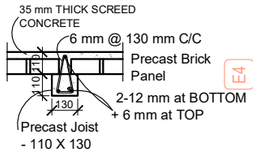
Drawing Showing Structural Details of Floor and Slab for Community Hall and Kiosk



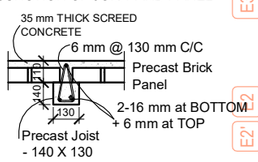
BRICK PANEL DETAIL



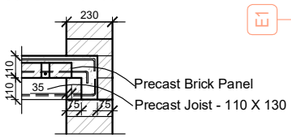
JUNCTION OF WALL AND PANEL



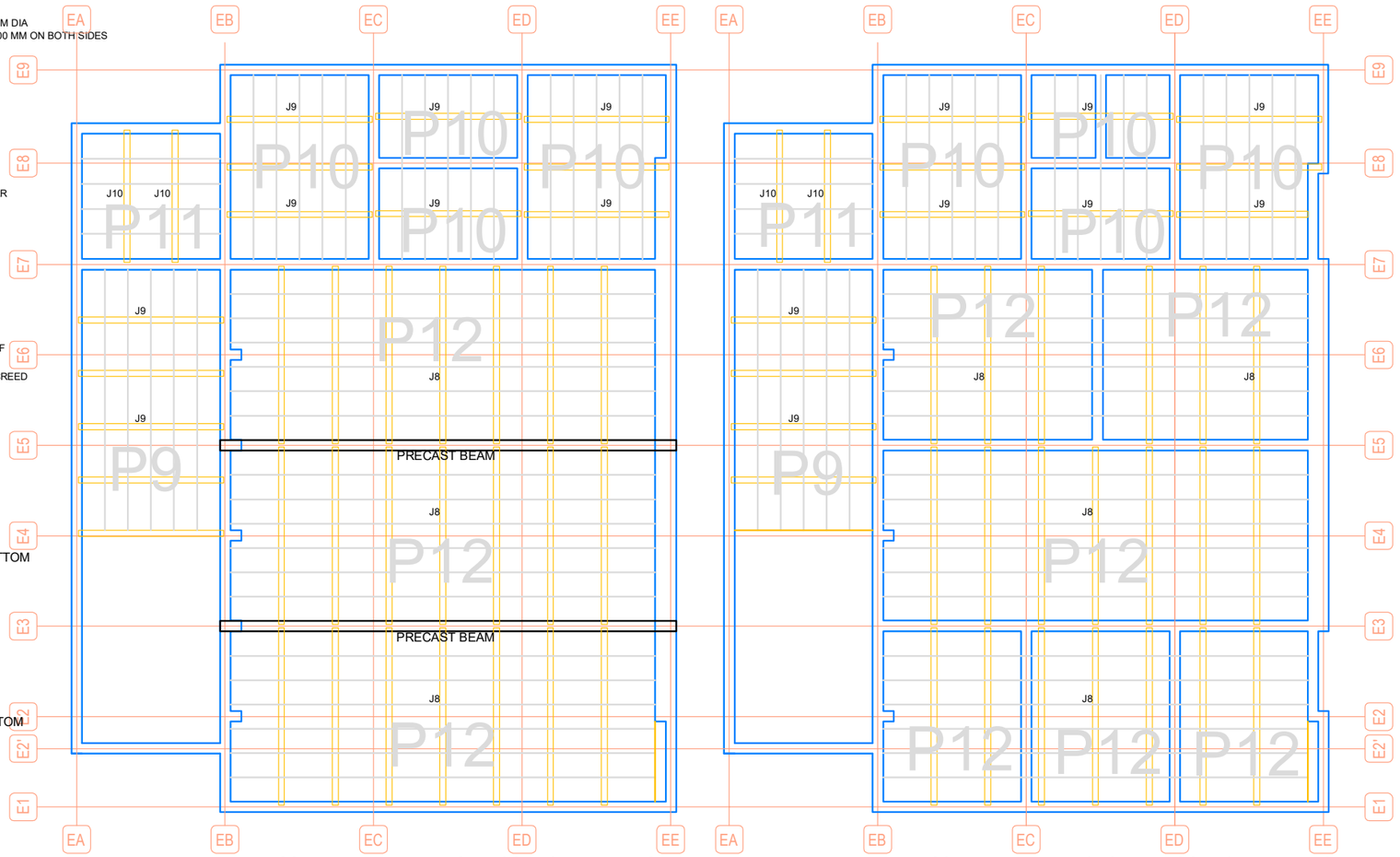
JUNCTION OF JOIST AND PANEL



JUNCTION OF JOIST AND PANEL

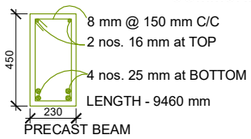


JUNCTION OF JOIST WALL AND PANEL



COMMUNITY HALL - FIRST FLOOR - SLAB DETAILS

COMMUNITY HALL - GROUND FLOOR - SLAB DETAILS



PRECAST BEAM

JOIST	SIZE	LENGTH	TOP REINFORC.	BOTTOM REINFORCE.	STIRRUP	NOS. REQD.
J8	140 X 130	3850	6 MM -1 NO	16 MM - 2 NO	6 MM @ 130 C/C	42
J9	110 X 130	3150	6 MM -1 NO	12 MM - 2 NO	6 MM @ 130 C/C	24
J10	110 X 130	2780	6 MM -1 NO	10 MM - 2 NO	6 MM @ 130 C/C	4

PANEL	SIZE	NOS
P9	1110 X 510	60
P10	980 X 510	144
P11	995 X 540	30
P12	1120 X 520	336

NOTES

1. ALL DIMENTIONS ARE IN MM, TO BE READ AND NOT MEASURED.
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DEVELOPED BY :

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

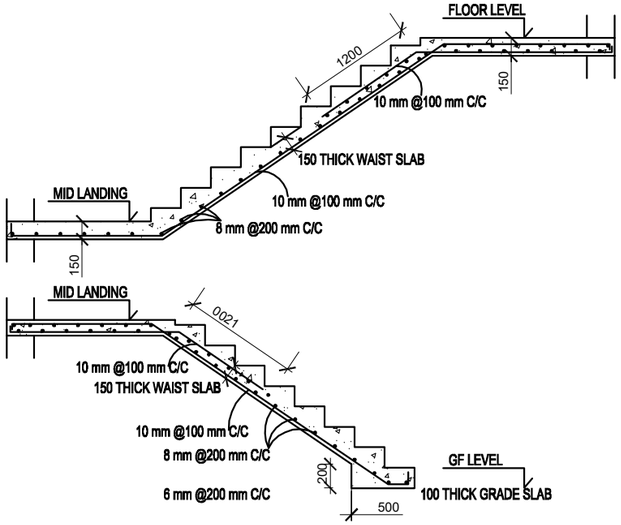
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

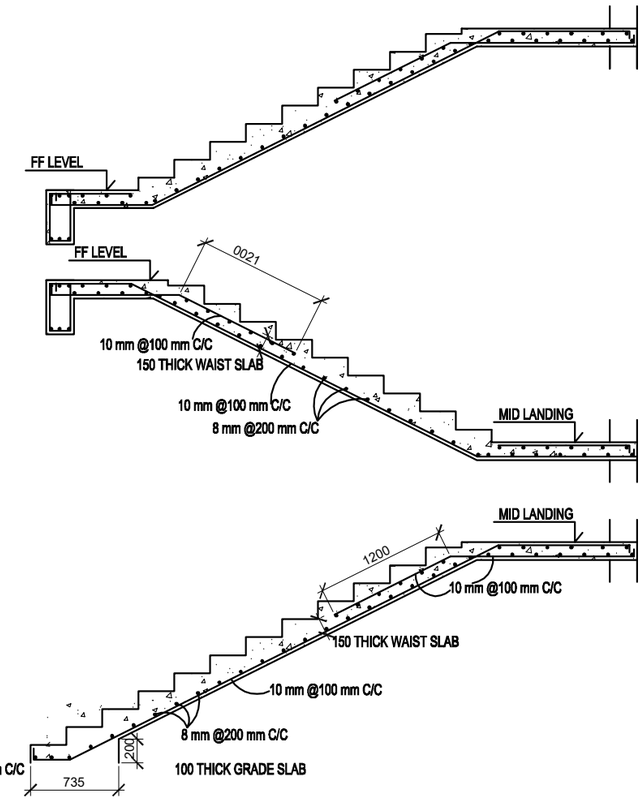
SHEET TITLE :

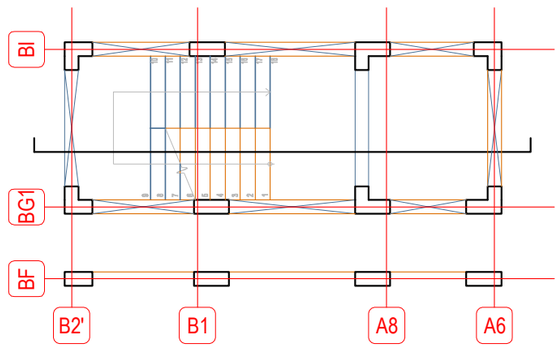
ROOF PLAN(COM.CEN.)

DRG.NO.	REV.	SCALE :
RU/S-15		SCALE TO FIT

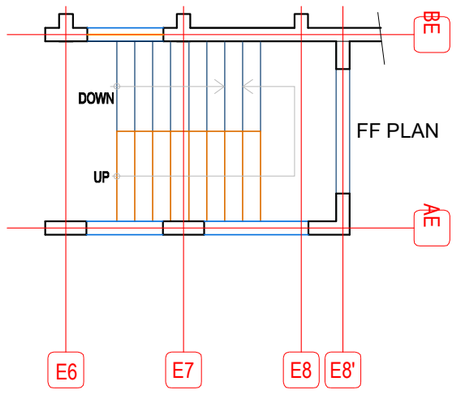
Drawing Showing Structural Details of Staircase







RESIDENTIAL STAIR DETAILS



COMMUNITY HALL STAIR DETAILS

DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
STAIRCASE DETAIL

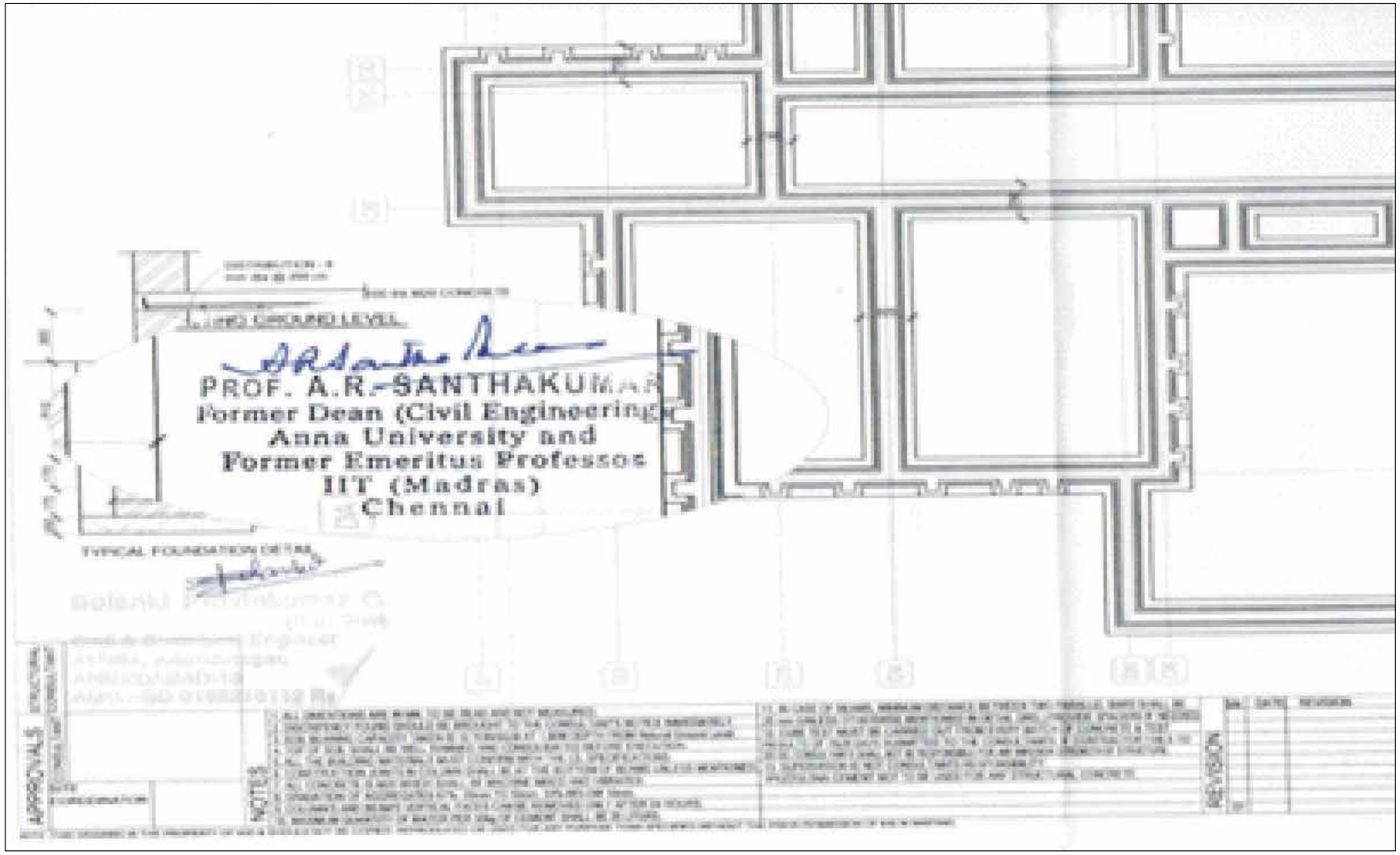
DRG.NO.	REV.	SCALE :
S-16		SCALE TO FIT

7 Proof Checking

While working on the structural design of the various structures, we had taken atmost care and precautions to ensure conformity with available codal framework where ever possible. Still to ensure safety, a third party proof checking process was carried out.

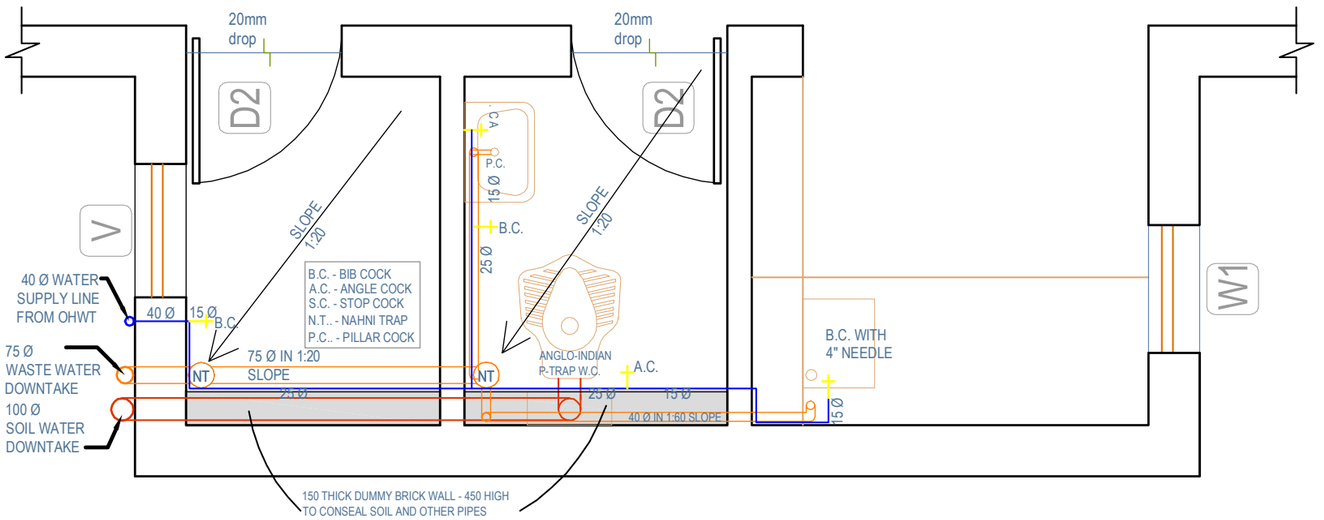
All the structural drawings of the project were proof checked by Dr. A. R. Santhakumar (Prof. Emeritus – IIT, Madras). He is one of the few persons in the country who has worked on validation of Filler slab and Rat-trap bond technologies.

This was an additional step taken by BMTPC so as to help build the confidence of respective state government in the present design package and also ensure highest level of structural safety.



Scanned copy of the proof checked drawings by Dr. A. R. Santhakumar

Drawing Showing Plumbing Details of A Typical Residential Unit

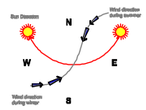


NOTE:

ALL PIPES ARE EXPOSED PIPES EXCEPT THE PIPES PASSING THROUGH THE DUMMY WALL.

NOTES :

1. ALL DIMENSIONS ARE IN MILIMETER & LVL. ARE IN METER.
2. DIMENSIONS SHOULD BE READ NOT TO BE MEASURED.
3. ANY DISCREPANCY IN THE DRAWING SHOULD BE BROUGHT TO THE ARCHITECT BEFORE COMMENCMENT OF THE CONSTRUCTION.
4. ANY ADDITION OR ALTERATION TO THIS DRAWING SHOULD NOT BE MADE WITHOUT THE WRITTEN CONSENT OF THE ARCHITECT.
5. STRUCTURAL DESIGNS WILL NOT BE THE RESPONSIBILITY OF THE ARCHITECTS.
6. ALL DIMENSIONS ARE UNFINISHED.



DEVELOPED BY :

BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

IN ASSOCIATION WITH:

SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :

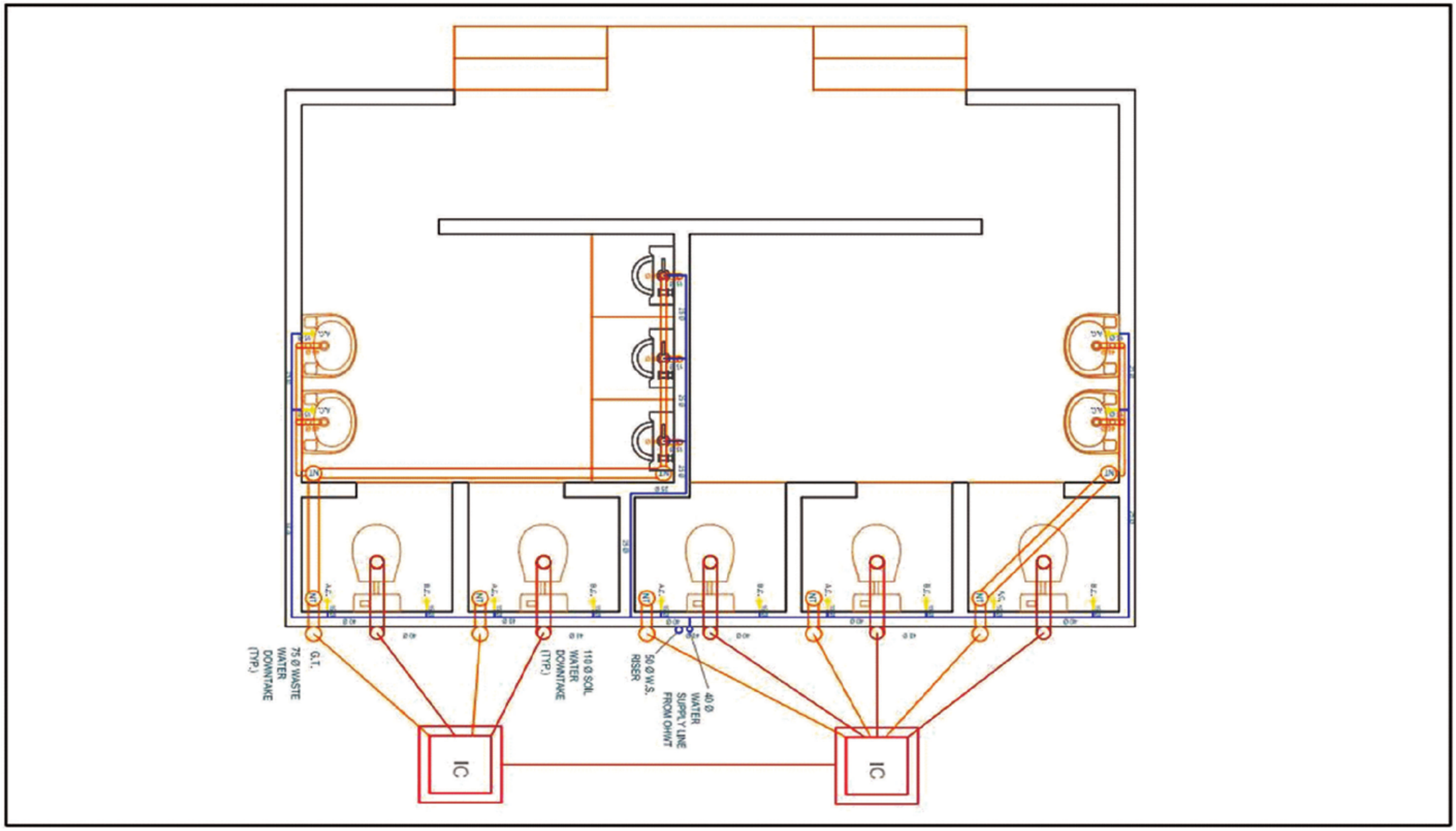
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :

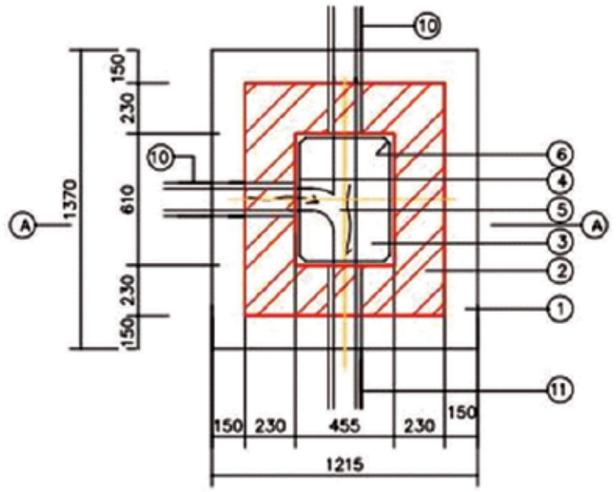
PLUBMING DETAIL (RESIDENCE)

DRG.NO.	REV.	SCALE :
PL-01		SCALE TO FIT

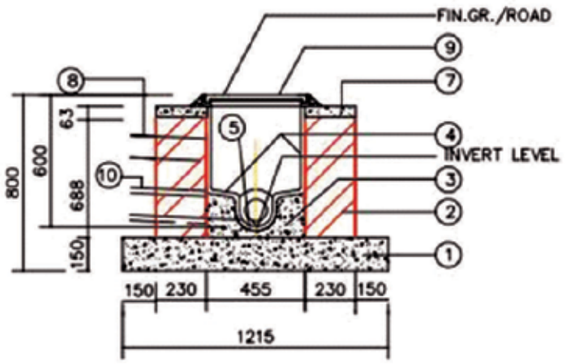
Drawing Showing Plumbing Details of School And Community Center



Drawing Showing details of Inspection chamber



PLAN

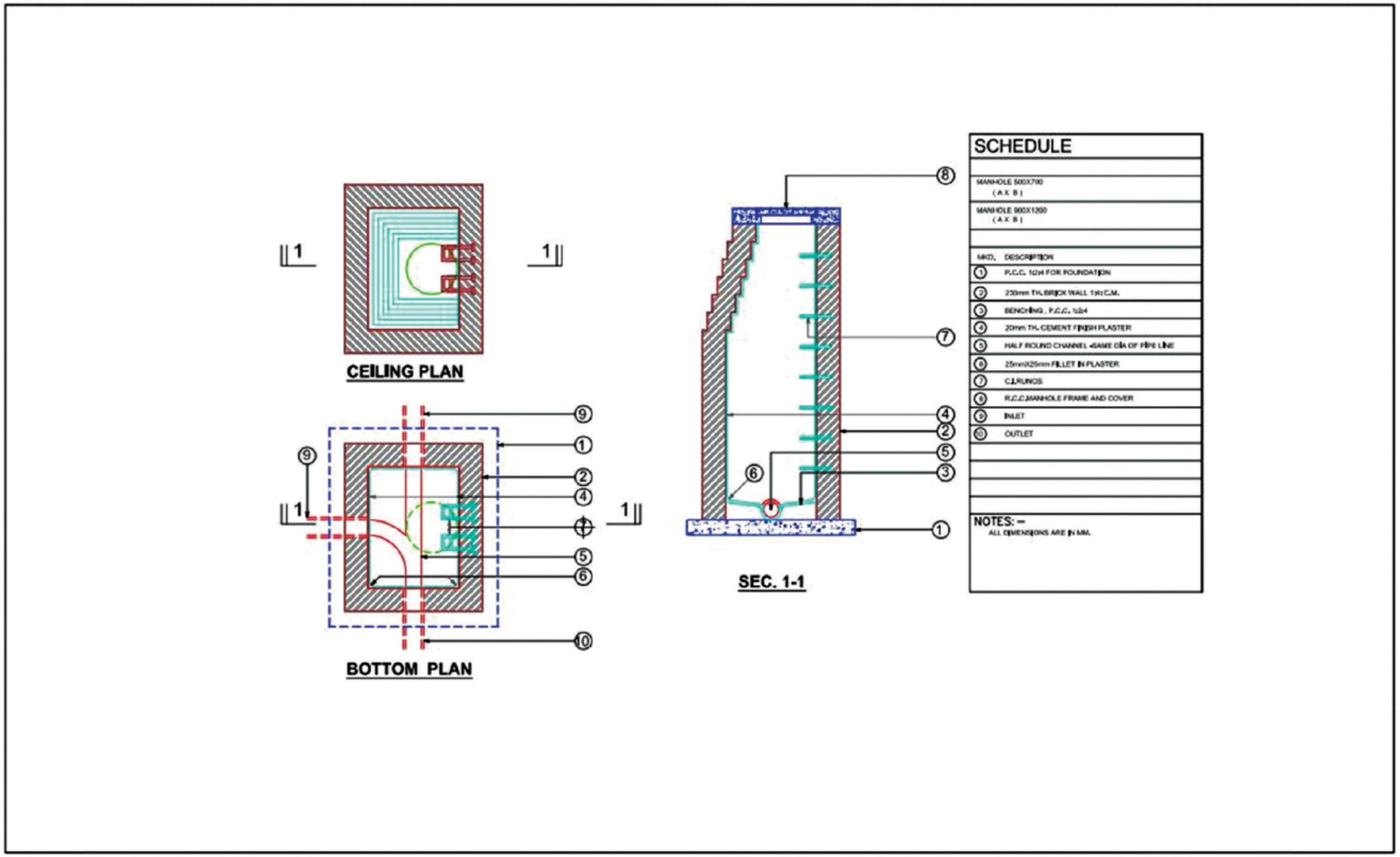


SECTION Ⓐ Ⓐ

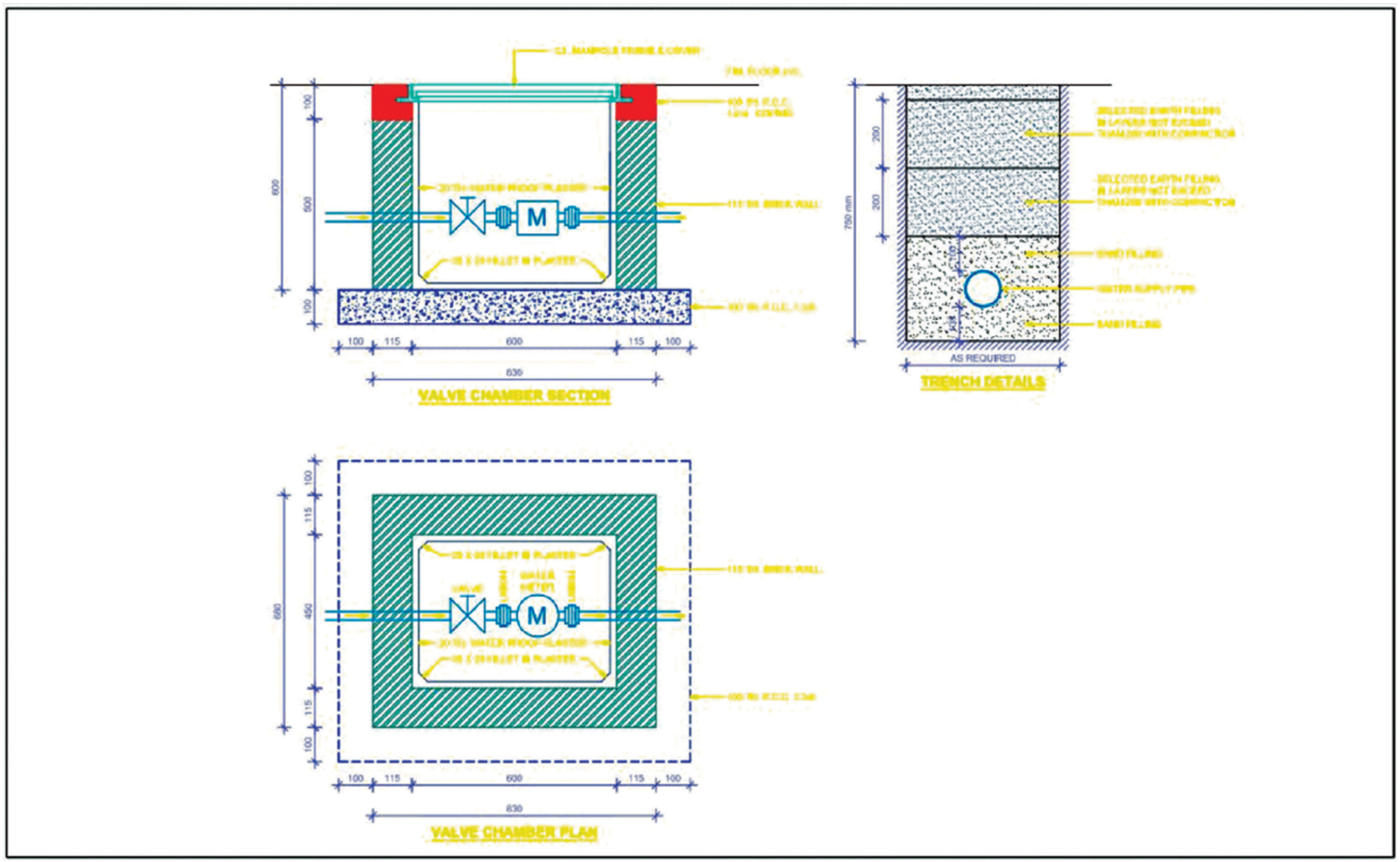
SCHEDULE	
INSPECTION CHAMBER	450 mm X 600mm x 600 mm DEEP
MKD.	DESCRIPTION
①	P.C.C. 1:3:6 FOR FOUNDATION
②	230mm TH. BRICK WALL 1:4: C.M.
③	BENCHING , P.C.C. 1:3:6
④	20mm TH. CEMENT FINISH PLASTER
⑤	HALF ROUND CHANNEL –SAME DIA OF PIPE LINE
⑥	25mmX25mm FILLET IN PLASTER
⑦	COPING P.C.C. 1:2:4
⑧	VENT PIPE
⑨	C.I.MANHOLE FRAME AND COVER
⑩	INLET
⑪	OUTLET

NOTES: –
ALL DIMENSIONS ARE IN MM.

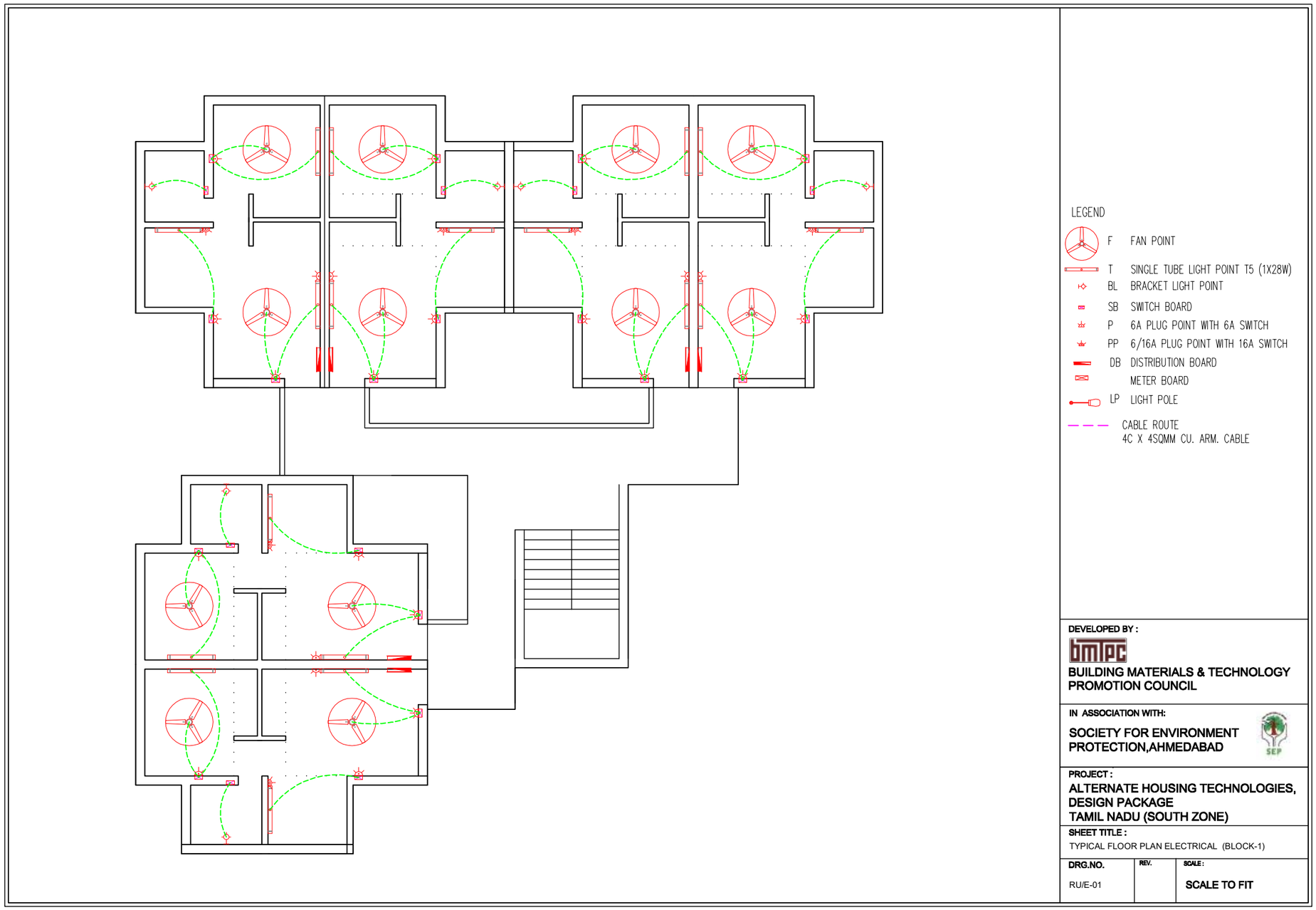
Drawing Showing details of Manhole



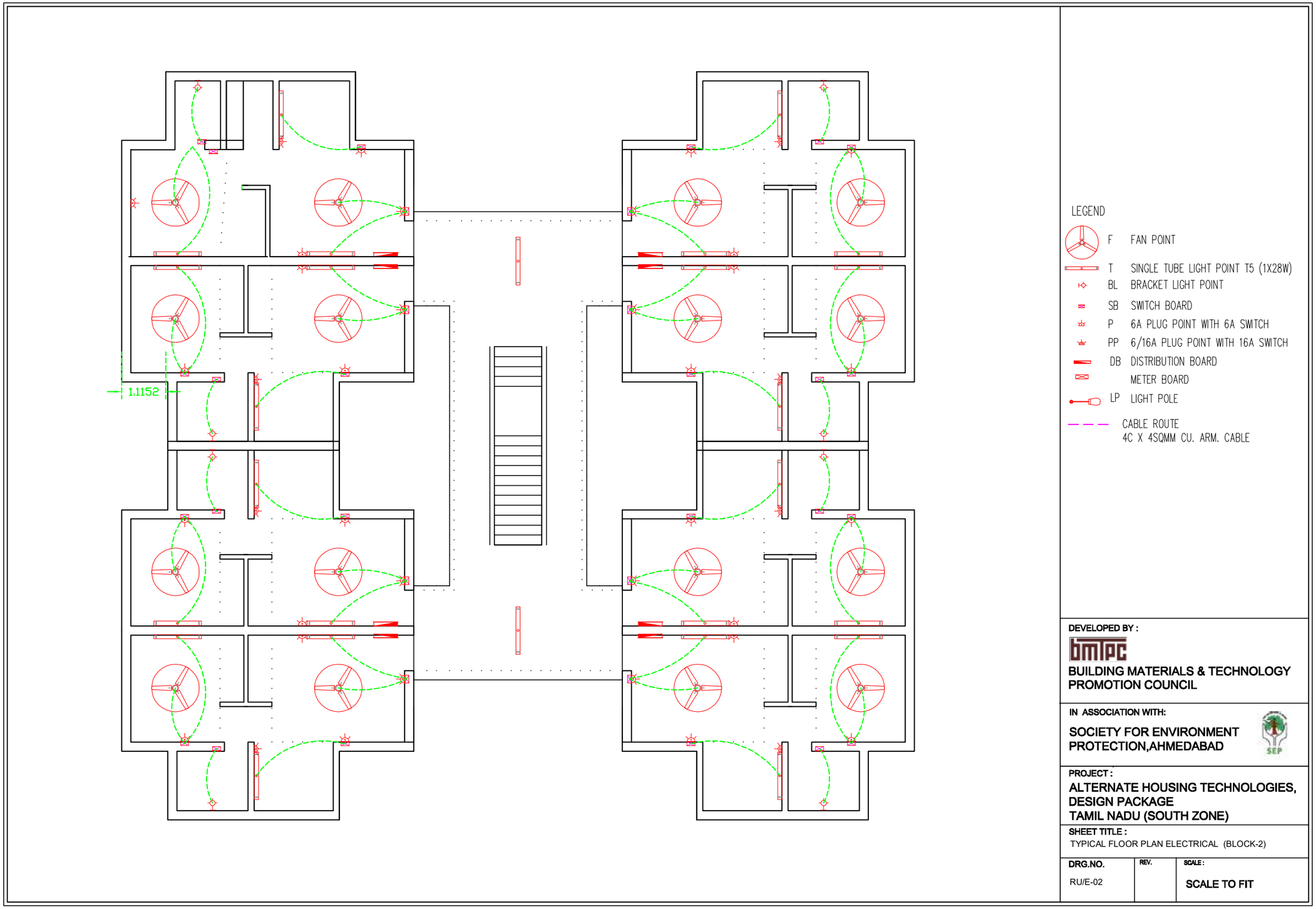
Drawing Showing details of Valve Chamber



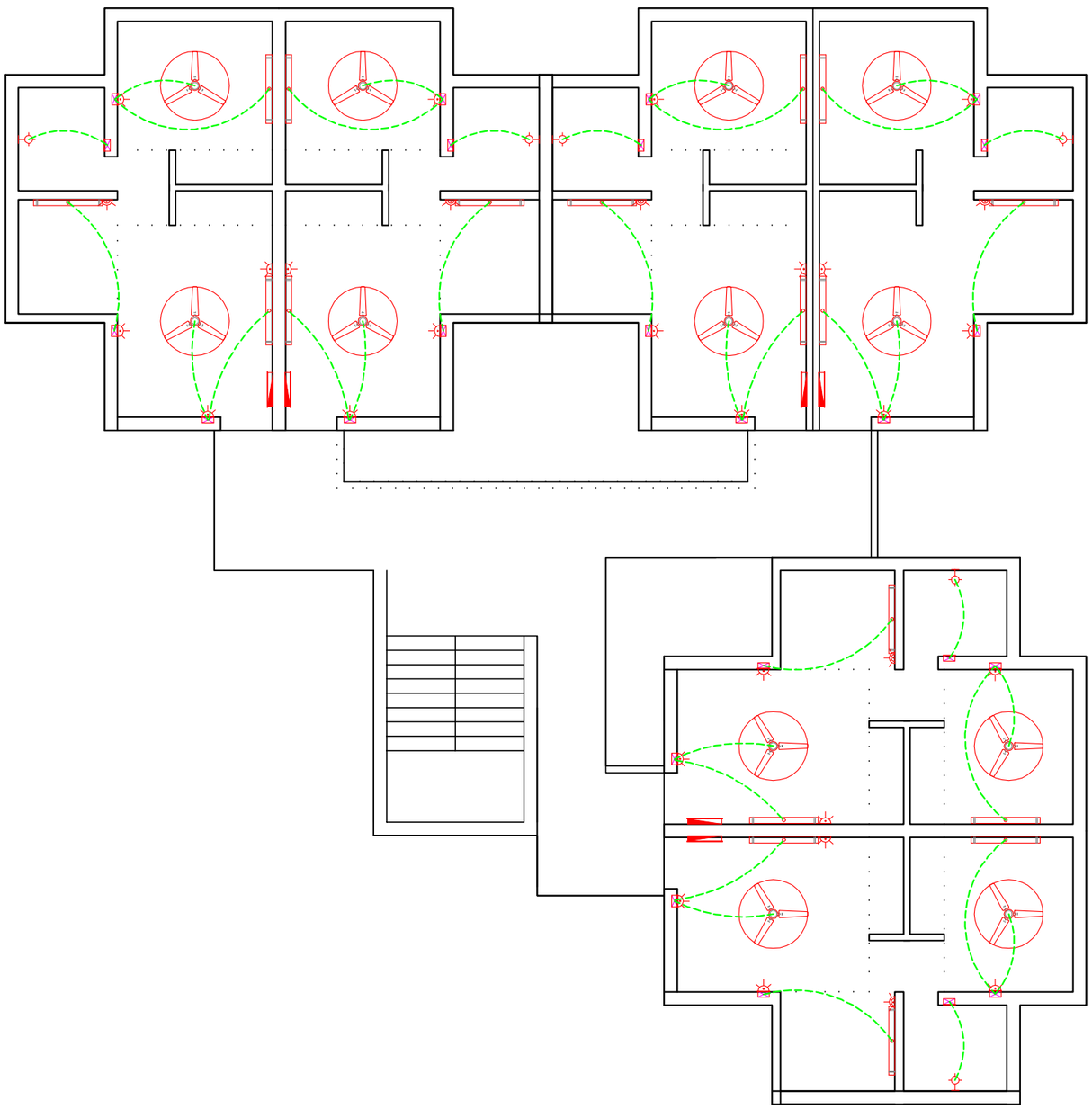
Drawing Showing Electrical Plan of Residential- Block 1



Electrical plan of Residential- Block 2



Electrical plan of Residential- Block 3



LEGEND

F	FAN POINT
T	SINGLE TUBE LIGHT POINT T5 (1X28W)
BL	BRACKET LIGHT POINT
SB	SWITCH BOARD
P	6A PLUG POINT WITH 6A SWITCH
PP	6/16A PLUG POINT WITH 16A SWITCH
DB	DISTRIBUTION BOARD
	METER BOARD
LP	LIGHT POLE

CABLE ROUTE
4C X 4SQMM CU. ARM. CABLE

DEVELOPED BY :
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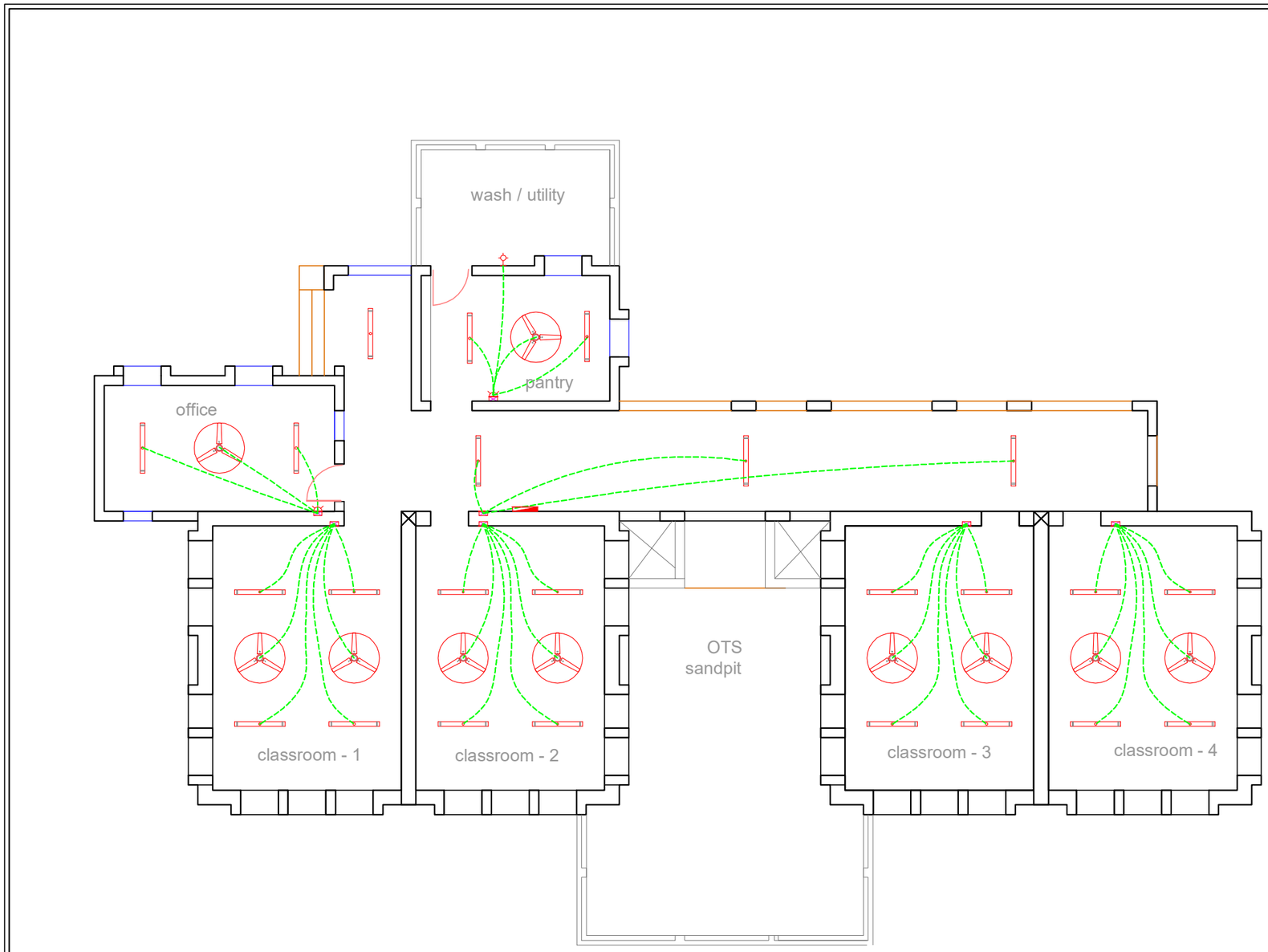
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
TYPICAL FLOOR PLAN ELECTRICAL (BLOCK-3)

DRG.NO.	REV.	SCALE :
RU/E-03		SCALE TO FIT

Electrical Plan of School



SCHOOL

LEGEND

F FAN POINT
T SINGLE TUBE LIGHT POINT T5 (1X28W)
BL BRACKET LIGHT POINT
SB SWITCH BOARD
P 6A PLUG POINT WITH 6A SWITCH
PP 6/16A PLUG POINT WITH 16A SWITCH
DB DISTRIBUTION BOARD
METER BOARD
LP LIGHT POLE
CABLE ROUTE
4C X 4SQMM CU. ARM. CABLE

TYPICAL FLOOR PLAN ELECTRICAL (BLOCK-1)

RU/E-01

DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

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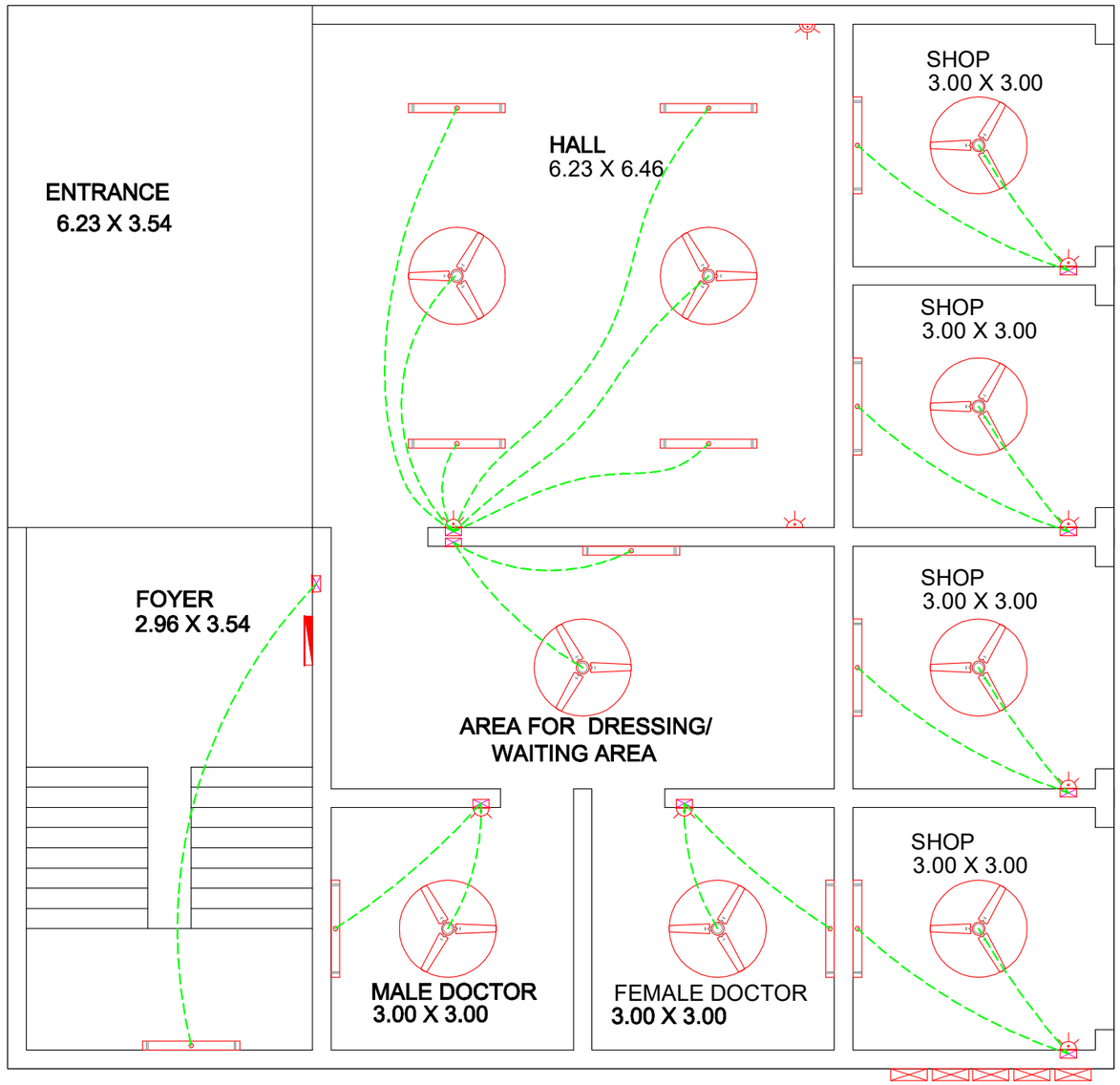
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
ELECTRICAL FLOOR PLAN (SCHOOL)

DRG.NO.	REV.	SCALE :
SC/E-04		SCALE TO FIT

Electrical Plan Of Community Hall and Kiosk



SHOP+COMMUNITY (G+1)

LEGEND

F	FAN POINT
T	SINGLE TUBE LIGHT POINT T5 (1X28W)
BL	BRACKET LIGHT POINT
SB	SWITCH BOARD
P	6A PLUG POINT WITH 6A SWITCH
PP	6/16A PLUG POINT WITH 16A SWITCH
DB	DISTRIBUTION BOARD
	METER BOARD
LP	LIGHT POLE
	CABLE ROUTE 4C X 4SQMM CU. ARM. CABLE

DEVELOPED BY :
BUILDING MATERIALS & TECHNOLOGY PROMOTION COUNCIL

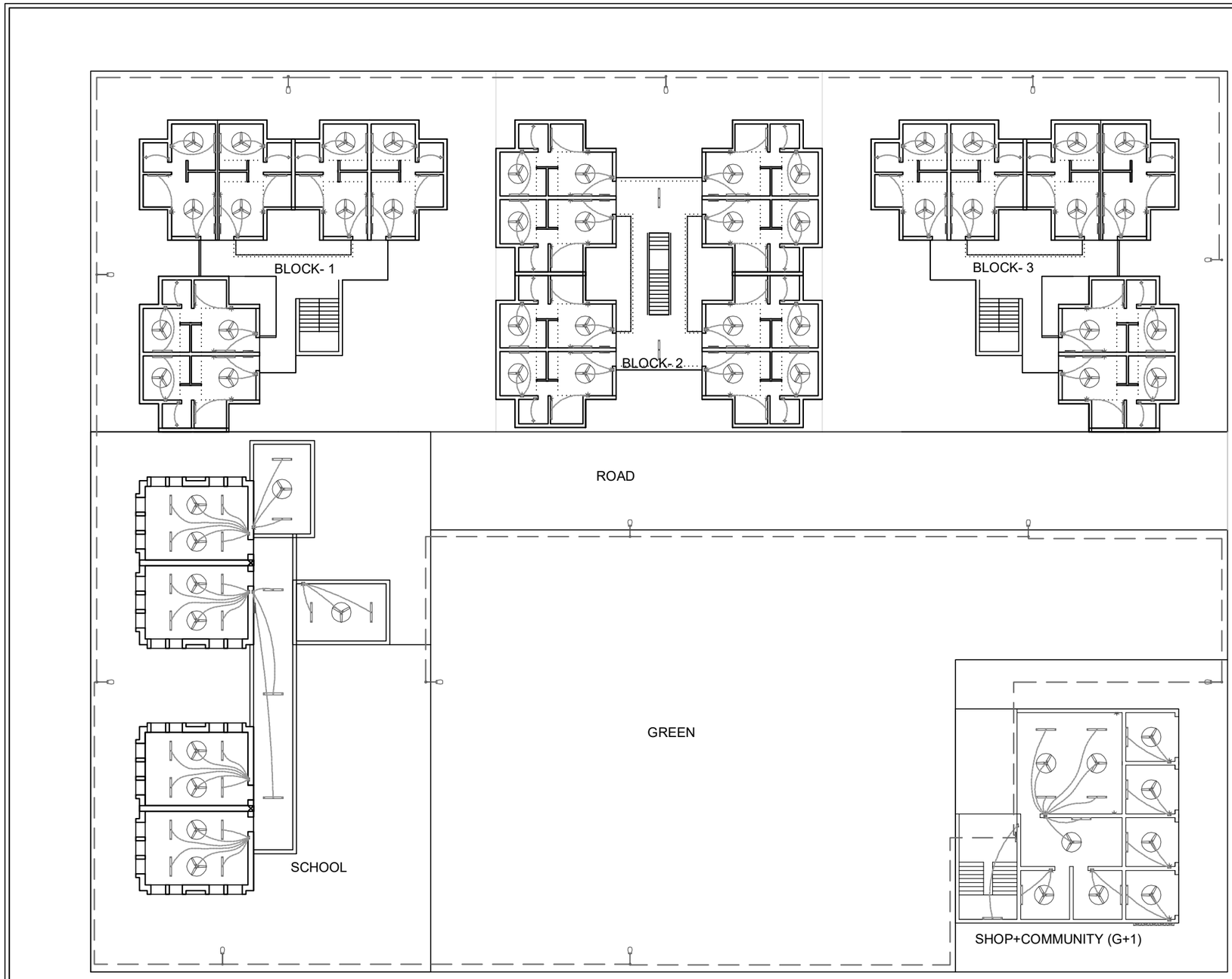
IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
TYPICAL FLOOR PLAN ELECTRICAL (COM.CEN)

DRG.NO.	REV.	SCALE :
CC/E-05		SCALE TO FIT

Site Electrical Plan



LEGEND

F	FAN POINT	
T	SINGLE TUBE LIGHT POINT T5 (1X28W)	
BL	BRACKET LIGHT POINT	
SB	SWITCH BOARD	
P	6A PLUG POINT WITH 6A SWITCH	
PP	6/16A PLUG POINT WITH 16A SWITCH	
DB	DISTRIBUTION BOARD	
	METER BOARD	
LP	LIGHT POLE	
	CABLE ROUTE 4C X 4SQMM CU. ARM. CABLE	

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IN ASSOCIATION WITH:
SOCIETY FOR ENVIRONMENT PROTECTION,AHMEDABAD

PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
SITE ELECTRICAL PLAN

DRG.NO.	REV.	SCALE :
LP/E-05		SCALE TO FIT

10 Pre requirement of Construction

a. Structural design

Followings are the assumptions and parameters which constitute the preliminary structural design note for the load bearing masonry buildings.

Load path

The box system utilizes walls which support vertical loads and also resist seismic forces. This system also has horizontal resisting elements, such as floors acting as diaphragms, which transmit the seismic forces to the walls. The walls oriented parallel to the direction of the load resist the reactions from the diaphragm as well as inertia forces from the mass of the wall itself. From the walls the horizontal load gets transmitted to the masonry box at foundation level through the plinth bands.

Soil Pressure

All parts of the building are tied together in such a manner that the building acts as one unit. Plinth band, lintel bands are used for this in brick masonry construction.

Openings in load bearing walls are staggered and reinforced all around.

Soil Pressure	The SBC is assumed as 150 kN/m2 in the absence of soil investigation report. The same shall be verified at the detail design stage for deviation in the SBC value, if any, for foundation design.
The typical calculation of bearing pressure at foundation level is as below:	
Bearing pressure	0.129 N/mm2
Stress on wall	129 kN/m2, which is less than assumed SBC of 150 kN/m2 , hence OK.
The consideration for effective and gross area of the wall taken as 0.85, the typical calculation of stress on walls is as below:	
Pressure on walls	Is 0.6 65 N/mm2, which is OK for masonry having brick units with crushing strength of 70 kg/cm2
Compliance to IS 4326:1993	
To impart the box action in the buildings, following compliance has been adopted. All the residential buildings fall in the category D and all the community buildings fall in the category E.	

Structural Design Assumptions

Strengthening Arrangements :

	Z	I	Sa/G	R	Ah=(ZI/2)*(S_a/G/R)	Category	Strengthening Arrangement	a	b	c	d	e	f	g	h
								Mortar	Lintel band	Roof & gable band	Vert steel @ corner & junction	Vert steel @ jambs	Bracing in plan @ level of roof	Plinth band	Dowel bars @ sil lvl & corner & junction
Residential building	0.16	1.00	2.50	2.50	0.08	D	Story 1&2 a to g	H_2=1:4 OR 1:1:5 Brick Unit 75 kg/cm^2	75mm thk,2.10 HYSD lnks 6mm dia@ 150mm c/c	-	12 HYSD	12 HYSD	-	Same as lntel band	NOT Required
							Story 3 & 4 a to h				12 HYSD and 16 HYSD	12 HYSD and 16 HYSD			8 dia HYSD,U-bar,900mm long
Community building	0.16	1.50	2.50	2.50	0.12	E	Story 1 to3 a to h Story 4 not allowed	H_2=1:4 OR 1:1:6 Brick Unit 75 kg/cm^2	75mm thk,2.12 HYSD lnks 6mm dia@ 150mm c/c	-	16 HYSD	16 HYSD	-	Same as lntel band	8 dia HYSD,U-bar,900mm long

Size and position openings in bearing walls:

	Z	I	Sa/G	R	Ah=(ZI/2)*(S_a/G/R)	Category	Strengthening Arrangement	Distance from the inside corner of outside wall(mm)	Opening percentage	Pier width between consecutive openings (mm)	Vertical distance between two openings (mm)	Width of opening of ventilator			
Residential building	0.16	1.00	2.50	2.50	0.08	D	Story 1&2 a to g	450	42%	560	600	900			
							Story 3 & 4 a to h		33%						
Community building	0.16	1.50	2.50	2.50	0.12	E	Story 1 to 3 a to h Story 4 not allowed	450	42% & 33%	560	600	900			

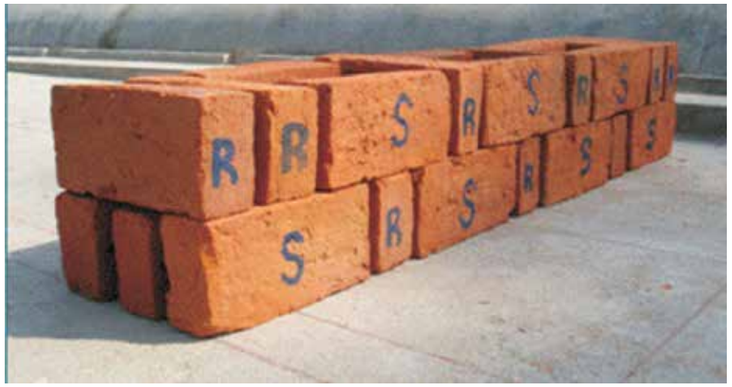
b. Technologies

The construction technologies for the project are selected considering the quantum of materials used in a particular technology, the cost of construction and the skill levels required for constructing the same. The technologies proposed are tested, proven, experienced and established.

Considering the project requirements and the basis of design, load bearing structural system is selected for G+ 2 stories. The foundation system proposed is conventional step footing with two offsets of 350mm and 450mm considering the dead load of the structure. The walling system proposed is Rat-trap bond of 230mm thickness as it uses less quantity of material and is cost efficient. The roofing system proposed is precast brick plank and Joist.

Walling System: Rat Trap Bond

A “Rat-Trap Bond” is a type of wall brick masonry bond in which bricks are laid on edge such that the shinner and rowlock are visible on the face of masonry. This gives the wall with an internal cavity bridged by the rowlock. Each alternate course begins with two Rowlocks (R), followed by a Shiner. The intermediate course begins with a Shiner (S), succeeded by a Rowlock. For walls without corners, such as in the case of non-load bearing walls between columns in framed structure, both methods are correct and can be applied according to the preferences of the masons. However, for walls with corners method (b) must be applied.



Advantages & Savings:

For 1 m3 brick wall a total of 550 bricks are required for English bond masonry wall. For a RTB masonry wall per m3 a total of 360 bricks are used.

By adopting this method of bonding, it is possible to use approx. 35 % less bricks and 50 % less cement mortar, this reduces the cost of a 9” wall by 30 %.

It is a cavity wall construction with added advantage of thermal comfort. The interiors remain cooler in summer and warmer in winters.

By adopting rat-trap bond, one can create aesthetically pleasing wall surface and plastering can be avoided.

All concrete work such as pillars, sill bands, window and tie beams can be concealed and hence only brick masonry work is exposed.

The walls have approx. 20% less dead weight and hence the foundations, depending on the bearing capacity of the soil, can suitably be redesigned to save bricks, steel and cement.

Compressive strength of the wall is equal when normal burnt clay bricks are used that any other brick bond. Rat-Trap bond masonry is considered to be stronger than flat bricks due to the production process.

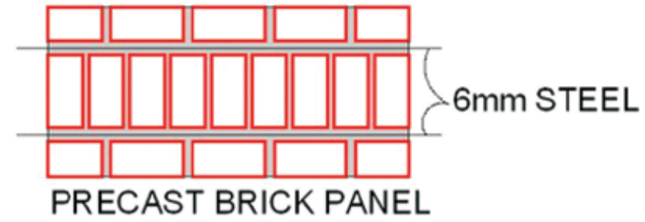
Vertical wiring and plumbing can easily be made during the wall construction and even after since the cavities allow inserting the fittings.

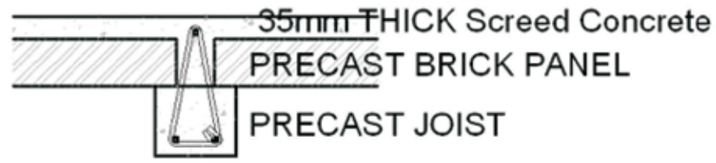
For horizontal installation of fittings, planning must be made before constructing the walls.

Rat-trap bond is a modular masonry system which can reduce wastage of bricks by un-necessary cutting.

Roofing System: Precast Joist and Brick Panel

Precast joist and brick panel is an extention of wood / stone roofing systems used for generations. In this roofing system stronger reinforced concrete joists are used to transfer the weight of the slab to the masonry wall while brick panels are used to span between the joists.





Spans and sizes of the precast members are devised so as not to compromise the structural strength and durability while clever use of material properties makes it cost and time saving system with higher quality.

Advantages:

Precast joists and panel system utilizes the materials intelligently and reduces the quantity of steel and concrete.

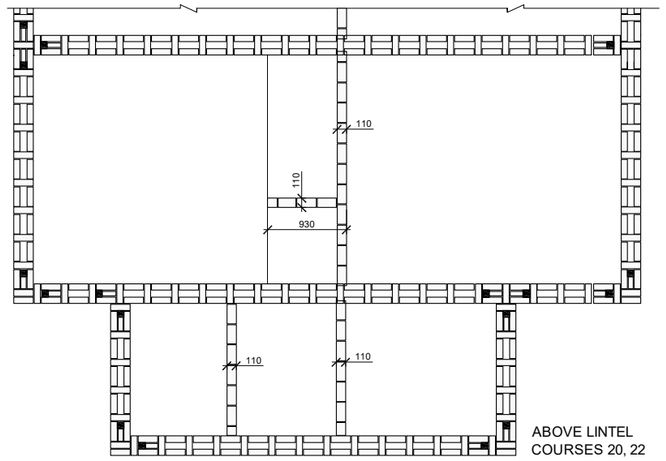
It reduces the overall cost by approximately 10%

With aesthetically pleasing patterned ceiling there is no need to plaster thus more saving in terms of cost and time.

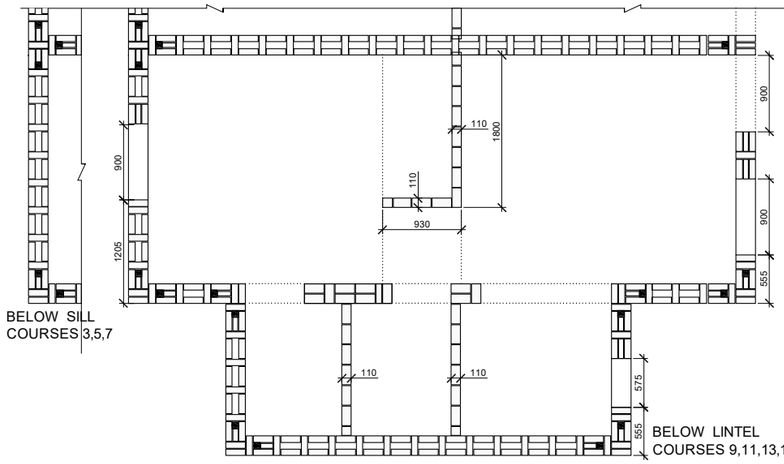
As there in no in situ formwork required it also saves on cost and time consumed by the form work, while avoiding all the issues coming because of the bad quality of form work.

Being a precast system, one can achieve better control our quality of product.

Rat Trap Bond drawing and details

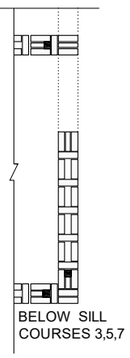


ABOVE LINTEL
COURSES 20, 22

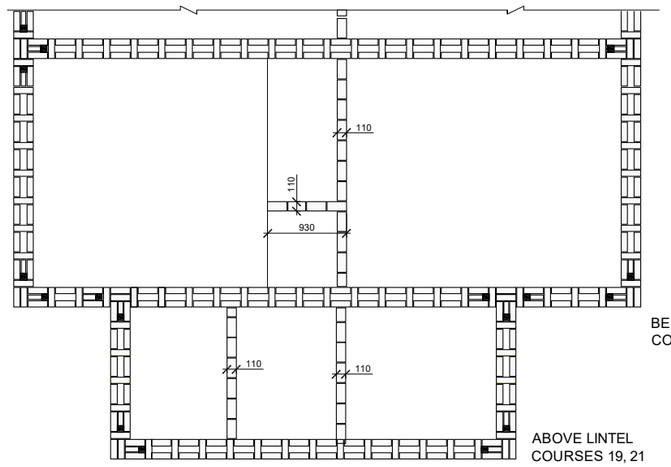


BELOW SILL
COURSES 3,5,7

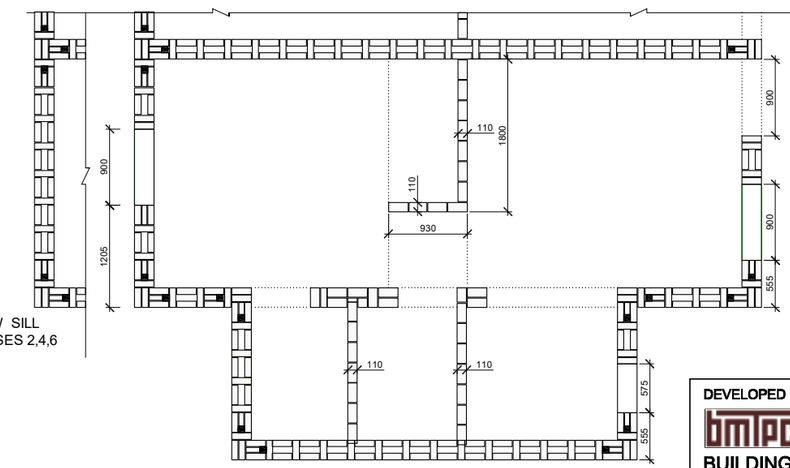
BELOW LINTEL
COURSES 9,11,13,15,17



BELOW SILL
COURSES 3,5,7

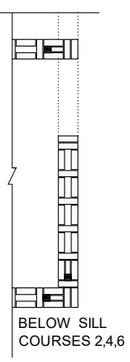


ABOVE LINTEL
COURSES 19, 21



BELOW SILL
COURSES 2,4,6

BELOW LINTEL
COURSES 8,10,12,14,16



BELOW SILL
COURSES 2,4,6

NOTE:
1. TOTAL HEIGHT FROM SLAB TOP TO PRECAST JOIST BOTTOM IS 2870 MM.
2. LINTEL BAND THICKNESS IS 100 MM.
3. REMAINING HEIGHT IS DIVIDED IN TO 23 COURSES OF 120 MM HEIGT (110 MM BRICK ON EDGE + 10 MM MORTAR).
4. COURSE 1,18 AND 23 i.e. FIRST COURSE ABOVE THE SLAB, COURSE BELOW THE LINTEL BAND AND BELOW THE JOISTS ARE SOLID CONTINIOUS BRICK ON EDGE COURSE.
5. ALL THE 'L' AND 'T' JUNCTIONS HAVE VERTICAL REINFORCEMENT, AND ALL THE JUNCTIONS ARE SOLID BRICK MASONRY.
6. EXCEPT FOR THE 110 MM THICK PARTITION WALL AND WHERE SPECIFIED; BRICK ON EDGE ARE USED FOR MASONRY.

DEVELOPED BY :
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PROJECT :
ALTERNATE HOUSING TECHNOLOGIES, DESIGN PACKAGE
TAMIL NADU (SOUTH ZONE)

SHEET TITLE :
DETAIL OF RAT TRAP BOND

DRG.NO.	REV.	SCALE :
SD-01		SCALE TO FIT

a. Rainwater harvesting

Need

Nature replenishes the ground water resources annually through rainfall; by way of infiltration though soil layers. Due to urbanization, the soil surface exposed to natural recharge gets reduced. Therefore, natural recharge is diminishing, resulting in drying of wells. Ground water source has the benefit of availability where water is needed and during emergencies and scarcity period, the public at large should take measure to improve the ground water recharge by rain water harvesting to maintain the reliable and sustainable ground water resource for supplementary domestic and industrial needs by ground water balance use.

Rain water Harvesting Aims and Objectives & Scope:

Rainwater harvesting may be defined as process of augmenting the natural infiltration of rainwater or surface run off into the ground by some artificial methods. The methods existing are recharge through pits, trenches, bore wells shafts by directly diverting runoff water into existing or disused wells or conserving the rain water by artificial storing and using the same for human use. The choice and effectiveness of any particular method is governed by local hydrological and soil conditions and ultimate use of water.

Methods of Rainwater Harvesting in Urban Cities

Broadly the rain water can be harvested by two methods

- Store the rainwater in containers above or above grounds or below grounds and reuse the water;
- Recharge into soil for withdrawal later by ground water recharging basis.

From the terraces/paved and unpaved ground areas the water is directed to a specified location by providing slope and is directed into the ground water through percolation wells.

Design Basis:

Rainfall data of past thirty years is considered. The calculations are done for Average Annual Rainfall (998mm).

Source: Indian Meteorological Department (IMD)

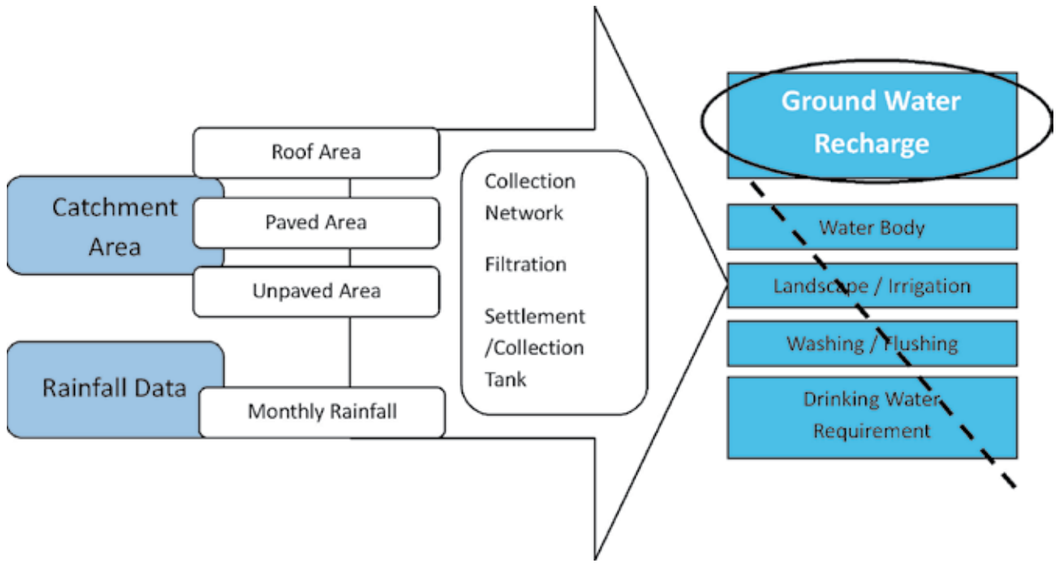
System & Design

Rain water harvesting system proposed will have four elements:

- Catchment area
- Conduits
- Settlement Tank & Filtration
- Recharge facility

Process Diagram & Proposed Option: Ground Water Recharge

The rainwater harvesting system proposed for the project collects rain water from the paved & unpaved surfaces on site and percolates it to the aquifer. Considering the bylaws requirement and project nature the basic action have been suggested.



Catchment Area:

The catchment is the area or surface, which receives rainfall directly. It can be any surface such as paved area like a terrace or courtyard of building or an unpaved area, like Lawn or open ground. Temporary structures like sloping sheds can also act as catchment. Run-off factor determines the quantity of water which will be available from the catchment. The catchment area is divided into three parts viz. the roof area, the paved area and the unpaved area.

Default Values considered for the design:

Surface Type	Runoff Coefficients
Paved Area (cemented)	0.85
Roofs, Conventional	0.95
Turf, Grass surface Avg. (1-3% slope)	0.35

Table: Surface type & Run-off Coefficient

Conduits: Conduits or the pipes carry rainwater from the catchment or roof tops to harvesting/storage system. The conduits may be of any materials like PVC, asbestos or galvanized or locally available metal like earthen pipes or bamboos which have been used in North-Eastern States of India.

Maintenance Tips for Rainwater harvesting structures

- Always keep the surroundings of the tank clean and hygienic
- Remove Algae from the roof tiles and asbestos sheets before the monsoon
- Drain the tank completely and clean from inside thoroughly before the monsoon.
- Clean the water channels (gutters) often during rainy season and definitely before the first monsoon rain.
- Change the filter media every rainy season.
- Cover all inlet and outlet pipes with closely knit nylon net or fine cloth or cap during non-rainy season to avoid entry of insects, worms and mosquitoes.
- Heavy loads should not be applied on the lid; particularly many people should not stand on the lid.
- Water should not be allowed to stagnate in the collection pit.
- The filter materials shall be washed thoroughly before replacing in the filter bucket

Rainwater Harvesting - Catchment Calcultation

Storm Water Runoff Quantity

Sr. No.	Catchment Area	Surface type	Run-off Coefficient	Area (sq.m.)	Impervious Area (Sq. m)	Average Annual Rainfall (mm)	Storm water quantity (cu.m./annum)
1	**Hardscpae**						
1.1	Road	Cemented	0.95	632.00	600.40	998.00	599.20
2	**Softscape**						
2.1	Landscaped Area	Turf	0.35	840.00	294.00	998.00	293.41
3	**Unpaved Ground**						
3.1	Housing	Earth	0.35	852.81	298.48	998.00	297.89
3.2	School	Earth	0.35	332.01	116.20	998.00	115.97
4	**Roof Top**						
4.1	Community Centre	Cemented tiles	0.95	502.84	477.70	998.00	476.74
4.2	Housing	Cemented tiles	0.95	832.60	790.97	998.00	789.39
4.3	School	Cemented tiles	0.95	253.17	240.51	998.00	240.03
	Total			**4245.43**	**2818.27**		**2812.63**
	Considering the effective rainfall season of 30 days (on higher side for Guj.)					93.75	cu.m./day
						93754.33	ltrs./24hrs.
					1	**3906.43**	ltrs./hr

Storm Water Runoff Rate							
Sr. No.	**Catchment Area**	**Surface type**	**Run-off Coeffcient**	**Area (sq.m.)**	**Impervious Area (Sq. m)**	**Peak Rainfall (mm/hr)**	**Peak Discharge Rate (cu.m./24hr)**
1	**Hardscpae**						
1.1	Road	Cemented	0.95	460.17	437.16	35.00	15.30
2	**Softscape**						
2.1	Landscaped Area	Turf	0.35	852.42	298.35	35.00	10.44
3	**Unpaved Ground**						
3.1	Housing	Earth	0.35	1207.67	422.69	35.00	14.79
3.2	School	Earth	0.35	279.37	97.78	35.00	3.42
4	**Roof Top**						
4.1	Community Centre	Cemented tiles	0.95	152.06	144.45	35.00	5.06
4.2	Housing	Cemented tiles	0.95	771.24	732.68	35.00	25.64
4.3	School	Cemented tiles	0.95	184.85	175.61	35.00	6.15
	Total			**3907.79**	**2308.72**		**80.81**
	The runoff rate considering the peak rainfall ‘for						
	the total site area including the Roof Top and Ground Surface discharge					80.81	cu.m./24hrs.
						80805.10	ltrs./24hrs.
					2	**3366.88**	**ltrs./hr**
	Note:						
	Taking average of (1) & (2) for the design capacity i.e.				3	**3636.65**	**ltrs./hr**
	Percolation Well Diameter & Capacity						
	6” Diameter	10000	lits/hr				
	8” Diameter	20000	lits/hr				
	10” Diameter	30000	lits/hr				
	One 6” dia percolation well is required considering the design value of (3)						

Embodied Energy in Buildings

The process of construction of buildings consumes huge amount of energy depending upon its geographic location, design, type of construction and materials used, which in turn produces large volume of GHG. Estimates suggest that about 20-25% of the total energy demand is due to manufacturing materials required in the building sector, while another 15 percent goes into the running needs of the building.

In India, because of its vast differences – in residential habits of rural and urban, climatic zones, income group's requirements, construction practices, availability of variety of building materials etc. have led to different housing patterns, which influence energy consumption considerably.

Objective

Selection of materials and technologies for the building construction should satisfy the felt needs of the user as well as the development needs of the society, without causing any adverse impact on environment.

There is a great concern and emphasis in reducing the greenhouse gases emission into the atmosphere in order to control adverse environmental impacts. Minimizing the consumption of the conventional materials by using cost effective energy efficient materials, methods and techniques can result in a large amount of energy savings as well as reduction of CO2 emission.

Definition

Embodied energy is the energy consumed by all of the processes associated with the production of a building, from the mining and processing of natural resources to manufacturing, transport and product delivery. Embodied energy does not include the operation and disposal of the building material. This would be considered in a life cycle approach. Embodied energy is the 'upstream' or 'front-end' component of the life cycle impact of a home.

> Embodied energy can be the equivalent of many years of operational energy.

It was thought until recently that the embodied energy content of a building was small compared to the energy used in operating the building over its life. This is not always the case. Operational energy consumption depends on the occupants. Embodied energy is not occupant dependent; the energy is built into the materials. Embodied energy content is incurred once whereas operational energy accumulates over time and can be influenced throughout the life of the building, so it is essential to promote low cost, low energy and medium energy materials for energy efficiency in building construction. However, these materials should also be durable, require less maintenance and should be recyclable. It may be noted that materials such as aluminum and steel although being very effective in use commonly to save cost and achieve durability but they are highly energy consuming and have a very great impact on the present CO2 emissions done by the construction Industry.

What The Study Aims At..??

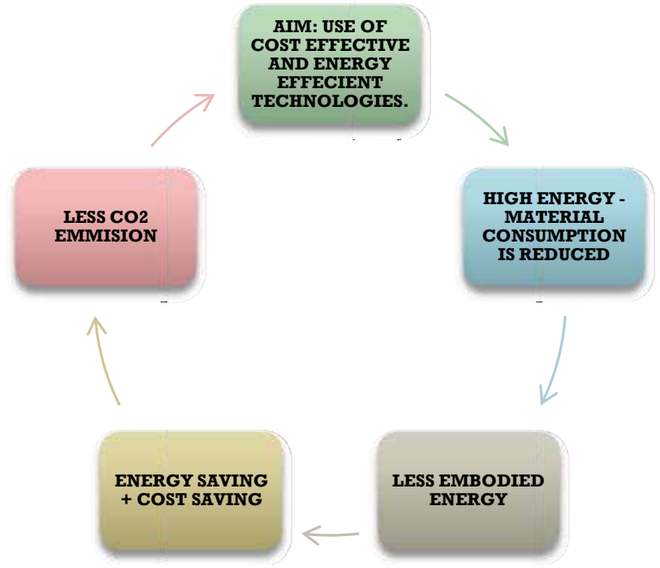


Figure 1: OBJECTIVE OF THE STUDY

In this study, comparison of EMBODIED ENERGY is showed between the following technologies which are selected for the project proposal and conventional technologies adopted for construction of a similar buildings with the conventional ones which are:

- Rat Trap Bond Brick work vs Conventional Solid brickwork.
- Joist and brick panel slab Vs. Conventional slab

Residential Building

Embodied Energy savings (Resdiential)												
Sr. No.	Particulars	Quantity	Unit	Total Raw Material	Quantity	Unit	Embodied Energy	Mj/kg	T. EE	Unit	Saving in EE	Unit
1A	RTB	915.0013	cum	Brick	338889.4	nos.	4.5	MJ/Kg	1525002	MJ/Kg	509045.71	MJ/Kg
				Cement	1241.2	bags	292.5	MJ/Kg	363045.8	MJ/Kg	64946.52	MJ/Kg
				Sand	169.4	cum	87.5	MJ/Kg	14826.41	MJ/Kg	3187.68	MJ/Kg
								Total	1902874	MJ/Kg	577179.90	MJ/Kg
1B	Conventional Brick work	915.0013	cum	Brick	452010.6	nos.	4.5	MJ/Kg	2034048	MJ/Kg		
				Cement	1463.2	bags	292.5	MJ/Kg	427992.3	MJ/Kg		
				Sand	205.9	cum	87.5	MJ/Kg	18014.09	MJ/Kg		
								Total	2480054	MJ/Kg		
2A	Joist and Reinforced brick slab	2205.29	sqm	Brick	63598.8	nos	4.5	MJ/Kg	286194.8	MJ/Kg		
				Cement	1243.206	bags	292.5	MJ/Kg	363637.70	MJ/Kg		
				Fine Aggregate	77.7	cum	87.5	MJ/Kg	6798.78	MJ/Kg		
				Course Aggregate	147.6	cum	108	MJ/Kg	15944.11	MJ/Kg		
				Steel	7655.2	kg	42	MJ/Kg	321517.61	MJ/Kg		
								Total	994093.01		-65299.57	MJ/Kg
2B	Conventional RCC Slab	2205.29	Sqm	Cement	2117.08	bags	292.5	MJ/Kg	619245.43	MJ/Kg		
				Fine Aggregate	132.32	cum	87.5	MJ/Kg	11577.77	MJ/Kg		
				Aggregate	661.59	cum	108	MJ/Kg	71451.40	MJ/Kg		
				Steel	5393.31	kg	42	MJ/Kg	226518.84	MJ/Kg		
								Total	928793.44			
											511880.33	MJ/Kg

Direct Saving in Raw material	Quantity	Unit	Amount (Rs.)
Brick	113121.3	nos.	350675.93
Cement	222.0	bag	54399.65
Sand	36.4	cum	4007.37
			409082.94

Observational Analysis

As seen from the Cost and EE analysis above, using of RTB against Conventional brick work saves cost and EE both. The use of RTB can impart Direct saving as listed in table above while at the same time saves 577179.90 MJ/kg of energy. Hence it is a very advantage.

On the other end, the use of Joist and Reinforced brick panel slab does not show any direct saving in EE but is cost saving in terms of direct cost saving. Also, it would be important to mention here that though Joist and RB panel slab are not showing direct saving in EE but the nature of energy generally used in brick making is more lower in catergory against the one used by cement or steel plants. Also, being more decentralized activity, it will have more enriching effect on local economy.

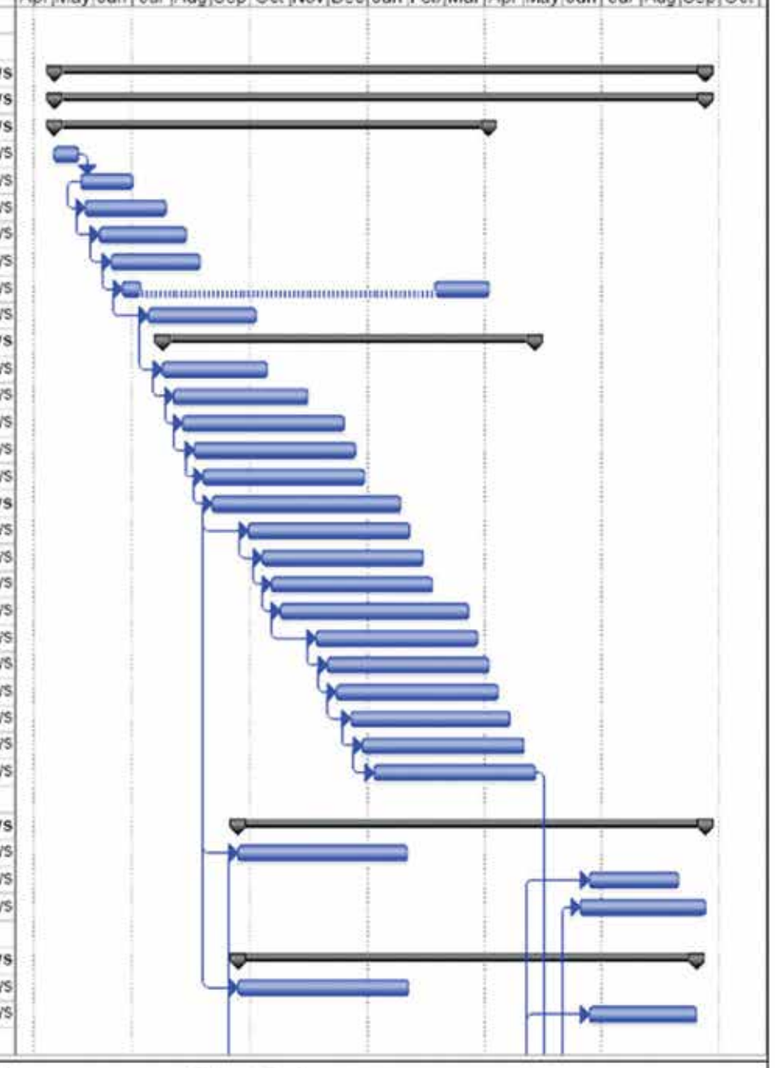
The above table is not accounting additional advantages of RTB and Reinforced brick panel slab in terms of thermal comfort and insulation. It will add further to the advantages.

School and Community hall have majorly Conventional brickwork and hence the EE analysis of the same is not taken up.

The above table shows the consumption of different materials in the Rat Trap bond brick masonry and conventional English bond.

- **Rat Trap Bond masonry**: This technology is well known as brick on edge technology which gives a cavity wall with a cavity of 80 mm in between two bricks. For structural safety purpose, 2 nos of corner reinforcements (12 dia upto GF & 10 dia upto Terrace) are also taken into account for calculating the embodied energy.
- **Conventional brick masonry**: The conventional masonry which is adopted for construction of buildings is taken into account for calculating the Embodied Energy.

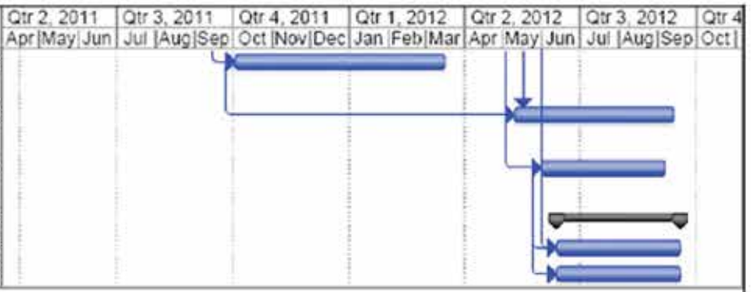
ID	Task Name	Duration
1		
2		
3	**BMTPC GUJARAT**	**364 days**
4	***FOR RESIDENTIAL + SCHOOL + KIOSK***	**364 days**
5	**Upto Plinth**	**243 days**
6	Line out	15 days
7	Excavation for foundation	30 days
8	PCC for Foundation	45 days
9	Brick Masonary Up to Plinth (foundation masonary)	50 days
10	Back filling in foundation	50 days
11	Brick masonry upto plinth	40 days
12	RCC coping at plinth level	60 days
13	**above Plinth**	**209 days**
14	Earth filling in Plinth including sand filling	60 days
15	PCC for Flooring	75 days
16	Brick Masonary from Plinth to Lintel GF	90 days
17	RCC Lintel GF (including staircase)	90 days
18	Brick Masonary from Lintel to GF Slab	90 days
19	RCC Slab GF	**105 days**
20	Brick Masonary from GF Slab to FF Lintel	90 days
21	RCC Lintel FF (including stair case)	90 days
22	Brick Masonary from Lintel to Slab FF	90 days
23	RCC Slab FF	105 days
24	Brick Masonary from FF Slab to SF Lintel	90 days
25	RCC Lintel SF (including stair case)	90 days
26	Brick Masonary from Lintel to Slab SF	90 days
27	RCC Slab SF	90 days
28	All works above Terrace Level	90 days
29	Parapet Masonary	90 days
30		
31	**Plumbing Works**	**261 days**
32	Internal Plumbing works	94 days
33	External Plumbing works	50 days
34	Sanitary ware fixing	70 days
35		
36	**Electrical Works**	**256 days**
37	Interna electrical works	95 days
38	**External Meter & wiring**	60 days
39		



Project: Project2n
Date: Fri 15/04/11

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

ID	Task Name	Duration
40	**Internal Plaster**	120 days
41		
42	**External Plaster**	90 days
43		
44	**Flooring Works**	70 days
45		
46	**Painting works**	**70 days**
47	Internal Painitng	70 days
48	External Painting	70 days



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Overall Cost Summary

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For the cost estimate, generally the SOR is considered as the standard for comparision. We have followed the same. Standard Schedule of Rates 2011-2012 published by Government of Tamil Nadu PWD department and is in effect from 1/7/2011 has been used. Case where directs rates are available they are used. In some exceptional one or two cases, the market survey is used to determine rates. All relevant supporting information is furnished in later part of this Design Package.

Summary of Cost

S.No.	DESCRIPTION OF WORKS	AMOUNT (Rs.)
A	**Civil Work Cost**	
i.	Housing Blocks	11,005,879.38
ii.	School Building	1,338,136.19
iii.	Community Hall	1,691,089.18
	Total Cost of Civil Work	**14,035,104.75**
B	**Plumbing Work Cost**	
i.	Housing Blocks + School building + Community Hall	2,446,941.00
	Total Cost of Plumbing Work	**2,446,941.00**
C	**Electrical Work Cost**	
i.	Housing Blocks	1,106,993.00
ii.	School Building	81,790.00
iii.	Community Hall	117,812.00
iv.	External Work	220,662.00
	Total Cost of Electrical Work	**1,527,257.00**
D	**Landscaping Work**	**280,702.10**
	Total of Civil, Plumbing and Electrical and Landscaping	**18,290,004.85**
	Contingency 10%	**1,829,000.48**
	Total	**20,119,005.33**

Cost Savings (overall for masonry and roofing)

Sr. No.	Building	Item	Technology	Quantity	Unit	Rate (Rs.)	Total Amount (Rs.)	Savings (Rs.)	Saving in %	Remarks
1	Residential	Brickwork	Rat Trap Bond	915.00	cum	2248.17	2057077.47	510191.03	19.87	
			Conventional Bond	915.00	cum	2805.75	2567268.49			
		Roofing	Precast Joist and Brick Panel	2205.29	sqm	696.63	1536275.85	687558.34	30.92	
			Conventional RCC slab	2205.29	sqm	1008.41	2223834.19			
2	School Building	Roofing	Precast Joist and Brick Panel	226.00	sqm	696.63	157438.86	70461.57	30.92	School and Community have large span and that might further add to the costing of conventioanl slab since for comparision thk of conv slab is taken as 120mm which will add with the span.
			Conventional RCC slab	226.00	sqm	1008.41	227900.42			
3	Community Hall	Roofing	Precast Joist and Brick Panel	197.15	sqm	696.63	137339.35	61466.06	30.92	
			Conventional RCC slab	197.15	sqm	1008.41	198805.41			
								1329676.99		

Note : For School and Community hall since Rat Trap bond work is negligible, the same is not considered in the saving.`The above table only considers major cost saving which is definitely possible to achieve if one adopts atleast above two technologies. Other small savings like lime plaster or architectural design optimization are not claimed for in above table.

14 Bill of Quantities

A. BOQ of Residential Units:

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
1	EARTH WORK AND EXCAVATION				
1.01	EXCAVATION for foundation in loose soil or soft soil upto 1.5 m depth including sorting out and stacking of useful materials, and lead upto 30 mts etc. complete	cu.m	433.8	122.9	53295
1.02	Backfilling the available excavated earth in trenches of plinth, sides of foundation in layers not exceeding 20 cm in thickness and consolidating each layer by ramming and watering	cu.m	227.9	51.5	11733
1.03	Providing and carrying out plinth filling with soil in layers not exceeding 20 cm in depth including watering, compaction etc complete	cu.m	30.0	182.2	5462
2	CONCRETING				
A	BED WORKS				
2.01	Providing and laying PCC in Foundation and Plinth in proportion 1:4:8 (where 1 part is cement, 4 parts is fine aggregates, 8 parts is aggregates) including curing ramming etc.	cu.m	43.7	2234.3	97557
B	R.C.C. WORKS				
2.02	Providing and laying controlled cement concrete M-20and curing complete excluding the cost of reinforcement for reinforced concrete work at all level and all type of concrete.				
	COMMON RATE	cu.m	121.2	3871.1	468999
2.03	Providing and laying partially precast RCC joists and precast brick panel slab made as per the structural design; with 6 mm diameter bars as top reinforcement and M-20 grade concrete screeding including formwork, deshuttering, propping, curing, cleaning etc. complete.	SQ.M.	2205.3	696.6	1536276
	COMMON RATE				
2.04	Providing and fixing precast concrete jali in concrete grade M 20 of size 0.575 x 0.48 mts as ventilators, screen wall etc with propping, fixing, curing, cleaning etc. complete	Nos.	120.0	532.0	63840
2.05	Providing and fixing precast concrete door frame of size 900 x 2100 including propping, fixing, curing, holdfast and cleaning etc. complete.	Nos.	120.0	1651.4	198166

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
2.06	Providing and fixing precast concrete window frame of size 900 x 1320 including propping, fixing, curing, holdfasts and cleaning etc. complete.	Nos.	120.0	1520.3	182431
2.07	Providing and fixing precast window frames of size 900 x 960 including propping, fixing, curing, holdfasts and cleaning etc. complete	Nos.	60.0	937.0	56220
2.08	Providing and fixing precast reinforced concrete compound wall using 150 x 150, 2100 long columns with 32 x 45 groove on two sides for fixing planks, and 300 x 25, 2090 long reinforced concrete planks, made using M25 concrete		240.0	2010	482400
C	FORM WORK				
2.09	Providing form work in ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 M & removal of the same for in situ reinforced or plain concrete work up to all floor levels.	sq.m	78.0	231.2	18033
	COMMON RATE				
D	REINFORCEMENT WORKS				
2.10.	Providing and laying TOR steel reinforcement for all RCC works as per the structural details and placing the rebar cage in position including cutting, bending, binding with 18 gauge GI wire etc.	kgs			
	COMMON RATE		7397.3	55.8	412605
2.11	Making 50 mm thick plinth protection of concrete 1:3:6 (1 Cement: 3 Sand: 6Aggregates) over 75 mm thick bed of dry brick bats well rammed and consolidated and grouted with fine filling sand including finishing the top smooth.	sq.m	218.4	179.6	39227
3	BRICK WORK				
3.01	Providing and laying brick work using fly ash bricks having a crushing strength more than 60 kg/sq.cm in cement mortar of 1:6 (where 1 part is cement, 6 parts is sand) below ground level upto 1.5 m depth and upto coping bottom including curing etc complete	cu.m	208.6	2805.8	585192
3.02	Providing and laying brickwork 230 mm thick in Rat-Trap bond using fly ash bricks having crushing strength MORE THAN 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.	cu.m			
	COMMON RATE		915.0	2248.2	2057077
3.03	Providing and laying brickwork 115 mm thick brick masonry partition wall using fly ash bricks having crushing strength more than 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.				
	COMMON RATE	sq.m	349.9	326.53	114261

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
3.04	Providing and laying perforated brick jali works for various parapets or screen walls in 1:4 cement mortar using fly ash bricks having crushing strength more than 60 kg/sq.cm. including raking out the joints, curing, scaffolding, cleaning etc complete.				
	COMMON RATE	sq.m	193.4	360.6	697.53
4	PLASTER WORKS				
	INTERIOR PLASTER				
4.01	Providing and laying lime pozzolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozzolonna and 3 is sand) 20 mm (in three layers)thick on interior brick surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete	sq.m			
	COMMON RATE		6894.2	153.3	1056555
	EXTERIOR PLASTER				
4.02	Providing and laying lime pozolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozolona and 3 is sand) 20 mm thick on exterior brick and concrete surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete upto GF slab level	sq.m			
	COMMON RATE		3622.9	153.3	555216
4.03	Providing. 15 mm. thick cement plaster in single coat on fair side of brick concrete walls for interior plastering up to floor two level and finished even and smooth in Cement Mortar 1:4 (where 1 part is cement, and 4 parts is sand)	sq.m	1058.4	117.5	124335
4.04	Extra over items No.4.03 for Providing and mixing water proofing materials in cement mortar in proportion recommended by the manufacturers.	sq.m	1058.4	3.8	4022
4.05	(A) Extra over items No.4.03, 4.04 for finishing with a floating coat of neat cement + / lime slurry	sq.m	1058.4	22.0	23285
5	PAINTING WORKS				
A	INTERIOR PAINTING				
5.01	White washing with lime on wall surfaces (two coats) to given an even shade including throughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.	sq.m	6894.2	13.2	91068
	COMMON RATE				
A	EXTERIOR PAINTING				

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
5.02	White washing with lime on decorated wall surfaces (one coat) to give an even shade including thoroughly brooming the surface to remove dirt, dust, mortar drops and loose scales of lime wash and other foreign matter etc. complete on EXTERNAL surfaces on GF level	sq.m	3622.9	13.2	47837
	COMMON RATE				
5.03	Applying priming coat over new steel and other surfaces (wall, wood etc) after over and including preparing the surface by throughly cleaning oil, grease, dirt and other foreign matter and scoured with brushes fine steel wool, scrapers and sand paper with ready mixed primer of approved make	sq.m	135	24	3287
	COMMON RATE				
5.04	Painting two coats (excluding priming coat) on new steel and other surfaces (wall, wood etc) with synthetic enamel paint brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	sq.m	135	29	3903
	COMMON RATE				
6	FLOORING WORKS				
6.01	Providing and laying India patent stone (IPS) flooring 40 mm thick with cement concrete 1:2:4 using 10 mm maximum size graded stone aggregates laid to levels or alternate by s, finished smooth with cement slurry, at all depth and heights below and above plinth level including from work, ramming curing, etc., complete as directed on GF level	sq.m	1489.0	583	868165
6.02	Providing and laying broken white china mosaic flooring for plain surfaces comprising of 18 to 25 mm size broken glazed tiles (6mm thick) laid over 40 mm thick bed of cement mortar 1:6 (where 1 is cement and 6 is sand) including applying neat cement slurry, the flooring shall be tampered to bring mortar up to the joints including grouting the joints with white cement and rounding the junctions upto 15 cm along the parapet at TERRACE level	sq.m	646.9	411.0	365922
6.03	Providing and laying kota stone kitchen platform as per drawings on brickwork 75 mm thick including plastering the walls by cement mortar 1:4, kota stone polished on one side including curing, etc., complete as directed 0.6 m wide of kadappah stone 2.04 sq.m	nos.	60.0	840.6	50436
6.04	Providing and laying polished Kadappah stone slab (Polished, Green colour) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) laid over the staircase, and joined with cement slurry, so as to give an even surface etc. complete	sq.m	78.6	408.8	32133
	COMMON RATE				
6.05	Providing and laying polished kadappah stone (25 mm) over 40 mm thick base of cement mortar 1:6 (where is part is cement, 6 parts is coarse sand) laid over and jointed with grey cement slurry including rubbing and polishing etc.for wash area	sq.m	42.0	452.4	19003
6.06	Providing and laying glazed tile flooring in toilet of tile size (150 x 150 mm) over a base of 30 mm cement mortar 1:3 for toilet flooring including flushing the tiles with white cement slurry including cleaning the surface to give an even finish etc complete	sq.m	162.0	394.2	63865

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
7	DOOR WINDOW SHUTTER				
7.01	Providing and fixing 35 mm thick flush door shutter including fixing in position with necessary hardwares such as hinges, aldrops, cleaning etc. complete.				
	D1	nos	120.0	3696.3	443559
7.02	Providing and fixing PVC doors with PVC section frames including fixing in position with necessary hardwares such as hinges, aldrops, handles etc. complete.				
	D2	nos	120.0	3921.8	470610
7.03	Providing and fixing 32 mm flush shtter windows including fixing in position with necessary hardware such as hinges, aldrops etc complete.				
	W1	nos	120.0	2306.0	276715
8	STEEL WORKS				
8.02	Steel work welded in built up sections frame work including cutting, hoisting, fixing in position and applying priming coat of red lead paint. In metal doors, louvers, grill etc.	kg	98	55.8	5466
9	MISCELENEOUS WORKS				
9.01	Making road with 100 mm thick 1:1.5:3 Concrete (1Cement : 1.5Graded Sand: 3 Graded Aggregates) laid over 100 thick base of blue metal base made of graded blumetal nominal size more than 80 mm to 20 mm well consolidated and rammed and grouted with fine filling sand with smooth top and top surface of the concrete sloping on both side from the center having broom finish.	sq.m	312.0	474.3	147971
TOTAL =					11005879

B. BOQ School Building:

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	EARTH WORK AND EXCAVATION				
1.01	**EXCAVATION** for foundation in loose soil or soft soil upto 1.5 m depth including sorting out and stacking of useful materials, and lead upto 30 mts etc. complete	cu.m	91	123	**11181**
1.02	**Backfilling** the available excavated earth in trenches of plinth, sides of foundation in layers not exceeding 20 cm in thickness and consolidating each layer by ramming and watering	cu.m	48	51	**2471**
1.03	Providing and carrying out **plinth filling** with soil in layers not exceeding 20 cm in depth including watering, compaction etc complete	cu.m	5	182	**820**
2	CONCRETING				
A	BED WORKS				
2.01	Providing and laying PCC in Foundation and Plinth in proportion 1:4:8 (where 1 part is cement, 4 parts is fine aggregates, 8 parts is aggregates) including curing ramming etc.	cu.m	9	2234	**19453**
B	R.C.C. WORKS				
2.02	Providing and laying controlled cement concrete M-20and curing complete excluding the cost of reinforcement for reinforced concrete work at all level and all type of concrete.				
	COMMON RATE	cu.m	34	3871	**129690**
2.03	Providing and laying partially precast RCC joists and precast brick panel slab made as per the structural design; with 6 mm diameter bars as top reinforcement and M-20 grade concrete screeding including formwork, deshuttering, propping, curing, cleaning etc. complete.	SQ.M.	226	697	**157439**
	COMMON RATE				
2.04	Providing and fixing precast concrete jali in concrete grade M 20 of size 0.6 x 0.6 mts as ventilators, screen wall etc with propping, fixing, curing, cleaning etc. complete	Nos.	4	532	**2128**
2.05	Providing and fixing precast concrete door frame of size 900 x 2100 including propping, fixing, curing, holdfast and cleaning etc. complete.	Nos.	8	1651	**13211**
2.06	Providing and fixing precast concrete window frame of size 900 x 1320 including propping, fixing, curing, holdfasts and cleaning etc. complete.	Nos.	24	1520	**36486**
2.07	Providing and fixing precast window frames of size 700 x 1200 including propping, fixing, curing, holdfasts and cleaning etc. complete	Nos.	3	1301	3903

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
C	FORM WORK				
2.08	Providing form work in ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 M & removal of the same for in situ reinforced or plain concrete work up to all floor levels.	sq.m	16	231	**3699**
	COMMON RATE				
D	REINFORCEMENT WORKS				
2.09	Providing and laying TOR steel reinforcement for all RCC works as per the structural details and placing the rebar cage in position including cutting, bending, binding with 18 gauge GI wire etc.	kgs			
	COMMON RATE		2038	56	**113676**
2.1	Making 50 mm thick plinth protection of concrete 1:3:6 (1 Cement: 3 Sand: 6Aggregates) over 75 mm thick bed of dry brick bats well rammed and consolidated and grouted with fine filling sand including finishing the top smooth.	sq.m	56.4	234.27	**13213**
3	BRICK WORK				
3.01	Providing and laying brick work using fly ash bricks having a crushing strength more than 60 kg/sq.cm in cement mortar of 1:6 (where 1 part is cement, 6 parts is sand) below ground level upto 1.5 m depth and upto coping bottom including curing etc complete	cu.m	116	2806	324805
3.02	Providing and laying brickwork 230 mm thick in Rat-Trap bond using fly ash bricks having crushing strength MORE THAN 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.	cu.m			
	COMMON RATE		2	2248	**4496**
3.03	Providing and laying brickwork 115 mm thick brick masonry partition wall using fly ash bricks having crushing strength more than 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.				
	COMMON RATE	sq.m	2	327	**653**
3.04	Providing and laying perforated brick jali works for various parapets or screen walls in 1:4 cement mortar using fly ash bricks having crushing strength more than 60 kg/sq.cm. including raking out the joints, curing, scaffolding, cleaning etc complete.				
	COMMON RATE	sq.m	44	360.61	**15867**

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
4	PLASTER WORKS				
	INTERIOR PLASTER				
4.01	Providing and laying lime pozzolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozzolonna and 3 is sand) 20 mm (in three layers)thick on interior brick surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete	sq.m			
	COMMON RATE		435	153	**66648**
	EXTERIOR PLASTER				
4.02	Providing and laying lime pozolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozolona and 3 is sand) 20 mm thick on exterior brick and concrete surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete upto GF slab level	sq.m			
	COMMON RATE		383	153	**58726**
4.03	Providing. 15 mm. thick cement plaster in single coat on fair side of brick concrete walls for interior plastering up to floor two level and finished even and smooth in Cement Mortar 1:4 (where 1 part is cement, and 4 parts is sand)	sq.m	20.0	117.5	**2349**
4.04	Extra over items No.4.03 for Providing and mixing water proofing materials in cement mortar in proportion recommended by the manufacturers.	sq.m	20.0	3.8	**76**
4.05	(A) Extra over items No.4.03, 4.04 for finishing with a floating coat of neat cement + / lime slurry	sq.m	20.0	22.0	**440**
5	PAINTING WORKS				
A	INTERIOR PAINTING				
5.01	White washing with lime on wall surfaces (two coats) to given an even shade including throughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.	sq.m	435	13	**5745**
	COMMON RATE				
A	EXTERIOR PAINTING				
5.02	White washing with lime on decorated wall surfaces (one coat) to give an even shade including thoroughly brooming the surface to remove dirt, dust, mortar drops and loose scales of lime wash and other foreign matter etc. complete on EXTERNAL surfaces	sq.m	383	13	**5060**
	COMMON RATE				

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
5.03	Applying priming coat over new steel and other surfaces (wall, wood etc) after over and including preparing the surface by throughly cleaning oil, grease, dirt and other foreign matter and scoured with brushes fine steel wool, scrapers and sand paper with ready mixed primer of approved make	sq.m	45	24	**1096**
	COMMON RATE				
5.04	Painting two coats (excluding priming coat) on new steel and other surfaces (wall, wood etc) with synthetic enamel paint brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	sq.m	45	29	**1301**
	COMMON RATE				
6	FLOORING WORKS				
6.01	Providing and laying India patent stone (IPS) flooring 40 mm thick with cement concrete 1:2:4 using 10 mm maximum size graded stone aggregates laid to levels or alternate by s, finished smooth with cement slurry, at all depth and heights below and above plinth level including from work, ramming curing, etc., complete as directed on GF level	sq.m	198	583	**115443**
6.02	Providing and laying broken white china mosaic flooring for plain surfaces comprising of 18 to 25 mm size broken glazed tiles (6mm thick) laid over 40 mm thick bed of cement mortar 1:6 (where 1 is cement and 6 is sand) including applying neat cement slurry, the flooring shall be tampered to bring mortar up to the joints including grouting the joints with white cement and rounding the junctions upto 15 cm along the parapet at TERRACE level	sq.m	202	411	**83031**
6.03	Providing and laying kota stone kitchen platform as per drawings on brickwork 75 mm thick including plastering the walls by cement mortar 1:4, kota stone polished on one side including curing, etc., complete as directed 0.6 m wide of kadappah stone 2.04 sq.m	nos.	2	841	**1681**
6.04	Providing and laying polished Kadappah stone slab (Polished, Green colour) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) laid over the staircase, and joined with cement slurry, so as to give an even surface etc. complete	sq.m	5	409	**2044**
	COMMON RATE				
6.05	Providing and laying polished kadappah stone (25 mm) over 40 mm thick base of cement mortar 1:6 (where is part is cement, 6 parts is coarse sand) laid over and jointed with grey cement slurry including rubbing and polishing etc.for wash area	sq.m	5	452	**2262**
6.06	Providing and laying glazed tile flooring in toilet of tile size (150 x 150 mm) over a base of 30 mm cement mortar 1:3 for toilet flooring including flushing the tiles with white cement slurry including cleaning the surface to give an even finish etc complete	sq.m	6	394	**2365**

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
7	DOOR WINDOW SHUTTER				
7.01	Providing and fixing 35 mm thick flush door shutter with 60 x 100 mm wood frame of country wood including fixing in position with necessary hardware such as hinges, aldrops, cleaning etc complete				
	Door	nos	7	3696	**25874**
7.02	Providing and fixing PVC doors with PVC section frames including fixing in position with necessary hardwares such as hinges, aldrops, including fixing in position cleaning etc complete				
	Bathroom door	nos	6	3922	**23531**
7.03	Providing and fixing 32 mm flush shtter windows with 60 x 100 mm wood frame of country wood including fixing in position with necessary hardware such as hinges, aldrops etc with cleaning complete.				
	Windows	nos	25	2306	**57649**
8	STEEL WORKS				
8.01	Providing and laying collapsible door hung from the top by supporting wheels fitted in steel hangers of substantial design, including wheels of low friction type, the rail upon which the supporting wheels run shall be a flat bar of steel at least 75mmx16mm in section, on which a steel runner bar 16mmx16mm in section fixed by rivets at 225mm centers to carry grooved supporting wheels and all fixtures and details of frame shall be as per IS 3614 (Part-I)	sq.m	10	2465	**24157**
8.02	Steel work welded in built up sections frame work including cutting, hoisting, fixing in position and applying priming coat of red lead paint. In metal doors, louvers, grill etc.	kg	98	56	5488
TOTAL=					1338136

C. Community centre and Kiosk

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
1	EARTH WORK AND EXCAVATION				
1.01	**EXCAVATION** for foundation in loose soil or soft soil upto 1.5 m depth including sorting out and stacking of useful materials, and lead upto 30 mts etc. complete	cu.m	92.7	122.9	**11387**
1.02	**Backfilling** the available excavated earth in trenches of plinth, sides of foundation in layers not exceeding 20 cm in thickness and consolidating each layer by ramming and watering	cu.m	51.8	51.5	**2667**
1.03	Providing and carrying out **plinth filling** with soil in layers not exceeding 20 cm in depth including watering, compaction etc complete	cu.m	22.4	182.2	**4085**
2	CONCRETING				
A	BED WORKS				
2.01	Providing and laying PCC in Foundation and Plinth in proportion 1:4:8 (where 1 part is cement, 4 parts is fine aggregates, 8 parts is aggregates) including curing ramming etc.	cu.m	39.8	2234.3	**66590**
B	R.C.C. WORKS				
2.02	Providing and laying controlled cement concrete M-20and curing complete excluding the cost of reinforcement for reinforced concrete work at all level and all type of concrete.				
	COMMON RATE	cu.m	30.0	3871.1	**116293**
2.03	Providing and laying partially precast RCC joists and precast brick panel slab made as per the structural design; with 6 mm diameter bars as top reinforcement and M-20 grade concrete screeding including formwork, deshuttering, propping, curing, cleaning etc. complete.	SQ.M.	197.10	696.6	**137339**
	COMMON RATE				
2.04	Providing and fixing precast concrete jali in concrete grade M 20 of size 0.6 x 0.6 mts as ventilators, screen wall etc with propping, fixing, curing, cleaning etc. complete	Nos.	4.0	532.0	**2128**
2.05	Providing and fixing precast concrete door frame of size 900 x 2100 including propping, fixing, curing, holdfast and cleaning etc. complete.	Nos.	13.00	1651.38	**21468**
2.06	Providing and fixing precast concrete door frame of size 1200 x 2100 including propping, fixing, curing, holdfasts and cleaning etc. complete.	Nos.	5.0	2185.65	**10928**
2.07	Providing and fixing precast window frames of size 900 x 1400 including propping, fixing, curing, holdfasts and cleaning etc. complete	Nos.	8.0	2008.50	16068
2.08	Providing and fixing precast window frames of size 1200 x 1400 including propping, fixing, curing, holdfasts and cleaning etc. complete	Nos.	11.00	1831.84	**20150**
C	FORM WORK				

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
2.09	Providing form work in ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 M & removal of the same for in situ reinforced or plain concrete work up to all floor levels.	sq.m	53.2	231.2	**12292**
	COMMON RATE				
D	REINFORCEMENT WORKS				
2.10.	Providing and laying TOR steel reinforcement for all RCC works as per the structural details and placing the rebar cage in position including cutting, bending, binding with 18 gauge GI wire etc.				
	COMMON RATE	kgs	2748.0	55.8	**153278**
2.11	Making 50 mm thick plinth protection of concrete 1:3:6 (1 Cement: 3 Sand: 6Aggregates) over 75 mm thick bed of dry brick bats well rammed and consolidated and grouted with fine filling sand including finishing the top smooth.	sq.m	36.6	1796.11	**65738**
3	BRICK WORK				
3.01	Providing and laying brick work using fly ash bricks having a crushing strength more than 60 kg/sq.cm in cement mortar of 1:6 (where 1 part is cement, 6 parts is sand) below ground level upto 1.5 m depth and upto coping bottom including curing etc complete	cu.m	170.8	2805.8	**47909.5**
3.03	Providing and laying brickwork 115 mm thick brick masonry partition wall using fly ash bricks having crushing strength more than 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.				
	COMMON RATE	sq.m	27.4	3347.7	**91594**
3.04	Providing and laying perforated brick jali works for various parapets or screen walls in 1:4 cement mortar using fly ash bricks having crushing strength more than 60 kg/sq.cm. including raking out the joints, curing, scaffolding, cleaning etc complete.				
	COMMON RATE	sq.m	34.0	360.61	**12261**
4	PLASTER WORKS				
	INTERIOR PLASTER				
4.01	Providing and laying lime pozzolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozzolonna and 3 is sand) 20 mm (in three layers)thick on interior brick surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete				

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
	COMMON RATE	sq.m	850.30	153.3	**130314**
	EXTERIOR PLASTER				
4.02	Providing and laying lime pozolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozolona and 3 is sand) 20 mm thick on exterior brick and concrete surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete upto GF slab level				
	COMMON RATE	sq.m	482.7	153.3	**73971**
5	PAINTING WORKS				
A	INTERIOR PAINTING				
5.01	White washing with lime on wall surfaces (two coats) to given an even shade including throughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.	sq.m	850.3	13.2	**11232**
	COMMON RATE				
A	EXTERIOR PAINTING				
5.02	White washing with lime on decorated wall surfaces (one coat) to give an even shade including thoroughly brooming the surface to remove dirt, dust, mortar drops and loose scales of lime wash and other foreign matter etc. complete on EXTERNAL surfaces on GF level	sq.m	482.7	13.2	**6373**
	COMMON RATE				
5.03	Applying priming coat over new steel and other surfaces (wall, wood etc) after over and including preparing the surface by throughly cleaning oil, grease, dirt and other foreign matter and scoured with brushes fine steel wool, scrapers and sand paper with ready mixed primer of approved make	sq.m	85	24	**2070**
	COMMON RATE				
5.04	Painting two coats (excluding priming coat) on new steel and other surfaces (wall, wood etc) with synthetic enamel paint brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	sq.m	85	29	**2457**
	COMMON RATE				

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
6	FLOORING WORKS				
6.01	Providing and laying India patent stone (IPS) flooring 40 mm thick with cement concrete 1:2:4 using 10 mm maximum size graded stone aggregates laid to levels or alternate by s, finished smooth with cement slurry, at all depth and heights below and above plinth level including from work, ramming curing, etc., complete as directed on GF level	sq.m	61.6	583.0	**35919**
6.02	Providing and laying broken white china mosaic flooring for plain surfaces comprising of 18 to 25 mm size broken glazed tiles (6mm thick) laid over 40 mm thick bed of cement mortar 1:6 (where 1 is cement and 6 is sand) including applying neat cement slurry, the flooring shall be tampered to bring mortar up to the joints including grouting the joints with white cement and rounding the junctions upto 15 cm along the parapet at TERRACE level	sq.m	20.5	411.0	8441
6.03	Providing and laying kota stone kitchen platform as per drawings on brickwork 75 mm thick including plastering the walls by cement mortar 1:4, kota stone polished on one side including curing, etc., complete as directed 0.6 m wide of kadappah stone 2.04 sq.m	nos.	6.0	840.6	**5044**
6.04	Providing and laying polished Kadappah stone slab (Polished, Green colour) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) laid over the staircase, and joined with cement slurry, so as to give an even surface etc. complete	sq.m	1.5	408.8	**629**
	COMMON RATE				
6.05	Providing and laying polished kadappah stone (25 mm) over 40 mm thick base of cement mortar 1:6 (where is part is cement, 6 parts is coarse sand) laid over and jointed with grey cement slurry including rubbing and polishing etc.for wash area	sq.m	5.0	452.4	**2262**
6.06	Providing and laying glazed tile flooring in toilet of tile size (150 x 150 mm) over a base of 30 mm cement mortar 1:3 for toilet flooring including flushing the tiles with white cement slurry including cleaning the surface to give an even finish etc complete	sq.m	6.4	394.2	**2526**
7	DOOR WINDOW SHUTTER				
7.01	Providing and fixing 35 mm thick flush door shutter including fixing in position with necessary hardware such as hinges, aldrops, cleaning etc complete				
	Door	nos	13.0	3696.3	**48052**
7.02	Providing and fixing PVC doors with PVC section frames including fixing in position with necessary hardwares such as hinges, aldrops, including fixing in position cleaning etc complete				
	Bathroom door	nos	4.0	3921.8	**15687**

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
7.03	Providing and fixing 32 mm flush shtter windows including fixing in position with necessary hardware such as hinges, aldrops etc with cleaning complete.				
	Windows	nos	21.0	2306.0	**48425**
8	STEEL WORKS				
8.01	Providing and laying collapsible door hung from the top by supporting wheels fitted in steel hangers of substantial design, including wheels of low friction type, the rail upon which the supporting wheels run shall be a flat bar of steel at least 75mmx16mm in section, on which a steel runner bar 16mmx16mm in section fixed by rivets at 225mm centers to carry grooved supporting wheels and all fixtures and details of frame shall be as per IS 3614 (Part-I)	sq.m	9.8	2465.0	**24157**
8.02	Steel work welded in built up sections frame work including cutting, hoisting, fixing in position and applying priming coat of red lead paint. In metal doors, louvers, grill etc.	kg	132.0	55.8	**7363**
8.03	Supplying and fixing rolling shutters of approved make, made of required size MS laths (80 x 1.25 mm) interlocked together through their entire length and joined together at the end by end locks mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete including the cost of providing and fixing necessary 27.5 cm long wire springs grade no. 2 and 1.25 mm thick MS top cover for rolling shutters.	sq.m	16.0	2675.0	**42805**
TOTAL =					**1691089**

D. BOQ of Plumbing work

Item No.		Description of Item	Quantity	Rate	Unit	Amount
1		PLUMBING WORKS				
	1.1	Providing, fixing and testing, heavy quality ISI marked gun metal or brass full way wheel valve, with screwed/ flanged ends with EPDM WASHER, factory tested at 20 kg/m2., on uPVC/GI/HDPE lines of the following nominal bore (NB) size:				
		75MM dia	2.00	3,900.00	Nos.	7800
		65MM dia	2.00	3,276.00	Nos.	6552
		50MM dia	5.00	2,730.00	Nos.	13650
		40MM dia	22.00	1,950.00	Nos.	42900
		32MM dia	2.00	1,716.00	Nos.	3432
	1.2	Providing, fixing and testing, heavy quality gun metal or brass non-return swing type valve, with screwed/ flanged ends, factory tested at 20 kg/cm2., of the following nominal bore (NB) size:				
		50MM dia	7.00	3,120.00	Nos.	21840
	1.3	Providing and fixing gun metal foot valve with the required accessories, of approved make, as approved or its equivalent of the following nominal bore size:				
		50MM dia	7.00	1,560.00	Nos.	10920
	1.4	Providing and fixing Water Meter of Pricol or equivalent make as approved and directed by the Consultants.				
		40 mm size	2.00	6,240.00	Nos.	12480
		50 mm size	5.00	3,900.00	Nos.	19500
	1.5	Providing and fixing R.O.SYTEM of Power H2O- CW 939-A brand including supply and fixing of CP jaquar continental -059 Angle valve & copper pipe inlet connection from GI outlet pipe, including fixing electrical accessories supplied/listed by manufacture with all necesery fittings complete.	1.00	19,500.00	Nos.	19500

Item No.		Description of Item	Quantity	Rate	Unit	Amount
	1.6	Supplying and fixing, PVC water tanks of the following capacities such as Sintex or equivalent, on terraces, lofts, in bathrooms, etc., at all heights including all accessories such as inlet, outlet, over flow, drain pipe sleeves of the specified size, with necessary neoprene gaskets/packing/ washers, GI washers and check nuts etc., all complete, as directed.				
		Upto 10000 litres.	35,000.00	6.50	Ltr.	227500
	1.7	Supplying and fixing electronic water level control, to start and stop the pump automatically at the present water level, of an approved make. The unit is to be supplied with 3 sets of stainless steel electrodes and wiring between the main unit and electrodes as directed.	7.00	3,510.00	Nos.	24570
	1.8	Charges for taking connections from the mains.	2.00	7,800.00	Lumpsum	15600
	1.9	Providing and fixing uPVC IS:4985:2000 PVC Class 3 (PN) 6 Kgf/cm2 of approved make; open, complete, including making airtight joints, with necessary specials, couplers, elbow, equal tees, tail piece, adapter (both male and female), reducer (single stage, double stage and triple stage), end cap, fabricated bend, etc., in proper line and level (with necessary support like clamps, clips, brick masonry pedestals and battens, if necessary) to wall, ceiling and floor, approved quality, and lubricant or jointing material, including testing, cutting, making good the wall, ceiling and floor etc., complete of the following (outer diameter) OD size:				
		75MM dia	40.00	470.00	Rmt	18800
		65MM dia	170.00	420.00	Rmt	71400
		50MM dia	110.00	410.00	Rmt	45100
		40MM dia	374.00	330.00	Rmt	123420
		32MM dia	60.00	325.00	Rmt	19500
		25MM dia	186.00	300.00	Rmt	55800
		15MM dia	170.00	290.00	Rmt	49300
	1.10	Providing and fixing CPVC pipe conform code ASTM with screwed sockets, joints, and necessary fittings such as elbows, bends,reducers, threded connection, tees etc, including making/ drilling holes in walls/ slabs and remaking good the damages in original conditions.Make Flow gard, Prince, Aashirwad or equivalant (SDR 11)				
		Internal Dia. 15 mm	115.00	120.00	Rmt	13800

Item No.		Description of Item	Quantity	Rate	Unit	Amount
	1.11	Providing and fixing white glazed vitreous chinaware Orissa pattern WC with back/front inlet with 1 no. white glazed vitreous chinaware `P' or `S' trap with or without vent horn as under:				
		1) size 530 mm x 450 mm	68.00	1,599.00	Nos.	108732
	1.12	Providing and fixing Ivory glazed vitreous chinaware wash basin of with single or double hole for pillar-tap comprising of: a) Ivory glazed vitreous chinaware washbasin, with supporting 15 mm GI pipe or heavy quality CI brackets. b) 1 no. 40 or 32mm CP cast brass bottle-trap with extension piece to wall, wall flange with rubber adopter for waste connection and one waste coupling. c) 2 no. heavy quality CP brass angular stopcock with wall CP flange, 15mm size. d) 2 no. 15mm NB heavy quality CP-brass inlet connection with unions at end. The supporting bracket shall be painted with 3 coats of approved paint of approved shade in following etc complete size:				
		1) Size 510 mm x 400 mm	66.00	1,170.00	Nos.	77220
	1.13	Providing and fixing a stainless steel sink with waste couplin of Nirali make or equivalent as approved by architect , single bowl of size not more than 610 x 460mm and depth 200mm, comprising of: a) stainless steel sink supported on MS or CI brackets or in platform. b) 1 no. 40 or 32mm CP cast brass bottle-trap of Jaquar make Allied series Cat. No. 769 with extension piece to wall, wall flange with rubber adopter for waste connection with 40 mm 6 kg /sqcm rigid PVC waste water etc complete. rate shall be incusive for keeping the Sink in as it is condition up till the handing over.	60.00	6,630.00	Nos.	397800
	1.14	Providing and fixing screw down brass chromium plated heavy quality bib-tap as approved by architect , on water supply pipe lines with a flange, as approved by the architects etc., complete.	190.00	936.00	Nos.	177840
	1.15	Providing and fixing brass chromium plated heavy quality wash basin pillar cock long neck with aerator of as approved by architect , on water supply pipelines of 15mm dia with extension piece with a flange, as approved by the Consultants etc., complete.	66.00	819.00	Nos.	54054
	1.16	Providing and fixing best Indian make mirror of specified size like Triveni, I.A.G or equivalent silvered locally, with plain edge as required, with 12mm thick marine plywood backing of ISI 710 with CP brass caps, etc., complete. Teakwood best quality seasoned Ghana teak beading size 20mm x 32mm with with semi gloos finish using PU polish, shall be done as drawings etc. complete as directed.	4.00	624.00	Sq.m.	2496
	1.17	Providing and fixing a heavy quality CP brass stopcock, male or female end, of 25mm dia on water supply pipe lines as approved by the Consultants etc., complete.	60.00	507.00	Nos.	30420

Item No.		Description of Item	Quantity	Rate	Unit	Amount
	1.18	Providing and fixing a 15 mm dia inlet shower arm 190 mm with flange with shower rose of as approved by the consultants etc completes.	60.00	1,170.00	Nos.	70200
	1.19	Providing and fixing a vitreous chinaware white urinal of approved make (low flow) as approved by Consultants, comprising of: a) CP brass heavy quality spreaders, 1 for each urinal. b) 32mm NB waste coupling of , 1 for each urinal c) 40 mm 6 kg /sq cm rigid PVC waste pipe with bottle trap of J, and d) angle valve of - 1 no. for each urinal d) Necessary connecting CP brass pipe upto spreader along with necessary connection CI urinal concelleld brackets 2 no & open bracket -1 no; etc complete .in size mentioned under:				
		white earthenware large flat back type size 635 mm x 395 mm x 420 mm	5.00	2,730.00	Nos.	13650
	1.20	Providing and fixing the first quality white glazed vitreous chinaware squatting urinal of required size, 600mm x 350mm, of approved make, as approved or equivalent.	1.00	3,510.00	Nos.	3510
	1.21	Providing and fixing a CP brass exposed or concealed heavy duty flush valve with a regulator etc., complete in following size:				
		1) 25mm dia,	68.00	624.00	Nos.	42432
	1.22	Providing and fixing a cast iron Nahni trap of self-cleansing design with a water seal not less than 50mm, with or without vent, including setting the trap in 1:2:4 CC, etc., complete. The Nahni trap shall be with 75mm dia. outlet.	68.00	507.00	Nos.	34476
	1.23	Providing and fixing in position a PVC grating, 150mm x 150mm or 150mm dia in size, generally conforming to the drawings and fixed on the inlet pipe.	68.00	156.00	Nos.	10608
	1.24	Providing and fixing an approved SWR quality, heavy duty, uPVC BTYPE pipes. (open/concelled laid) with necessary specials, bends, such as `Y' junction, `T' junction (both single and double), including plugs, shoes, cowls, flange compression type fittings,, in proper line and level with necessary support like GI Coated MS brackets/ GI coated MS fabricated clamps, clips, Hilti fischer anchor fasteners ,RCC or brick pedestals or battens, if necessary, to wall, ceiling and floor, open, complete jointing with rubberising and airtight joints, with 'T' shaped rubber ring, , etc., and lubricant or jointing material, including testing, cutting, making good the wall, ceiling and floor, etc. complete of the following .PCC for encasing the pipe in sunk slab and excavation shall be paid in respective tender item				
		2) 110mm,	230.00	400.00	Rmt	92000
		4) 75mm.	200.00	250.00	Rmt	50000

Item No.		Description of Item	Quantity	Rate	Unit	Amount
		6) 40 mm.	300.00	117.00	Rmt	35100
	1.25	Providing and fixing an approved SWR quality, heavy duty, uPVC 'P' trap or 'S' trap with 150 x 150 mm or 150 mm dia.stain less steel -316 grating or heavy quality brass chromium plated hinged jail of chilly or equivalent. Including cutting the floor and making them good with surrounding M15 CC, masonry supports, MS brackets etc. testing, etc., complete having 110 mm inlet and 110 mm outlet with vertical extension piece up to floor.	68.00	1,170.00	Nos.	79560
	1.26	Providing and laying salt-glazed stoneware pipes (to the line, level and slopes) and jointing with stiff mixture of CM 1:1, depth upto 1.5 m., including testing of pipes and joints, etc., complete.				
		1) 230 mm dia	75.00	351.00	Rmt	26325
		1) 150 mm dia	170.00	234.00	Rmt	39780
	1.27	Providing and fixing a salt-glazed stoneware gully trap, class `A' of 230 mm dia inlet and 150 mm outlet with CI grating at the top embedded & making gala in M15 concrete etc., complete. (Excluding cost of Chamber and CI cover with frame)	45.00	1,170.00	Nos.	52650
	1.28	Constructing masonry for under ground Inspection chamber and bends with bricks having crushing strength not less than 35kg/cm2 in cm 1.5 C.I. Cover with frame (light duty) 455mm x 610mm internal dimensions total weight of cover with frame to be not less than 38kg (wt. of cover 23kg. and wt. of frame 15kg) R.C.C. top slab with 1:2:4 mix (1 cement :2 coarse sand :4 grade stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete				
		Inside dimensions 455 mm x 610 mm and 450mm deep for single pipe lines	6.00	2,176.00	Nos.	13056
		Inside dimensions 500mm x 700 mm and 450mm deep for pipe lines with one or two inlets	12.00	2,639.00	Nos.	31668
	1.29	Extra over items 24.44 for every additional depth of 0.1 m or part thereof beyond 450 mm depth for brick masonry chamber.				
		For 455 mm x 610 mm size	2.00	148.00	Nos.	296
		For 500mm x 700 mm size	10.00	161.00	Nos.	1610

Item No.		Description of Item	Quantity	Rate	Unit	Amount
	1.30	Construction manhole with R.C.C. top slab in 1:2:4 mix [1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size] foundation concrete 1:3:6 mix [1 cement : 3 coarse sand : 6 brick bets 40-50 mmsize] inside plastering 15mm thick with cement mortar 1:5 [1 cement : 5 coarses sand] and finished with afloting coat of neat cement and making channels in cement concrete 1:2:4 mix [1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size] finished smooth complete including curing and testing.				
		Inside size 900mm x 1200 mm and upto 1.50m deep including C.I. cover with frame size 650mm diameter total weight of cover and frame to be not less than 128 kgs.[wt. of cover 64 kg. and wt. frame 64 kg.] 'with 230 mm thick wall of brick masonry using bricks having crushing strength not less then 35kg/sq.cm in cement mortar 1:5 [1 cement : 5 coarse sand]	10.00	15,131.00	Nos.	151310
	1.31	Providing and fixing cast iron manhole frame and cover, having weight not less than 35 kg., of circular dimensions, including carting to site of work, fixing in CC and finishing with 3 coats of anti-corrosive paint, etc. complete as directed by E-I-C	10.00	830.00	Nos.	8300
	1.32	Providing and fixing, CI cowl, of 100 mm. dia., on ventilating pipe, as per drawing, etc. complete.	7.00	479.00	Nos.	3353
	1.33	Providing and fixing, CI steps in manhole, water tank, septic tank, etc., of size 500 mm. x 150 mm. x 22.5 mm. and painting with 3 coats of anti-corrosive paint, etc. complete.	27.00	167.00	Nos.	4509
	1.34	Providing , laying, [to level or slopes] and jointing reinforced concrete non-pressure pipes I.S. class NP2 of the following diameter with collar joints including testing of joints complete.				
		250 mm	14.00	375.00	Rmt	5250
		300 mm	12.00	446.00	Rmt	5352
Total of Boq Items Items						2,446,921.00

E. Electrical BOQ

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
1	Point wiring for Light / Fan /Bell / Primary				
	point with 2-1.0 sq. mm & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected, complete with				
	6A Tissino Type ISI marked flush type				
	switch /bell push and accessories erected				
	on polished wooden block / Metal / PVC				
	Box covered with 3 mm thick laminated				
	sheet.				
	(a) For open Wiring.	Pt.	154	150.00	23100.00
	SOR-1-1-1.				
2	Point wiring for independent PLUG with				
	2-1.0 sq.mm & earth wire of 1.0 sq.mm				
	(green) both are of ISI marked FR PVC				
	insulated multistrand copper wires, in				
	existing pipe duly erected complete with				
	Insulated multistrand copper wires, in				
	ISI marked 3 Pin 6A socket and 6A tissino				
	type switch erected with earth continuity				
	connection erected on polished wooden				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	block / Metal / PVC box covered with 3 mm				
	thick laminated sheet.				
	(a) For open Wiring.	Pt.	24	173.00	4152.00
	SOR-1-1-2.				
3	Point wiring for looped PLUG with tissino				
	type single pole ISI marked 6 A. Switch				
	and 6 A Socket erected with necessary				
	connections erected on polished wooden				
	block / Metal / PVC Box covered with 3				
	mm thick laminated sheet for open /				
	concealed wiring.	Pt.	73	35.00	2555.00
	SOR-1-1-3.				
4	Point wiring for Two Way Controlled Light				
	Point with 2-1.0 sq. mm. & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected complete with				
	6A. Tissino Type ISI marked accessories				
	with earth continuity erected on polished				
	wooden block / Metal/ PVC box covered				
	with 3 mm thick laminated sheet.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	(a) For open Wiring.	Pt.	3	156.00	468.00
	SOR-1-1-5.				
5	Providing following type of Modular Type				
	Accessories mounted on PVC / Metallic				
	box covered with appropriate front plate				
	modules erected with necessary connection.				
	As desire by Engineer incharge.				
	(10) 16 Amp. Sp One way switch				
	Cat-II	Nos	24	160.00	3840.00
	(11) 6/16 Amp. Universal Socket				
	Cat-II	Nos	24	180.00	4320.00
	SOR-1-2-6.				
6	Providing and erecting 1.5 mm thick FIA				
	approved and ISI mark (embossed) RIGID				
	PVC PIPES of following size complete				
	erected with necessary PVC fittings and				
	Junction boxes fixed with adhesive solution				
	and Clamps with following type of erection.				
	(1) For Open execution with clamps				
	erecting on wall / ceiling of following sizes of				
	Diameter..				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	b) 25 mm	Mtr.	615	32.00	19680.00
	(2) For erection concealed in wall / slab				
	along with continuous fish wire to draw				
	mains, laid in approved manner with				
	Plastering by cement mortar & finishing the				
	surface to match the wall / ceiling.				
	b) 25 mm	Mtr.	529	32.00	16923.20
	SOR-1-4-2.				
7	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				
	continuity of following size.				
	c) 2 Wire 2.5 sq. mm	Mtr.	760	31.00	23560.00
	SOR-1-5-1.				
8	Approved make C.F.L. Lamp Retrofit				
	9/11 Watt.				
	Cat-III	Nos	24	121.00	2904.00
	SOR-2-6-1.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
9	Fancy bracket with decorative cylindrical				
	shape and with chromium plated or anodized				
	bracket, one light with brass batten holder to				
	be erected on polished wooden block or on				
	3mm laminated sheet (Wooden block or				
	laminated sheet is incorporated in point				
	wiring)	Nos	24	94.00	2256.00
	SOR-2-8-1.				
10	Supplying and erecting approved make tube				
	fitting with One No.T-5 tube 28 W with				
	Electronic Ballast with THD less than				
	10 & built with adoptors, GI / PVC housing &				
	mirror effect reflector, suitable to work on				
	120V - 300 V, A.C. Supply with connector.				
	Make of fitting & tube may be differed.				
	SOR-2-9-7.				
	Cat-III	Nos.	85	825.00	70125.00
11	Approved make Power Saving 50 Watt				
	Ceiling Fan with condenser 230 volt A.C.				
	50 Cys 1200 mm sweep complete having				
	3 blades with alluminium blades with,				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	canopy 7 30 cms down rod erected with				
	24/0.2 flat 3 Core flexible wire with earthing				
	(Haavells, Orient, Crompton, Anchor, Bajaj)	Nos	48	1573.00	75504.00
	(Add Rs. 80/- Extra for Resistant type				
	Fan Regulator)				
	SOR-5-1-6.				
12	Mains with 1.1 KV grade FR PVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 2.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth				
	continuity of following size.				
	SOR-1-5-2.				
	a) 2 wire 4 sq. mm.	Mtr.	222	49.00	10878.00
13	Miniature circuit breaker Single Pole 6 A to				
	32 A suitable to operate on 240 V A. C.				
	system and having overload and short				
	circuit tripping elements and breaking				
	capacity 10 KA to be erected in existing				
	M. S. Box confirming to IS 8828/1996 with				
	ISI mark.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-3-10-1.				
	Cat-III	Nos	150	137.00	20550.00
14	Providing and erecting Sheet Steel powder				
	coated MCB distribution board - Flush /				
	surface mounted fitted with busbar, neutral				
	link, earth bar and DIN rail, confirming to				
	IS:13032 and BS-5486-1986 without MCB to				
	house appropriate nos. of MCB's (The DBs				
	should be used of same company of MCB				
	to be used)				
	SOR-3-11-5.				
	F) Single Phase 8 way SS Double door.	Nos	25	759.00	18975.00
15	Approved make ELCBs / RCCBs conforming				
	to IS:12640 and having sensititvity of 30 m A				
	and Short Circuit with stand capacity of 6KA				
	and suitable for operation on single phase				
	240 V having charectorstic of quick action &				
	tripping with all advance feature & do not				
	incorporate any electronic component for				
	following Max. rating.				
	SOR-3-12-1.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	(II) 40 Amps. DP				
	Cat-III	Nos	25	2007.00	50175.00
16	Providing and erecting HOT Deep				
	Galvanised Strip iron wire 8 to 16 S.W.G.	Kg.	28.66	58.00	1662.40
	SOR-3-15-5.				
17	Suuplying & erecting earth pit of minimum				
	bore dia.150 mm size approved make safe				
	Earthing Electrode consisting Pipe-in-Pipe				
	Technology as per IS 3043-1987 made of				
	corrosion free G.I.Pipes having Outer pipe				
	dia of 50 mm having 80-200 Micron				
	galvanising, Inner pipe dia of 25 mm having				
	200-250 Micron galvanising, connection				
	terminal dia of 12 mm with constant ohmic				
	value surrounded by highly conductive				
	compound with high charge dissipation				
	suitable for following type of applications.				
	a) For Electrical installation up to 11 KV				
	in normal soil.				
	Length of Pipe : 2.00 mtrs.				
	Back filling Compound : 1 no. bag of 25 Kg.	Nos.	1	6900.00	6900.00

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-3-15-9.				
18	Providing Approved make Double Pole				
	Cast Iron Clad Switch & rewirable Fuse				
	240 V / 250 V confirming to I.S.S.				
	(b) 32A				
	Cat-III	Nos	26	449.00	11674.00
	SOR-3-1-2.				
19	Erection & connection charges for 16A/				
	32A DP as following with duly painted red oxide.				
	(b). On polished wooden block.	Nos	26	34.00	884.00
	SOR-3-1-3.				
20	Providing and erecting open well type				
	horizontal mono block pump set with cast				
	iron body having following specification.				
	B) 1. H.P. Single Phase open well motor				
	pump set suitable for 145 LPM discharge @				
	25 Mtr head, suitable for 32 mm dia. Delivery				
	pipe with control panel and 10 mtr. Long				
	3 x 1.5 Sq. mtr. Submersible flat copper cable.				
	Cat-II	Nos	1	6613.00	6613.00

SR. NO.	NAME OF WORK:-Electrification of Apartment Type A (Block-2)				
	Item Description	Unit	Electrical SOR-2008-09 Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-9-4-1.				
21	Liasioning work to getting 230 V, 1-Phase, 3 wire power from SEB as per estimated service.				
	Motive power service	Nos.	1	1500.00	1500.00
	Lighting power service	Nos.	25	1000.00	25000.00
	TOTAL				**404198.60**
	TOTAL				**404198.60**
	ADD CONTENGENCY @ 5%	5%			20209.93
	TOTAL				424408.53
	ADD WORK CHARGE	2%			8488.17
	GRAND TOTAL				**432896.70**
	SAY				**432897.00**
	Note:				
	For Liquid level controller additional cost - 3000/- for each Apartment				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	5A PLG SEP	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	10A T/W SWITCH	16A SP SWITCH	5A PLUG
1	PASSAGE	3						7.5	5.3	9	3			
2	STAIR	1						2.5	1.8	3		1		
3	APARTMENT 1							0.0	0.0	0				
4	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
5	BED ROOM	1		1	1			8.0	5.6	9	3			1
6	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
7	BATH		1					2.5	1.8	3	1			
8	WASH							0.0	0.0	0	0			
9	APARTMENT 2							0.0	0.0	0				
10	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
11	BED ROOM	1		1	1			8.0	5.6	9	3			1
12	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
13	BATH		1					2.5	1.8	3	1			
14	WASH							0.0	0.0	0	0			
15	APARTMENT 3							0.0	0.0	0				
16	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
17	BED ROOM	1		1	1			8.0	5.6	9	3			1
18	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
19	BATH		1					2.5	1.8	3	1			
20	WASH							0.0	0.0	0	0			
21	APARTMENT 4							0.0	0.0	0				
22	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
23	BED ROOM	1		1	1			8.0	5.6	9	3			1
24	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
25	BATH		1					2.5	1.8	3	1			
26	WASH							0.0	0.0	0	0			
27	APARTMENT 5							0.0	0.0	0				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	5A PLG SEP	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	10A T/W SWITCH	16A SP SWITCH	5A PLUG
28	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
29	BED ROOM	1		1	1			8.0	5.6	9	3			1
30	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
31	BATH		1					2.5	1.8	3	1			
32	WASH							0.0	0.0	0	0			
33	APARTMENT 6							0.0	0.0	0				
34	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
35	BED ROOM	1		1	1			8.0	5.6	9	3			1
36	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
37	BATH		1					2.5	1.8	3	1			
38	WASH							0.0	0.0	0	0			
39	APARTMENT 7							0.0	0.0	0				
40	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
41	BED ROOM	1		1	1			8.0	5.6	9	3			1
42	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
43	BATH		1					2.5	1.8	3	1			
44	WASH							0.0	0.0	0	0			
45	APARTMENT 8							0.0	0.0	0				
46	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
47	BED ROOM	1		1	1			8.0	5.6	9	3			1
48	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
49	BATH		1					2.5	1.8	3	1			
50	WASH							0.0	0.0	0	0			
								0.0	0.0	0				
	TOTAL FOR GROUND FLOOR	**28**	**8**	**16**	**24**	**8**	**8**	**250**	**175**	**204**	**83**	**1**	**8**	**32**
	TERRACE	**1**			**1**			**5.5**	**3.9**	**3**	**2**			**1**
	GRAND TOTAL	**85**	**24**	**48**	**73**	**24**	**24**	**755.5**	**529**	**615**	**251**	**3**	**24**	**97**

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
1	Point wiring for Light / Fan /Bell / Primary				
	point with 2-1.0 sq. mm & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected, complete with				
	6A Tissino Type ISI marked flush type				
	switch /bell push and accessories erected				
	on polished wooden block / Metal / PVC				
	Box covered with 3 mm thick laminated				
	sheet.				
	(a) For open Wiring.	Pt.	121	150.00	18150.00
	SOR-1-1-1.				
2	Point wiring for independent PLUG with				
	2-1.0 sq.mm & earth wire of 1.0 sq.mm				
	(green) both are of ISI marked FR PVC				
	insulated multistrand copper wires, in				
	existing pipe duly erected complete with				
	Insulated multistrand copper wires, in				
	ISI marked 3 Pin 6A socket and 6A tissino				
	type switch erected with earth continuity				
	connection erected on polished wooden				
	block / Metal / PVC box covered with 3 mm				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	thick laminated sheet.				
	(a) For open Wiring.	Pt.	18	173.00	3114.00
	SOR-1-1-2.				
3	Point wiring for looped PLUG with tissino				
	type single pole ISI marked 6 A. Switch				
	and 6 A Socket erected with necessary				
	connections erected on polished wooden				
	block / Metal / PVC Box covered with 3				
	mm thick laminated sheet for open /				
	concealed wiring.	Pt.	55	35.00	1925.00
	SOR-1-1-3.				
4	Point wiring for Two Way Controlled Light				
	Point with 2-1.0 sq. mm. & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected complete with				
	6A. Tissino Type ISI marked accessories				
	with earth continuity erected on polished				
	wooden block / Metal/ PVC box covered				
	with 3 mm thick laminated sheet.				
	(a) For open Wiring.	Pt.	3	156.00	468.00

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-1-1-5.				
5	Providing following type of Modular Type				
	Accessories mounted on PVC / Metallic				
	box covered with appropriate front plate				
	modules erected with necessary connection.				
	As desire by Engineer incharge.				
	(10) 16 Amp. Sp One way switch				
	Cat-II	Nos	18	160.00	2880.00
	(11) 6/16 Amp. Universal Socket				
	Cat-II	Nos	18	180.00	3240.00
	SOR-1-2-6.				
6	Providing and erecting 1.5 mm thick FIA				
	approved and ISI mark (embossed) RIGID				
	PVC PIPES of following size complete				
	erected with necessary PVC fittings and				
	Junction boxes fixed with adhesive solution				
	and Clamps with following type of erection.				
	(1) For Open execution with clamps				
	erecting on wall / ceiling of following sizes of				
	Diameter..				
	b) 25 mm	Mtr.	480	32.00	15360.00

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	(2) For erection concealed in wall / slab				
	along with continuous fish wire to draw				
	mains, laid in approved manner with				
	Plastering by cement mortar & finishing the				
	surface to match the wall / ceiling.				
	b) 25 mm	Mtr.	408	32.00	13059.20
	SOR-1-4-2.				
7	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				
	continuity of following size.				
	c) 2 Wire 2.5 sq. mm	Mtr.	590	31.00	18290.00
	SOR-1-5-1.				
8	Approved make C.F.L. Lamp Retrofit				
	9/11 Watt.				
	Cat-III	Nos	18	121.00	2178.00
	SOR-2-6-1.				
9	Fancy bracket with decorative cylindrical				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	shape and with chromium plated or anodized				
	bracket, one light with brass batten holder to				
	be erected on polished wooden block or on				
	3mm laminated sheet (Wooden block or				
	laminated sheet is incorporated in point				
	wiring)	Nos	18	94.00	1692.00
	SOR-2-8-1.				
10	Supplying and erecting approved make tube				
	fitting with One No.T-5 tube 28 W with				
	Electronic Ballast with THD less than				
	10 & built with adoptors, GI / PVC housing &				
	mirror effect reflector, suitable to work on				
	120V - 300 V, A.C. Supply with connector.				
	Make of fitting & tube may be differed.				
	SOR-2-9-7.				
	Cat-III	Nos.	70	825.00	57750.00
11	Approved make Power Saving 50 Watt				
	Ceiling Fan with condenser 230 volt A.C.				
	50 Cys 1200 mm sweep complete having				
	3 blades with alluminium blades with,				
	canopy 7 30 cms down rod erected with				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	24/0.2 flat 3 Core flexible wire with earthing				
	(Haavells, Orient, Crompton, Anchor, Bajaj)	Nos	36	1573.00	56628.00
	(Add Rs. 80/- Extra for Resistant type				
	Fan Regulator)				
	SOR-5-1-6.				
12	Mains with 1.1 KV grade FR PVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 2.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth				
	continuity of following size.				
	SOR-1-5-2.				
	a) 2 wire 4 sq. mm.	Mtr.	143	49.00	7007.00
13	Miniature circuit breaker Single Pole 6 A to				
	32 A suitable to operate on 240 V A. C.				
	system and having overload and short				
	circuit tripping elements and breaking				
	capacity 10 KA to be erected in existing				
	M. S. Box confirming to IS 8828/1996 with				
	ISI mark.				
	SOR-3-10-1.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	Cat-III	Nos	114	137.00	15618.00
14	Providing and erecting Sheet Steel powder				
	coated MCB distribution board - Flush /				
	surface mounted fitted with busbar, neutral				
	link, earth bar and DIN rail, confirming to				
	IS:13032 and BS-5486-1986 without MCB to				
	house appropriate nos. of MCB's (The DBs				
	should be used of same company of MCB				
	to be used)				
	SOR-3-11-5.				
	F) Single Phase 8 way SS Double door.	Nos	19	759.00	14421.00
15	Approved make ELCBs / RCCBs conforming				
	to IS:12640 and having sensititvity of 30 m A				
	and Short Circuit with stand capacity of 6KA				
	and suitable for operation on single phase				
	240 V having charectorstic of quick action &				
	tripping with all advance feature & do not				
	incorporate any electronic component for				
	following Max. rating.				
	SOR-3-12-1.				
	(II) 40 Amps. DP				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	Cat-III	Nos	19	2007.00	38133.00
16	Providing and erecting HOT Deep				
	Galvanised Strip iron wire 8 to 16 S.W.G.	Kg.	19.28	58.00	1118.12
	SOR-3-15-5.				
17	Suuplying & erecting earth pit of minimum				
	bore dia.150 mm size approved make safe				
	Earthing Electrode consisting Pipe-in-Pipe				
	Technology as per IS 3043-1987 made of				
	corrosion free G.I.Pipes having Outer pipe				
	dia of 50 mm having 80-200 Micron				
	galvanising, Inner pipe dia of 25 mm having				
	200-250 Micron galvanising, connection				
	terminal dia of 12 mm with constant ohmic				
	value surrounded by highly conductive				
	compound with high charge dissipation				
	suitable for following type of applications.				
	a) For Electrical installation up to 11 KV				
	in normal soil.				
	Length of Pipe : 2.00 mtrs.				
	Back filling Compound : 1 no. bag of 25 Kg.	Nos.	1	6900.00	6900.00
	SOR-3-15-9.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
18	Providing Approved make Double Pole				
	Cast Iron Clad Switch & rewirable Fuse				
	240 V / 250 V confirming to I.S.S.				
	(b) 32A				
	Cat-III	Nos	20	449.00	8980.00
	SOR-3-1-2.				
19	Erection & connection charges for 16A/				
	32A DP as following with duly painted red oxide.				
	(b). On polished wooden block.	Nos	20	34.00	680.00
	SOR-3-1-3.				
20	Providing and erecting open well type				
	horizontal mono block pump set with cast				
	iron body having following specification.				
	B) 1. H.P. Single Phase open well motor				
	pump set suitable for 145 LPM discharge @				
	25 Mtr head, suitable for 32 mm dia. Delivery				
	pipe with control panel and 10 mtr. Long				
	3 x 1.5 Sq. mtr. Submersible flat copper cable.				
	Cat-II	Nos	1	6613.00	6613.00
	SOR-9-4-1.				

SR. NO.	NAME OF WORK:-Electrification of Apartment Type B (Block - 1 & 3)				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
21	Liasioning work to getting 230 V, 1-Phase, 3 wire power from SEB as per estimated service.				
	Motive power service	Nos.	1	1500.00	1500.00
	Lighting power service	Nos.	19	1000.00	19000.00
	TOTAL				314704.32
	TOTAL for One Block				314704.32
	ADD CONTENGENCY @ 5%	5%			15735.22
	TOTAL				330439.54
	ADD WORK CHARGE	2%			6608.79
	GRAND TOTAL				337048.33
	SAY				337048.00
	Note:				
	For Liquid level controller additional cost - 3000/- for each Apartment				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	5A PLG SEP	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	10A T/W SWITCH	16A SP SWITCH	5A PLUG
1	PASSAGE	4						10.0	7.0	12	4			
2	STAIR	1						2.5	1.8	3		1		
3	APARTMENT 1							0.0	0.0	0				
4	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
5	BED ROOM	1		1	1			8.0	5.6	9	3			1
6	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
7	BATH		1					2.5	1.8	3	1			
8	WASH							0.0	0.0	0	0			
9	APARTMENT 2							0.0	0.0	0				
10	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
11	BED ROOM	1		1	1			8.0	5.6	9	3			1
12	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
13	BATH		1					2.5	1.8	3	1			
14	WASH							0.0	0.0	0	0			
15	APARTMENT 3							0.0	0.0	0				
16	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
17	BED ROOM	1		1	1			8.0	5.6	9	3			1
18	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
19	BATH		1					2.5	1.8	3	1			
20	WASH							0.0	0.0	0	0			
21	APARTMENT 4							0.0	0.0	0				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	5A PLG SEP	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	10A T/W SWITCH	16A SP SWITCH	5A PLUG
22	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
23	BED ROOM	1		1	1			8.0	5.6	9	3			1
24	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
25	BATH		1					2.5	1.8	3	1			
26	WASH							0.0	0.0	0	0			
27	APARTMENT 5							0.0	0.0	0				
28	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
29	BED ROOM	1		1	1			8.0	5.6	9	3			1
30	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
31	BATH		1					2.5	1.8	3	1			
32	WASH							0.0	0.0	0	0			
33	APARTMENT 6							0.0	0.0	0				
34	LIVING ROOM	1		1	1	1		11.0	7.7	9	4			2
35	BED ROOM	1		1	1			8.0	5.6	9	3			1
36	KITCHEN	1			1		1	8.5	6.0	3	2		1	1
37	BATH		1					2.5	1.8	3	1			
38	WASH							0.0	0.0	0	0			
								0.0	0.0	0				
	TOTAL FOR GROUND FLOOR	**23**	**6**	**12**	**18**	**6**	**6**	**192.5**	**135**	**159**	**64**	**1**	**6**	**24**
	TERRACE	**1**			**1**			**5.5**	**3.9**	**3**	**2**			**1**
	GRAND TOTAL	**70**	**18**	**36**	**55**	**18**	**18**	**583**	**408**	**480**	**194**	**3**	**18**	**73**

LOAD CALCULATION					
SR	PARTICULAR	LIGHTING	POWER PLUG	EQUIPMENT	TOTAL
1	FLAT 1	0.21	0.30		0.51
2	FLAT 2	0.21	0.30		0.51
3	FLAT 3	0.21	0.30		0.51
4	FLAT 4	0.21	0.30		0.51
5	FLAT 5	0.21	0.30		0.51
6	FLAT 6	0.21	0.30		0.51
7	FLAT 7	0.21	0.30		0.51
8	FLAT 8	0.21	0.30		0.51
9	FLAT 9	0.21	0.30		0.51
10	FLAT 10	0.21	0.30		0.51
11	FLAT 11	0.21	0.30		0.51
12	FLAT 12	0.21	0.30		0.51
13	FLAT 13	0.21	0.30		0.51
14	FLAT 14	0.21	0.30		0.51
15	FLAT 15	0.21	0.30		0.51
16	FLAT 16	0.21	0.30		0.51
17	FLAT 17	0.21	0.30		0.51
18	FLAT 18	0.21	0.30		0.51
19	COMMON	0.21	0.30		0.51
20	MOTOR PUMP 1 HP			0.75	0.75
	SURVICE REQUIRED (each)			**KW**	**0.90**

School

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
1	Point wiring for Light / Fan /Bell / Primary				
	point with 2-1.0 sq. mm & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected, complete with				
	6A Tissino Type ISI marked flush type				
	switch /bell push and accessories erected				
	on polished wooden block / Metal / PVC				
	Box covered with 3 mm thick laminated				
	sheet.				
	(a) For open Wiring.	Pt.	34	150.00	5100.00
	SOR-1-1-1.				
2	Point wiring for looped PLUG with tissino				
	type single pole ISI marked 6 A. Switch				
	and 6 A Socket erected with necessary				
	connections erected on polished wooden				
	block / Metal / PVC Box covered with 3				
	mm thick laminated sheet for open /				
	concealed wiring.	Pt.	2	35.00	70.00
	SOR-1-1-3.				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
3	Providing following type of Modular Type				
	Accessories mounted on PVC / Metallic				
	box covered with appropriate front plate				
	modules erected with necessary connection.				
	As desire by Engineer incharge.				
	(10) 16 Amp. Sp One way switch				
	Cat-II	Nos	1	160.00	160.00
	(11) 6/16 Amp. Universal Socket				
	Cat-II	Nos	1	180.00	180.00
	SOR-1-2-6.				
4	Providing and erecting 1.5 mm thick FIA				
	approved and ISI mark (embossed) RIGID				
	PVC PIPES of following size complete				
	erected with necessary PVC fittings and				
	Junction boxes fixed with adhesive solution				
	and Clamps with following type of erection.				
	(1) For Open execution with clamps				
	erecting on wall / ceiling of following sizes of				
	Diameter..				
	b) 25 mm	Mtr.	132	32.00	4224.00
	(2) For erection concealed in wall / slab				
	along with continuous fish wire to draw				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	mains, laid in approved manner with				
	Plastering by cement mortar & finishing the				
	surface to match the wall / ceiling.				
	SOR-1-4-2.				
	b) 25 mm	Mtr.	66	32.00	2105.60
5	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				
	continuity of following size.				
	SOR-1-5-1.				
	c) 2 Wire 2.5 sq. mm	Mtr.	100	31.00	3100.00
7	Supplying and erecting approved make tube				
	fitting with One No.T-5 tube 28 W with				
	Electronic Ballast with THD less than				
	10 & built with adoptors, GI / PVC housing &				
	mirror effect reflector, suitable to work on				
	120V - 300 V, A.C. Supply with connector.				
	Make of fitting & tube may be differed.				
	SOR-2-9-7.				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	Cat-III	Nos.	23	825.00	18975.00
8	Approved make Power Saving 50 Watt				
	Ceiling Fan with condenser 230 volt A.C.				
	50 Cys 1200 mm sweep complete having				
	3 blades with alluminium blades with,				
	canopy 7 30 cms down rod erected with				
	24/0.2 flat 3 Core flexible wire with earthing				
	(Haavells, Orient, Crompton, Anchor, Bajaj)	Nos	10	1573.00	15730.00
	(Add Rs. 80/- Extra for Resistant type				
	Fan Regulator)				
	SOR-5-1-6.				
9	Mains with 1.1 KV grade FR PVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 2.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth				
	continuity of following size.				
	SOR-1-5-2.				
	a) 2 wire 4 sq. mm.	Mtr.	25	49.00	1225.00
10	Miniature circuit breaker Single Pole 6 A to				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	32 A suitable to operate on 240 V A. C.				
	system and having overload and short				
	circuit tripping elements and breaking				
	capacity 10 KA to be erected in existing				
	M. S. Box confirming to IS 8828/1996 with				
	ISI mark.				
	SOR-3-10-1.				
	Cat-III	Nos	6	137.00	822.00
11	Providing and erecting Sheet Steel powder				
	coated MCB distribution board - Flush /				
	surface mounted fitted with busbar, neutral				
	link, earth bar and DIN rail, confirming to				
	IS:13032 and BS-5486-1986 without MCB to				
	house appropriate nos. of MCB's (The DBs				
	should be used of same company of MCB				
	to be used)				
	SOR-3-11-5.				
	F) Single Phase 8 way SS Double door.	Nos	1	759.00	759.00
12	Approved make ELCBs / RCCBs conforming				
	to IS:12640 and having sensititvity of 30 m A				
	and Short Circuit with stand capacity of 6KA				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	and suitable for operation on single phase				
	240 V having charectorstic of quick action &				
	tripping with all advance feature & do not				
	incorporate any electronic component for				
	following Max. rating.				
	SOR-3-12-1.				
	(II) 40 Amps. DP				
	Cat-III	Nos	1	2007.00	2007.00
13	Providing and erecting HOT Deep				
	Galvanised Strip iron wire 8 to 16 S.W.G.	Kg.	2.04	58.00	118.32
	SOR-3-15-5.				
14	Suuplying & erecting earth pit of minimum				
	bore dia.150 mm size approved make safe				
	Earthing Electrode consisting Pipe-in-Pipe				
	Technology as per IS 3043-1987 made of				
	corrosion free G.I.Pipes having Outer pipe				
	dia of 50 mm having 80-200 Micron				
	galvanising, Inner pipe dia of 25 mm having				
	200-250 Micron galvanising, connection				
	terminal dia of 12 mm with constant ohmic				
	value surrounded by highly conductive				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	compound with high charge dissipation				
	suitable for following type of applications.				
	a) For Electrical installation up to 11 KV				
	in normal soil.				
	Length of Pipe : 2.00 mtrs.				
	Back filling Compound : 1 no. bag of 25 Kg.	Nos.	1	6900.00	6900.00
	SOR-3-15-9.				
15	Providing Approved make Double Pole				
	Cast Iron Clad Switch & rewirable Fuse				
	240 V / 250 V confirming to I.S.S.				
	(b) 32A				
	Cat-III	Nos	2	449.00	898.00
	SOR-3-1-2.				
16	Erection & connection charges for 16A/				
	32A DP as following with duly painted red oxide.				
	(b). On polished wooden block.	Nos	2	34.00	68.00
	SOR-3-1-3.				
17	Providing and erecting open well type				
	horizontal mono block pump set with cast				
	iron body having following specification.				

SR. NO.	NAME OF WORK:-Electrification of School Building				
	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	A) 0.5 H.P. Single phase open well motor				
	pump set having discharge of 75 LPM @				
	15 Mtr. Head suitable for 32 mm dia.				
	delivery pipe with control panel and 10 Mtr.				
	long 3 x 1.5 Sq. mtr. Submersible flat copper.				
	Cat-II	Nos	2	5463.00	10926.00
	SOR-9-4-1.				
18	Liasioning work to getting 230 V, 1-Phase, 3 wire power from SEB as per estimated service.				
	Motive Power service	Nos.	1	1500.00	1500.00
	Lighting Power service	Nos.	1	1500.00	1500.00
	TOTAL				76367.92
	TOTAL				76367.92
	ADD CONTENGENCY @ 5%	5%			3818.40
	TOTAL				80186.32
	ADD WORK CHARGE	2%			1603.73
	GRAND TOTAL				81790.04
	SAY				81790.00
	Note:				
	For Liquid level controller additional cost - 3000/-				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	5A PLUG	16A SP SWITCH
	GROUND FLOOR											
1	OFFICE	2		1	1		10.5	7.4	12	4	1	
2	PANTRY	2		1	1	1	13.5	9.5	12	4	1	1
3	WASH		1				2.5	1.8	3	1		
4	PASSAGE	3					7.5	5.3	9	3		
5	CLASS ROOM 1	4		2			15.0	10.5	24	6		
6	CLASS ROOM 2	4		2			15.0	10.5	24	6		
7	CLASS ROOM 1	4		2			15.0	10.5	24	6		
8	CLASS ROOM 2	4		2			15.0	10.5	24	6		
							0.0	0.0	0			
	TOTAL	**23**	**1**	**10**	**2**	**1**	**94**	**65.8**	**132**	**36**	**2**	**1**

LOAD CALCULATION					
SR	**PARTICULAR**	**LIGHTING**	**POWER PLUG**	**EQUIPMENT**	**TOTAL**
1	GROUND FLOOR	1.205	0.20		1.41
	TOTAL CONNECTED LOAD			KW	1.41
	LOAD FACTOR				0.70
	RUNNING LOAD			**KW**	**0.98**
	SURVICE REQUIRED			**KW**	**1.00**

Community center

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
1	Point wiring for Light / Fan /Bell / Primary				
	point with 2-1.0 sq. mm & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected, complete with				
	6A Tissino Type ISI marked flush type				
	switch /bell push and accessories erected				
	on polished wooden block / Metal / PVC				
	Box covered with 3 mm thick laminated				
	sheet.				
	(a) For open Wiring.	Pt.	41	150.00	6150.00
	SOR-1-1-1.				
2	Point wiring for looped PLUG with tissino				
	type single pole ISI marked 6 A. Switch				
	and 6 A Socket erected with necessary				
	connections erected on polished wooden				
	block / Metal / PVC Box covered with 3				
	mm thick laminated sheet for open /				
	concealed wiring.	Pt.	6	35.00	210.00
	SOR-1-1-3.				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
3	Point wiring for Two Way Controlled Light				
	Point with 2-1.0 sq. mm. & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected complete with				
	6A. Tissino Type ISI marked accessories				
	with earth continuity erected on polished				
	wooden block / Metal/ PVC box covered				
	with 3 mm thick laminated sheet.				
	(a) For open Wiring.	Pt.	1	156.00	156.00
	SOR-1-1-5.				
4	Providing following type of Modular Type				
	Accessories mounted on PVC / Metallic				
	box covered with appropriate front plate				
	modules erected with necessary connection.				
	As desire by Engineer incharge.				
	SOR-1-2-6.				
	(10) 16 Amp. Sp One way switch				
	Cat-II	Nos	2	160.00	320.00
	(11) 6/16 Amp. Universal Socket				
	Cat-II	Nos	2	180.00	360.00

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
5	Providing and erecting 1.5 mm thick FIA				
	approved and ISI mark (embossed) RIGID				
	PVC PIPES of following size complete				
	erected with necessary PVC fittings and				
	Junction boxes fixed with adhesive solution				
	and Clamps with following type of erection.				
	(1) For Open execution with clamps				
	erecting on wall / ceiling of following sizes of				
	Diameter..				
	b) 25 mm	Mtr.	165	32.00	5280.00
	(2) For erection concealed in wall / slab				
	along with continuous fish wire to draw				
	mains, laid in approved manner with				
	Plastering by cement mortar & finishing the				
	surface to match the wall / ceiling.				
	SOR-1-4-2.				
	b) 25 mm	Mtr.	90	32.00	2889.60
6	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	continuity of following size.				
	SOR-1-5-1.				
	c) 2 Wire 2.5 sq. mm	Mtr.	130	31.00	4030.00
7	Supplying and erecting approved make tube				
	fitting with One No.T-5 tube 28 W with				
	Electronic Ballast with THD less than				
	10 & built with adoptors, GI / PVC housing &				
	mirror effect reflector, suitable to work on				
	120V - 300 V, A.C. Supply with connector.				
	Make of fitting & tube may be differed.				
	SOR-2-9-7.				
	Cat-III	Nos.	25	825.00	20625.00
8	Approved make Power Saving 50 Watt				
	Ceiling Fan with condenser 230 volt A.C.				
	50 Cys 1200 mm sweep complete having				
	3 blades with alluminium blades with,				
	canopy 7 30 cms down rod erected with				
	24/0.2 flat 3 Core flexible wire with earthing				
	(Haavells, Orient, Crompton, Anchor, Bajaj)	Nos	13	1573.00	20449.00
	(Add Rs. 80/- Extra for Resistant type				
	Fan Regulator)				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-5-1-6.				
9	Mains with 1.1 KV grade FR PVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 2.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth				
	continuity of following size.				
	SOR-1-5-2.				
	a) 2 wire 4 sq. mm.	Mtr.	15	49.00	735.00
	b) 2 wire 6 sq. mm.	Mtr.	20	66.00	1320.00
10	Miniature circuit breaker Single Pole 6 A to				
	32 A suitable to operate on 240 V A. C.				
	system and having overload and short				
	circuit tripping elements and breaking				
	capacity 10 KA to be erected in existing				
	M. S. Box confirming to IS 8828/1996 with				
	ISI mark.				
	SOR-3-10-1.				
	Cat-III	Nos	12	137.00	1644.00
11	Providing and erecting Sheet Steel powder				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	coated MCB distribution board - Flush /				
	surface mounted fitted with busbar, neutral				
	link, earth bar and DIN rail, confirming to				
	IS:13032 and BS-5486-1986 without MCB to				
	house appropriate nos. of MCB's (The DBs				
	should be used of same company of MCB				
	to be used)				
	SOR-3-11-5.				
	F) Single Phase 8 way SS Double door.	Nos	2	759.00	1518.00
12	Approved make ELCBs / RCCBs conforming				
	to IS:12640 and having sensititvity of 30 m A				
	and Short Circuit with stand capacity of 6KA				
	and suitable for operation on single phase				
	240 V having charectorstic of quick action &				
	tripping with all advance feature & do not				
	incorporate any electronic component for				
	following Max. rating.				
	SOR-3-12-1.				
	(II) 40 Amps. DP				
	Cat-III	Nos	2	2007.00	4014.00
13	Providing and erecting HOT Deep				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	Galvanised Strip iron wire 8 to 16 S.W.G.	Kg.	3.57	58.00	207.06
	SOR-3-15-5.				
14	Suuplying & erecting earth pit of minimum				
	bore dia.150 mm size approved make safe				
	Earthing Electrode consisting Pipe-in-Pipe				
	Technology as per IS 3043-1987 made of				
	corrosion free G.I.Pipes having Outer pipe				
	dia of 50 mm having 80-200 Micron				
	galvanising, Inner pipe dia of 25 mm having				
	200-250 Micron galvanising, connection				
	terminal dia of 12 mm with constant ohmic				
	value surrounded by highly conductive				
	compound with high charge dissipation				
	suitable for following type of applications.				
	a) For Electrical installation up to 11 KV				
	in normal soil.				
	Length of Pipe : 2.00 mtrs.				
	Back filling Compound : 1 no. bag of 25 Kg.	Nos.	1	6900.00	6900.00
	SOR-3-15-9.				
15	Providing Approved make Double Pole				
	Cast Iron Clad Switch & rewirable Fuse				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	240 V / 250 V confirming to I.S.S.				
	(b) 32A				
	Cat-III	Nos	2	449.00	898.00
	SOR-3-1-2.				
16	Erection & connection charges for 16A/				
	32A DP as following with duly painted red oxide.				
	(b). On polished wooden block.	Nos	2	34.00	68.00
	SOR-3-1-3.				
17	Providing and erecting open well type				
	horizontal mono block pump set with cast				
	iron body having following specification.				
	A) 0.5 H.P. Single phase open well motor				
	pump set having discharge of 75 LPM @				
	15 Mtr. Head suitable for 32 mm dia.				
	delivery pipe with control panel and 10 Mtr.				
	long 3 x 1.5 Sq. mtr. Submersible flat copper.				
	Cat-II	Nos	2	5463.00	10926.00
	SOR-9-4-1.				
18	Liasioning work to getting 230 V, 1-Phase, 3 wire power from SEB as per estimated service.				

NAME OF WORK:-Electrification of Community Hall					
SR.NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	Motive Power service	Nos.	1	1500.00	1500.00
	Lighting Power service	Nos.	1	3500.00	3500.00
	TOTAL				**93699.66**
	TOTAL				**93699.66**
	ADD CONTENGENCY @ 5%	5%			4684.98
	TOTAL				98384.64
	ADD WORK CHARGE	2%			1967.69
	GRAND TOTAL				**100352.34**
	SAY				**100352.00**
	Note:				
	For Liquid level controller additional cost - 3000/-				

SR	DISCRIPTION	1*28 W T-5	BRACKET LIGHT	FAN	5A PLG ONB	15A PLG	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	10A T/W SWITCH	16A SP SWITCH	5A PLUG
	GROUND FLOOR												
1	CRECHE	4		2	1		18.0	12.6	24	7			1
2	WAITTING	2		1	1		10.5	7.4	12	4			1
3	MALE ROOM	1		1			5.0	3.5	9	2			
4	TOILET		1				2.5	1.8	3	1			
5	FEMALE ROOM	1		1			5.0	3.5	9	2			
6	TOILET		1				2.5	1.8	3	1			
7	WAITTING	1					2.5	1.8	3	1			
8	LIBRARY	2		1	1		10.5	7.4	12	4			1
9	STAIR	1					2.5	1.8	3		1		
10	PASSAGE	1					2.5	1.8	3	1			
11	OFFICE	1		1	1		8.0	5.6	9	3			
	FIRST FLOOR												
1	HALL	6		4	2	2	37.0	25.9	42	12		2	2
2	MALE ROOM	1		1			5.0	3.5	9	2			
3	TOILET		1				2.5	1.8	3	1			
4	FEMALE ROOM	1		1			5.0	3.5	9	2			
5	TOILET		1				2.5	1.8	3	1			
6	STORE	1					2.5	1.8	3	1			
7	LOBY	1					2.5	1.8	3	1			
8	STORE	1					2.5	1.8	3	1			
	TOTAL	**25**	**4**	**13**	**6**	**2**	**129**	**90.3**	**165**	**47**	**1**	**2**	**5**

LOAD CALCULATION					
SR	PARTICULAR	LIGHTING	POWER PLUG	EQUIPMENT	TOTAL
1	GROUND FLOOR	0.80	0.20		1.00
2	FIRST FLOOR	0.66	0.30		0.96
3	EXTERNAL LIGHTING	1.80			1.80
	TOTAL CONNECTED LOAD			KW	3.76
	LOAD FACTOR				0.70
	RUNNING LOAD			KW	2.63
	SURVICE REQUIRED			KW	3.00

Shops

NAME OF WORK:-Electrification of Shops					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
1	Point wiring for Light / Fan /Bell / Primary				
	point with 2-1.0 sq. mm & earth wire of 1.0				
	sq. mm (green) both are of ISI marked FR				
	PVC insulated multistrand copper wires, in				
	existing pipe duly erected, complete with				
	6A Tissino Type ISI marked flush type				
	switch /bell push and accessories erected				
	on polished wooden block / Metal / PVC				
	Box covered with 3 mm thick laminated				
	sheet.				
	(a) For open Wiring.	Pt.	6	150.00	900.00
	SOR-1-1-1.				
2	Point wiring for looped PLUG with tissino				
	type single pole ISI marked 6 A. Switch				
	and 6 A Socket erected with necessary				
	connections erected on polished wooden				
	block / Metal / PVC Box covered with 3				
	mm thick laminated sheet for open /				
	concealed wiring.	Pt.	3	35.00	105.00
	SOR-1-1-3.				

NAME OF WORK:-Electrification of Shops					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
3	Providing and erecting 1.5 mm thick FIA				
	approved and ISI mark (embossed) RIGID				
	PVC PIPES of following size complete				
	erected with necessary PVC fittings and				
	Junction boxes fixed with adhesive solution				
	and Clamps with following type of erection.				
	(1) For Open execution with clamps				
	erecting on wall / ceiling of following sizes of				
	Diameter..				
	b) 25 mm	Mtr.	27	32.00	864.00
	(2) For erection concealed in wall / slab				
	along with continuous fish wire to draw				
	mains, laid in approved manner with				
	Plastering by cement mortar & finishing the				
	surface to match the wall / ceiling.				
	SOR-1-4-2.				
	b) 25 mm	Mtr.	17	32.00	537.60
4	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				

NAME OF WORK:-Electrification of Shops					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
	continuity of following size.				
	SOR-1-5-1.				
	c) 2 Wire 2.5 sq. mm	Mtr.	30	31.00	930.00
5	Supplying and erecting approved make tube				
	fitting with One No.T-5 tube 28 W with				
	Electronic Ballast with THD less than				
	10 & built with adoptors, GI / PVC housing &				
	mirror effect reflector, suitable to work on				
	120V - 300 V, A.C. Supply with connector.				
	Make of fitting & tube may be differed.				
	SOR-2-9-7.				
	Cat-III	Nos.	3	825.00	2475.00
6	Approved make Power Saving 50 Watt				
	Ceiling Fan with condenser 230 volt A.C.				
	50 Cys 1200 mm sweep complete having				
	3 blades with alluminium blades with,				
	canopy 7 30 cms down rod erected with				
	24/0.2 flat 3 Core flexible wire with earthing				
	(Haavells, Orient, Crompton, Anchor, Bajaj)	Nos	3	1573.00	4719.00
	(Add Rs. 80/- Extra for Resistant type				
	Fan Regulator)				
	SOR-5-1-6.				

NAME OF WORK:-Electrification of Shops					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
7	Mains with 1.1 KV grade FR PVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 2.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth				
	continuity of following size.				
	SOR-1-5-2.				
	a) 2 wire 4 sq. mm.	Mtr.	27	49.00	1323.00
8	Providing Approved make Double Pole				
	Cast Iron Clad Switch & rewirable Fuse				
	240 V / 250 V confirming to I.S.S.				
	(b) 32A				
	Cat-III	Nos	3	449.00	1347.00
	SOR-3-1-2.				
9	Erection & connection charges for 16A/				
	32A DP as following with duly painted red oxide.				
	(b). On polished wooden block.	Nos	3	34.00	102.00
	SOR-3-1-3.				

NAME OF WORK:-Electrification of Shops					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Quantity	Estimated Rate (Rs.)	Amount (Rs.)
10	Liasioning work to getting 230 V, 1-Phase, 3 wire power from SEB as per estimated service.	Nos.	3	1000.00	3000.00
	TOTAL				**16302.60**
	TOTAL				**16302.60**
	ADD CONTENGENCY @ 5%	5%			815.13
	TOTAL				**17117.73**
	ADD WORK CHARGE	2%			342.35
	GRAND TOTAL				**17460.08**
	SAY				**17460.00**

SR	DISCRIPTION	1*28 W T-5	FAN	5A PLG ONB	2.5 SQMM MAINS	COND 25MM		10A SP SWITCH	5A PLUG
1	SHOP 1	1	1	1	8.0	5.6	9	3	1
2	SHOP 2	1	1	1	8.0	5.6	9	3	1
5	SHOP 3	1	1	1	8.0	5.6	9	3	1
	TOTAL	3	3	3	24	16.8	27	9	3

LOAD CALCULATION					
SR	**PARTICULAR**	**LIGHTING**	**POWER PLUG**	**EQUIPMENT**	**TOTAL**
1	SHOP 1	0.06225	0.04		0.10
2	SHOP 2	0.06225	0.04		0.10
3	SHOP 3	0.06225	0.04		0.10
4	SHOP 4	0.06225	0.04		0.10
	SERVICE PER SHOP			KW	0.50

External electrical

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
1	Providing and erecting XLPE(IS:7098)(I)-88				
	ISI marked armoured cable multistrand				
	Copper Conductor for 1.1 KV to be laid				
	on wall with necessary clamps or in existing				
	cable trench / pipe at road crossing or floor				
	of following size of cables.				
	SOR-4-4-2.				
	a) 3 Core 4 Sq.mm.	Mtr.	322	121.00	38962.00
2	Providing and fixing heavy duty flange type				
	brass cable gland with rubber ring for PVC				
	insulated armourd cable complete with out				
	going tails, insulating tape etc. for following				
	size of cables.				
	SOR-4-6-1.				
	c) 2 to 4 Core 6 Sq.mm	Nos	24	29.00	696.00
3	Solderiess crimping type Copper lugs				
	conforming to IS suitable for cable of				
	following size evenly crimped with high				
	pressure tool & connected to switchgear				
	terminals with brass / cadmium plated nut				
	bolts in as approved manner.				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
	SOR-4-7-2.				
	A) 2.5 to 6 Sq. mm.	Nos	96	6.00	576.00
4	Galvanised iron pipe post " B " class 88.9				
	mm O D 6 Mtr. Long duly painted with two				
	coats of alluminium paint complete with				
	metalic base plate of 300 mm x 300 mm x				
	4 mm thick to be erected as compound light				
	pole with approx weight 47 Kg.	Nos.	12	2324.00	27888.00
	SOR-6-1-2.				
5	C.I. pole base Suitable for 90 mm dia				
	base of pole with M.S. door having two				
	hinges welded on M.S. falt 25 x 3 mm which				
	is fitled on C.I. base by bolts welded inside				
	the pole base erected with one coat of				
	Redoxide and two coat of Alluminium paint				
	and covering the gap between pole and pole				
	base with suitable clamp as per SOR				
	drawing or sample.	Nos.	12	2208.00	26496.00
	SOR-6-2-1.				
6	Providing cement concrete foundation				
	including excavation for the pole with 45 x45				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
	x 100 cms deep in 1:3:6 cement concrete				
	(20 to 25 mm stone metal) with 45 cms x				
	45 cms (or 45 cms dia) x 45 cms high				
	cement concrete plinth with necessary				
	curing and finishing in approved manner.				
	(for 4 & 6 mtr pole)	Nos.	12	449.00	5388.00
	SOR-6-3-4.				
7	Supplying Water tight M.S. box of size				
	20 x 15 x 15 cms to erected suitable kitkat				
	fuse / MCB to be erected on polished				
	wooden board inside the box with hinged /				
	sliding door with rubber rings and erected				
	on pole with suitable pole clamp, all duly				
	painted with one coat of red oxide and two				
	coats of paints. (Cost of Fuse / MCB shall				
	be taken extra)	Nos.	12	115.00	1380.00
	SOR-6-4-1.				
8	Providing Single Arm Bracket consisting of				
	Light Class G.I. pipe of 4.2 cms outside dia				
	complete with suitable M.s.sleeve tubing of				
	approximate 30 cms. Length suitable for				
	76.5 mm / 80 mm or require size pole top				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
	having 5 Nos. fastners for fixing the brackets				
	and having spread of 1 mtr. Length with				
	suitable rise as per site condition & suitable				
	welded stiffner reducer and nipple with				
	check nut complete painted with one coat				
	of Red oxide and two coats of Alminium				
	paint suitable for side entry.	Nos.	12	368.00	4416.00
	SOR-6-5-5.				
9	“B” class Galvanised iron pipe 38/40 mm				
	dia. Meter having smooth finished bore of				
	the pipe on both ends erected on the face of				
	the wall with clamps, nuts and bolts for				
	laying of cable along the pole / wall shaping				
	the pipe as per site requirement to ease				
	cable entry.	Mtr.	24	150.00	3600.00
	SOR-6-5-9.				
10	Supplying & erecting approved make HPSV				
	public lighting luminair as per Keselec’Z’				
	range or approved make comprising an				
	injection moulded Aluminium body 2 side				
	reflection or a single piece deep drawn				
	reflector in high puirty polished & enodised				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
	Aluminium, with polystyrene acrylonitrite				
	protective cover & a clear acrylic protector.				
	The control gear monted in the body on to				
	removable mounting plate. Suitable for				
	vertical mounting directly on 76mm dia. Pole				
	top with prismatic or reinforced glass				
	protector.				
	C). Suitable for 150 W SVL	Nos.	12	4620.00	55440.00
	SOR-2-13-3.				
11	Approved make High Pressure sodium				
	vapour lamp, Tubular / Elliptical type 150W.				
	230/240/250V erected, if required.				
	Cat-III	Nos.	12	600.00	7200.00
	SOR-2-4-1.				
12	Miniature circuit breaker Single Pole 6 A to				
	32 A suitable to operate on 240 V A. C.				
	system and having overload and short				
	circuit tripping elements and breaking				
	capacity 10 KA to be erected in existing				
	M. S. Box confirming to IS 8828/1996 with				
	ISI mark.				
	Cat-III	Nos.	12	137.00	1644.00
	SOR-3-10-1.				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
13	Mains with 1.1 KV grade FRPVC insulated				
	ISI marked stranded Copper conductor				
	wire in existing pipe erected with 1.5 sq. mm				
	copper conductor FR PVC insulated				
	stranded wire of green colour for earth.				
	continuity of following size.				
	c) 2 Wire 2.5 sq. mm	Nos.	72	31.00	2232.00
	SOR-1-5-1.				
14	Pipe type earthing having 150 cms. Long and				
	2.5 cms dia. Galvised iron pipe with coupling				
	and buch burried in specially prepared earth				
	pit complate with necessary 8SWG earth				
	wire	Nos.	12	31.00	372.00
	SOR-3-15-6.				
15	Making trench in Hard murum / Tar Road				
	of suitable width of 90 cms deep for laying				
	cable or locating the fault all over the run				
	and back filling the same and making the				
	surface porper.				
	A) Upto 25 Sq. mm. Cable.	Mtr.	286	35.00	10010.00
	SOR-4-5-2.				

NAME OF WORK:-Electrification of External Road					
SR. NO.	Item Description	Unit	Electrical SOR-2008-09		
			Estimated Qty	Estimated Rate (Rs.)	Amount (Rs.)
16	Covering of cable with second class bricks				
	laid cover the cable crosswise & also on				
	both sides with covering of 7.5 cms layer of				
	sand above & below cable (Cable shall be				
	laid in 0.9 mtr deep & 0.4 mtr wide trench)				
	Where there are more than one cable in the				
	trench on either side of the cable, 5 cms.				
	over lapping the bricks shall be provided.	Mtr.	286	69.00	19734.00
	SOR-4-5-3.				
	TOTAL				**206034.00**
	TOTAL				**206034.00**
	ADD CONTENGENCY @ 5%	5%			10301.70
	TOTAL				**216335.70**
	ADD WORK CHARGE	2%			4326.71
	GRAND TOTAL				**220662.41**
	SAY				**220662.00**

15 Rate Analysis

BACKGROUND

For the cost estimate, generally the SOR is considered as the standard for comparision. We have followed the same. Standard Schedule of Rates 2011-2012 published by Governmetn of Tamil Nadu PWD department and is in effect from 1/7/2011 has been used. Case where directs rates are available they are used. In some exceptional one or two cases, the market survey is used to determine rates.

It would be important to mention that all calculations are done in excel format with cross referenced calculations of formulas; while putting in word rounding off upto 2 decimal point is done. This may reflect minor calculation error if checked manually.

The list of Base rates followed are as below:

Material Costs	Rate	Unit	SOR Reference
cement	245	bag	39,600/MT
river sand	110	cum	Pg-20item 97-98
filling sand	110	cum	
earth			
40 mm blue metal	616	cum	item75
20 mm blue metal	858	cum	item77
10 mm blue metal	583	cum	item79
6 mm blue metal	396	cum	item80
Binding Wire	42	kg	Item155
reinforcement steel	40600	ton	
brick bats (40mm)	365	cum	pg19/item14
fabrication steel	60	kg	mrkt survey
red bricks	12000	3000 nos	
fly ash bricks	9300	3000 nos	
mason / carpenter/ painter	243	day	Pg12/Item26
mason II class	218	day	pg12/item 27
labor	153	day	Pg12/Item 30
beldar etc	138	day	Pg12/Item 31
carpeter I class	237	day	pg-11/item7-8
carpeter II class	218	day	
Labor charges for fixing door frames	71.8	Sqm	Pg 34/Item 154
Labor charges for fixing window frames	90.4	Sqm	Pg 34/Item 155
Solid core flush door with commercial ply both side	1310	sqm	pg-45/item 95
Solid panel PVC door with frame	2490	sqm	pg46/Item 96a
Rolling shutters (collapsible)	2465	sqm	pg47/Item 102b

EARTHWORK AND EXCAVATION:

Item no.	Item Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.01	**EXCAVATION for foundation in loose soil or soft soil upto 1.5 m depth including sorting out and stacking of useful materials, and lead upto 30 mts etc. complete**	cu.m		122.86	
	for 10 cu.m				
	Labour:				
	Mate	Each	0.15	153	22.95
	Beldar Male	Each	3	153	459.00
	Coolie Female	Each	3.5	153	535.50
	Sub total				1017.45
	Add for tools & Plants tokaries etc; @ 2%		2%		20.35
	Add for sundries & Contingencies @ 3%		3%		30.52
	Sub total				50.87
	Add OH & Profit @ 15%		15%		160.25
	Total				1228.57
	Rate per Cum				122.86
1.02	**Backfilling the available excavated earth in trenches of plinth, sides of foundation in layers not exceeding 20 cm in thickness and consolidating each layer by ramming and watering**	cu.m		51.48	
	for 10 cu.m				
	Labour:				
	Beldar Male	Each	1.35	153	206.55
	Coolies Female	Each	1.35	153	206.55
	Waterman	Each	0.1	153	15.30
	Sub total				428.40
	Add for sundries & Contingencies @ 3%		3%		12.85
	Add for water & Electricity @ 1.5%		1.50%		6.43
	Sub total				19.28
	Add OH & Profit @ 15%		15%		67.15
	Total				514.83
	Rate per Cum				51.48

Item no.	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.03	**Providing and carrying out plinth filling with soil in layers not exceeding 20 cm in depth including watering, compaction etc complete**	**Cum.**		**182.19**	
	Details of cost for 10 Cum:				
	Materials				
	P. Sand	Cum	11	110	1210.00
	Labour				
	Beldar	Each	1.8	153	275.40
	Waterman	Each	0.2	153	30.60
	Sub total				1516.00
	Add for sundries & Contingencies @ 3%		3%		45.48
	Add for water & Electricity @ 1.5%		1.50%		22.74
	Sub total				68.22
	Add OH & Profit @ 15%		15%		237.63
	Total				1821.85
	Rate per Cum				182.19

RCC WORKS

Item no.	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
2.01	**Providing and laying PCC in Foundation and Plinth in proportion 1:4:8 (where 1 part is cement, 4 parts is fine aggregates, 8 parts is aggregates) including curing ramming etc.**	**Cum.**		**2234.29**	
	Details for 1 Cum				
	Material				
	Cement	Bags	3.414	245	836.43
	40mm metal	Cum	1.029	616	633.86
	P. sand	Cum	0.514	110	56.54

Item no.	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
	Labour:				
	Foreman	Each	0.08	243	19.44
	Beldar	Each	0.8	138	110.40
	Coolie	Each	0.8	153	122.40
	Mason	Each	0.125	243	30.38
	Waterman	Each	0.125	153	19.13
	Sub total				1828.57
	Add for machineries @ 1.75%		1.75%		32.00
	Add for sundries & Contengencies @ 3%		3%		54.86
	Add for water charges @ 1.5%		1.50%		27.43
	Sub total				114.29
	Add OH & Profit @ 15%		15%		291.43
	Cost per Cum				2234.29

Item no.	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
2.02	**Providing and laying controlled cement concrete M-20and curing complete excluding the cost of reinforcement for reinforced concrete work at all level and all type of concrete.**	**Cum.**		**3871.14**	
	Details for 1 Cum				
	Material				
	Cement	Bags	8	245	1960.00
	20mm metal	Cum	0.65	858	557.70
	12mm meta	Cum	0.3	583	174.90
	P. sand	Cum	0.5	110	55.00
	Foreman	Each	0.05	243	12.15
	Beldar	Each	0.7	138	96.60
	Coolie	Each	0.7	153	107.10
	Mason	Each	0.15	243	36.45
	Waterman	Each	0.125	153	19.13
	Sub total				3019.03
	Add for machineries @ 3%		3%		90.57
	Add for sundries & Contingencies @ 3%		3%		90.57
	Add for water charges @ 1.5%		3%		90.57
	Add for testing & scaffoldings @ 1.50%		1.50%		45.29
	Add for cement slurry & cover block @ 0.5%		0.50%		15.10
	Add for hacking the surfaces @ 0.5%		0.50%		15.10
	Sub total				347.19
	Add OH & Profit @ 15%		15%		504.93
	Cost per Cum				3871.14

Item no.	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
2.03	**Providing and laying partially precast RCC joists and precast brick panel slab made as per the structural design; with 6 mm diameter bars as top reinforcement and M-20 grade concrete screeding including formwork, deshuttering, propping, curing, cleaning etc. complete.**	**Sq.m.**		**696.63**	
	Details of cost for a room of size 2700 x 6935				
	Room area 2.7 m x 6.95 m	sq.m.	18.7245		
	Size of precast brick panel 1125 x 535	Nos	30		
	Size of precast RC joist 110 x 130	Nos	5		
	Mould (timber) for brick panel				
	Deodar wood (taken neem @ 600 rs. Per cft				
	2 x 1.3 x 0.075 x 0.03	cum.	0.0049		
	2 x 0.6 x 0.075 x 0.03	cum.	0.0023		
	total wood with 5% wastage	cum.	0.0075	21210	158.68
	MS strap etc.	Nos.	4	25	100
	Sundries				
	Labor				
	Skilled	Nos.	0.5	243	121.50
	Unskilled	Nos.	0.5	153	76.50
	Assuming 60 uses for mould				456.68
	cost per panel				7.61
	Brick Panel				
	Material				
	Bricks	Nos	18	3.10	55.80
	1:1.5:3 concrete for joints	cum.	0.01	3871.14	38.71
	Steel 2 nos 6 mm dia bars 1.25 m long	kg	0.58	43.68	25.12
	Labor				
	Skilled	Nos	0.05	243	12.15

Item no.	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
	unskilled	Nos	0.12	153	18.36
	Oil, sand etc	Nos	3	2.6	7.80
	Cost for mould				7.61
	Total for brick panel				165.55
	Precast joist size 110 x 130 x 2850	**Nos**	**5**		
	Mould (timber)				
	Wood	cum.	0.038	33560	1275.28
	MS iron clamps				
	type A	Nos	1	50	50
	type B	Nos	2	75	150
	Labour				
	Skilled	Nos	0.5	243	121.50
	Unskilled	Nos	0.5	153	76.5
	Sundries	Nos	12	2.6	31.2
	Assuming for 100 repetations total				1704.48
	Mould Cost for 1 use				17.0448
	Material				
	C.C. 1:1.5:3	cum.	0.040755	3871.14	157.7685
	Steel				
	top 1 no 6 mm	kg	0.6486	43.68	28.33085
	bottom 2 nos 10 mm	kg	3.7788	43.68	165.058
	stirrups 6 mm @130 c/c 22 nos	kg	2.53	43.68	110.5104
	sundries	nos	6	2.6	15.6
	total for 1 precast joist				494.3125

Item no.	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
	Erection and assembly for 18.72 sqm.				
	cost of 5 joists	nos	5	494.3125	2471.563
	transport from yard to site	nos	5	15	75
	joist propping				
	ballies etc	nos	30	2.6	78
	labor				
	skilled	nos	0.2	243	48.6
	unskilled	nos	0.4	153	61.2
	precast brick panels	nos	30	165.55	4966.462
	labour				
	skilled	nos	0.7685	243	186.7455
	unskilled	nos	0.945	153	144.585
	Insitu concrete				
	total slab volume 3.0 x 7.16 x 0.11	cum.	2.3628		
	volume of brick panels	cum.	1.35421875		
	insitu1:1.5:3 concrete	cum.	1.00858125	3871.14	3904.364
	top reinforcement 6 mm	kg	12.811	39.60	507.3156
	scafolding catwalk etc	nos	180	2.6	468
	total for erection				12911.83
	add 1% for water				129.1183
			Total for 18.72 sqm	13040.95	
	Rate per sqm. of precast brick panel and joist roofing		**696.63**		

	Description of works	Unit		Quantity		Rate (Rs.)		Amount (Rs,)
2.10	**Providing and laying reinforcement as per drawing complete**	**Kgs**				**55.82**		
	Details for 100 kgs							
	Materials							
	Steel bars	Kgs		105		39.6		4158.00
	Binding wire	Kgs		5		42		210.00
	Labour							
	Fore man	Each		0.04		200		8.00
	Bar bender	Each		0.5		211		105.50
	Helper	Each		0.5		196		98.00
	Sub total							4579.50
	Add for chiesels etc; @ 1.5%			1.50%				68.69
	Add for scaffoldings, cover block etc; @ 1.5%			1.50%				68.69
	Add for sundries & contengencies @ 3%			3%				137.39
	Sub total							274.77
	Add OH & CP @ 15%			15%				728.14
	Total							5582.41
	Rate per Kgs.							55.82

	Description of works	Unit		Quantity		Rate (Rs.)		Amount (Rs,)
2.11	**Plinth protection 1:3:6 concrete over 75 thick brick bats bed**	**Sq.m.**				**179.61**		
	Details for 10 sqm. of flooring							
	Materials							
	Cement	Bags		2.2		245		539.00
	Sand	Cu.m		0.23		110		25.30
	Brick bats 40 mm size	Cu.m		0.75		365		273.75
	Fillng sand	Cu.m		0.06		110		6.6
	20 mm + 10 mm blue metal	Cu.m		0.47		858		403.26
	Labour							
	Mason	Each		0.05		243		12.15
	Coolie	Each		0.11		153		16.83
	Waterman	Each		0.33		153		50.49
	Beldar	Each		1.16		138		160.08
	Sub-total							1487.46
	Add for water and electricity @ 1%			1%				14.8746
	Add for TEP @ 2%			2%				29.7492
	Add for sundries and contingencies @ 2%			2%				29.7492
	Sub-total							74.373
	Add OH & Profit @15%			15%				234.27
	Cost per 10 Sqm.							1796.10
	Cost per Sqm.							179.61

BRICKWORK

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
3.01	**Providing and laying 230mm brick work using fly ash bricks having a crushing strength more than 60 kg/ sq.cm in cement mortar of 1:4 (where 1 part is cement, 4 parts is sand) etc. complete**	**Cu.m**		**2805.75**	
	Details for 1 Cu.m. of brick work				
	Materials				
	Bricks	Nos.	494	3.10	1531.40
	Cement	Bags	1.25	245	306.25
	Sand	Cu.m	0.2675	110	29.425
	Labour				
	Mason	Each	0.72	243	174.96
	Coolie	Each	1.37	153	209.61
	Waterman	Each	0.2	153	30.6
	Foreman	Each	0.08	243	19.44
	Sub-total				2301.69
	Add for water and electricity @ 2%		2%		46.03
	Add for TEP @ 2%		2%		46.03
	Add for sundries and contingencies @ 2%		2%		46.03
	Sub-total				138.10
	Add OH & Profit @15%		15%		365.97
	Cost per Cum				2805.75

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
3.02	**Providing and laying brickwork 230 mm thick in Rat-Trap bond using fly ash bricks having crushing strength MORE THAN 60kg/sq.cm., in 1:4 mortar (where 1 part is cement & 4 parts is sand) including raking out the joints, curing, scaffolding etc.**	**Cu.m**		**2248.17**	
	Details for 2.16 Cu.m. of brick work				
	Materials				
	Bricks	Nos.	800	3.1	2480
	Cement	Bags	2.93	245	717.85
	Sand	Cu.m	0.4	110	44
	Labour				
	Mason	Each	1.6	243	388.8
	Coolie	Each	1.8	153	275.4
	Waterman	Each	0.38	153	58.14
	Foreman	Each	0.08	243	19.44
	Sub-total				3983.63
	Add for water and electricity @ 2%		2%		79.67
	Add for TEP @ 2%		2%		79.67
	Add for sundries and contingencies @ 2%		2%		79.67
	Sub-total				239.02
	Add OH & Profit @15%		15%		633.40
	Cost per Cum				2248.17

PLASTER WORK

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
4.01	Providing and laying lime pozolona plaster in proportion 1:1.5:3 (where 1 part is lime, 1.5 parts is pozolona and 3 is sand) 20 mm thick on exterior brick and concrete surfaces in true line and level finished even and smooth including curing and scaffolding, etc. complete upto GF slab level	Sq.m.		**153.25**	
	For 100 sq.m				
A	Materials				
	Cement	bags	21.90	245	5365.98
	Sand	cu.m	1.65	110.00	181.50
	Lime	cu.m	0.55	979.00	538.45
B	Labour				
	Skilled	nos	10.00	243.00	2430.00
	Unskilled	nos	22.00	153.00	3366.00
	Bhishti	nos	5.00	138.00	690.00
	Total of A + B				12571.93
C	Water & Elec. (2% of A + B)				251.44
D	TEP (2% of A + B)				251.44
E	Scaffolding (2% of A + B)				251.44
	Total A+B+C+D				**13326.24**
E	Over heads & Profits (15% of A+B+C+D)				1998.94
	Therefore total cost in Rs =				15325.18
	THEREFORE UNIT COST for GF =				153.25

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
4.03	**Providing. 15 mm. thick cement plaster in single coat on fair side of brick concrete walls for interior plastering up to floor two level and finished even and smooth in Cement Mortar 1:4 (where 1 part is cement, and 4 parts is sand)**	**Sq.m.**		**117.47**	
	For 100 sq.m				
A	Materials				
	Cement	bags	12.05	245.00	2951.29
	Sand	cu.m	1.82	110.00	199.65
B	Labour				
	Skilled	nos	10.00	243.00	2430.00
	Unskilled	nos	22.00	153.00	3366.00
	Bhishti	nos	5.00	138.00	690.00
	Total of A + B				9636.94
C	Water & Elec. (2% of A + B)				192.94
D	TEP (2% of A + B)				192.94
E	Scaffolding (2% of A + B)				192.94
	Total A+B+C+D				10215.15
E	Over heads & Profits (15% of A+B+C+D)				1532.27
	Therefore total cost in Rs =				11747.43
	THEREFORE UNIT COST for GF =				117.47

PAINTING

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
5.01	**White washing with lime on wall surfaces (two coats) to given an even shade including throughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter. (INTERIOR)**	**sq.m**		**13.21**	
	For 100 sq.m				
A	Materials				
	Lime	Cum	0.00	979.00	3.95
B	Labour				
	Skilled	nos	2.70	243.00	656.10
	Unskilled	nos	1.14	153.00	174.42
	Add 30% extra				249.16
	Total of A + B				1083.62
C	Water & Elec. (2% of A + B)				21.67
D	TEP (2% of A + B)				21.67
E	Scaffolding (2% of A + B)				21.67
	Total A+B+C+D				1148.64
F	Over heads & Profits (15% of A+B+C+D)				172.30
					1320.93
	THEREFORE COST FOR WHITEWASHING				13.21

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT
5.02	**White washing with lime on decorated wall surfaces (one coat) to give an even shade including thoroughly brooming the surface to remove dirt, dust, mortar drops and loose scales of lime wash and other foreign matter etc. complete on EXTERNAL surfaces on GF level**	**sq.m**		**13.20**	
	For 100 sq.m				
A	Materials				
	Lime	Cum	0.004	979.00	3.51
B	Labour				
	Skilled	nos	2.70	243.00	656.10
	Unskilled	nos	1.14	153.00	174.42
	Add 30% extra				249.16
	Total of A + B				1083.18
C	Water & Elec. (2% of A + B)				21.66
D	TEP (2% of A + B)				21.66
E	Scaffolding (2% of A + B)				21.66
	Total A+B+C+D				1148.17
E	Over heads & Profits (15% of A+B+C+D)				172.23
					1320.40
	Rate per Sq.m.				13.20

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT
5.03	**Applying priming coat over new steel and other surfaces (wall, wood etc) after over and including preparing the surface by throughly cleaning oil, grease, dirt and other foreign matter and scoured with brushes fine steel wool, scrapers and sand paper with ready mixed primer of approved make**	**sq.m**		**24.35**	
	For 100 sq.m				
A	Materials				
	Distemper Paint	Bags	13.50	68.00	918.00
B	Labour				
	Skilled	nos	2.70	243.00	656.10
	Unskilled	nos	1.14	153.00	174.42
	Add 30% extra				249.16
	Total of A + B				1997.68
C	Water & Elec. (2% of A + B)				39.95
D	TEP (2% of A + B)				39.95
E	Scaffolding (2% of A + B)				39.95
	Total A+B+C+D				2117.54
E	Over heads & Profits (15% of A+B+C+D)				317.63
					2435.17
	THEREFORE COST FOR PAINTING				24.35

ITEM NO	ITEM DESCRIPTION	UNIT	QUANTITY	RATE (Rs.)	AMOUNT (Rs.)
5.04	**Painting two coats (excluding priming coat) on new steel and other surfaces (wall, wood etc) with synthetic enamel paint brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**	**sq.m**		**28.91**	
	For 100 sq.m				
A	Materials				
	Distemper Paint	Bags	19.00	68.00	1292.00
B	Labour				
	Skilled	nos	2.70	243.00	656.10
	Unskilled	nos	1.14	153.00	174.42
	Add 30% extra				249.16
	Total of A + B				2371.68
C	Water & Elec. (2% of A + B)				47.43
D	TEP (2% of A + B)				47.43
E	Scaffolding (2% of A + B)				47.43
	Total A+B+C+D				2513.98
E	Over heads & Profits (15% of A+B+C+D)				377.10
					2891.07
	THEREFORE COST FOR PAINTING				28.91

FLOORING

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.01	**Providing and laying India patent stone (IPS) flooring 40 mm thick with cement concrete 1:2:4 using 10 mm maximum size graded stone aggregates laid to levels or alternate by s, finished smooth with cement slurry, at all depth and heights below and above plinth level including from work, ramming curing, etc., complete as directed on GF level**	**Sq.m**		**583.04**	
	Details for 100 sqm. of flooring				
	Materials				
	Cement	Bags	34	245	8330
	Sand	Cu.m	2.01	110	221.1
	Aggregates	Cu.m	4.01	583	2337.83
	Labour				
	Mason	Each	17	243	4131
	Coolie	Each	133	153	20349
	Waterman	Each	70	153	10710
	Mixer and Operator	Each	0.3	166	49.8
	Beldar	Each	7	243	1701
	Sub-total				47829.73
	Add for water and electricity @ 2%		2%		956.59
	Add for TEP @ 2%		2%		956.59
	Add for Machinery				
	Add for sundries and contingencies @ 2%		2%		956.59
	Sub-total				2869.78
	Add OH & Profit @15%		15%		7604.93
	Cost per 100 Sqm.				58304.44
	Cost per Sqm.				583.04

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.02	**Providing and laying broken white china mosaic flooring for plain surfaces comprising of 18 to 25 mm size broken glazed tiles (6mm thick) laid over 40 mm thick bed of cement mortar 1:6 (where 1 is cement and 6 is sand) including applying neat cement slurry, the flooring shall be tampered to bring mortar up to the joints including grouting the joints with white cement and rounding the junctions upto 15 cm along the parapet at TERRACE level**	**Sq.m**		**411.04**	
	Materials				
	Mosaic	sq.m	105.00	238.00	24990.00
	Cement	bags	22.94	245.00	5621.50
	Sand	cu.m	5.19	110.00	570.43
	White cement	kgs	15.00	19.95	299.25
	Labour				
	Skilled	nos	4.00	243.00	972.00
	Unskilled	nos	5.84	153.00	893.52
	Add 20% extra				373.10
	Total of A + B				33719.80
	Water & Elec. (2% of A + B)				674.40
	TEP (2% of A + B)				674.40
	Scaffolding (2% of A + B)				674.40
	Total A+B+C+D				35742.99
	Over heads & Profits (15% of A+B+C+D)				5361.45
	Therefore total cost in Rs 100 sq.m =				41104.44
	THEREFORE UNIT COST for FF=				411.04

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.03	**Providing and laying kota stone kitchen platform as per drawings on brickwork 75 mm thick including plastering the walls by cement mortar 1:4, kota stone polished on one side including curing, etc., complete as directed 0.6 m wide of kadappah stone 2.04 sq.m**	**sq.m**		**840.59**	
	Materials				
	Cement	bags	69.59	245.00	17050.43
	Sand	m^3	10.53	110.00	1158.70
	Kota stone	sq.m	105.00	462.00	48510.00
	Labour				
	skilled	nos	4.00	243.00	972.00
	Unskilled	nos	5.84	153.00	893.52
	Add 20% labour				373.104
	Total of A1 + B1				68957.75
	Water and Electricity (2% of A1 + B1)				1379.15
	Tools and equipment (2% of A1 + B1)				1379.15
	Scaffolding (2% of A1 + B1)				1379.15
	Overheads & Profits (15% of A1+B1+C1+D1+F1)				10964.28
	Total cost of 100 sq.m =				84059.49
	Total UNIT cost =				840.59

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.04	**Providing and laying polished Kadappah stone slab (Polished, Green colour) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) laid over the staircase, and joined with cement slurry, so as to give an even surface etc. complete**	**sq.m**		**408.82**	
	Materials				
	Cement	bags	13.26	245.00	3247.70
	Sand	m^3	3.01	110.00	331.06
	Kadapah stone	sq.m	105.00	264.00	27720.00
	Labour				
	skilled	nos	4.00	243.00	972.00
	Unskilled	nos	5.84	153.00	893.52
	Add 20% labour				373.104
	Total of A1 + B1				33537.38
	Water and Electricity (2% of A1 + B1)				670.75
	Tools and equipment (2% of A1 + B1)				670.75
	Scaffolding (2% of A1 + B1)				670.75
	Overheads & Profits (15% of A1+B1+C1+D1+F1)				5332.44
	Total cost of 100 sq.m =				**40882.07**
	Total UNIT cost =				**408.82**

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.05	**Providing and laying polished kadappah stone (25 mm) over 40 mm thick base of cement mortar 1:6 (where is part is cement, 6 parts is coarse sand) laid over and jointed with grey cement slurry including rubbing and polishing etc.for wash area**	**sq.m**		**452.45**	
	Materials				
	Cement	bags	26.51	245.00	6495.40
	Sand	m^3	6.02	110.00	662.11
	Kadapah stone	sq.m	105.00	264.00	27720.00
	Labour				
	skilled	nos	4.00	243.00	972.00
	Unskilled	nos	5.84	153.00	893.52
	Add 20% labour				373.104
	Total of A1 + B1				37116.14
	Water and Electricity (2% of A1 + B1)				742.32
	Tools and equipments (2% of A1 + B1)				742.32
	Scaffolding (2% of A1 + B1)				742.32
	Overheads & Profits (15% of A1+B1+C1+D1+F1)				5901.47
	Total cost of 100 sq.m =				**45244.57**
	Total UNIT cost =				**452.45**

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.06	**Providing and laying glazed tile flooring in toilet of tile size (150 x 150 mm) over a base of 30 mm cement mortar 1:3 for toilet flooring including flushing the tiles with white cement slurry including cleaning the surface to give an even finish etc complete**	**sq.m**		**394.23**	
	Materials				
	Mosaic	sq.m	105.00	210.00	22050.00
	Cement	bags	30.12	245.00	7378.22
	Sand	cu.m	3.40	110.00	374.34
	White cement	kgs	15.00	19.95	299.25
	Labour				
	Skilled	nos	4.00	243.00	972.00
	Unskilled	nos	5.84	153.00	893.52
	Add 20% extra				373.10
	Total of A + B				32340.44
	Water & Elec. (2% of A + B)				646.81
	TEP (2% of A + B)				646.81
	Scaffolding (2% of A + B)				646.81
	Total A+B+C+D				34280.86
	Over heads & Profits (15% of A+B+C+D)				5142.13
	Therefore total cost in Rs 100 sq.m =	40524.31			39422.99
	THEREFORE UNIT COST for FF=				394.23

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
6.07	**Providing and laying Brick on edge flooring in 1:6 CM in line and level complete as per design**	**Sq.m**		**364.46**	
	Details for 10 sqm. of flooring				
	Materials				
	Cement	Bags	2.57	245	629.65
	Sand	Cu.m	0.4643	110	51.073
	Bricks	Nos.	565	3.1	1751.5
	Labour				
	Mason	Each	1.08	243	262.44
	Coolie	Each	1.62	153	247.86
	Waterman	Each	0.27	153	41.31
	Beldar	Each	0.25	138	34.5
	Sub-total				3018.33
	Add for water and electricity @ 1%		1%		30.18
	Add for TEP @ 2%		2%		60.37
	Add for sundries and contingencies @ 2%		2%		60.37
	Sub-total				150.92
	Add OH & Profit @15%		15%		475.39
	Cost per 10 Sqm.				3644.64
	Cost per Sqm.				364.46

Doors and Windows

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
7.01	**Providing and fixing 35 mm thick flush door shutter including fixing in position with necessary hardwares such as hinges, aldrops, cleaning etc. complete.**	**Sq.m**		**3696.32**	
	Details for 1 door				
	Material				
	Flush door	Sq.m	1.8	1310	2358
	Hardware	lumpsum	1	120	120
	Finishing - painting	lumpsum	4.05	110	445.5
	Labour				
	for fixing				
	Carpenter	Each	0.4	237	94.80
	Helper	Each	0.4	218	87.20
	Sub-total				3105.50
	Add for machineries @2%		2%		62.11
	Add for sundries and contengencies@1.5%		1.50%		46.58
	Sub-total				108.69
	Add OH & Profit @15%		15%		482.13
	Cost per door				3696.32

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
7.03	**Providing and fixing 32 mm flush shtter windows including fixing in position with necessary hardware such as hinges, aldrops etc complete**	**Sq.m**		**2305.96**	
	Details for 1 door				
	Material				
	Flush shutter	Sq.m	1.05	1310	1375.50
	Hardware	lumpsum	1	120	120
	Finishing - painting	lumpsum	2.3625	110	259.875
	Labour				
	for fixing				
	Carpenter	Each	0.4	237	94.80
	Helper	Each	0.4	218	87.20
	Sub-total				1937.38
	Add for machineries @2%		2%		38.75
	Add for sundries and contengencies@1.5%		1.50%		29.06
	Sub-total				67.81
	Add OH & Profit @15%		15%		300.78
	Cost per door				2305.96

MISCELLANEOUS WORKS

	Description of works	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
9.01	**Road concrete in M20 over 100 mm thick blue metal bedding complete**	Sq.m		**474.26**	
	Details for 10 sqm. of flooring				
	Materials				
	Cement	Bags	8	245	1960
	Sand	Cu.m	0.5	110	55
	Blue metal 40 mm + 60 mm plus	Cu.m	1	616	616
	Fillng sand	Cu.m	0.12	110	13.2
	20 mm + 10 mm blue metal	Cu.m	0.85	858	729.3
	Labour				
	Foreman	Each	0.1	243	24.3
	Mason	Each	0.28	243	68.04
	Coolie	Each	0.94	153	143.82
	Waterman	Each	0.5	153	76.5
	Beldar	Each	1.75	138	241.5
	Sub-total				3927.66
	Add for machine and operator @ 1%		1.00%		39.28
	Add for water and electricity @ 1%		1%		39.28
	Add for TEP @ 2%		2%		78.55
	Add for sundries and contingencies @ 2%		2%		78.55
	Sub-total				196.38
	Add OH & Profit @15%		15%		618.61
	Cost per 10 Sqm.				4742.65
	Cost per Sqm.				474.26

RESIDENTIAL UNITS

EXCAVATION	L	B	H	No Of Items Per Block	No. of Blocks	Quantity
kit -bath long wall block 1	4.78	0.75	1	3	2	21.51
kit -bath long wall block 2	4.78	0.75	1	5	2	35.85
long walls block 1	7.89	0.75	1	6	2	71.01
long walls block 2	7.89	0.75	1	9	2	106.515
kit-bath short walls b1	0.98	0.75	1	12	2	17.64
kit-bath short walls b2	0.98	0.75	1	18	2	26.46
short walls b1	5.11	0.75	1	4	2	30.66
short walls b2	5.11	0.75	1	6	2	45.99
common b1 long	5.35	0.75	1	2	1	8.025
	3.38	0.75	1	4	1	10.14
common b1 short	7.06	0.75	1	3	1	15.885
common b1 short - front	1.8	0.75	1	2	1	2.7
common b2 long	7.06	0.75	1	2	1	10.59
	9.85	0.75	1	2	1	14.775
	4.9	0.75	1	2	1	7.35
common b2 short	5.8	0.75	1	2	1	8.7
						433.8

PCC	L	B	H	No of Items Per Block	No. of Blocks	Quantity
FOOTING PCC						
kit -bath long wall block 1	4.78	0.75	0.1	3	2	2.151
kit -bath long wall block 2	4.78	0.75	0.1	5	2	3.585
long walls block 1	7.89	0.75	0.1	6	2	7.101
long walls block 2	7.89	0.75	0.1	9	2	10.6515
kit-bath short walls b1	0.98	0.75	0.1	12	2	1.764
kit-bath short walls b2	0.98	0.75	0.1	18	2	2.646
short walls b1	5.11	0.75	0.1	4	2	3.066
short walls b2	5.11	0.75	0.1	6	2	4.599
common b1 long	5.35	0.75	0.1	2	1	0.8025
	3.38	0.75	0.1	4	1	1.014
common b1 short	7.82	0.75	0.1	3	1	1.7595
common b1 short - front	2.55	0.75	0.1	2	1	0.3825
common b2 long	7.06	0.75	0.1	2	1	1.059
	9.85	0.75	0.1	2	1	1.4775
	4.9	0.75	0.1	2	1	0.735
common b2 short	5.8	0.75	0.1	2	1	0.87
						43.6635
PLINTH PROTECTION	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
B1	84	0.6	1	2	1	100.8
B2	98	0.6	1	1	2	117.6
						218.4
FLOORING CONCRETE - GRADE SLAB	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
ROOMS	3.045	7.37	0.1	20	1	44.8833
KIT+BATH	1.73	4.49	0.1	20	1	15.5354

COMMON B1	56.95	1	0.1	1	1	5.695
COMMON B2	45.9	1	0.1	1	2	9.18
						75.2937
RCC	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
LINTEL BAND						
kit -bath long wall block 1	4.26	0.23	0.075	9	2	1.32273
kit -bath long wall block 2	4.26	0.23	0.075	15	2	2.20455
long walls block 1	7.37	0.23	0.075	18	2	4.57677
long walls block 2	7.37	0.23	0.075	27	2	6.865155
kit-bath short walls b1	1.5	0.23	0.075	36	2	1.863
kit-bath short walls b2	1.5	0.23	0.075	54	2	2.7945
short walls b1	5.4	0.23	0.075	12	2	2.2356
short walls b2	5.4	0.23	0.075	18	2	3.3534
common b1 long	5.87	0.23	0.075	6	1	0.607545
	2.86	0.23	0.075	12	1	0.59202
common b1 short	7.29	0.23	0.075	9	1	1.131773
common b1 short - front	2.03	0.23	0.075	6	1	0.210105
common b2 long	7.29	0.23	0.075	6	1	0.754515
	10.08	0.23	0.075	6	1	1.04328
	5.13	0.23	0.075	6	1	0.530955
common b2 short	5.57	0.23	0.075	6	1	0.576495
						30.66239
BRICKWORK	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
FOOTING 1ST STEP - 2 COURSES						
kit -bath long wall block 1	4.49	0.46	0.17	3	2	2.106708
kit -bath long wall block 2	4.49	0.46	0.17	5	2	3.51118
long walls block 1	7.6	0.46	0.17	6	2	7.13184
long walls block 2	7.6	0.46	0.17	9	2	10.69776
kit-bath short walls b1	1.27	0.46	0.17	12	2	2.383536
kit-bath short walls b2	1.27	0.46	0.17	18	2	3.575304

short walls b1	5.4	0.46	0.17	4	2	3.37824
short walls b2	5.4	0.46	0.17	6	2	5.06736
common b1 long	5.64	0.46	0.17	2	1	0.882096
	3.09	0.46	0.17	4	1	0.966552
common b1 short	7.52	0.46	0.17	3	1	1.764192
common b1 short - front	2.26	0.46	0.17	2	1	0.353464
common b2 long	7.52	0.46	0.17	2	1	1.176128
	10.31	0.46	0.17	2	1	1.612484
	5.36	0.46	0.17	2	1	0.838304
common b2 short	5.34	0.46	0.17	2	1	0.835176
						46.28032
FOOTING 2ND STEP - 2 COURSES	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
kit -bath long wall block 1	4.38	0.35	0.17	3	2	1.56366
kit -bath long wall block 2	4.38	0.35	0.17	5	2	2.6061
long walls block 1	7.49	0.35	0.17	6	2	5.34786
long walls block 2	7.49	0.35	0.17	9	2	8.02179
kit-bath short walls b1	1.38	0.35	0.17	12	2	1.97064
kit-bath short walls b2	1.38	0.35	0.17	18	2	2.95596
short walls b1	5.16	0.35	0.17	4	2	2.45616
short walls b2	5.16	0.35	0.17	6	2	3.68424
common b1 long	5.87	0.35	0.17	2	1	0.69853
	2.86	0.35	0.17	4	1	0.68068
common b1 short	7.29	0.35	0.17	3	1	1.301265
common b1 short - front	2.03	0.35	0.17	2	1	0.24157
common b2 long	7.29	0.35	0.17	2	1	0.86751
	10.08	0.35	0.17	2	1	1.19952
	5.13	0.35	0.17	2	1	0.61047
common b2 short	5.57	0.35	0.17	2	1	0.66283
						34.86879

BRICK WORK UP TO GROUND LEVEL	L	B	H	No. of Items Per Block	No. of Blocks	Quantity
kit -bath long wall block 1	4.26	0.23	0.595	3	2	3.497886
kit -bath long wall block 2	4.26	0.23	0.595	5	2	5.82981
long walls block 1	7.37	0.23	0.595	6	2	12.10301
long walls block 2	7.37	0.23	0.595	9	2	18.15452
kit-bath short walls b1	1.5	0.23	0.595	12	2	4.9266
kit-bath short walls b2	1.5	0.23	0.595	18	2	7.3899
short walls b1	5.4	0.23	0.595	4	2	5.91192
short walls b2	5.4	0.23	0.595	6	2	8.86788
common b1 long	5.87	0.23	0.595	2	1	1.606619
	2.86	0.23	0.595	4	1	1.565564
common b1 short	7.29	0.23	0.595	3	1	2.99291
common b1 short - front	2.03	0.23	0.595	2	1	0.555611
common b2 long	7.29	0.23	0.595	2	1	1.995273
	10.08	0.23	0.595	2	1	2.758896
	5.13	0.23	0.595	2	1	1.404081
common b2 short	5.57	0.23	0.595	2	1	1.524509
						81.08499
BRICKWORK UP TO PLINTH LEVEL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
kit -bath long wall block 1	4.26	0.23	0.34	3	2	1.998792
kit -bath long wall block 2	4.26	0.23	0.34	5	2	3.33132
long walls block 1	7.37	0.23	0.34	6	2	6.916008
long walls block 2	7.37	0.23	0.34	9	2	10.37401
kit-bath short walls b1	1.5	0.23	0.34	12	2	2.8152
kit-bath short walls b2	1.5	0.23	0.34	18	2	4.2228
short walls b1	5.4	0.23	0.34	4	2	3.37824
short walls b2	5.4	0.23	0.34	6	2	5.06736
common b1 long	5.87	0.23	0.34	2	1	0.918068
	2.86	0.23	0.34	4	1	0.894608

common b1 short	7.29	0.23	0.34	3	1	1.710234
common b1 short - front	2.03	0.23	0.34	2	1	0.317492
common b2 long	7.29	0.23	0.34	2	1	1.140156
	10.08	0.23	0.34	2	1	1.576512
	5.13	0.23	0.34	2	1	0.802332
common b2 short	5.57	0.23	0.34	2	1	0.871148
						46.33428
BRICKWORK UP TO LINTEL LEVEL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
kit -bath long wall block 1	4.26	0.23	2.16	3	6	38.09462
kit -bath long wall block 2	4.26	0.23	2.16	5	6	63.49104
long walls block 1	7.37	0.23	2.16	6	6	131.811
long walls block 2	7.37	0.23	2.16	9	6	197.7165
kit-bath short walls b1	1.5	0.23	2.16	12	6	53.6544
kit-bath short walls b2	1.5	0.23	2.16	18	6	80.4816
short walls b1	5.4	0.23	2.16	4	6	64.38528
short walls b2	5.4	0.23	2.16	6	6	96.57792
common b1 long	1.5	0.23	2.16	2	3	4.4712
	0.46	0.23	2.16	4	3	2.742336
common b1 short	2.36	0.23	2.16	3	3	10.55203
common b1 short - front	0.59	0.23	2.16	2	3	1.758672
common b2 long	2.36	0.23	2.16	2	3	7.034688
	1.77	0.23	2.16	2	3	5.276016
	1.41	0.23	2.16	2	3	4.202928
common b2 short	2.36	0.23	2.16	2	3	7.034688
						769.2849
BRICKWORK UP TO ROOF LEVEL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
kit -bath long wall block 1	4.26	0.23	0.72	3	6	12.69821
kit -bath long wall block 2	4.26	0.23	0.72	5	6	21.16368

long walls block 1	7.37	0.23	0.72	6	6	43.93699
long walls block 2	7.37	0.23	0.72	9	6	65.90549
kit-bath short walls b1	1.5	0.23	0.72	12	6	17.8848
kit-bath short walls b2	1.5	0.23	0.72	18	6	26.8272
short walls b1	5.4	0.23	0.72	4	6	21.46176
short walls b2	5.4	0.23	0.72	6	6	32.19264
common b1 long	5.87	0.23	0.72	2	3	5.832432
	2.86	0.23	0.72	4	3	5.683392
common b1 short	7.29	0.23	0.72	3	3	10.86502
common b1 short - front	2.03	0.23	0.72	2	3	2.017008
common b2 long	7.29	0.23	0.72	2	3	7.243344
	10.08	0.23	0.72	2	3	10.01549
	5.13	0.23	0.72	2	3	5.097168
common b2 short	5.57	0.23	0.72	2	3	5.534352
						294.359
DEDUCTION						
main door	0.9	0.23	2.16	60	1	26.8272
toilet door	0.75	0.23	2.16	60	1	22.356
kit wall with drawing room	1.77	0.23	2.16	60	1	52.76016
win drawing room	0.9	0.23	1.2	60	1	14.904
bed room	0.9	0.23	1.2	60	1	14.904
kit window	0.9	0.23	0.96	60	1	11.9232
toilet vent	0.6	0.23	0.6	60	1	4.968
						148.6426
BRICK JALI PARAPET WALL ON 1 & 2 FLOOR	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
common b1 long	4.37	1	0.9	2	2	15.732
	2.4	1	0.9	4	2	17.28
common b1 short	4.93	1	0.9	3	2	26.622
common b1 short - front	1.44	1	0.9	2	2	5.184

common b2 long	4.93	1	0.9	2	2	17.748
	8.31	1	0.9	2	2	29.916
	3.72	1	0.9	2	2	13.392
common b2 short	3.21	1	0.9	2	2	11.556
						137.43
PARAPET ON TERRACE	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
PARTITION WALL						
for making the cupboard between bed and drawing	2.7	1	2.16	60	1	349.92
						349.92
DOOR WINDOWS	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
main door	0.9	1	2.1	60	1	113.4
toilet door	0.75	1	2.1	60	2	189
bed door	0.9	1	2.1	60	1	113.4
						415.8
win drawing room	0.9	1	1.32	60	1	71.28
bed room	0.9	1	1.32	60	1	71.28
kit window	0.9	1	0.96	60	1	51.84
						194.4
toilet vent	0.575	2	0.48	60	1	33.12
						33.12
FLOORING	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
ROOMS	6.91	2.7	1	60	1	1119.42
KITCHEN	2	1.73	1	60	1	207.6
TOILET	1.8	1.5	1	60	1	162
						1489.02
COMMON AREA B1	30.9	1	1	3	1	92.7
STAIR B1	10.6	1	1	3	1	
COMMON AREA B2	28.5	1	1	3	2	171
STAIR B2	7.8	1	1	3	2	
						1752.72

INTERNAL PLASTER	L	B	H	No. of Items Per Block	No. of Blocks	Quantity
ROOMS	24.62	1	3.2	60	1	4727.04
KITCHEN	7	1	3.2	60	1	1344
TOILET	9.8	1	1.4	60	1	823.2
EXTERNAL PLASTER	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**
B1	118	1	11.93	1	1	1407.74
B2	59	1	11.93	1	2	1407.74
	33.84	1	11.93	1	2	807.4224
						3622.902

LINTEL FOR STEEL	L	B	H	No. of Items Per Block	No. of Blocks	Quantity
kit -bath long wall block 1	4.26	1	1	3	6	76.68
kit -bath long wall block 2	4.26	1	1	5	6	127.8
long walls block 1	7.37	1	1	6	6	265.32
long walls block 2	7.37	1	1	9	6	397.98
		1	1			
kit-bath short walls b1	1.5	1	1	12	6	108
kit-bath short walls b2	1.5	1	1	18	6	162
short walls b1	5.4	1	1	4	6	129.6
short walls b2	5.4	1	1	6	6	194.4
common b1 long	5.87	1	1	2	3	35.22
	2.86	1	1	4	3	34.32
common b1 short	7.29	1	1	3	3	65.61
common b1 short - front	2.03	1	1	2	3	12.18
		1	1			
common b2 long	7.29	1	1	2	3	43.74
	10.08	1	1	2	3	60.48
	5.13	1	1	2	3	30.78
common b2 short	5.57	1	1	2	3	33.42
						1777.53

SCHOOL QUANTITIES

EXCAVATION	L	B	H	No. of Items Per Block	No. of Blocks	Quantity	
DA	11.08	0.75	1	2	1	16.62	
DB, DC, DD	27.805	0.75	1	2	1	41.7075	
DE	7.49	0.75	1	1	1	5.6175	
D1	2.48	0.75	1	1	1	1.86	
D2	5.6	0.75	1	1	1	4.2	
D3	4.36	0.75	1	1	1	3.27	
D4	8.08	0.75	1	1	1	6.06	
D6	8.08	0.75	1	1	1	6.06	
D7,D8,D10	5.6	0.75	1	1	1	4.2	
D9	1.88	0.75	1	1	1	1.41	
						91.005	CU.M.
FOOTING PCC	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
DA	9.58	0.75	0.1	2	1	1.437	
DB, DC, DD	27.055	0.75	0.1	2	1	4.05825	
DE	6.74	0.75	0.1	1	1	0.5055	
D1	2.48	0.75	0.1	1	1	0.186	
D2	5.6	0.75	0.1	1	1	0.42	
D3	4.36	0.75	0.1	1	1	0.327	
D4	8.08	0.75	0.1	1	1	0.606	
D6	8.08	0.75	0.1	1	1	0.606	
D7,D8,D10	5.6	0.75	0.1	1	1	0.42	
D9	1.88	0.75	0.1	1	1	0.141	
						8.70675	CU.M.
GRADE SLAB	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
	232.8	1	0.1	1	1	23.28	
						23.28	CU.M.
PLINTH PROTECTION							
	95.8	1	0.1	1	1	9.58	
						9.58	CU.M.

RCC	L	B	H	No. of Items Per Block	No. of Blocks	Quantity	
LINTEL BAND							
DA	9.58	0.75	0.1	2	1	1.437	
DB, DC+ DD	27.055	0.75	0.1	2	1	4.05825	
DE	6.74	0.75	0.1	1	1	0.5055	
D1	3.23	0.75	0.1	1	1	0.24225	
D2	6.35	0.75	0.1	1	1	0.47625	
D3	5.86	0.75	0.1	1	1	0.4395	
D4	9.58	0.75	0.1	1	1	0.7185	
D6	9.58	0.75	0.1	1	1	0.7185	
D7,D10, D8	6.35	0.75	0.1	3	1	1.42875	
D9	2.63	0.75	0.1	1	1	0.19725	
						10.22175	CU.M.
BRICKWORK	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
FIRST COURSE							
DA	9.58	0.46	0.17	2	1	1.498312	
DB, DC+ DD	27.055	0.46	0.17	2	1	4.231402	
DE	6.74	0.46	0.17	1	1	0.527068	
D1	3.23	0.46	0.17	1	1	0.252586	
D2	6.35	0.46	0.17	1	1	0.49657	
D3	5.86	0.46	0.17	1	1	0.458252	
D4	9.58	0.46	0.17	1	1	0.749156	
D6	9.58	0.46	0.17	1	1	0.749156	
D7,D10, D8	6.35	0.46	0.17	3	1	1.48971	
D9	2.63	0.46	0.17	1	1	0.205666	
						10.65788	CU.M.
SECOND COURSE	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
DA	9.58	0.35	0.17	2	1	1.14002	
DB, DC+ DD	27.055	0.35	0.17	2	1	3.219545	
DE	6.74	0.35	0.17	1	1	0.40103	

D1	3.23	0.35	0.17	1	1	0.192185	
D2	6.35	0.35	0.17	1	1	0.377825	
D3	5.86	0.35	0.17	1	1	0.34867	
D4	9.58	0.35	0.17	1	1	0.57001	
D6	9.58	0.35	0.17	1	1	0.57001	
D7,D10, D8	6.35	0.35	0.17	3	1	1.133475	
D9	2.63	0.35	0.17	1	1	0.156485	
						8.109255	CU.M.
BRICK WORK UP TO GL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
DA	9.58	0.23	0.595	2	1	2.622046	
DB, DC+ DD	27.055	0.23	0.595	2	1	7.404954	
DE	6.74	0.23	0.595	1	1	0.922369	
D1	3.23	0.23	0.595	1	1	0.442026	
D2	6.35	0.23	0.595	1	1	0.868998	
D3	5.86	0.23	0.595	1	1	0.801941	
D4	9.58	0.23	0.595	1	1	1.311023	
D6	9.58	0.23	0.595	1	1	1.311023	
D7,D10, D8	6.35	0.23	0.595	3	1	2.606993	
D9	2.63	0.23	0.595	1	1	0.359916	
						18.65129	CU.M.
BRICK WORK UP TO PLINTH LEVEL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
DA	9.58	0.23	0.34	2	1	1.498312	
DB, DC+ DD	27.055	0.23	0.34	2	1	4.231402	
DE	6.74	0.23	0.34	1	1	0.527068	
D1	3.23	0.23	0.34	1	1	0.252586	
D2	6.35	0.23	0.34	1	1	0.49657	
D3	5.86	0.23	0.34	1	1	0.458252	
D4	9.58	0.23	0.34	1	1	0.749156	
D6	9.58	0.23	0.34	1	1	0.749156	
D7,D10, D8	6.35	0.23	0.34	3	1	1.48971	
D9	2.63	0.23	0.34	1	1	0.205666	
						10.65788	CU.M.

BRICK WORK UP TO LINTEL LEVEL	L	B	H	No. of Items Per Block	No. of Blocks	Quantity	
DA	9.58	0.23	2.16	2	1	9.518688	
DB, DC+ DD	27.055	0.23	2.16	2	1	26.88185	
DE	6.74	0.23	2.16	1	1	3.348432	
D1	3.23	0.23	2.16	1	1	1.604664	
D2	6.35	0.23	2.16	1	1	3.15468	
D3	5.86	0.23	2.16	1	1	2.911248	
D4	9.58	0.23	2.16	1	1	4.759344	
D6	9.58	0.23	2.16	1	1	4.759344	
D7,D10, D8	6.35	0.23	2.16	3	1	9.46404	
D9	2.63	0.23	2.16	1	1	1.306584	
						67.70887	CU.M.
BRICK WORK UP TO ROOF LEVEL	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
DA	9.58	0.23	0.72	2	1	3.172896	
DB, DC+ DD	27.055	0.23	0.72	2	1	8.960616	
DE	6.74	0.23	0.72	1	1	1.116144	
D1	3.23	0.23	0.72	1	1	0.534888	
D2	6.35	0.23	0.72	1	1	1.05156	
D3	5.86	0.23	0.72	1	1	0.970416	
D4	9.58	0.23	0.72	1	1	1.586448	
D6	9.58	0.23	0.72	1	1	1.586448	
D7,D10, D8	6.35	0.23	0.72	3	1	3.15468	
D9	0	0	0.72	0	0	0	
						22.1341	CU.M.
DEDUCTIONS							
D1	0.9	0.23	2.1	7	1	3.0429	
D2	0.75	0.23	2.1	7	1	2.53575	
W4	0.9	0.23	1.36	24	1	6.75648	
W7	0.7	0.23	1.2	3	1	0.5796	

2.4 MTS ARCH	2.4	0.23	2.16	5	1	5.9616	
	1.2	0.23	2.16	4	1	2.38464	
	1.8	0.23	2.16	1	1	0.89424	
						22.15521	CU.M.
DOOR WINDOW	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
D1	0.9	1	2.1	8	1	15.12	
D2	0.75	1	2.1	7	1	11.025	
W4	0.9	1	1.36	24	1	29.376	
W7	0.7	1	1.2	3	1	2.52	
						58.041	SQ.M.
FLOORING	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
CLASS ROOM	4.5	6.12	1	4	1	110.16	
OFFICE	5	3	1	1	1	15	
KITCHEN	4	3	1	1	1	12	
PASSAGE	20.62	2.6	1	1	1	53.612	
	1.8	3.25	1	1	1	5.85	
						196.622	SQ.M.
INTERNAL PLASTER	**L**	**B**	**H**	**No. of Items Per Block**	**No. of Blocks**	**Quantity**	
CLASSROOM	21.24	1	3	4	1	254.88	
OFFICE	16	1	3	1	1	48	
KITCHEN	14	1	3	1	1	42	
PASSAGE	38.14	1	2.36	1	1	90.0104	
						434.8904	SQ.M.

COMMUNITY HALL AND KIOSK QUANTITIES

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
1.00	**Excavation from 0 to 1.5 mtr depth**							
	Wall EE, EB	2.00	16.01	0.75	1.00	24.02		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.75	1.00	6.35		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.75	1.00	2.95		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.75	1.00	5.90		
	Wall EA	1.00	13.17	0.75	1.00	9.88		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.75	1.00	36.34		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.75	1.00	7.27		
						92.69	92.69	Cum
2.00	**PCC in foundation-1:4:8**							
	Wall EE, EB	2.00	16.01	0.75	0.10	2.40		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.75	0.10	0.63		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.75	0.10	0.29		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.75	0.10	0.59		
	Wall EA	1.00	13.17	0.75	0.10	0.99		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.75	0.10	3.63		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.75	0.10	0.73		
						9.27	9.27	Cum
	PCC for Flooring (1:4:8)							
	Main building	1.00	16.24	13.15	0.10	21.36		
	less corners	(2.00)	1.27	3.23	0.10	(0.82)		
						20.54	20.54	Cum
3.00	**RCC for Grade Slab (M20)**							
	Main building	1.00	16.24	13.15	0.10	21.36		
	less corners	(2.00)	1.27	3.23	0.10	(0.82)		
						20.54	20.54	Cum
4.00	**Masonary in foundation**							
	Step 1							
	Wall EE, EB	2.00	16.01	0.46	0.17	2.50		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.46	0.17	0.66		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.46	0.17	0.31		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.46	0.17	0.61		
	Wall EA	1.00	13.17	0.46	0.17	1.03		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.46	0.17	3.79		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.46	0.17	0.76		
						9.66		
	Step 2							
	Wall EE, EB	2.00	16.01	0.35	0.17	1.91		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.35	0.17	0.50		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.35	0.17	0.23		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.35	0.17	0.47		
	Wall EA	1.00	13.17	0.35	0.17	0.78		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.35	0.17	2.88		

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.35	0.17	0.58		
						7.35		
	Wall up to plinth level							
	Wall EE, EB	2.00	16.01	0.23	0.81	5.97		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.23	0.81	1.58		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.23	0.81	0.73		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.23	0.81	1.46		
	Wall EA	1.00	13.17	0.23	0.81	2.45		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.23	0.81	9.03		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.23	0.81	1.81		
	Extra pier	8.00	0.23	0.46	0.17	0.14		
		8.00	0.23	0.35	0.17	0.11		
		8.00	0.23	0.23	0.81	0.34		
						23.17	40.18	
5.0	**Filling with available excavated earth.**							
	Total Excavation					**92.69**		
	Less Pcc					**(9.27)**		
	Initial 2 step masonry					**(17.02)**		
	60% of 230 thk masonry					**(14.59)**		
						51.81		
	Filling in plinth area	1.00	16.24	13.15	0.35	74.74		
	Less Corner	(2.00)	1.27	3.23	0.35	(2.87)		
	Less masonry	(1.00)	1.00	1.00	8.58	(8.58)		
						63.29	**92.69**	**cum**
b)	Filling with selected outside earth (contractor's earth)						**22.42**	**cum**
6.00	**Form Work up to PL**							
	Form work for grade slab							
	Horizontal	2.00	16.24	0.10	1.00	3.25		
	Vertical	2.00	13.15	0.10	1.00	2.63	5.88	sqm
7.00	**Masonry for super structure**							
A	**For Ground floor**							
	Wall EE, EB	2.00	16.01	0.23	2.85	20.99		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.23	2.85	5.55		
	Wall on EC' betn grid E3 and E5	1.00	3.93	0.23	2.85	2.58		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.23	2.85	5.15		
	Wall EA	1.00	13.17	0.23	2.85	8.63		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.23	2.85	31.76		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	0.23	2.85	6.35		
						81.01		
	Less opening							
	Door, D1	3.00	0.90	2.10	0.23	1.30		
	D2	2.00	0.75	2.10	0.23	0.72		
	D3	3.00	1.28	2.10	0.23	1.85		
	Window - w1	5.00	1.28	1.40	0.23	2.05		
	w2	4.00	1.15	1.40	0.23	1.48		
	Arched opening	5.00	1.28	2.00	0.23	2.93		

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
	V1	2.00	0.60	0.60	0.23	0.17		
	Rolling Shutter	3.00	2.54	2.10	0.23	3.68		
						14.19		
							66.82	Cum
B	**For First Floor**							
	Wall EE, EB	2.00	16.01	0.23	3.55	26.14		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.23	3.55	6.91		
	Wall EA	1.00	13.17	0.23	3.55	10.75		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	3.00	9.69	0.23	3.55	23.74		
	Wall on E2, E3 and E8’ betn grid EA and EB	3.00	3.23	0.23	3.55	7.91		
						75.45		
	Less Opening							
	Door, D1	4.00	0.90	2.10	0.23	1.74		
	D2	2.00	0.75	2.10	0.23	0.72		
	D3	2.00	1.28	2.10	0.23	1.23		
	Window - w1	8.00	1.28	1.40	0.23	3.28		
	w2	4.00	1.15	1.40	0.23	1.48		
	Arched opening	5.00	1.28	2.00	0.23	2.93		
	V1	2.00	0.60	0.60	0.23	0.17		
		(1.00)				(11.56)		
	Less Difference of ht of wall at first flr							
	EE Wall	2.00	4.23	0.70	0.23	1.36		
	B1 to E1	1.00	9.92	0.70	0.23	1.60		
	Wall AA	1.00	13.17	0.70	0.23	2.12		
	Wall on E2, E3 and E8’ betn grid EA and EB	3.00	3.23	0.70	0.23	1.56		
		(1.00)				(6.64)	**57.25**	**cum**
C	**For parapet**							
	Wall EE, EB	2.00	16.01	0.35	0.23	2.58		
	Wall EA	1.00	13.17	0.35	0.23	1.06		
	Wall 1,3, 9	3.00	9.69	0.35	0.23	2.34		
	Wall 1A and 8a	2.00	3.23	0.35	0.23	0.52		
						6.50	**6.50**	**Cum**
8.0	**PLAIN AND REINFORCED CEMENT CONCRETE WORKS**							
A	Lintel ground floor							
	For Ground floor							
	Wall EE, EB	2.00	16.01	0.23	0.10	0.74		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.23	0.10	0.19		
	Wall on EC’ betn grid E3 and E5	1.00	3.93	0.23	0.10	0.09		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	0.23	0.10	0.18		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	0.23	0.10	1.11		
	Wall on E2, E3 and E8’ betn grid EA and EB	3.00	3.23	0.23	0.10	0.22		
B	Lintel at First Floor							
	Wall EE, EB	2.00	16.01	0.23	0.10	0.74		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	0.23	0.10	0.19		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	3.00	9.69	0.23	0.10	0.67		
	Wall on E2, E3 and E8’ betn grid EA and EB	3.00	3.23	0.23	0.10	0.22		

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
							4.36	**cum**
C	Staircase Waist Slab including landing	1.00	3.00			0.81	**2.42**	**cum**
D	Precast beam at floor level	2.00	13.14	0.23	0.45	2.72	**2.72**	**cum**
9.00	**Form work**							
	For Ground floor							
	Wall EE, EB	2.00	16.01	2.00	0.10	6.40		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	2.00	0.10	1.69		
	Wall on EC' betn grid E3 and E5	1.00	3.93	2.00	0.10	0.79		
	Wall on Grid EC and ED betn Grid E7 and E9	2.00	3.93	2.00	0.10	1.57		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	5.00	9.69	2.00	0.10	9.69		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	2.00	0.10	1.94		
	Lintel at First Floor							
	Wall EE, EB	2.00	16.01	2.00	0.10	6.40		
	Wall on EC and ED betn Grid E1 and E3	2.00	4.23	2.00	0.10	1.69		
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	3.00	9.69	2.00	0.10	5.81		
	Wall on E2, E3 and E8' betn grid EA and EB	3.00	3.23	2.00	0.10	1.94		
	Staircase waist slab	2.00	3.12		1.50	9.36		
	Sides	2.00			0.81	1.62		
	Landing	1.00	1.24		3.00	3.72		
						47.29	**47.29**	**sqm**
10.00	**Masonary Partition**							
	Ground Floor							
		1.00	3.00	2.85	1.00	8.55		8.55
		1.00	1.80	2.85	1.00	5.13		
	First Floor	1.00	3.00	2.85	1.00	8.55		
		1.00	1.80	2.85	1.00	5.13		
						27.36	**27.36**	**Sqm**
11.00	**IPS - 40 mm thk**							
	As per grade slab	1.00						
	Main building	1.00	16.24	13.15	0.10	21.36		
	less corners	(2.00)	1.27	3.23	0.10	(0.82)		
	For Ground flr slab, first flr slab and terrace level					20.54	**61.61**	**Cum**
	Flooring for staircase							
	Add stair tread	19.00	1.50	0.30	0.18	1.54		
						1.54	1.54	sqm
12.00	Precast plank and joist							
	Floor slab	2.00	16.24	13.15		213.56		
		(4.00)	1.27	3.23		(16.41)		sqm
						197.15		sqm
13.00	**Doors and Windows/grill and vents**							
	Door, D1	7.00	0.90	2.10	1.00	13.23		
	D2	4.00	0.75	2.10	1.00	6.30		
	D3	5.00	1.28	2.10	1.00	13.39	**32.92**	**sqm**
	Window - w1	13.00	1.28	1.40	1.00	23.21		
	w2	8.00	1.15	1.40	1.00	12.88	**36.09**	**sqm**
	Arched opening	10.00	1.28	2.00	1.00	25.50	**25.50**	**sqm**

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
	V1	4.00	0.60	0.60	1.00	1.44	**1.44**	**sqm**
	Rolling Shutter	3.00	2.54	2.10	1.00	16.00	**16.00**	**sqm**
14.00	**Inside plaster**							
	Ground Floor							**sqm**
	Wall EE, EB	3.00	16.01		2.85	136.89		sqm
	Wall on EC and ED betn Grid E1 and E3	4.00	4.23		2.85	48.22		sqm
	Wall on EC' betn grid E3 and E5	2.00	3.93		2.85	22.40		sqm
	Wall on Grid EC and ED betn Grid E7 and E9	4.00	3.93		2.85	44.80		sqm
	Wall EA	1.00	13.17		2.85	37.53		sqm
	Wall E1, 3, 5, 7 and 9 betn grid EB and EE	8.00	9.69		2.85	220.93		sqm
	Wall on E2, E3 and E8' betn grid EA and EB	4.00	3.23		2.85	36.82		sqm
	Less deduction on EB							
	Door	1	1.275		2.1	-2.6775		sqm
	window	3	1.275		1.4	-5.355		sqm
	less wall thk	1	0.23		2.85	-0.6555		sqm
	addition of wall offset	5	0.69		2.85	9.8325		sqm
	Less deduction on EE	2	1.275		1.4	-3.57		sqm
		2	1.275		2.1	-5.355		sqm
	Deduction of Wall on EC and ED between Grid E1 & E3							
	Door D1	2	0.75		2.1	-3.15		sqm
	Door D2	2	0.9		2.1	-3.78		sqm
	deduction of wall thickness 115 mm	2	0.115		2.85	-0.6555		sqm
	Less deduction on EA							
	Arch 1	4	1.27		3.13	-15.9004		sqm
	Arch 2	1	1.74		3.7	-6.438		sqm
	window	1	1.15		1.2	-1.38		sqm
	wall thk	1	0.23		2.85	-0.6555		sqm
	Less Deduction on E1 (window)	2	1.15		1.2	-2.76		sqm
	Ventilator	2	0.6		0.6	-0.72		sqm
	Wall thk 230mm	2	0.23		2.85	-1.311		sqm
	wall thk 115mm	1	0.115		2.85	-0.32775		sqm
	addition of partition wall in toilet and waiting area	2	3.36		2.85	19.152		sqm
	addition of partition wall in toilet and waiting area	2	1.8		2.85	10.26		sqm
	Less deduction on E3 & E9							
	Door	1	0.9		2.1	-1.89		sqm
	rolling shutters - shop	3	2.54		2.1	-16.002		sqm
	deduction wall thk 230mm	4	0.23		2.85	-2.622		sqm
	Less deduction on E2 betwn EA and EB							
	window	1	1.15		1.4	-1.61		sqm
	Door	1	0.9		2.1	-1.89		sqm
	window	1	2.08		1.4	-2.912		sqm
							505.23	**sqm**
	First floor							
	Wall EE, EB	3.00	16.01		2.85	136.89		**sqm**
	Wall on EC and ED betn Grid E1 and E3	4	4.23		2.85	48.22		**sqm**

Sr.No	Description	No	L	B	D/H	Qty	T.Qty	Unit
	Wall EA	1	13.17		2.85	37.53		**sqm**
	Wall E1, 3 and 9 betn grid EB and EE	4	9.69		2.85	110.47		**sqm**
	Wall on E2, E3 and E8' betn grid EA and EB	4	3.23		2.85	36.82		**sqm**
	Less deduction on EB							**sqm**
	Door	2	1.275		2.1	-5.355		**sqm**
	window	3	1.275		1.2	-4.59		**sqm**
	less wall thk	1	0.23		2.85	-0.6555		**sqm**
	addition of wall offset	5	0.69		2.85	9.8325		**sqm**
	Less deduction on EE	4	1.275		1.4	-7.14		**sqm**
		1	1.15		1.4	-1.61		**sqm**
	Less deduction on EC and ED betn E1 & E3							**sqm**
	Door	2	0.75		2.1	-3.15		**sqm**
	addition of partition wall in toilet and waiting area	2	3.36		2.85	19.15		**sqm**
	addition of partition wall in toilet and waiting area	2	1.8		2.85	10.26		**sqm**
	Less deduction on EA							**sqm**
	Arch 1	4	1.27		3.13	-15.9004		**sqm**
	Arch 2	1	1.74		3.7	-6.438		**sqm**
	window	1	1.15		1.2	-1.38		**sqm**
	wall thk	1	0.23		2.85	-0.6555		**sqm**
	Less Deduction on E1 (window)	2	1.15		1.2	-2.76		**sqm**
	Ventilator	2	0.6		0.6	-0.72		**sqm**
	Wall thk 230mm	2	0.23		2.85	-1.311		**sqm**
	wall thk 115mm	1	0.115		2.85	-0.32775		**sqm**
	Less Deduction on E3 (door)	3	0.9		2.1	-5.67		**sqm**
	Less deduction on E2 betwn EA and EB							**sqm**
	window	1	1.15		1.4	-1.61		**sqm**
	Door	1	0.9		2.1	-1.89		**sqm**
	window	1	2.08		1.4	-2.912		**sqm**
							345.10	**sqm**
15.00	**Outside Plaster**							
	Wall EE, EB	2.00	16.01		8.85	283.38		sqm
	Walll on E1 and E9 betn EA and EE	2.00	13.14		8.85	232.58		sqm
	Parapet wall (inside surface at terrace level)	1.00	58.30		0.58	33.81		sqm
	Parapet wall (middle on gird E3 and split level slab)	2.00	13.14		0.93	24.44		sqm
	Deduction on EE and EB							
	Arches	8	1.27		3.13	-31.8008		sqm
	Arches	2	1.74		3.7	-12.876		sqm
	window	2	1.15		1.4	-3.22		sqm
	window	6	1.275		1.4	-10.71		sqm
	Deduction on E1 and E9							
	Window	6	1.15		1.4	-9.66		sqm
	Ventilator	4	0.6		0.6	-1.44		sqm
	staircase window	2	2.08		1.4	-5.824		sqm
	rooling shutters	3	2.54		2.1	-16.002		sqm
							482.68	**sqm**

ABOUT BMTPC

The Building Materials & Technology Promotion Council (BMTPC) was setup in 1990 as an inter-ministerial organization under the Ministry of Housing & Urban Poverty Alleviation to bridge the gap between laboratory research and field level application.
The Council also provides technical support for strengthening of SMEs in the building materials sector through development and promotion of eco-friendly and energy-efficient projects, manufacturing technologies and appropriate services to entrepreneurs.

Vision

BMTPC to be world class knowledge and demonstration hub for providing solutions to all with special focus on common man in the area of sustainable building materials, appropriate construction technologies & systems including disaster resistant construction.

Mission

To work towards as comprehensive and integrated approach for promotion and transfer of potential, cost-effective, environment-friendly, disaster resistant building materials and technologies including locally available materials from lab to land for sustainable development of housing.

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Building Materials & Technology Promotion Council (BMTPC)
Ministry of Housing & Urban Poverty Alleviation, Government of India
Core-5A, 1st Floor, India Habitat Centre, Lodhi Road,
New Delhi - 110 003 (India).
Phone: +91-11-2463 8096, Fax: +91-11-2464 2849,
E-Mail: bmtpc@del2.vsnl.net.in; Website: www.bmtpc.org

and

Society for Environment Protection (SEP)
6-A, Kalamwadi Society, Nr. Shreyas Crossing, Paldi,
Ahmedabad-380 007 (Gujarat)
Phone: +91-79-6513 7987, Mobile: 9327201215
Fax: +91-11-24642849
E-Mail: admin@sepindia.org, Website: www.sepindia.org