

CHOICE OF CONSTRUCTION TECHNOLOGIES REGION WISE

RECOMMENDED TECHNOLOGIES FOR HOUSING IN DIFFERENT GEO-CLIMATIC ZONES IN URBAN AREAS

Sr. No		NORTH EASTERN ZONE	NORTH ZONE	HILLY REGIONS OF NORTH ZONE	WEST ZONE	EAST ZONE	SOUTH ZONE
1.	STATES	Assam, Manipur, Meghalaya, Nagaland, Tripura, Arunachal Pradesh, Mizoram and Sikkim	Punjab, Haryana, Union Territory of Chandigarh, National Capital Region of Delhi and western Uttar Pradesh	Jammu and Kashmir, Himachal Pradesh, Uttarakhand.	Rajasthan, Gujarat and Madhya Pradesh, Maharashtra.	West Bengal, Bihar, Orissa and eastern Uttar Pradesh, Chhattisgarh, Jharkhand.	Andhra Pradesh, Karnataka, Tamil Nadu, Kerala, Goa and Union Territories of Dam an and Diu, Dadra and Nagar Haveli, Andaman and Nicobar Islands, Lakshwadeep and Puducherry.
2.	EXISTING CONDITIONS AND CONSTRUCTION PRACTICES	The zone is basically hilly region with heavy rainfall and falls under seismic zone V. There is abundance of stones but at number of pockets, soil for making bricks is also available. Forests are thick having bamboo and other timber trees in plenty. The houses are built with soil blocks and ‘Ekra’ walling. The roofs are generally sloping, either of thatch or CGI sheets having rafters and purlins make of timber/bamboo.	The zone covers hilly region as well as substantial part of Indo-gangetic plane and falls under seismic zone IV. In the hilly areas there is abundance of stone and the planes are full of alluvial soil. The houses are built with soil blocks, bricks, stone walls and roofs are CGI sheets, burnt clay tiles, reinforced brick concrete and R.C.C.	The zone covers hilly region as well as substantial part of Indo-gangetic plane and falls under seismic zone IV. In the hilly areas there is abundance of stone and the planes are full of alluvial soil. The houses are built with soil blocks, bricks, stone walls and roofs are CGI sheets, burnt clay tiles, reinforced brick concrete and R.C.C.	The zone contains sand dunes, marshy land, black cotton soil and hilly region. The bricks produced are having low compressive strength of 25-40 kgf cm ² and high water absorption. Stones in most parts are used for walling. The rainfall is low and soil blocks bricks are used in construction of houses.	The zone comprises of alluvial soil in the Indo-gangetic plane and some portions contain lateritic soils and also hilly portion. The alluvial soil is very good for production of clay bricks while in other parts laterite blocks are used. In the hilly region, stone walling is made. The houses are built with soil blocks, bricks, laterite blocks and stone. The roofs are made up of RCC/GI sheet roofing laid in slope. The area is rich in mines and coal mining is a major industry.	This zone covers areas of poor quality soil for brick, red soil, lateritic soils, coastal marine soil and some hilly areas. Some areas are having very thick forestation and have two seasons of monsoon. The houses are made with soil blocks, lateritic blocks, bricks, stone walls, and the roofs are with RCC Mangalore tiles and RBC.
3.	INNOVATION OF MATERIALS, COMPONENTS AND TECHNOLOGIES	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay blocks with cement / lime / bitumen can be used. Ferrocement walls using split bamboo reinforcement and stabilized soil /cement mortars. In place of RR masonry solid concrete blocks of 30x20x15 cm and 30x15x15 cm with lean concrete mixes of 1:4:4:8 (cement: coarse sand: 12mm graded aggregate: 40mm aggregate) shall be produced with individual or battery mould having vibration by a plate vibrator or using block making machine. The blocks for the partition walls shall be 30x10x10cm. The hollow concrete blocks shall be 40x20x20 cm and 40x20x10 cm. 	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay bl,ocks with cement / lime / bitumen shall be produced mud used. Stone block masonry. In areas where flyash is available, units production for producing building components utilizing flyash for clay-flyash bricks or and flyash- sand-lime bricks. In place of RR masonary, solid concrete blocks of 30x20x15 cm and 30x15x15 cm with designed concrete mixes using 50 mm aggregates / stone spalls or hollow concrete blocks of 40x20x20 cm shall be used. The partition wall blocks shall be 30x10x10 cm hollow. In Hilly area solid/hollow concrete block walls with RCC bands, as per 1.5. code, shall be used which will avoid the use of timber and provide easier / faster and better construction. 	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay blocks with cement / lime / bitumen shall be produced mud used. Stone block masonry. In Hilly area solid/hollow concrete block walls with RCC bands, as per IS code, shall be used which will avoid the use of timber and provide easier/faster and better construction. 	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay blocks with cement / lime / bitumen shall be produced and used. Concrete blocks or stone blocks for masonry. In areas where flyash is available, u n i t s production for producing building components utilizing flyash for clay-flyash bricks or and flyash- sand-lime bricks. In place of R.R. masonry, solid concrete blocks of 30x20x15 cm and 30x15x15 cm with designed concrete mixes using 50 mm aggregates / stone spalls or hollow concrete blocks of 40x20x20 cm shall be used. The partition wall blocks shall be 30x10x10 cm solid or 40x20x10 cm hollow. 	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay blocks with cement flime bitumen shall be produced. In areas where flyash is available, units production for producing building components utilizing flyash for clay-flyash bricks or and flyash- sand-lime bricks. Precast concrete blocks using laterite as an aggregate can be produced and used. In hilly areas where stone is readily available, solid concrete blocks of 30x20x15 cm and 30x15x15cm with designed concrete mixes using 50mm aggregates / stone spalls or hollow concrete blocks of 40x20x20 cm shall be produced. The partition wall blocks shall be 30x10x10 cm solid or 40x20x10 cm hollow. In areas affected by cyclones, the houses may be constructed on RCC stilts. 	<ul style="list-style-type: none"> Instead of mud blocks for walling, stabilized clay interlocking blocks with cement / lime / bitumen shall be produced. Stone or concrete blocks for walling. Production of good quality bricks from interior soils by adding opening materials comprising of cinder/grog/ flyash. In place of RR masonry, solid concrete blocks of 30x20x15 cm and 30x15x15 cm with designed concrete mixes using 50 mm aggregate / stone spalls or hollow concrete blocks of 40x20x20 cm shall be used. The partition wall block shall be 30x10x10 cm solid or 40x20x10 cm hollow. Precast cement concrete blocks with laterite aggregates can be produced in 30x20x15 cm and 30x10x10 cm.

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3.1	Foundation	<ul style="list-style-type: none"> For the stilts, precast RCC posts shall be used instead of instead of timber posts. The joists shall also be of RCC either in-situ or either precast. Burnt clay bricks in cm1:6 	<ul style="list-style-type: none"> For the stilts, precast RCC posts instead of timber posts shall be used. The joists shall also be of RCC either in-situ or precast. Burnt clay bricks in cm1:6 		<ul style="list-style-type: none"> In black cotton soil areas the foundation can be on pedestal piles/under-reamed piles. Burnt clay bricks in cm1:6 	<ul style="list-style-type: none"> The foundation in floods I cyclones affected areas can be on RCC columns, footings. Burnt clay bricks in cm1:6 	<ul style="list-style-type: none"> Burnt clay bricks in cm1:6
3.2	Wailing	<ul style="list-style-type: none"> RCC bands and vertical reinforcement as per IS code, shall be provided to protect against the seismic forces. Burnt brick walls laid in cement mortar 1:6 with RCC bands shall be provided where bricks are available. Solid concrete blocks of 30x20x15cm or 30x15x15cm or hollow concrete blocks of 40x20x20 cm laid in cement sand 1:6 mortar with RCC bands can be provided for load bearing walls. Partition walls can be with blocks of 30x10x10 cm. 	<ul style="list-style-type: none"> Rat-trap bond walling with burnt bricks which saves 25% bricks and mortar in plastering can be used as filler walls in RC framed structure. 19 cm thick burnt brick wall for buildings upto 2 storeys provide around 20% saving in bricks and mortar and greater floor area for the same plinth area can be used or as filler wall in case of RC framed structure. Single brick thick walls laid in cement mortar 1 :6 as load bearing structure. Hollow, concrete blocks or solid concrete blocks for walling instead of RR masonry saves in cubic content of masonry thereby reducing weight on foundations and achieving sailings in foundation as well as masonry walling. It will provide speedier construction and greater floor area for the same plinth area. 		<ul style="list-style-type: none"> Solid Comcrete blocks/ hollow concrete blocks instead of RR masonry saves in cubic content of masonry, thereby reducing weight on foundations and achieving saving in foundation as well as masonry walling. It also provides faster construction and makes greater floor area for the same plinth area. Single brick thick walls laid in cement mortar 1:6 as load bearing structure. 	<ul style="list-style-type: none"> Rat-trap bond walling with burnt bricks which saves 25% bricks and mortar in plastering can be used as filler walls in RC framed structure. 19 cm thick burnt brick wall for buildings upto 2 storeys provide around 20% saving in bricks and mortar and greater floor area for the same plinth area can be used or as filler walls in R.C. framed structure. Single brick thick walls laid in cement mortar 1:6 as load bearing structure. Hollow concrete blocks or solid concrete blocks for walling instead of RR masonry saves in cubic content of masonry thereby reducing weight on foundations and achieving savings in foundation as well as masonry walling. It will provide speedier construction and greater floor area for the same plinth area. Prefabricated concrete blocks with lateritic aggregate can be used for walling. 	<ul style="list-style-type: none"> Rat-trap bond walling with burnt bricks which saves 25% bricks and mortar in plastering can be used as filler walls for RC framed structure. 19 cm thick burnt brick wall for buildings upto 2 storeys provide around 20% saving in bricks and mortar and greater floor area for the same plinth area can be used or as filler wall in RC framed structure. Hollow concrete blocks or solid concrete blocks for walling instead of RR masonry or coarsed rubble masonry of granite stone can be used. This will reduce weight on foundations, provide greater floor area for the same plinth area, speedier construction and saving in cost of masonry and foundation
3.3	Lintels	<ul style="list-style-type: none"> 75mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M20 concrete. 	<ul style="list-style-type: none"> 75mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M-20 concrete. 	<ul style="list-style-type: none"> 75mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M-20 concrete. 	<ul style="list-style-type: none"> 75 mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M-20 concrete. 	<ul style="list-style-type: none"> 75 mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M-20 concrete. 	<ul style="list-style-type: none"> 75 mm thick precast RCC lintels, with or without sunshades, can be provided in brick or block masonry walls. RC plinth bands, lintel bands and roof band using cement concrete M-20 concrete.

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3.4	Doors and Windows	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames and shutter for doors and windows can be provided. Bamboo mat shutters for doors and windows can be provided. 	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames for doors and windows. Ferrocement shutters for doors. Cement bonded particle boards, with or without frame can be provided. 	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames for doors and windows. Ferrocement shutters for doors. 	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames for doors and windows. RCC frames for doors and windows. Ferrocement shutters for doors. Ferrocement shutters for doors. 	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames for doors and windows. Ferrocement shutters for doors. Cement bonded particle boards, with or without frames can. be provided. 	<ul style="list-style-type: none"> Braced and battened doors of secondary species timber with pivots at top and bottom can be provided with or without any frame. RCC frames for doors and windows. Ferrocement shutters for doors
3.5	Roofing	<ul style="list-style-type: none"> Precast RCC joist with prefab brick panels/RC plank / funicular shell / Precast Jack-arch Panel can be provided. Micro concrete tiles over treated bamboo/timber purlins of ferrocement purlins. CGI sheets with false ceiling. BMC roofing sheets on Bamboo or steel trusses. 	<ul style="list-style-type: none"> Precast RCC joist with prefab brick panels / RC plank / funicular shell / Precast Jackarch panel and concrete panels in roofs alongwith prefab brick panel system can be provided. RBC/RCC in-situ may also be provided. Precast channel units of RCC or ferrocement especially for panchayatghar / school building/health centres/post office / bank can be provided. AC/CGI sheets with purlins of steel/ RCC / ferrocement instead of timber can be used. Precast RC L panel for sloping roof can be used. 	<ul style="list-style-type: none"> Precast RCC joist with prefab brick panels/RC plank /funicular shell/ Precast Jack- arch panel and concrete panels in roofs alongwith prefab brick panel system can be provided. RBC/RCC in-situ may also be provided. AC/CGI sheets with purlins of steel/ RCC / ferrocement instead of timber can be used. Precast RC L panel for sloping roof can be used. 	<ul style="list-style-type: none"> Precast RCC joists with RC plank/funicular shells. Slab roofing/RCC L-panel roofing. Precast channel units of R.C.C. AC/CGI sheets with purlins of steel/ RCC / ferrocement. 	<ul style="list-style-type: none"> Precast RCC joist with prefab brick panels / RC plank / funicular shell / Precast Jackarch panel and concrete panels in roofs alongwith prefab brick panel system can be provided. RBC/RCC in-situ may also be provided. Precast channel units of RCC or ferrocement especially for ‘panchayat-ghar’/school building/ health centres/post office/bank can be provided. Precast RCC L-panel for sloping roof can be provided. 	<ul style="list-style-type: none"> Precast RCC joist with prefab brick panels / RC plank / funicular shell / Precast Jack- arch panel and concrete panels in roofs alongwith prefab brick panel system can be provided. Cast in-situ RC solid or filler slabs with RCC grid beams and hollow tiles or Mangalore tiles. Precast channel units of RCC or ferrocement t for ‘panchayat-ghar’/ school building/health centres/post office/ bank can be provided. AC/CGI sheets with purlins of steel/ RCC/ ferrocement.
3.6	Flooring	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25 mm thick over a base course of lean concrete (1:5:10) 75 mm thick. 	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25 mm thick over a base course of lean concrete (1:5:10) 75mm thick. 	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25mm thick over a base course of lean concrete (1:5:10) 75mm thick. 	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25mm thick over a base course of lean concrete (1:5:10) 75mm thick. 	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25mm thick over a base course of lean concrete (1:5:10) 75mm thick. 	<ul style="list-style-type: none"> PCC 1:2:4 flooring 25 mm thick over a base course of lean concrete (1:5:10) 75mm thick.
3.7	Sanitation	<ul style="list-style-type: none"> Single stack system of plumbing. GI/PVC pipes for water supply. CI/PVC soil/waste pipes. 	<ul style="list-style-type: none"> Single stack system of plumbing. GI/PVC pipes for water supply. CI/PVC soil / waste pipes. 	<ul style="list-style-type: none"> Single stack system of plumbing. GI/PVC pipes for water supply. CI/ PVC soil / waste pipes. 	<ul style="list-style-type: none"> Single stack system of plumbing. GI/PVC pipes for water supply. CI/PVC soil/waste pipes. 	<ul style="list-style-type: none"> Single stack system of plumbing. GI/ PVC pipes for water supply. CI/ PVC soil / waste pipes. 	<ul style="list-style-type: none"> Single stack system of plumbing. GI/ PVC pipes for water supply. CI/ PVC soil/waste pipes.