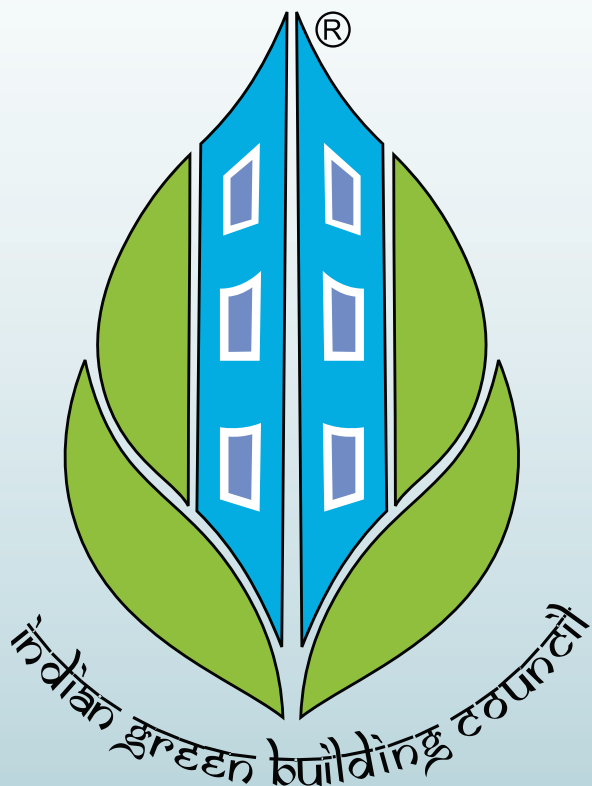




IGBC Green Affordable Housing



IGBC

IGBC Rating System

for Green Affordable Housing
Version 2.0

Abridged Reference Guide
October 2022



Confederation of Indian Industry

Confederation of Indian Industry

CII – Sohrabji Godrej Green Business Centre

www.igbc.in

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Green Affordable Housing rating system

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Green Affordable Housing – The Indian Perspective

Introduction

While rapid urbanization and growing cities provide various opportunities, there are fallouts in terms of proliferation of slums, high prices of land and building materials which render houses unaffordable for the segment at the bottom of the pyramid. Therefore, the need for adequate housing for the low-income groups will substantially increase. MoHUPA has estimated the housing shortage of 18.78 million during the 12th Five Year Plan (FYP) period of which over 95% of this housing shortage is estimated in the Economically Weaker Sections (EWS) and Low-Income Group (LIG) categories. To address this shortage, intensive efforts are required to substantially increase affordable housing stock.

Most importantly, while we create housing for these sections of the society, they need to be green too. The principles of green and sustainability are fortunately or unfortunately community-agnostic, in the sense that they also need to handle wastages a bit more carefully, be thrifty in the usage of energy & water, handle waste in a hygienic manner to avoid outbreak of epidemics, reduced use of virgin materials and above all enhance their own quality of lives.

Green Affordable Housing

Housing that is appropriate to the needs of a household and within their means to pay along with being environment conscious. The means (or capacity) of a household to pay for their housing depends on three primary factors:

- ❖ The income of the household;
- ❖ The cost of appropriate housing; and
- ❖ Other essential living costs to be met by the household, such as food and household goods, transport, education and healthcare.

The influencing parameters for such housing will take into consideration various design characteristics of the housing, alongside social, economic and cultural attributes of the household. Some central indicators of green affordable housing would be:

- ❖ Standard and quality of housing
- ❖ Availability of basic amenities
- ❖ Located close to the services, jobs and community facilities
- ❖ Energy and water efficient
- ❖ Cost efficient in maintenance & operations

Objective: *The objective of IGBC Green Affordable Housing rating is to ensure a high degree of sustainability with no / meagre additional cost to the developer or the occupant.*

Therefore, the approach would be to selectively adopt those measures that are simple and yet have profound impacts in conserving the environment. Few of the attributes that would define the success of implementing sustainability in this segment are:

- ❖ Green measures should be easily implementable
- ❖ Easy to monitor and measure

- ❖ Operation & maintenance friendly throughout the life of building
- ❖ No / Meagre costs to end-user

National Benefits Anticipated

Green concepts and techniques in the affordable housing sector can help address the following:

- ❖ Reduction in energy and water consumption
- ❖ Improved health and hygiene
- ❖ Better ventilation and natural lighting
- ❖ Fuel savings in transit of people & associated impacts

IGBC would strive to reach out the sustainability principles amongst the affordable housing community. This is a wonderful opportunity for the country to be a trend-setter amongst other countries in addressing such sections of the society.

Applicability of Rating System

The Green Affordable Housing Rating is applicable for:

- ❖ Projects applicable under PMAY scheme/ local affordable housing schemes
- ❖ Tier I Cities: Housing projects designed with carpet area less than or equal to 60 sq. m per dwelling unit, which constitutes to at least 70% of the total dwelling units in the project
- ❖ Tier II and Tier III Cities: Housing projects designed with carpet area less than or equal to 90 sq. m per dwelling unit, which constitutes to at least 70% of the total dwelling units in the project

Scope of IGBC Green Affordable Housing

IGBC Green Affordable Housing Rating System is designed for new and major renovation of affordable multi-dwelling residential buildings/project.

In general, all projects that meet the mandatory requirements specified and minimum credit points can apply for certification. Various levels of green building certification are awarded based on the total points earned.

IGBC Green Affordable Housing Rating System

IGBC Green Affordable Housing rating system addresses green features under the following categories:

- ❖ Sustainable Site
- ❖ Water Conservation
- ❖ Energy Conservation
- ❖ Materials Conservation
- ❖ Indoor Environmental Quality
- ❖ Innovation & Design Process

The guidelines detailed under each mandatory requirement & credit enables the design and construction of green affordable housing. However, every dwelling unit should meet certain mandatory requirements, which are non-negotiable.

The various levels of rating awarded are:

Certification Level	Recognition
Certified	Best Practices
Silver	Outstanding Performance
Gold	National Excellence
Platinum	Global Leadership

a. IGBC Green Affordable Housing Registration

Project teams interested in IGBC Green Affordable Housing Certification for their project must first register with IGBC. Projects can be registered on IGBC website (www.igbc.in) under 'IGBC Green Affordable Housing'. The website includes information on registration fee for IGBC member companies as well as non-members. Registration is the initial step which helps establish contact with IGBC and provides access to the required documents, templates, important communications and other necessary information.

IGBC website will have all important details on IGBC Green Affordable Housing registration & certification - process, schedule and fee.

b. Precertification

This is an option provided for projects aspiring to get precertified at the design stage. The documentation submitted for precertification must detail the project design features which will be implemented. The rating awarded under precertification is based on the project's intention to conform to the requirements of IGBC Green Affordable Housing Rating system. It is important to note that the precertification rating awarded need not necessarily correspond to the final certification.

Precertified projects are required to provide the status of the project to IGBC, in relation to the rating, once in every six months until the award of the final rating.

Pre-certification gives the owner/ developer a unique advantage to market the project to potential buyers.

The projects which seek pre-certification need to submit the following documentation:

1. General information of project including
 - a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
 - b. General drawings (in CAD and PDF format only):
 - i. Master/ Site plan
 - ii. Parking plans
 - iii. Floor plans
 - iv. Elevations
 - v. Sections
 - vi. Photographs/ Rendered views

2. Common developer declaration indicating proposed measures as mentioned in specific credits
3. Filled-in Master Template (in excel format)
4. Narratives and supporting documentation such as conceptual drawings, estimate/ tentative calculations (in excel sheets), for each mandatory requirement/ credit
5. In addition, project teams can refer the 'Documentation Required for Precertification' section provided under each mandatory requirement/ credit.

The above necessary details are mentioned in this guide, under each mandatory requirement and credit.

IGBC would take 30 working days to review the first set of precertification documents. On receiving the clarifications posed in the first review, IGBC would take another 30 working days to award the precertification.

A certificate will be provided to projects on precertification.

c. Certification

Projects which are at the completion stage can apply for certification. To earn the IGBC Green Affordable Housing Rating, the project must satisfy all the mandatory requirements and the minimum number of credit points.

The project team is expected to provide supporting documents at preliminary and final stage of submission for all the mandatory requirements and the credits attempted.

The project needs to submit the following:

1. General information of project including
 - c. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
 - d. General drawings (in CAD and PDF format only):
 - i. Master/ Site plan
 - ii. Parking plans
 - iii. Floor plans
 - iv. Elevations
 - v. Sections
 - vi. Photographs
2. Common developer declaration indicating measures as mentioned in specific credits
3. Filled-in Master Template (in excel format)
4. Narratives and supporting documentation such as drawings, calculations (in excel sheets), declarations/ contract documents, purchase invoices, manufacturer cut sheets/ letters/ material test reports, photographs, etc., for each mandatory requirement/ credit
5. In addition, project teams can refer the 'Documentation Required for Certification' section provided under each mandatory requirement/ credit.

The necessary details are mentioned in this guide, under each mandatory requirement and credit.

Documentation is submitted in two phases – preliminary submittal and final submittal:

- ❖ The preliminary submission involves those credits which can be evaluated at the design stage. The reference guide provides the list of design and construction phase credits. After the design submission, review is done by third party assessors and review comments are provided within 30 working days.
- ❖ The next phase involves submission of clarifications to preliminary review queries and final submittal. The construction document is submitted on completion of the project. This review would be provided within 30 working days, after which the rating is awarded.
- ❖ It is important to note that the mandatory requirements/ credits earned at the preliminary review are only considered as anticipated. These mandatory requirements/ credits are not awarded until the final documents are submitted, along with additional documents showing implementation of design features. If there are changes in any 'credit anticipated' after preliminary review, these changes need to be documented and resubmitted during the final review.
- ❖ IGBC will recognise affordable housing that achieves one of the rating levels with a formal letter of certification and a mountable plaque.

d. Physical Verification & Monitoring

Before the award of rating, the residential project would be physically audited to verify implementation of the design measures.

e. Certification Levels:

The threshold criteria for certification levels are as under:

Certification Level	Multi-dwelling Residential Unit	Recognition
Certified	50 – 59	Best Practices
Silver	60 - 69	Outstanding Performance
Gold	70 - 79	National Excellence
Platinum	80 - 100	Global Leadership

f. Appeal Process

In rare cases, mandatory requirements or credits may be denied due to misinterpretation of the intent. On receipt of the final review, if a Project Team feels that sufficient grounds exist to appeal a credit denied in the final review, the project has an option to appeal to IGBC for reassessment of denied mandatory requirements or credits. The documentation for the mandatory requirements or credits seeking appeal may be resubmitted to IGBC along with necessary fee. IGBC will take 35 days to review such documentation. If an appeal is pursued, please note that a different review team will assess the Appeal Documentation.

The following documentation should be submitted:

1. General information of project including
 - a. Project brief stating project type, different type of spaces, occupancy, number of floors, area statement, etc.,
 - b. General drawings (in CAD and PDF format only):
 - i. Master/ Site plan
 - ii. Parking plans

- iii. Floor plans
 - iv. Elevations
 - v. Sections
 - vi. Photographs/ Rendered views
2. Common developer declaration indicating proposed measures
 3. Filled-in Letter Template for respective mandatory requirement/ credit.
 4. Original, re-submittal, and appeal submittal documentation for only those mandatory requirement/ credits that the project is appealing for. Also include a narrative for each appealed mandatory requirement/ credit to describe how the documents address the reviewers` comments and concerns.

g. Fee

Registration, Certification, Appeal and CIR fee details are available on IGBC website (www.igbc.in) or projects can write to IGBC (igbc@cii.in).

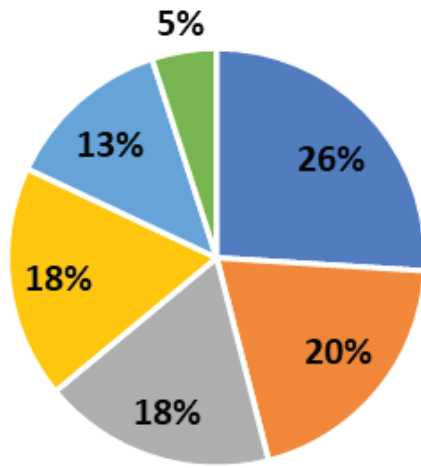
CHECKLIST IGBC GREEN AFFORDABLE HOUSING VERSION 2.0

Credits	Criteria	Point(s)
Sustainable Site (SS)		
SS Mandatory Requirement 1	Local Building Regulations	Y
SS Mandatory Requirement 2	Site Selection	Y
SS Credit 1	Proximity to Public Transport	2
SS Credit 2	Soil Erosion Control	3
SS Credit 3	Access to Social Infrastructure	3
SS Credit 4	Green Cover on-site -15%, 20% and 25%,30%	4
SS Credit 5	Heat Island Effect-Non-Roof: 25%, 50%	2
SS Credit 6	Heat Island Effect-Roof: 75%, 95%	3
SS Credit 7	Parking Facilities for Tenements	4
SS Credit 8	Design For differently abled	2
SS Credit 9	Basic Facilities for construction workforce	2
SS Credit 10	Green Education	1
Sub Total		26
Water Conservation (WC)		
WC Mandatory Requirement 1	Availability of Potable Water	M
WC Mandatory Requirement 2	Rainwater Harvesting: 25%	M
WC Credit 1	Enhanced Rainwater Harvesting: 50%, 75%, 95% (or) 10%, 20%, 30% and Reuse	4
WC Credit 2	Water Efficient Plumbing Fixtures	4
WC Credit 3	Wastewater treatment: 50%, 75%, 95%	3
WC Credit 4	Treated wastewater Reuse	3
WC Credit 5	Management of Irrigation Systems	3
WC Credit 6	Water Sub-metering	3
Sub Total		20
Energy Conservation (EC)		
EC Mandatory Requirement 1	Energy Efficient Building Envelope	M
EC Credit 1	Enhanced Energy Efficient Building Envelope	5
EC Credit 2	Shading Elements for Building Openings	2
EC Credit 3	Efficient Lighting	3
EC Credit 4	Sensors and Control	2
EC Credit 5	On-site Renewable Energy: 50%, 75%	2
EC Credit 6	Solar Water Heaters: 25%, 50%	2
EC Credit 7	Energy Saving Measures in Appliances & other Equipment	2
Sub Total		18

Material Conservation (MC)		
MC Mandatory Requirement 1	Segregation of House-hold waste	M
MC Credit 1	Organic Waste Management: 50%, 75%	2
MC Credit 2	Handling of construction waste materials: 50%, 75%	2
MC Credit 3	Use of local Materials: 50%, 75%, 95%	3
MC Credit 4	Certified Green Products: 5%, 10%, 15%	3
MC Credit 5	Appropriate Technologies: 25%, 50%, 75%, 95%	4
MC Credit 6	Alternate Construction Materials	2
MC Credit 7	Eco friendly wood materials	2
Sub Total		18
Indoor Environment Quality (IEQ)		
IEQ Mandatory Requirement 1	Tobacco Smoke Control	M
IEQ Mandatory Requirement 2	Minimum Daylighting: 50%	M
IEQ Credit 1	Day Lighting: 75%, 95%	2
IEQ Credit 2	Fresh air ventilation: 50%, 75%, 95%	3
IEQ Credit 3	Cross Ventilation: 50%, 75%	2
IEQ Credit 4	Exhaust Systems	2
IEQ Credit 5	Low VOC Material, Paints & Adhesives	2
IEQ Credit 6	Building Flush Out	1
IEQ Credit 7	Occupant Well-being Facilities	1
Sub Total		13
Innovation & Design (ID)		
ID Credit 1	Innovation	2
ID Credit 2	Exemplary	2
ID Credit 3	IGBC Accredited Professional	1
Sub Total		5
Total Points		100

IGBC Green Affordable Housing Certification Levels		
Certification Level	Multi-dwelling Residential Unit	Recognition
Certified	50 – 59	Best Practices
Silver	60 - 69	Outstanding Performance
Gold	70 - 79	National Excellence
Platinum	80 - 100	Global Leadership

IGBC GREEN AFFORDABLE HOUSING VERSION 2.0



- Sustainable Site (SS)
- Water Conservation (WC)
- Energy Conservation (EC)
- Material Conservation (MC)
- Indoor Environment Quality (IEQ)
- Innovation & Design (ID)



SUSTAINABLE SITE

Local Building Regulations

SS Mandatory Requirement 1

Intent:

Ensure that the building(s) complies with necessary statutory regulatory codes thereby regulating the growth of the built environment.

Requirements:

Design and execute the project as per the local building byelaws.

Benefits Anticipated:

- Restrict excessive and unsafe developments within the site

Documents Required:

Precertification Level

- Narrative with projects basic information and details of regulatory authority
- Plans approved by urban local body/ regulatory authority.
(Or)
- Project Commencement certificate issued by local Government authority.

Note:

- *Projects which have not yet received site plan approved from local Government authority may submit an acknowledgement from the authority that the Project drawings have been submitted for approval or drawings attested by principal architect and documentation demonstrating approval from the local Authorities shall be submitted at the time of Final Certification.*
- *If the approval from local body/ regulatory authority is in local language, submit English translated copy of the same.*

Certification Level

- Plans approved by urban local body/ regulatory authority.
- Letter from Principal Architect mentioning fit for occupancy / copy of Fit-for-occupancy certificate from authority.
- Photographs of building taken at various stages of construction.

SITE SELECTION

SS Mandatory Requirement 2

Intent:

Avoid the development on inappropriate sites thereby reducing the environmental impacts caused due to the location of a building on a site

Requirements:

Avoid development of buildings, hardscapes, roads or parking areas on portions of sites that meet any of the following criteria:

- ❖ High-value farmland as defined by the relevant local, regional, state or central government agency
- ❖ Previously undeveloped land within area classified at high or very high hydro geologic risk, including any land whose elevation is lower than 5 feet (1.5 meters) above the elevation of the 100-year flood, as defined by the relevant local, regional or central government agency.
- ❖ Land specifically identified as habitat for any species listed as threatened or endangered by Wildlife Institute of India.
- ❖ Land within 100 feet (30 meters) of a wetland listed as being of high ecological value by the relevant local, regional, state, or central government agency. Renovation of an existing building is allowed if construction impact is limited to the existing development footprint.
- ❖ Previously underdeveloped land that is within 50 feet (15 meters) of a water body or Full Tank Level (FTL) that supports or could support aquatic life, recreation or industrial use, as determined by a professional biologist.
- ❖ Land that prior to acquisition for the project was public parkland.

Benefits Anticipated:

- ❖ Ensures the occupants get access to the urban environment and basic amenities.
- ❖ Helps prevent the need for expanded transportation and utility infrastructure and likely affords building occupants more access to alternative transportation when the building site is selected on a previously developed site.
- ❖ Appropriate site selection can reduce the risk of property damage due to natural events such as landslides, floods, sinkholes and soil erosion.
- ❖ Not building on inappropriate sites preserves wildlife, recreation and ecological balance.

Documents Required:**Precertification**

- Narrative describing the project site
- Master plan indicating location of project at city/ zonal level
- Site plan approved by urban local body/ regulatory authority
- Permit from the relevant local authority in the form of a land allotment/ land use letter/ Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.

Certification

- Narrative describing the project site
- Site plan approved by urban local body/ regulatory authority
- Permit from the relevant local authority in the form of a land allotment/ land use letter/ Clearance from the Ministry of Environment and Forest (MoEF), as applicable.
- Map indicating the project location details.

Proximity to Public Transport

SS Credit 1

Points: 2

Intent:

Encourage use of public transport, so as to reduce negative impacts caused from automobile use

Requirements:

❖ Public Transport (1 point)

Locate the building within 1 km walking distance from an intra-city railway station (or) a bus-stop (or) other modes of public transport.

❖ Shuttle Service (1 point)

The project can operate or have a contract in place for shuttle services (from / to the nearest intracity railway station or bus-stop), for at least 25% of the building occupants.

Benefits Anticipated:

- ❖ Savings on fuel in commuting
- ❖ Less dependence on vehicular usage

Documentation required:

Precertification Level

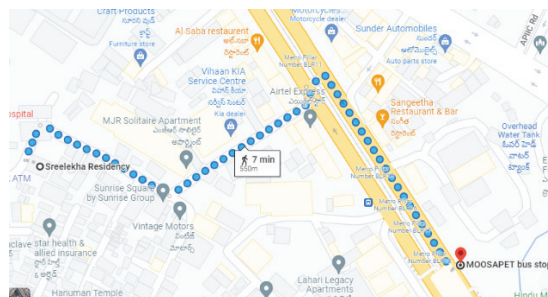
- Narrative describing the details of the public transport and shuttle services.
- Vicinity map (e.g.: Google, etc.,) with scale highlighting the proposed/existing public transport facility within proximity from the project entrance.
- Declaration from the developer indicating the proposed shuttle service and it's capacity.

Certification Level

- Narrative describing the details of the public transport and shuttle services.
- Vicinity map (e.g.: Google, etc.,) with scale highlighting the public transport within the proximity from project entrance.
- Shuttle service facility contract (minimum 2 years).



Shuttle Service



Vicinity map highlighting walking distance

Soil Erosion Control

SS Credit 2

Points: 3

Intent:

Control soil erosion and sedimentation thereby, reducing negative impacts to the site and surroundings

Requirements:

Soil erosion control measures for pre-construction and during construction must conform to the best management practices highlighting in the National Building Code 2016 (NBC) of India.

Adopt the following measures: (One point for each measure)

- i. Preserve top 150 - 200 mm soil from excavation & reuse the soil for landscaping purposes within the same site and plant vegetation to prevent soil erosion
- ii. Adopt dust suppression measures such as temporary & permanent seeding, wheel washing, regular spraying of water on the roads to prevent tracking of sediment and spraying of water on materials such as sand, bricks etc. while transportation.
- iii. Develop a storm water management plan during construction to ensure that the storm water runoff during construction is filtered to remove the TSS* prior to releasing into the municipal storm water drain.

Benefits Anticipated

- ❖ Preserves the fertile topsoil
- ❖ Avoids sedimentation
- ❖ Maintains health of construction workforce

Documents required:

Precertification Level

- Narrative stating the soil erosion measures proposed
- Conceptual site plan showing topsoil stockpiling, dust suppression and storm water management strategies to be implemented.
- Declaration from the developer indicating the proposed measures

Certification Level

- Narrative stating the soil erosion measures implemented
- Site plan showing topsoil stockpiling, dust suppression and storm water management strategies implemented.
- Photographs showing topsoil stockpiling, dust suppression and storm water management strategies implemented in the project.

Guidelines & Examples:



Stockpiling of Topsoil



Sedimentation Trenches

Access to Social Infrastructure

SS Credit 3

Points: 3

Intent:

Provide access to basic amenities, so as to reduce negative impacts caused from automobile use.

Requirements:

Provide access to at least six basic amenities within a walking distance of 1 km from the site entrance

- ❖ Crèche / School / Anganwadi, provisional store, clinic, pharmacy, primary health center / dispensary, ATM, entertainment zones, milk booth, saloon, parks, restaurant: *1 point*
- ❖ Additionally, provide the following within the campus:
 - Seating facility and Tot-lot for children: *1 point*
 - Toilets in the common area for service staff & visitors: *1 point*
 - minimum one toilet for every 300 dwelling units

Note: The project shall mandatorily have Creche or School as one of the basic amenities.

Benefits Anticipated:

- ❖ Savings on fuel in commuting
- ❖ Less dependence on vehicular usage
- ❖ Encourages people to walk or cycle, thereby improving health

Documentation required:

Precertification Level

- Narrative describing the basic amenities and proposed measures in the site.
- Vicinity map (e.g.: Google, etc.) with scale highlighting the proposed basic amenities from project entrance
- Site plan showing seating facility, tot-lot area and common area toilet(s).
- Declaration from the developer indicating the proposed measures onsite.

Certification Level

- Narrative describing the basic amenities and implemented measures in the site.
- Vicinity map (e.g.: Google, etc.) with scale highlighting the basic amenities from project entrance
- Site plan showing seating facility, tot-lot area and common area toilet(s).
- Photographs showing the social infrastructure and measures implemented onsite.

Guidelines & Examples:

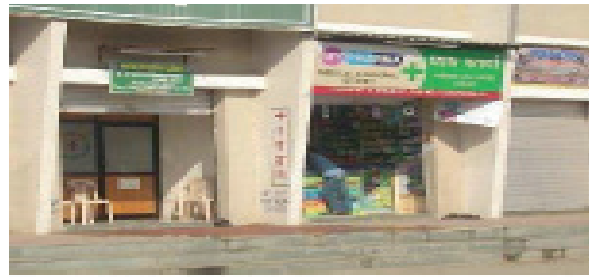
(These guidelines are illustrative)



Google map indicating basic amenities



School



Medical clinic and Pharma Store



Tot-lot area

Green Cover on-site – 15%, 20% and 25%, 30%

SS Credit 4

Points: 4

Intent:

Minimise disturbances or restore the site so as to reduce long-term negative environmental impacts, thereby promoting habitat and biodiversity

Requirements:

Case A: Vegetation on Ground

Retain Natural topography* or vegetated green spaces only on ground for at least 15% of total site area.

Percentage of green cover on-site: $\frac{\text{Total landscaped area on Ground}}{\text{Total Site area}} \times 100$	Points
$\geq 15\%$	1
$\geq 20\%$	2

Case B: Vegetation on Ground & built structures

Develop vegetated area on ground and built structures such as podium, roof surfaces, vertical surfaces to meet at least 25% of total site area.

Percentage of green cover on-site: $\frac{\text{Total landscaped area on Ground}}{\text{Total Site area}} \times 100$	Points
$\geq 25\%$	3
$\geq 30\%$	4

Note: Creepers/ Climbers cannot be considered as vegetation on built structure

Benefits Anticipated:

- ❖ Increased green cover
- ❖ Restoring native and adaptive plants will require less maintenance, irrigation and fewer application of chemical fertilizers
- ❖ Attracts birds and other habitat

Documentation required:**Precertification**

- Narrative describing the area breakup with details of landscape
- Conceptual site plan highlighting the area proposed with green cover.
- Site area calculations indicating the total site area, area with natural topography or vegetation on the ground and built structures.

Certification

- Narrative describing the area breakup with details of landscape
- Site plan highlighting the area covered with green cover.
- Site area calculations indicating the total site area, area with natural topography or vegetation on the ground and built structures.
- Photographs showing the site area with vegetation/ landscape

Guidelines & Examples:

(These guidelines are illustrative)



Vegetated areas on ground and podium

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if more than 25% of the site area is covered with vegetation on ground only or 35% of the site area is covered with vegetation on ground and built structures.

Heat Island Effect: Non-Roof – 25%, 50%

SS Credit 5

Points: 2

Intent:

Minimise heat island effect so as to reduce negative impacts on micro-climate, human and biodiversity

Requirements:

Provide one or combination of the following, for at least 25% of exposed non-roof impervious/ hardscape areas within the project site:

- Shade the footpaths, pathways, roads, uncovered surface parking and other impervious/hardscaped areas with tree cover
- Install open grid pavers (or) grass pavers (or) light-coloured materials with solar reflective index (SRI) between 29-64

Points are awarded as below:

Percentage: $\frac{\text{Non-Roof area with proposed strategy}}{\text{Total Non-Roof area}} \times 100$	Points
$\geq 25\%$	1
$\geq 50\%$	2

NON-ROOF AND ROOF AREA:

NON-ROOF: Any impervious surface area which is on ground and exposed to sky, shall be considered as 'Non-roof'. Such areas include uncovered surface parking, roads, driveways, walkways, foot paths, pavements and other impervious areas within the project site.

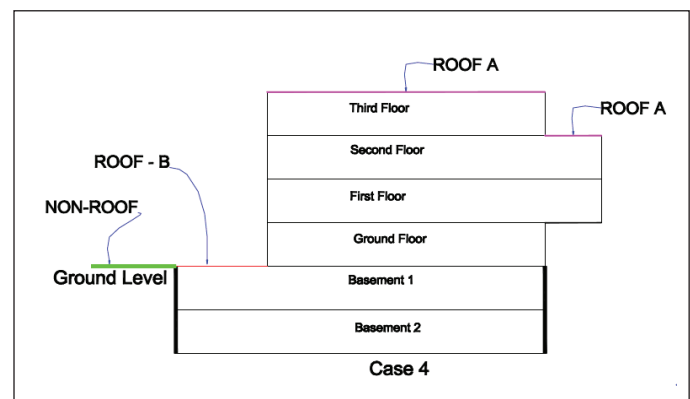
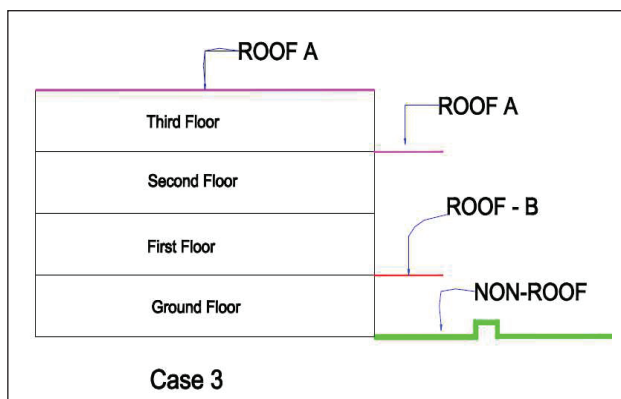
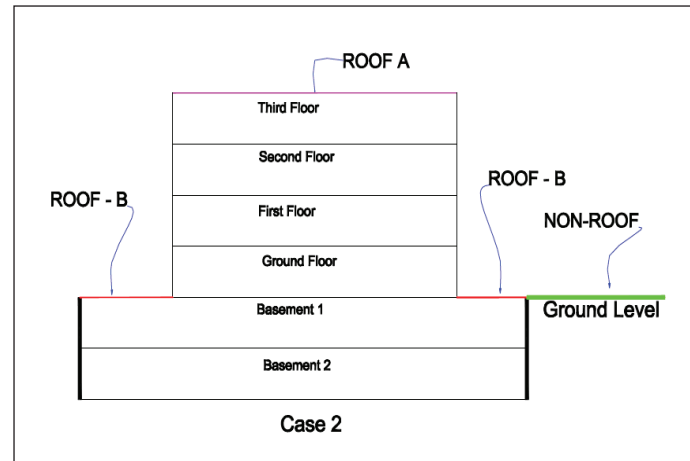
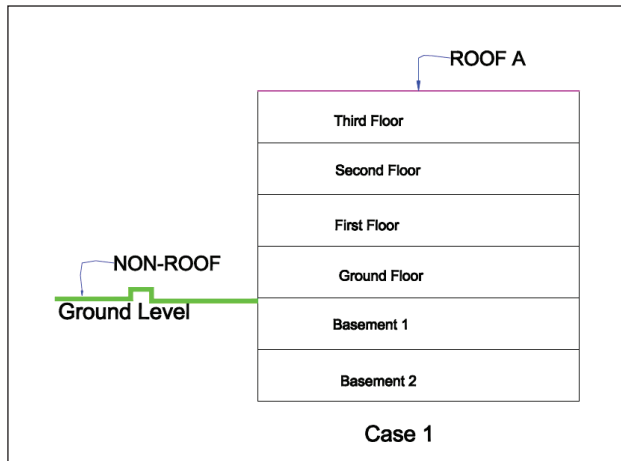
ROOF A: Any surface area which is exposed to sky shall be considered as 'Roof'. To meet the requirements, use high SRI materials or high albedo materials with SRI more than 78 or vegetation.

ROOF B: Basement roof exposed to sky shall come under 'Roof' and shall use hardscape materials with an SRI of at least 29 (and not higher than 64) or open grid pavers or grass pavers or vegetation

Note: Functional areas such as parking, roads, driveways, walkways, foot paths, pavements and other impervious areas shall be included in the calculations

Benefits Anticipated:

- ❖ Reduction in local temperature
- ❖ Better ambience



Documentation required:

Precertification Level

- Narrative describing proposed strategies to reduce heat island effect in the non-roof areas.
- Submit breakup of non-roof area calculations.
- Conceptual site plan highlighting non-roof impervious (hardscape) areas and areas covered with proposed measures.
- Declaration from the developer stating the proposed measures.
- Cutsheet of light-coloured materials indicating solar reflective index (SRI) between 29-64

Certification Level

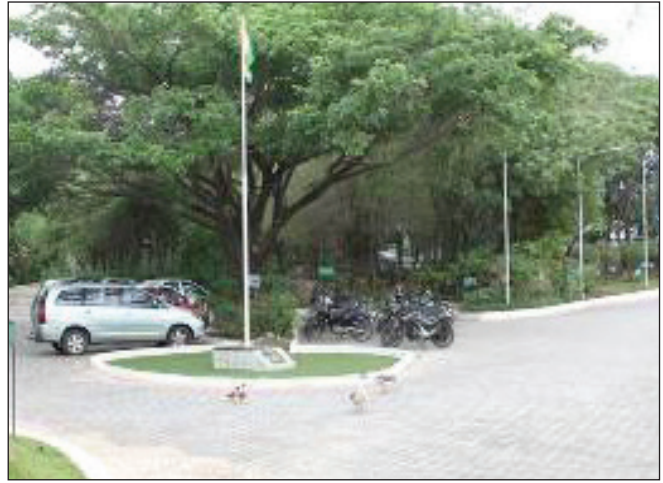
- Narrative describing implemented strategies to reduce heat island effect in the non-roof areas.
- Submit breakup of non-roof area calculations.
- Site plan highlighting non-roof impervious (hardscape) areas and areas covered with implemented measures.
- Cutsheet along with purchase invoice of light-coloured materials indicating solar reflective index (SRI) between 29-64.
- Photographs of implemented measures.

Guidelines & Examples:

(These guidelines are illustrative)



Open Grid Pavers for Non-Roof Areas



Tree Cover for Parking Areas

Heat Island Effect: Roof – 75%, 95% and 25%

SS Credit 6

Points: 3

Intent:

Minimise heat island effect to reduce negative impact on micro-climate, human and biodiversity

Requirements:

Provide one or combination of the following:

- ❖ Cover at least 75% of the exposed roof areas with high SRI paint/ china mosaic tiles/ white tiles
- ❖ Provide at least 25% of the exposed roof area with green roof (vegetation)

Points are awarded as below:

Percentage: <u>Roof area with proposed strategy</u> x 100 Total Roof area	Points
≥ 75%	1
≥ 95%	2

AND

Percentage: <u>Roof area with vegetation</u> x 100 Total Roof area	Points
≥ 25%	1

NON-ROOF AND ROOF AREA:

NON-ROOF: Any impervious surface area which is on ground and exposed to sky, shall be considered as 'Non-roof'. Such areas include uncovered surface parking, roads, driveways, walkways, foot paths, pavements and other impervious areas within the project site.

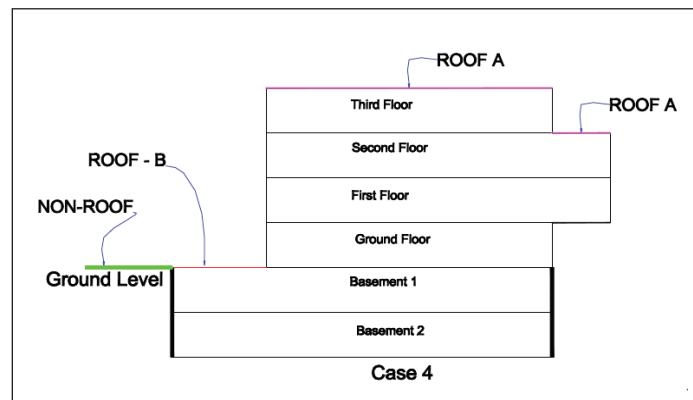
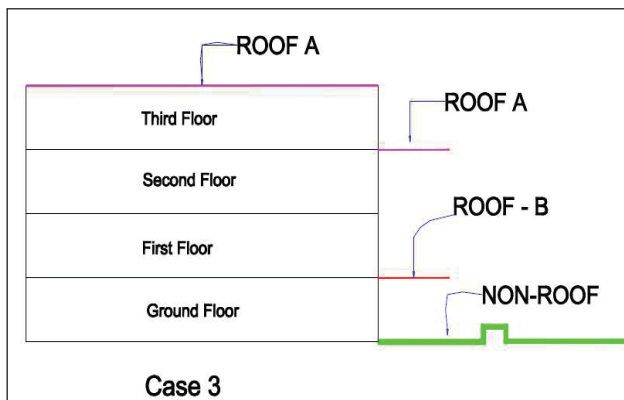
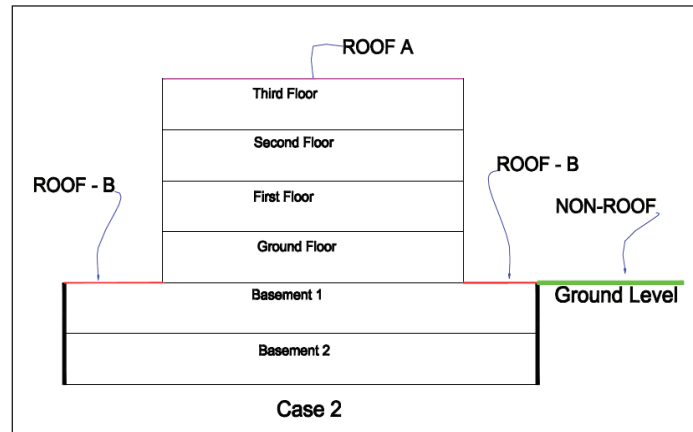
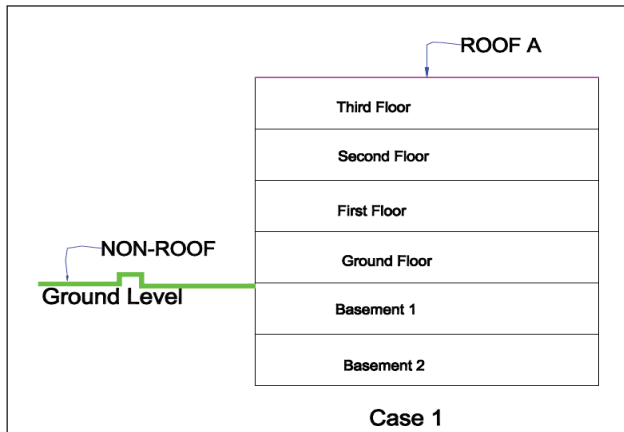
ROOF A: Any surface area which is exposed to sky shall be considered as 'Roof'. To meet the requirements, use high SRI materials or high albedo materials with SRI more than 78 or vegetation.

ROOF B: Basement roof exposed to sky shall come under 'Roof' and shall use hardscape materials with an SRI of at least 29 (and not higher than 64) or open grid pavers or grass pavers or vegetation

Note: Functional areas such as parking, roads, driveways, walkways, foot paths, pavements and other impervious areas shall be included in the calculations

Benefits Anticipated:

- ❖ Reduction in local temperatures
- ❖ Better ambience



Documentation required:

Precertification Level

- Narrative describing proposed strategies to reduce heat island effect in the roof areas.
- Submit breakup of roof area calculations showing exposed roof area, service and utility areas and areas covered with high reflective roof materials/ vegetation.
- Conceptual site plan highlighting roof areas and areas covered with proposed measures.
- Declaration from the developer stating the proposed measures.
- Cutsheet of proposed high reflective materials

Certification Level

- Narrative describing implemented strategies to reduce heat island effect in the roof areas.
- Submit breakup of roof area calculations showing exposed roof area, service and utility areas and areas covered with high reflective roof materials/ vegetation.
- Site plan highlighting roof areas and areas covered with implemented measures.
- Cutsheet of proposed high reflective materials
- Photographs of the measures adopted.
- Purchase invoice/ payment receipts of the high reflective roof materials sourced for the project.

Guidelines & Examples:

(These guidelines are illustrative)



Roof covered with White paints



Roof covered with China Mosaic tiles

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if at least 50% of the exposed roof area is covered with vegetation.

Parking facilities for Tenements

SS Credit 7

Points: 4

Intent:

Provide adequate parking within the site to minimise disturbance caused due to parking on public roads, thereby, enhancing the quality of civic life

Requirements:

Provide one or combination of the following:

- ❖ One 2-wheeler parking on-site to cater to each dwelling unit: *1 point*
- ❖ One 4-wheeler parking on-site for every 2 dwelling units (OR) as per local byelaws whichever is stringent: *1 point*
- ❖ Electrical charging for at least 10% of the dwelling units: *1 point*
- ❖ Bicycle Parking for at least 5% of the dwelling units: *1 point*

Benefits Anticipated:

- ❖ Avoid parking on roads
- ❖ Reduced traffic chaos

Documentation required:

Precertification Level

- Narrative describing parking facilities proposed in the project along with calculations
- Conceptual parking plan showing proposed parking facilities for tenements.
- A copy of the local byelaw highlighting the parking requirements.
- Declaration from the developer indicating proposed parking facilities

Certification Level

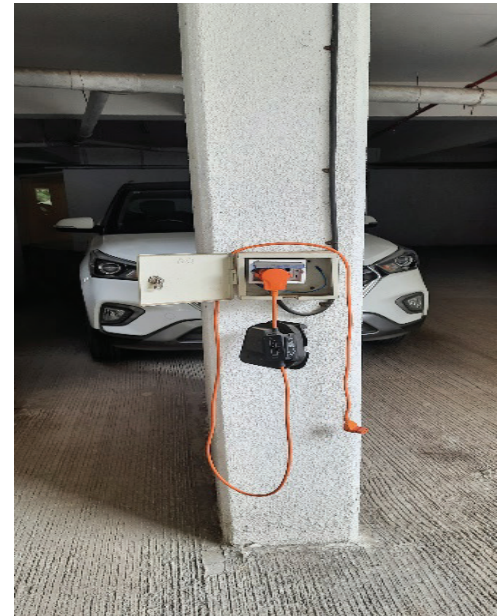
- Narrative describing parking facilities provided in the project along with calculations
- Parking plan showing parking facilities provided for tenements
- Photographs of parking facilities provided for tenements.

Guidelines & Examples:

(These guidelines are illustrative)



Parking for tenements



Electric Charging Facility

Design for Differently Abled

SS Credit 8

Points: 2

Intent:

Ensure that the building design caters to differently abled and senior citizens for their wellbeing

Requirements:

Provide the following features: (any 2 measures, 1 point; all 3 measures 2 points)

- ❖ Non-slippery ramps with handrails on at least one side for easy access till main entrance and special parking provision for differently abled near lifts/ main entrance
- ❖ Lift Facility:
 - Case 1: Projects with lift facility – provide uniform flooring levels/ ramps with handrail till lift facility
 - Case 2: Projects without lifts – provide declaration mentioning that preferred allotments of housing are provided for differently abled in ground floor and ramps shall be provided till ground floor
- ❖ Differently abled friendly toilet in the common area facility as per NBC standards

Benefits Anticipated:

- ❖ Comfortable living conditions for the differently abled and senior citizens

Documentation required:

Precertification Level

- Narrative describing all measures proposed in the building for differently abled.
- Conceptual plans highlighting provisions for differently abled.
- Declaration from the developer stating the proposed measures

Certification Level

- Narrative describing all measures implemented in the building for differently abled.
- Plans highlighting provisions for differently abled.
- Photographs of measures implemented.

Guidelines & Examples:

(These guidelines are illustrative)



Non-slippery ramps with handrails



Differently abled Toilet

Basic Facilities for Construction Workforce

SS Credit 9

Points: 2

Intent:

Provide facilities for wellbeing and hygiene of the construction workforce to enhance the quality of life and promote safe and healthy work conditions.

Requirements:

Provide the following on-site basic facilities for construction workforce:

- ❖ Adequate drinking water facilities to workforce
- ❖ Safety and personal protective equipment
- ❖ Sanitary measures to meet or exceed local / labour bye-law requirement (OR) Provide at least one toilet seat/ urinal for every 50 workers (separate for men and women)
- ❖ Adequate illumination levels in construction work areas
- ❖ First-aid and emergency facilities

Benefits Anticipated:

- ❖ Better work environment leading to better productivity
- ❖ Health and wellbeing of workforce

Documents required:

Precertification Level

- Narrative describing the basic facilities proposed in the project for construction workforce.
- Conceptual site plan highlighting the basic facilities proposed for the construction workforce.

Certification Level

- Narrative describing the basic facilities provided in the project for construction workforce.
- Site plan highlighting the basic facilities provided for the construction workforce
- Photographs showing the implemented strategies for wellbeing of construction work force.

Guidelines & Examples:

(These guidelines are illustrative)



Personal Protective Equipment



Adequate illumination levels in construction area

Green Education

SS Credit 10

Points: 1

Intent:

Educate the workforce during construction phase and occupants post construction to sustain the green features through the life of the building, thereby reducing the negative impacts associated on environment

Requirements:

1. During construction

- a. Awareness sessions for construction workforce on green & safety measures
- b. Display signages indicating envisaged green features

2. Post construction:

- a. Project brochure highlighting the green features proposed
- b. Awareness sessions to prospective occupants
- c. Circulate green home guidelines
- d. Permanent signages highlighting the implemented green features

Benefits Anticipated:

- ❖ Awareness to workforce and occupants
- ❖ Maintenance of green measures in the project

Documents required:

Precertification Level

- Narrative describing the during and post construction measures
- Declaration from owner stating the schedule of awareness sessions planned
- Photographs of the signages displayed in construction site, as applicable
- Project brochure

Certification

- Narrative describing the during and post construction measures
- Photographs and snapshot of the acknowledgment of receipt of green home guidelines by occupants
- Copy of green home guidelines circulated to occupants

The background features a series of overlapping, wavy bands in various shades of blue, creating a sense of movement and depth. In the center, a bright white circular glow illuminates the scene. A prominent red banner with a white border and a slight 3D effect is positioned horizontally across the middle. The text 'WATER CONSERVATION' is written in a bold, white, sans-serif font on the banner. There are also some thin red lines extending from the banner's edges.

WATER CONSERVATION

Availability of Potable Water

WC Mandatory Requirement 1

Intent:

Ensure that households are provided with piped water supply to meet water requirements, so as to ensure that the community is habitable

Requirements:

Provide piped potable water supply and storage system, considering 135 litres of water per person per day.

Benefits Anticipated:

- ❖ Improved hygiene and quality of life

Documentation required:

Precertification Level

- Narrative describing the proposed storage systems for providing water supply to households.
- Calculations indicating the total potable water requirement in the project.
- Conceptual site plan highlighting the location of proposed storage systems.

Certification Level

- Narrative describing the storage systems for providing water supply to households.
- Calculations indicating the total potable water requirement in the project.
- Site plan highlighting the location of storage systems provided
- Photographs of installed water storage systems.

Rainwater Harvesting – 25%

WC Mandatory Requirement 2

Intent:

Implement Rainwater management systems to enhance ground water table and reduce dependency on municipal water demand

Requirements:

Case 1:

Provide rainwater harvesting system to capture at least 25% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years.

Case 2:

In areas where the central/ state ground water board does not recommend artificial rainwater recharge (or) if the groundwater table is less than 8 m, the project is deemed to meet the mandatory requirement.

Rainwater Harvesting Calculations

Rainwater runoff from site = Total site Area X Runoff Coefficient X Average rainfall per day

Notes:

- *Average rainfall per day considerations*
 - *Region with average rainfall during the year up to 1000 mm to consider avg. rainfall per day as 20mm for RWH calculations.*
 - *Region with average rainfall during the year from 1001 mm-2000 mm to consider avg. rainfall per day as 25 mm for RWH calculations.*
 - *Region with average rainfall during the year from 2001 mm – 3000 mm to consider avg. rainfall per day as 30 mm for RWH calculations.*
- *Refer to annexure for average annual rainfall for the various cities or from the website – [https://hydro.imd.gov.in/hydrometweb/\(S\(amesrkewoqdc11550u3moyer\)\)/DistrictRaifall.aspx](https://hydro.imd.gov.in/hydrometweb/(S(amesrkewoqdc11550u3moyer))/DistrictRaifall.aspx)*
- *Runoff coefficient for typical surfaces can be used from the below table:*

Table 2 - Runoff coefficients for Typical Surface Types

S No	Surface Type	Runoff Coefficient
1	Cemented / Tiled Roof	0.95
2	Cemented or Pavement	0.95
3	Pavement Asphalt	0.9
4	Open-grid Grass Pavement	0.5
5	Roof Garden (> 500 mm thickness)	0.1
6	Garden, Farms, Parks	0.3

Benefits Anticipated:

- Reduce dependence on municipal supply of water.
- Reduce the amount of water being discharged into drains and watercourses thereby reducing the risk of localised flooding.
- Recharging of aquifers maintains or augments natural groundwater, would conserve surface water and combat progressive depletion of groundwater levels.

Documentation required:**Precertification Level**

- Narrative describing the ground water level and proposed strategies for Rainwater harvesting system.
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity.
- Plans and cross section of proposed harvesting system
- Conceptual site plan indicating the storm water layout and proposed harvesting system
- Soil test report indicating the ground water level
- Declaration from the developer indicating the proposed rainwater harvesting system

Certification Level

- Narrative describing the ground water level and implemented strategies for Rainwater harvesting system.
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity.
- Plans and cross section of harvesting system provided
- Site plan indicating the storm water layout and harvesting system provided
- Soil test report indicating the ground water level
- Photographs of installed water storage systems.

Guidelines & Examples:

Provide rainwater harvesting system to capture at least 25% of run-off volumes from roof and non-roof areas for a project located in Hyderabad with a total site area of 2,000 sq. m.

Rainwater Harvesting calculations				
S. No	Surface Type	Runoff Coefficient	Area (Sq. m)	Impervious Area (Sq. m)
1	Cemented / Tiled Roof	0.95	1000	950
2	Cemented or Pavement	0.95	500	475
3	Pavement Asphalt	0.9	0	0
4	Open-grid Grass Pavement	0.5	100	50
5	Roof Garden (> 500 mm thickness)	0.1		0
6	Garden, Farms, Parks	0.3	400	120
	Total Impervious area (sq. m)			1,595
Average Normal rainfall per day (m)				0.02
Total roof & nonroof runoff volume (cu.m)				31.9
Total Storage or harvesting capacity (cu.m)				25
Percentage of Rainwater harvesting done				78%



Recharge pit with borewell



Roof top rain water harvesting tank

Rainwater Harvesting – 50%, 75%, 95% or 10%, 20%, 30% and Reuse

WC Credit 1

Points: 4

Intent:

Implement Rainwater management systems to enhance ground water table and reduce dependency on municipal water demand

Requirements:

Case 1:

Provide rainwater harvesting system to capture at least 50% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years.

Points are awarded as below:

Rainwater harvesting system to capture / recharge runoff from site	Points
≥ 50% from roof & non-roof areas	1
≥ 75% from roof & non-roof areas	2
≥ 95% from roof & non-roof areas	3

Case 2:

In areas where the central/ state ground water board does not recommend artificial rainwater recharge (or) if the groundwater table is less than 8 m, the projects can show compliance by storage & reuse. Provide rainwater harvesting system to capture at least 10% of run-off volume from roof and non-roof areas. The harvesting system designed should cater to at least 1 day of normal rainfall* occurred in the last 5 years

Points are awarded as below:

Rainwater harvesting system to capture	Points
≥ 10% from roof & non-roof areas	1
≥ 20% from roof & non-roof areas	2
≥ 30% from roof & non-roof areas	3

AND

Reuse

Reuse at least 50% of captured harvested rainwater within the project.

Rainwater Harvesting Calculations

Rainwater runoff from site = Total site Area X Runoff Coefficient X Average rainfall per day

Notes:

- *Average rainfall per day considerations*
 - *Region with average rainfall during the year up to 1000 mm to consider avg. rainfall per day as 20mm for RWH calculations.*
 - *Region with average rainfall during the year from 1001 mm-2000 mm to consider avg. rainfall per day as 25 mm for RWH calculations.*
 - *Region with average rainfall during the year from 2001 mm – 3000 mm to consider avg. rainfall per day as 30 mm for RWH calculations.*
- *Refer to annexure for average annual rainfall for the various cities or from the websites - [https://hydro.ind.gov.in/hydrometweb/\(S\(amesrkewoqdc11550u3moyer\)\)/DistrictRaifall.aspx](https://hydro.ind.gov.in/hydrometweb/(S(amesrkewoqdc11550u3moyer))/DistrictRaifall.aspx)*
- *Runoff coefficient for typical surfaces can be used from the below table:*

Table 2 - Runoff coefficients for Typical Surface Types

S No	Surface Type	Runoff Coefficient
1	Cemented / Tiled Roof	0.95
2	Cemented or Pavement	0.95
3	Pavement Asphalt	0.9
4	Open-grid Grass Pavement	0.5
5	Roof Garden (> 500 mm thickness)	0.1
6	Garden, Farms, Parks	0.3

Benefits Anticipated:

- Reduce dependence on municipal supply of water.
- Reduce the amount of water being discharged into drains and watercourses thereby reducing the risk of localised flooding.
- Recharging of aquifers maintains or augments natural groundwater, would conserve surface water and combat progressive depletion of groundwater levels.

Documentation required:**Precertification Level**

- Narrative describing the ground water level, proposed strategies for Rainwater harvesting system and reuse applications, if any
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume, harvesting system capacity and reuse applications capacity
- Plans and cross section of proposed harvesting system
- Conceptual site plan indicating the storm water layout and proposed harvesting system
- Soil test report indicating the ground water level
- Declaration from the developer indicating the proposed rainwater harvesting system and reuse applications.

Certification Level

- Narrative describing the ground water level and implemented strategies for Rainwater harvesting system.
- Last 5 years rainfall data
- Calculations indicating the rainwater runoff volume and harvesting system capacity.
- Plans and cross section of harvesting system provided
- Site plan indicating the storm water layout and harvesting system provided
- Soil test report indicating the ground water level
- Photographs of installed water storage systems and reuse applications

Guidelines & Examples:

Provide rainwater harvesting system to capture at least 50% of run-off volumes from roof and non-roof areas for a project located in Hyderabad with a total site area of 2,000 sqm.

Rainwater Harvesting calculations				
S. No	Surface Type	Runoff Coefficient	Area (Sq. m)	Impervious Area (Sq. m)
1	Cemented / Tiled Roof	0.95	1000	950
2	Cemented or Pavement	0.95	500	475
3	Pavement Asphalt	0.9	0	0
4	Open-grid Grass Pavement	0.5	100	50
5	Roof Garden (> 500 mm thickness)	0.1		0
6	Garden, Farms, Parks	0.3	400	120
	Total Impervious area (sq.m)			1595
Average Normal rainfall per day (m)				0.02
Total roof & nonroof runoff volume (cu.m)				31.9
Total Storage or harvesting capacity (cu.m)				25
Percentage of Rainwater harvesting done				78%
Reuse of harvested rainwater (cu.m)				15
Percentage of harvested rainwater reused within the project				60%

Water Efficient Plumbing Fixtures

WC Credit 2

Points: 4

Intent:

Enhance efficiency of plumbing fixtures, thereby minimising potable water use

Requirements:

Install water efficient fixtures in dwelling units and common areas (*1 point each measure*)

- ❖ Aerators for taps in dwelling units
- ❖ Water closets with dual flush in dwelling units
- ❖ Aerators for Shower heads in dwelling units
- ❖ Water efficient fixtures in common area toilets

Benefits Anticipated:

- Reduces water consumption
- Decrease the load on municipal supply of potable water
- Reduces consumption of groundwater

Documentation Required:

Precertification Level

- Narrative describing proposed plumbing fixtures (flow and flush), with respective make & model
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the proposed plumbing flow and flush fixtures.
- Declaration from the developer indicating the proposed plumbing fixtures (flow and flush)

Certification Level

- Narrative describing installed plumbing fixtures (flow and flush), with respective make & model
- Manufacture cut-sheets/ brochures/ letters indicating the flow rates of the proposed plumbing flow and flush fixtures.
- Declaration from the developer indicating the installed plumbing fixtures (flow and flush)
- Photographs showing the water efficient plumbing fixtures installed.
- Purchase invoice or payment receipts of plumbing fixtures (flow and flush) with make & model.

Guidelines & Examples:

(These guidelines are illustrative)



Aerators fitted to tap and dual Flush Cistern

Wastewater Treatment: 50%, 75%, 95%

WC Credit 3

Points: 3

Intent:

Reduce consumption of potable water and wastewater generation to minimise the burden on municipal water supply

Requirements:

Provide on-site wastewater treatment system to treat minimum 50% of the wastewater generated within the project.

Points are awarded as below:

Percentage: $\frac{\text{Capacity of wastewater treatment system}}{\text{Total Wastewater generated}} \times 100$	Points
$\geq 50\%$	1
$\geq 75\%$	2
$\geq 95\%$	3

Benefits Anticipated:

- ❖ Self-sufficiency of water needs within the project
- ❖ Reduces the dependency on municipal water supply

Documentation required:

Precertification Level

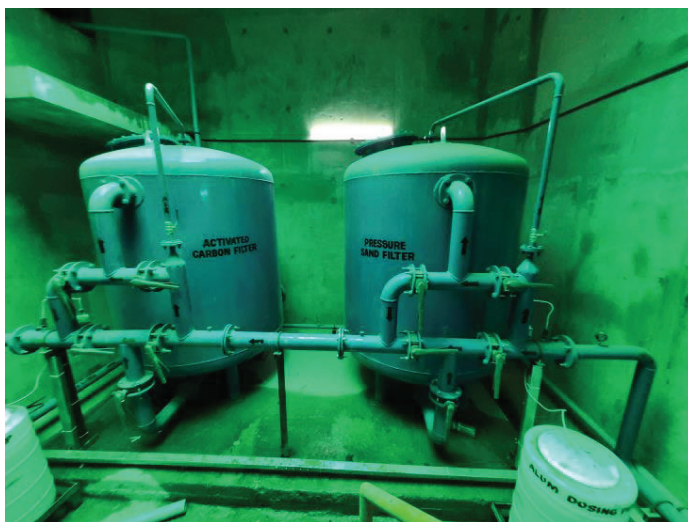
- Narrative describing the proposed on-site wastewater treatment plant/ system, along with quality standards of wastewater treated.
- Tentative daily and annual water balance of the project.
- Conceptual site plan highlighting the location of proposed on-site wastewater treatment system.
- Declaration from the developer indicating the capacity of proposed wastewater treatment system.

Certification Level

- Narrative describing the installed on-site wastewater treatment plant/ system, along with quality standards of wastewater treated.
- Tentative daily and annual water balance of the project.
- Site plan highlighting the location of installed on-site wastewater treatment system.
- Declaration from the developer indicating the capacity of proposed wastewater treatment system.
- Photographs showing the on-site wastewater treatment system installed.

Guidelines & Examples:

(These guidelines are illustrative)



Decentralised Wastewater Treatment system

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has Non-mechanical, Biological and natural ways of treating the wastewater.

Treated Wastewater Reuse

WC Credit 4

Points: 3

Intent:

Encourage use of treated wastewater to reduce dependence on municipal water

Requirements:

Reuse the treated wastewater on-site the following applications (*1 point for each measure*):

- ❖ Flushing
- ❖ Landscaping
- ❖ Vehicle wash applications/ Other appropriate applications

Benefits Anticipated:

- ❖ Self-sufficiency of water needs within the project
- ❖ Reduces the dependency on municipal water supply

Documentation required:

Precertification Level

- Narrative describing the proposed use of the treated water on site.
- Schematic drawing showing proposed dual plumbing lines, if treated wastewater is reused for flushing.
- Tentative daily and annual water balance of project.
- Declaration from the developer indicating the proposed use of the treated water on site

Certification Level

- Narrative describing the use of the treated water on site.
- Single line drawing showing dual plumbing lines, if treated wastewater is reused for flushing.
- Tentative daily and annual water balance of project.
- Declaration from the developer indicating the use of the treated water on site
- Photographs showing reusing of treated for flushing/ landscaping/ vehicle wash

Management of Irrigation Systems

WC Credit 5

Points: 3

Intent:

Provide water efficient management systems and techniques for irrigation to reduce dependence on municipal water

Requirements:

Provide efficient irrigation systems incorporating the features mentioned below: *(every two measures 1-point, maximum points: 3)*

- ❖ Turf and each type of bedding area must be segregated into independent zones based on watering needs
- ❖ Sprinklers for turf areas
- ❖ At least 50% of landscape planting beds must have drip irrigation system to reduce evaporation
- ❖ Central shut-off valve
- ❖ Pressure regulating device(s) to maintain optimal pressure to prevent water loss
- ❖ Timer based controllers
- ❖ Any other innovative methods for watering

Benefits Anticipated:

- About 40 - 60% of water savings for landscape irrigation
- Controlled and optimised irrigation results in healthier plants

Documentation Required:

Precertification Level

- Narrative describing all the proposed water efficient irrigation systems and techniques.
- Conceptual landscape plan highlighting proposed irrigation systems.
- Manufacturer's cut-sheets/ brochures of the proposed water efficient irrigation systems.
- Declaration from the developer indicating the proposed water efficient irrigation systems

Certification Level

- Narrative describing all the water efficient irrigation systems and techniques.
- Landscape plan highlighting irrigation systems.
- Manufacturer's cut-sheets/ brochures of the water efficient irrigation systems provided.
- Declaration from the developer indicating the water efficient irrigation systems
- Photographs showing the installed irrigation systems and techniques.



Drip irrigation system

Sub metering

WC Credit 6

Points: 3

Intent:

Encourage water sub-metering to improve the water performance in the project, and thereby save potable water

Requirements:

Provide water sub meters for the following: (maximum 3 points)

- Common area applications: *1 point*
- Vertical raisers for each block: *1 point*
- Every dwelling units: *2 points*

Benefits Anticipated:

- ❖ Measure any deviations in the water lines
- ❖ Reduce additional water costs

Documentation Required:

Precertification Level

- ❖ Narrative describing the proposed list of water sub metering systems in the project.
- ❖ Single line diagram showing the proposed water sub metering system
- ❖ Declaration from the developer indicating the proposed list of water sub metering systems in the project.

Certification Level

- ❖ Narrative describing the list of water sub metering systems in the project.
- ❖ Single line diagram showing the water sub metering system
- ❖ Declaration from the developer indicating the list of water sub metering systems in the project
- ❖ Purchase invoice of installed water meters
- ❖ Photographs of the installed meters.



Water meter

The background features a central white circle with a radial gradient, surrounded by several overlapping, semi-transparent blue and purple arcs that create a sense of motion and depth. The text is centered within a red, trapezoidal banner that has a white outline and is flanked by horizontal red lines.

ENERGY CONSERVATION

Energy Efficient Building Envelope

EC Mandatory Requirement 1

Intent:

Improve energy efficiency of the building(s) to reduce environmental impacts from excessive energy use

Requirements:

Implement efficient roof and glazing for building envelope measures to improve the energy efficiency.

- ❖ **Roof:** The project must ensure that the U-value of the overall Roof assembly shall meet the baseline criteria of $\leq 1.8 \text{ W/m}^2\text{K}$
- ❖ **Glazing:** The project must ensure that the U-value of the Glazing of all windows shall meet the baseline criteria of $\leq 5.7 \text{ W/m}^2\text{K}$

Benefits Anticipated:

- ❖ Reduced energy bills
- ❖ Energy cost saving for up to 20-30%

Documents Required:

Precertification Level

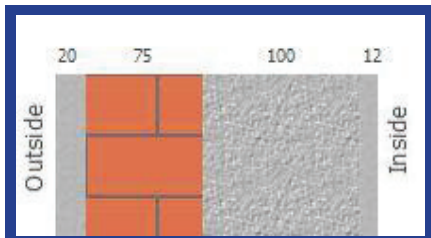
- Narrative stating the climate zone and U-value of proposed roof assembly and glazing.
- Comparison of the baseline envelope parameters and the proposed envelope parameters.
- Cross section of roof assembly
- Details of proposed glazing along with the list of identified manufacturers and respective specifications of glazing (U-value). Also, specify proposed window-to-wall ratio (WWR) for each building.
- Declaration from the developer indicating the proposed measures

Certification Level

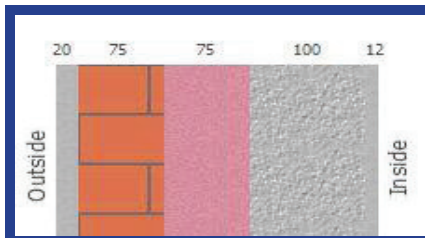
- Narrative stating the climate zone and U-value of roof assembly and glazing.
- Comparison of the baseline envelope parameters and implemented envelope parameters.
- Cross section of roof assembly
- Details of glazing along with specifications of glazing (U-value). Also, specify window-to-wall ratio (WWR) for each building.
- Declaration from the developer indicating the implemented measures
- Photographs showing the implemented strategies
- Purchase invoice of glass and roofing materials

Guidelines & Examples:

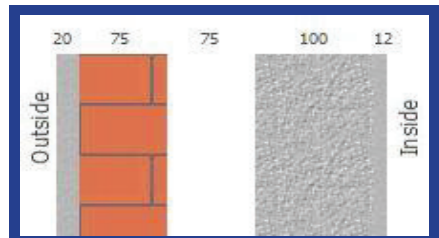
Common approximate U-values for Roof compositions



Assembly: 100mm RCC slab with 75mm brick bat coba, 20mm external & 12mm internal plaster
U-value: 2.93 W/m²K

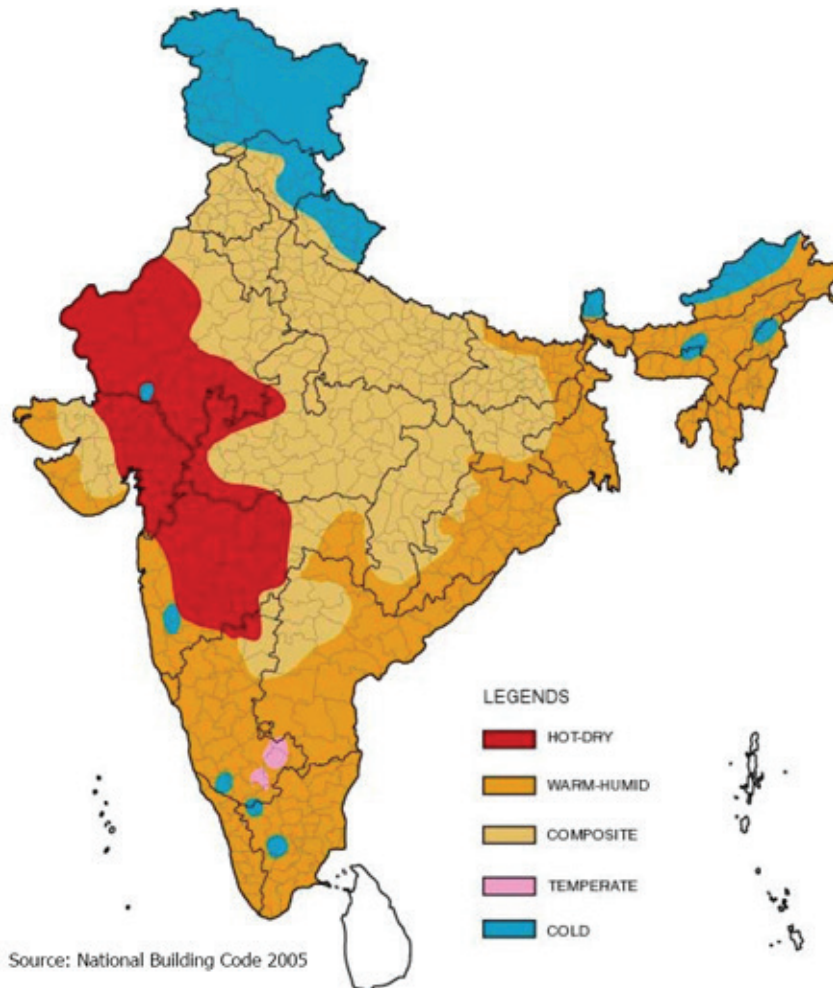


Assembly: 100mm RCC slab with 75mm XPS, 75mm brick bat coba, 20mm external & 12mm internal plaster
U-value: 0.43 W/m²K



Assembly: 100mm RCC slab with 75mm EPS, 75mm brick bat coba, 20mm external & 12mm internal plaster
U-value: 0.39 W/m²K

Climate Zone Map Of India



- LEGENDS**
- HOT-DRY
 - WARM-HUMID
 - COMPOSITE
 - TEMPERATE
 - COLD

Enhanced Energy Efficient Building Envelope

EC Credit 1

Points: 5

Intent:

Improve energy efficiency of the building(s) to reduce environmental impacts from excessive energy use

Requirements:

Implement efficient wall, roof and glazing for building envelope measures to improve the energy efficiency. (1 point for each parameter)

- ❖ **Wall:** The project must ensure that the overall U-value of the wall assembly shall meet the baseline criteria based on climatic zones of India as mentioned in the below table:

Climate Zone	Maximum U-value of overall wall assembly (W/m ² K)
Composite & Hot-Dry	1.8
Warm-Humid	2.0
Temperate	2.2

- ❖ **Roof:** The project must ensure that the U-value of the overall Roof assembly shall meet the baseline criteria of ≤ 1.5 W/m²K based on climatic zones of India as mentioned in the below table:
- ❖ **Glazing:** The project must ensure that the U-value of the Glazing of all windows shall meet the baseline criteria of ≤ 5.7 W/m²K
- ❖ **Solar Heat Gain Coefficient (SHGC) of Glazing:** The project must ensure that the SHGC of the Glazing of all windows shall meet the baseline criteria based on the window to wall ratio & climatic zones of India as mentioned in the below table

Climate Zone *	Maximum SHGC Value	
	WWR < 20%	WWR > 20%
Composite	0.5	0.42
Hot and Dry	0.5	0.42
Warm and Humid	0.5	0.42
Moderate	0.6	0.48
Cold	0.8	0.8

- ❖ **Visible Light Transmittance (VLT):** The project must ensure that the VLT of the Glazing of all windows shall meet the baseline criteria of ≥ 0.27 or 27%.

Benefits Anticipated:

- ❖ Reduced energy bills
- ❖ Energy cost saving for up to 20-30%

Documents Required:**Precertification Level**

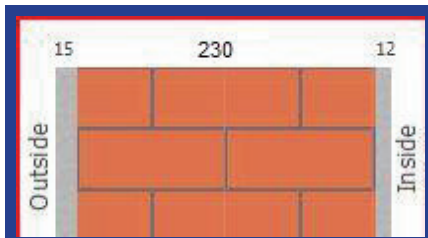
- Narrative stating the climate zone and U-value of proposed wall assembly, roof assembly and glazing, SHGC and VLT of glazing
- Comparison of the baseline envelope parameters and the proposed envelope parameters.
- Cross section of wall and roof assembly
- Details of proposed glazing along with the list of identified manufacturers and respective specifications of glazing (U-value, SHGC and VLT). Also, specify proposed window-to-wall ratio (WWR) for each building.
- Declaration from the developer indicating the proposed measures

Certification Level

- Narrative stating the climate zone and U-value of provided wall assembly, roof assembly and glazing, SHGC and VLT of glazing
- Comparison of the baseline envelope parameters and implemented envelope parameters.
- Cross section of wall and roof assembly
- Details of glazing along with specifications of glazing (U-value, SHGC and VLT). Also, specify window-to-wall ratio (WWR) for each building.
- Declaration from the developer indicating the implemented measures
- Photographs showing the implemented strategies
- Purchase invoice of glass, wall, and roofing materials

Guidelines & Examples:

Common approximate U-values for wall compositions



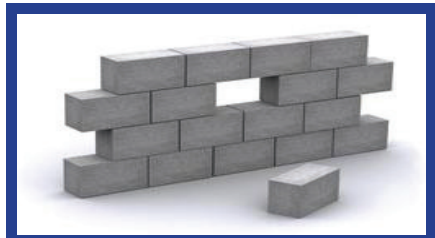
Assembly: 230mm Brick wall with 15mm external & 12mm internal plaster

U-value: 1.91 W/m²K



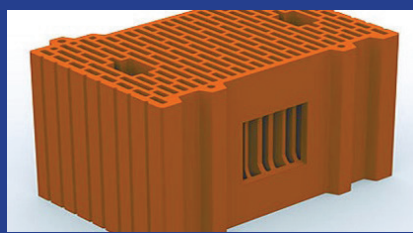
Assembly: 200mm concrete block with 15mm external & 12mm internal plaster

U-value: 3.09 W/m²K



Assembly: 200mm AAC block with 15mm external & 12mm internal plaster

U-value: 0.56 W/m²K



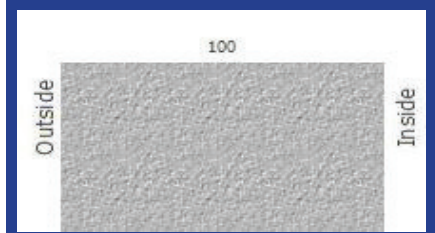
Assembly: 140mm porotherm block with 100mm glass fibre

U-value: <0.27 W/m²K



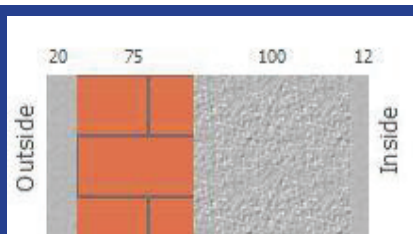
Assembly: 150mm CLC block with 15mm external & 12mm internal plaster

U-value: 0.80 W/m²K



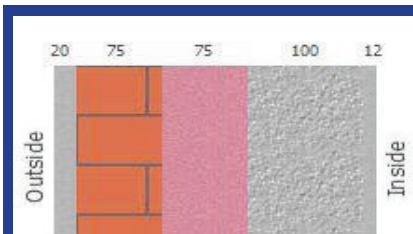
Assembly: 100mm RCC wall

U-value: 5.45 W/m²K



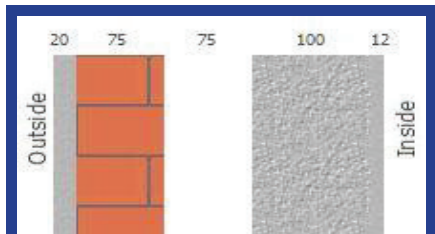
Assembly: 100mm RCC slab with 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 2.93 W/m²K



Assembly: 100mm RCC slab with 75mm XPS, 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 0.43 W/m²K



Assembly: 100mm RCC slab with 75mm EPS, 75mm brick bat coba, 20mm external & 12mm internal plaster

U-value: 0.39 W/m²K

Shading Elements for Building Openings

EC Credit 2

Points: 2

Intent:

Incorporate shading elements for external openings to improve energy efficiency

Requirements:

Provide shading devices over external openings

- ❖ At least 80% of the exterior opening area (fenestration) shall have sunshades/ chajjas with a projection factor of 0.5 or more. *(1 point)*

(AND / OR)

- ❖ Climate responsive concepts and design features as applicable: *(1 point)*
 - Eg: Extended louvers, punched windows, pergolas, horizontal and vertical landscaping, etc.,

Benefits:

- ❖ Reduced energy bills

Documentation Required:

Precertification Level:

- Narrative describing the proposed shading elements
- Conceptual plans indicating proposed width of sunshades/ chajjas and climate responsive concepts

Certification Level:

- Narrative describing the proposed shading elements
- Plans indicating width of sunshades/ chajjas and climate responsive concepts
- External building photographs showing the shading elements and shading devices.

Guidelines & Examples:

(These guidelines are illustrative)



Shaded balconies



Sunshades

Efficient Lighting

EC Credit 3

Points: 3

Intent:

Enhance energy efficiency of the building(s) and system(s) to reduce environmental impacts from excessive energy use

Requirements:

Use energy efficient lighting fixtures to reduce the lighting power densities (LPD) in all exterior, common and parking areas. *(1 point for each measure)*

❖ Design lighting such that the lighting power density (LPD) shall meet the following maximum values:

Lighting	Applicable Areas	Baseline Lighting Power Density (LPD)
Exterior Lighting, excluding Parking Area (for residential & non-residential units)	Landscaping, Façade, Street lighting, Pathways, Signage's, etc.,	$\leq 2.15\text{W/m}^2$
Common Area Lighting, excluding Parking Area (for residential & non-residential units)	Corridors, Lobbies, Staircases, Terrace, etc.,	$\leq 3.23\text{ W/m}^2$
Parking Area	Surface parking (covered & uncovered), Basement parking	$\leq 1.6\text{ W/m}^2$

Reference: NBC,2016

Benefits:

❖ 20% - 30% energy cost savings

Documents Required:

Precertification Level

- Narrative describing the proposed lighting design
- Conceptual plans indicating the lighting layouts
- List of proposed lighting fixtures to be installed in all exterior, common and parking areas.
- LPD calculations as per submitted lighting layouts

Certification Level

- Narrative describing the implemented lighting design
- Plans indicating the lighting layouts
- List of lighting fixtures installed in all exterior, common and parking areas.
- LPD calculations as per submitted lighting layouts
- Photographs showing the installed energy efficient light fixtures.
- Manufacturer cut-sheets/ brochures/ letters indicating the wattage and type of light fixtures installed.

Guidelines & Examples:

(These guidelines are illustrative)



Efficient lighting design



LED lighting fixtures

Sensors and Controls

EC Credit 4

Points: 2

Intent:

Enhance energy efficiency of the lighting system(s) to reduce environmental impacts from excessive energy use

Requirements:

Install following for all non-emergency exterior & common area lighting such as façade, pathways, landscaping, surface and covered parking, street lighting, staircases in common areas & common toilets: *(1 point for each measure; maximum 2 points)*

- Day light sensor
- Occupancy/ Motion sensor
- Timer based controls

Benefits:

- ❖ 20% - 30% energy cost savings

Documents Required:

Precertification Level

- ❖ Narrative describing the proposed lighting sensors and controls.
- ❖ Conceptual lighting layout of interior and common areas for each typical floor, as applicable lighting sensors and controls.
- ❖ Conceptual exterior lighting layout highlighting the lighting sensors and controls.
- ❖ Proposed list of lighting sensors and control systems with manufacturer details.
- ❖ Declaration from the developer indicating the proposed lighting sensors and control systems.

Certification Level

- ❖ Narrative describing the lighting sensors and controls.
- ❖ Lighting layout of interior and common areas for each typical floor, as applicable lighting sensors and controls.
- ❖ Exterior lighting layout highlighting the lighting sensors and controls.
- ❖ List of lighting sensors and control systems with manufacturer details.
- ❖ Declaration from the developer indicating the lighting sensors and control systems.
- ❖ Purchase invoices of the installed lighting sensors and control systems.
- ❖ Photographs of the installed lighting sensors and control systems.

On-site Renewable Energy: 50%, 75%

EC Credit 5

Points: 2

Intent:

Promote self-sufficiency in energy through renewable technologies for on-site power generation and use within the project.

Requirements:

Install renewable energy systems for at least 50% of annual energy consumption for common area lighting requirements

Points are awarded as below:

Percentage = $\frac{\text{Annual energy consumption for common area lighting} \times 100}{\text{Total on-site renewable energy generated annually}}$	Points
$\geq 50\%$	1
$\geq 75\%$	2

Benefits:

- ❖ Reduces the adverse environmental impacts caused by fossil fuel based energy production and use
- ❖ Ensures energy security for the country

Documents Required:

Precertification Level

- ❖ Narrative describing the proposed renewable energy system.
- ❖ Tentative calculations indicating the annual energy consumption for common area lighting requirement of the project in kW
- ❖ NREL report indicating the annual energy generation from proposed on-site renewable energy system in kWh/year
- ❖ Proposed list of renewable energy systems with manufacturer details.
- ❖ Conceptual site plans showing the location of proposed renewable energy systems.
- ❖ Declaration from the developer indicating the capacity of proposed renewable energy systems

Certification Level

- ❖ Narrative describing the installed renewable energy system.
- ❖ Tentative calculations indicating the annual energy consumption for common area lighting requirement of the project in kW
- ❖ NREL report indicating the annual energy generation from installed on-site renewable energy system in kWh/year
- ❖ Renewable energy systems with manufacturer details.
- ❖ Site plans showing the location of renewable energy systems.
- ❖ Declaration from the developer indicating the capacity of renewable energy systems
- ❖ Purchase invoices of the installed RE Systems.
- ❖ Photographs of the installed RE systems

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has On-site Renewable Energy system to meet more than 95% of annual common area requirement.



On-site Solar PV

Solar Water Heating Systems: 25%, 50%

EC Credit 6

Points: 2

Intent:

Encourage use of on-site solar water heating systems to improve energy efficiency.

Requirements:

Install on-site solar water heating systems for at least 25% of total hot water requirements of the project

Points are awarded as below:

Hot water through solar water heating system as a percentage of total hot water requirements of the project	Points
≥ 25 %	1
≥ 50%	2

Note: Consider hot water requirement as 20 litres per person per day

Benefits:

- ❖ Reduces the adverse environmental impacts caused by fossil fuel based energy production and use
- ❖ Ensures energy security for the country

Documents Required:

Precertification Level

- ❖ Narrative describing the proposed solar water heating systems.
- ❖ Tentative calculations indicating the total hot water requirement of the project in KLD
- ❖ Manufacturing details of proposed solar water heating systems.
- ❖ Conceptual site plans showing the location of proposed solar water heating systems.
- ❖ Declaration from the developer indicating the capacity of solar water heating systems

Certification Level

- ❖ Narrative describing the installed solar water heating systems.
- ❖ Tentative calculations indicating the total hot water requirement of the project in KLD
- ❖ Manufacturing details of installed solar water heating systems.
- ❖ Site plan showing the location of installed solar water heating systems.
- ❖ Declaration from the developer indicating the capacity of solar water heating systems
- ❖ Purchase invoices of the installed solar water heating systems.
- ❖ Photographs of the installed solar water heating systems

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has solar water heating system to meet more than 75% of annual common area requirement.



Solar Water heater

Energy Saving Measures in Appliances & other Equipment

EC Credit 7

Points: 2

Intent:

Conserve energy in the use of appliances and other equipment, thereby reducing environmental impacts.

Requirements:

Provide the following (each application 1 point, Maximum 2 points):

- ❖ Pumps: BEE 4-Star rated pumps or Minimum 60% efficiency for pumps for capacity greater than 3HP and ISI certified pumps for others
- ❖ Motors: The minimum efficiency of Motors shall be BEE 4-star rated Motors (or) International Efficiency with class 3 (IE 3)
- ❖ Other energy efficient equipment/ system

Benefits Anticipated:

- ❖ Reduction in energy consumption, thereby reducing associated adverse environmental impacts

Documentation Required:

Precertification Level

- Narrative describing proposed energy efficient appliances & other equipment in the project, with the energy efficiency parameters.
- Declaration from the developers indicting the energy efficient appliances & other equipment in the project, with the energy efficiency parameters.

Certification Level

- Narrative describing installed energy efficient appliances & other equipment in the project, with the energy efficiency parameters.
- Declaration from the developers indicating the energy efficient appliances & other equipment in the project, with the energy efficiency parameters.
- Manufacturer's cut-sheets/ brochures of the installed appliances and others equipment.
- Purchase invoices of the installed appliances & equipment.
- Photographs of the installed appliances and other equipment.



Energy Efficient Pumps & Motors



MATERIAL CONSERVATION

Separation of House-hold Waste

MC Mandatory Requirement 1

Intent:

Facilitate segregation of house-hold waste at source so as to prevent waste being sent to landfills

Requirements:

- ❖ Provide separate bins to collect dry waste (paper, plastic, metals, glass, etc.,) and wet waste (organic) for every dwelling unit
- ❖ Additionally provide separate bins in a centralised/ common facility to collect waste such as dry waste, wet waste, e-waste, medical and paper waste.

Benefits:

- ❖ Reduces the burden on landfills

Documentation Required:

Precertification Level

- ❖ Narrative describing the strategies to be implemented to segregate and divert dry & wet waste.
- ❖ Conceptual plan showing the location of the proposed waste bins at individual unit level and common facilities.
- ❖ Declaration from the developer indicating the provision of separate bins (dry and wet) for every dwelling unit

Certification Level

- ❖ Narrative describing the strategies implemented to segregate and divert dry & wet waste.
- ❖ Conceptual plan showing the location of the waste bins at individual unit level and common facilities.
- ❖ Declaration from the developer indicating the provision of separate bins (dry and wet) for every dwelling unit
- ❖ Purchase invoice of colour coded bins for wet and dry waste segregation for all dwelling units.
- ❖ Photographs showing the dry and wet bins at dwelling unit level along with separate bins at common segregation area.

Guidelines & Examples:

(These guidelines are illustrative)



Dry Waste Segregation



Wet Waste Segregation

Organic waste management: 50%, 75%

MC Credit 1

Points: 2

Intent:

Ensure effective organic waste management, post-occupancy, so as to prevent waste being sent to landfills

Requirements:

Install on-site waste treatment systems viz., dump-pits, organic waste converter or Vermi-Composting, etc., to treat at least 50% of the organic waste generated and reuse them for landscaping needs.

Points are awarded as below:

Percentage of organic waste treated : $\frac{\text{Organic waste converter capacity}}{\text{Total organic waste generated on-site}} \times 100$	Points
$\geq 50\%$	1
$\geq 75\%$	2

Benefits Anticipated:

- ❖ Reduces the burden on landfills.
- ❖ Improved hygiene and sanitation

Documentation Required:

Precertification Level

- Narrative describing the proposed organic waste treatment system and its capacity
- Tentative calculations indicating the amount of organic (bio-degradable) waste generated.
- Conceptual site plan highlighting the location of proposed on-site organic waste treatment system.
- Manufacturer brochure of the proposed organic waste treatment system, as applicable.
- Declaration from the developer indicating the capacity of organic waste treatment system

Certification Level

- Narrative describing the installed organic waste treatment system and its capacity.
- Calculations indicating the amount of organic (bio-degradable) waste generated.
- Site plan highlighting the location of installed on-site organic waste treatment system.
- Manufacturer brochure of the organic waste treatment system
- Declaration from the developer indicating the capacity of organic waste treatment system
- Photographs showing the organic treatment implemented on-site

Guidelines & Examples:W

(These guidelines are illustrative)



Organic Waste Converter



Vermi Composting

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has on-site waste treatment systems to treat at least 95% of the organic waste generated.

Handling of Construction Waste Materials: 50%, 25%

MC Credit 2

Points: 2

Intent:

Encourage practices to manage construction waste, thereby, avoiding waste being sent to land-fills.

Requirements:

Avoid at least 50% of the waste generated (by either weight or volume) during construction from being sent to land-fills.

Points are awarded as below:

- ❖ Segregation and reuse of at least 50% of waste materials on-site. (1 point)
- ❖ At least 25% of waste diversion to haulers (1 point)

Notes:

- Excavated earth & stones should not be considered under this credit, as these are natural resources.
- Temporary materials such as materials used for formwork, scaffolding shall not be considered for credit calculations.

Benefits Anticipated:

- ❖ Reduces the burden on landfills and associated environmental impacts.
- ❖ Reduces impacts associated with resource extraction & processing.

Documents Required:

Precertification

- ❖ Narrative describing the proposed strategies in handling the construction waste
- ❖ Conceptual site plan highlighting the proposed construction waste management yard.
- ❖ Calculations indicating the amount of waste generated, reused, recycled and sent to landfill, either by weight or volume.
- ❖ List of construction waste materials likely to be generated and diverted from landfills for reuse and recycle
- ❖ List of identified haulers
- ❖ Declaration from the developer describing the proposed strategies in handling the construction waste

Certification

- ❖ Narrative describing the implemented strategies in handling the construction waste
- ❖ Site plan highlighting the construction waste management yard.
- ❖ Calculations indicating the amount of waste generated, reused, recycled and sent to landfill, either by weight or volume.
- ❖ List of construction waste materials generated and diverted from landfills for reuse and recycle
- ❖ Receipts from haulers
- ❖ Declaration from the developer describing the implemented strategies in handling the construction waste
- ❖ Photographs showing the construction waste management.

Use of Local Material: 50%, 75%, 95%

MC Credit 3

Points: 3

Intent:

Encourage use of building materials available locally thereby minimising the associated environmental impacts resulting from transportation

Requirements:

- Source at least 50% materials which are extracted and manufactured, locally within a distance of 400 kms
- Survey and identify building materials which are in the specified distance, in early stages of project design.

Points are awarded as below:

Percentage: $\frac{\text{Cost of Local materials used}}{\text{Total Cost of the materials}} \times 100$	Points
50%	1
75%	2
95%	3

***Note:** Total cost of materials does not include the labour charges.

Benefits:

- Decreased transportation costs for the project
- Supports local economy

Documentation Required:

Precertification Level

- Narrative describing the proposed strategies implemented to source local materials
- List/ Bill of Quantities (BOQ) of proposed local materials specifying approximate distance from the project site to place of manufacturing units
- Master material sheet highlighting percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project.
- Google map indicating the approximate distance from the project site to place of manufacturing units
- Declaration from the developer indicating the use of local materials

Certification Level

- Narrative describing the strategies implemented to source local materials
- List/ Bill of Quantities (BOQ) of local materials specifying approximate distance from the project site to place of manufacturing units
- Master material sheet highlighting percentage of local materials sourced (in terms of cost) with respect to the total materials cost of the project.
- Google map indicating the approximate distance from the project site to place of manufacturing units
- Supplier/ vendor declaration letter indicating the distance from the project site to the place of manufacturing unit.
- Declaration from the developer indicating the use of local materials

Certified Green Products: 5%, 10%, 15%

MC Credit 4

Points: 3

Intent:

Use certified green building materials, products, and equipment, so as to reduce dependence on materials that have associated negative environmental impacts.

Requirements:

Ensure that the project source GreenPro eco-labelled (or) any other Eco-labelled products & materials for building construction. The purchased quantity of eco-labelled products to be at least 5% of the total cost of products & materials used for construction.

Note: For GreenPro eco-labelled products & categories, please refer the GreenPro directory.

Points are awarded as below:

Percentage of Green products & materials used for construction:	Points
≥ 5%	1
≥ 10%	2
≥ 15%	3

Notes:

- *Material Cost = Total Cost – (Labour cost + Installation cost)
- If Labour and Installation cost is not known, the default material cost can be considered as 60% of the total cost of the component
- Cost of electrical, mechanical & plumbing - equipment, systems & appliances and movable materials & furniture should not be considered in the total material cost

Benefits:

- Reduce dependency on products and materials with negative impact on environment

Documentation Required:

Precertification Level

- Narrative on green certified building materials, products & equipment available.
- Proposed list of green certified building materials, products & equipment.
- Master material sheet highlighting percentage of green certified materials (in terms of cost) with respect to the total materials cost of the project
- Manufacturer brochure of the materials, products & equipment to be procured.
- Supporting document indicating the green product certification.
- Declaration from the developer indicating the use of green certified material

Certification Level

- Narrative on green certified building materials, products & equipment available
- List of green certified building materials, products & equipment.
- Master material sheet highlighting percentage of green certified materials (in terms of cost) with respect to the total materials cost of the project
- Manufacturer brochure of the materials, products & equipment to be procured.
- Supporting document indicating the green product certification.
- Declaration from the developer indicating the use of green certified material
- Purchase invoice of green products procured.

Exemplary Performance:

The project is eligible for exemplary performance under Innovation and Design if the project has more than 20% of green certified materials.

Appropriate Technologies: 25%, 50%, 75%, 95%

MC Credit 5

Points: 4

Intent:

Encourage use of appropriate construction technologies to conserve natural resources and thereby reduce environmental impacts

Requirements:

At least 25% (by cost) of the structure should be constructed using appropriate and cost-effective technologies without compromising on strength, durability & functional performance and encourage use of alternative technologies.

$\frac{\text{Cost of Structure constructed with alternative technologies} \times 100}{\text{Total Cost of the structure}}$	Points
25%	1
50%	2
75%	3
95%	4

Project can consider using the following technologies:

- Monolithic Concrete Construction
- Precast Concrete Construction for Super structures
- Glass Fiber Reinforced Gypsum (GFRG) Panel Building System
- Use of Compressed Stabilized Earth Blocks
- Filler Slabs
- Any other innovative technologies

Notes: For further details on available alternative technologies please refer to Building Materials & Technology Promotion Council (BMTPC)

Benefits Anticipated:

- ❖ Fast track construction
- ❖ Minimum wastage of materials
- ❖ Better strength and durability
- ❖ Provides quality working environment for the Work force

Documentation Required:**Precertification Level**

- Narrative describing the proposed strategies for use of proposed appropriate construction technologies.
- Calculation showing percentage of cost involved in construction of appropriate and cost-effective technologies without compromising on strength, durability & functional performance
- Declaration from the developer indicating the use of proposed appropriate construction technologies.

Certification Level

- Narrative describing the implemented strategies for use of appropriate construction technologies.
- Calculation showing percentage of cost involved in construction of appropriate and cost-effective technologies without compromising on strength, durability & functional performance
- Declaration from the developer indicating the use of appropriate construction technologies
- On-site photographs of the implemented alternate construction techniques

Guidelines & Examples:

(These guidelines are illustrative)



Monolithic Concrete Construction - BDA



GFRG Demonstration Building – IIT Madras

Alternative Construction Materials

MC Credit 6

Points: 2

Intent:

Encourage use of alternative construction materials to conserve natural resources and thereby reduce environmental impacts

Requirements:

Use of Alternative Construction Materials for 100% of the material of the following applications: (1 point for each measure; maximum 2 points)

- ❖ Concreting using artificial sand
- ❖ Concreting using artificial aggregates
- ❖ Plastering using artificial sand
- ❖ Plastering using Pre-mix plasters
- ❖ Curing compounds
- ❖ Alternate to Wood based materials for door and window frames

Benefits Anticipated:

- ❖ Savings in natural resources consumption.
- ❖ Better strength and durability

Documentation Required:

Precertification Level

- Narrative describing the proposed strategies for use of alternate construction materials to replace the natural resources in construction.
- Proposed list of identified materials
- Master material sheet highlighting the total materials cost of the project
- Declaration from the developer indicating the list of alternate construction materials to replace the natural resources in construction.

Certification Level

- Narrative describing the strategies for use of alternate construction materials to replace the natural resources in construction.
- List of alternate construction materials used in the project
- Master material sheet highlighting the total materials cost of the project
- Declaration from the developer indicating the list of alternate construction materials to replace the natural resources in construction.
- On-site photographs of the implemented alternate construction materials.
- Cut sheets/ brochures from manufacturers.

Eco-friendly Wood based materials

MC Credit 7

Points: 2

Intent:

Minimise use of new wood-based products, thereby reducing impacts of deforestation.

Requirements:

Ensure new wood-based products (by cost) used in the building are:

- ❖ Alternate to wood-based materials for doors and windows (2 points)
- ❖ Projects using wood-based applications shall consider for at least >50% of wood-based materials as:
 - Rapidly Renewable or
 - Composite/ Agri based wood/ Recycled waste wood
 - FSC certified wood

<u>Cost of alternate wood products/ Certified Timber X 100</u> Total cost of wood-based products	Points
50%	1
75%	2

Notes:

- **Rapidly renewable materials are those that can be harvested and used within a ten-year cycle. Example: Bamboo, Eucalyptus, Bagasse based materials, Jute based materials, cotton blinds, rubber wood etc.,*
- *** Composite / Agri based wood / recycled waste wood examples include (but not limited to) MDF boards, particle boards, linoleum boards, etc.,*

Benefits Anticipated:

- ❖ Reduce dependency on virgin wood
- ❖ Avoids deforestation

Documentation Required:

Precertification Level

- Narrative describing the proposed strategies to source rapidly renewable materials (and/ or) Composite / Agri based wood (and/or) certified timber.
- List applications where rapidly renewable material (and/ or) certified wood by FSC/ (PEFC) (and/or) Composite / Agri based wood are used
- List of proposed manufacturers to source rapidly renewable material (and/or) certified wood by FSC/ (PEFC)/ equivalent.
- Tentative calculations indicating the percentage of rapidly renewable material (and/or) certified wood by FSC/ (PEFC)(and/ or) Composite / Agri based wood, to the total cost of new wood used in the project. If certified wood is sourced, provide manufacturer CoC number/ certificate and details of type of certified wood e.g. pure, mixed, etc.,
- Declaration from the developer indicating the use of Alternate to wood-based materials for doors and windows or Eco-friendly Wood based materials

Certification Level

- Narrative describing the strategies implemented to source rapidly renewable materials (and/ or) Composite /Agri based wood (and/or) certified timber.
- List applications where rapidly renewable material (and/ or) certified wood by FSC/ (PEFC) (and/or) Composite / Agri based wood are used
- List of manufacturers to source rapidly renewable material (and/or) certified wood by FSC/ (PEFC)/ equivalent.
- Calculations indicating the percentage of rapidly renewable material (and/or) certified wood by FSC/ (PEFC)(and/ or) Composite / Agri based wood, to the total cost of new wood used in the project. If certified wood is sourced, provide manufacturer CoC number/ certificate and details of type of certified wood e.g. pure, mixed, etc.,
- Declaration from the developer indicating the use of Alternate to wood-based materials for doors and windows or Eco-friendly Wood based materials



**INDOOR ENVIRONMENT
QUALITY**

Tobacco Smoke Control

IEQ Mandatory Requirement 1

Intent:

Minimise exposure of non-smokers to the adverse health impacts arising due to passive smoking,

Requirements:

Smoking should be prohibited in all the common areas of the building.

Benefits Anticipated:

- ❖ Reduces health hazards caused due to passive smoking
- ❖ Improves air quality thereby improving the health of the community as a whole

Documents Required:

Precertification Level

- ❖ Narrative describing proposed implementation strategies to be adopted to control smoking on site
- ❖ Tenant guidelines indicating 'No smoking' policy
- ❖ Declaration from the developer indicating that smoking is prohibited in all the common areas of the building.

Certification Level

- ❖ Narrative describing the strategies adopted to control smoking on site
- ❖ Tenant guidelines indicating 'No smoking' policy
- ❖ Declaration from the developer indicating that smoking is prohibited in all the common areas of the building.
- ❖ Photographs showing no smoking signages in the project.

Minimum Daylighting: 50%

IEQ Mandatory Requirement 2

Intent:

Ensure adequate daylighting in the interior and the exterior environment, to improve occupant well being

Requirements:

Achieve a minimum glazing factor (GF) or lux level for at least 50% of regularly occupied spaces in each dwelling unit

- Multiple openings of adequate window sizes to the exteriors, openings in proper orientation preferably north or east facing

Option 1: Prescriptive Approach

Achieve minimum glazing factors as listed below in at least 50% of the regularly occupied spaces in each dwelling unit.

Glazing factors for Regularly Occupied Spaces

Type of Regularly Occupied Spaces	Glazing Factor (GF)*
Living/ Bedroom	1
Multi-purpose room	1
Kitchen	2

Note:

For other regularly occupied spaces which are not listed in the table above, a minimum glazing factor of 1 should be achieved.

Glazing Factor Calculation:

Glazing factor can be calculated using the formula given below:

$$\text{Glazing Factor} = \frac{\text{Window Area [sq.m]} \times \text{Actual Visible Transmittance of Glazing} \times \text{Constant} \times 100}{\text{Floor Area [sq.m]}}$$

Constant Values:

Windows on wall : 0.2

Window on roof (skylight) : 1.0

Notes:

- Regularly occupied spaces include living room, bed rooms, dining room, study room, kitchen, etc.,
- Regularly occupied spaces which are used for multi- purpose, such as living-cum-dining room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.
- Window openings in dwelling unit where the angle of obstruction of objects obscuring the sky dome is greater than 70° from the horizontal shall not be considered for daylight calculations (refer figure no.1)

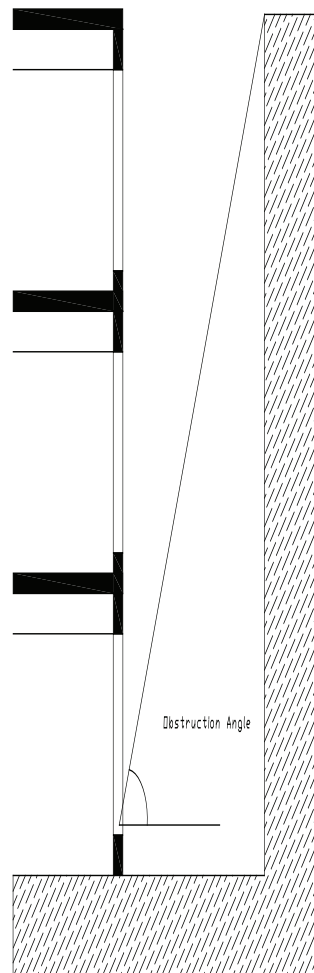


Figure – Angle of Obstruction

Option 2: Measurement/ Simulation Approach

Demonstrate through daylight illuminance measurement that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux.

Measurements shall be taken at 2 feet 6 inches height at 9 am, 12 pm, and 3 pm, on a 10 foot square grid.

(OR)

Demonstrate through computer simulation that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux in a clear sky condition on 21st September at 12 noon, at 2 feet 6 inches height.

Benefits Anticipated:

- Lower electricity bills
- Improves quality of life
- Better health and well-being of occupants

Documentation Required:**Precertification Level**

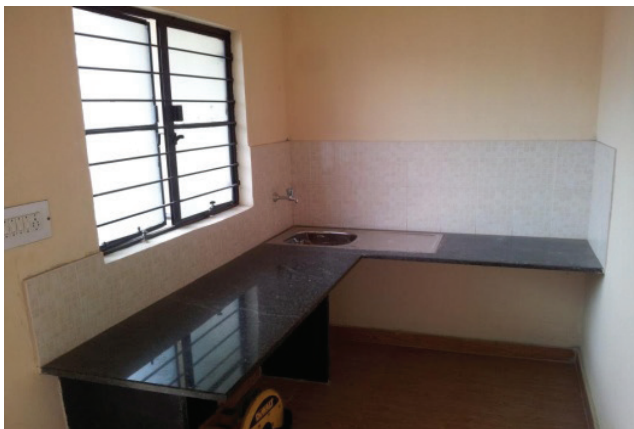
- Narrative describing the Proposed daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction &
- All floor plans indicating door/ window schedules.
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of proposed glass showing the visual light transmittance

Certification Level

- Narrative describing the implemented daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules.
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of installed glass showing the visual light transmittance.
- Simulation reports as applicable.
- Photographs of interior spaces of dwelling units.

Guidelines & Examples:

(These guidelines are illustrative)



Daylighting

Enhanced Day lighting: 75%, 95%

IEQ Credit 1

Points: 2

Intent:

Ensure adequate daylighting in the interior and the exterior environment, to improve occupant well being

Requirements:

Achieve a minimum glazing factor (GF) or lux level for all regularly occupied spaces.

- Multiple openings of adequate window sizes to the exteriors, openings in proper orientation preferably north or east facing

Points are awarded as below:

Percentage of Daylighting: <u>Regularly occupied area with GF X 100</u> Total Regularly occupied area	Points
75%	1
95%	2

Option 1: Prescriptive Approach

Achieve minimum glazing factors as listed below in at least 75% of the regularly occupied spaces in each dwelling unit.

Glazing factors for Regularly Occupied Spaces

Type of Regularly Occupied Spaces	Glazing Factor (GF)*
Living/ Bedroom	1
Multi-purpose room	1
Kitchen	2

Note:

For other regularly occupied spaces which are not listed in the table above, a minimum glazing factor of 1 should be achieved.

Glazing Factor Calculation:

Glazing factor can be calculated using the formula given below:

Glazing Factor = $\frac{\text{Window Area [sq.m]} \times \text{Actual Visible Transmittance of Glazing} \times \text{Constant} \times 100}{\text{Floor Area [sq.m]}}$

Factor

Constant Values:

Windows on wall : 0.2

Window on roof (skylight) : 1.0

Notes:

- Regularly occupied spaces include living room, bed rooms, dining room, study room, kitchen, etc.,
- Regularly occupied spaces which are used for multi- purpose, such as living-cum-dining room, can be considered as separate spaces based on the function. The room boundary need not be a physical boundary.
- Window openings in dwelling unit where the angle of obstruction of objects obscuring the sky dome is greater than 70° from the horizontal shall not be considered for daylight calculations (refer figure no.1)

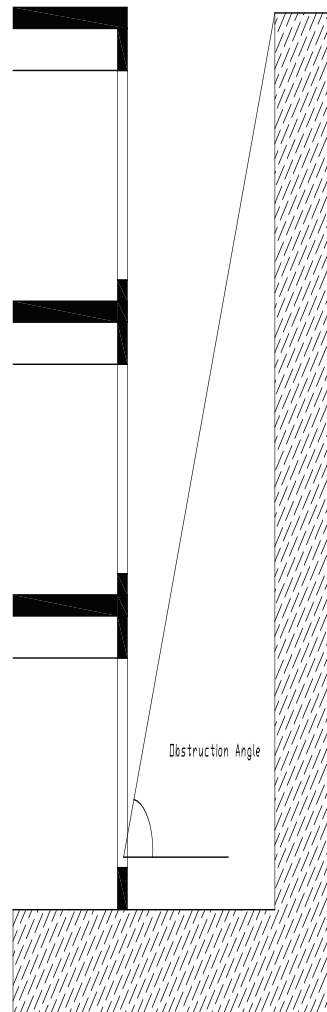


Figure – Angle of Obstruction

Option 2: Measurement/ Simulation Approach

Demonstrate through daylight illuminance measurement that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux.

Measurements shall be taken at 2 feet 6 inches height at 9 am, 12 pm, and 3 pm, on a 10 foot square grid.

(OR)

Demonstrate through computer simulation that 50% of the regularly occupied spaces in the building achieve daylight illuminance levels for a minimum of 110 Lux in a clear sky condition on 21st September at 12 noon, at 2 feet 6 inches height.

Benefits Anticipated:

- Lower electricity bills
- Improves quality of life
- Better health and well-being of occupants.

Documentation Required:**Precertification Level**

- Narrative describing the Proposed daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules.
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of proposed glass showing the visual light transmittance

Certification Level

- Narrative describing the implemented daylighting strategies
- Site/ master plan showing all the buildings indicating angle of obstruction
- All floor plans indicating door/ window schedules.
- Calculations indicating the percentage of area meeting the daylight requirement
- Manufacturer/ brochure/ cut-sheet / letter of installed glass showing the visual light transmittance.
- Simulation reports as applicable.
- Photographs of interior spaces of dwelling units.

Fresh Air Ventilation: 50%, 75%, 95%

IEQ Credit 2

Points: 3

Intent:

Avoid indoor pollutants by providing adequate air ventilation, thereby enhancing the indoor environment quality

Requirements:

- Provide openable windows or doors and ventilators to the exteriors in all regularly occupied spaces of each dwelling unit such that the openable area is designed as outlined in the table below:

Space type	Percentage: $\frac{\text{Openable area}}{\text{Total carpet area}} \times 100$
Living Spaces/Bedroom	10%
Kitchen	8%
Bathrooms*	4%

Notes:

- *Net Openable area as a percentage of total carpet area shall be calculated room by room
- For sliding windows / doors, only openable area to the exteriors shall be considered in calculations

Points are awarded as below:

Percentage of Ventilation in Regularly Occupied Spaces: Percentage of rooms meeting above criteria Total regularly occupied area	Points
50%	1
75%	2
95%	3

Benefits:

- Enhances indoor air quality
- Improves quality of life
- Good health and wellbeing of the occupants

Documentation Required:**Precertification Level**

- Narrative describing the proposed Ventilation strategies
- All floor plans indicating door/ window schedules.
- Tentative calculations showing percentage of ventilation in regularly occupied spaces.

Certification Level

- Narrative describing the implemented Ventilation strategies
- All floor plans indicating door/ window schedules.
- Calculations showing percentage of ventilation in regularly occupied spaces.
- Photographs of the interior spaces showing windows

Guidelines & Examples:

These guidelines are illustrative)



Ventilation

Cross Ventilation: 50%, 75%

IEQ Credit 3

Points: 2

Intent:

Encourage adequate cross ventilation in the design thereby, providing a healthy environment.

Requirements:

Provide openable doors / windows / ventilators to the exteriors in all regularly occupied spaces of each dwelling unit in at least two of the orientations.

Percentage of regularly occupied spaces with cross ventilation in regularly occupied spaces	Points
≥50%	1
≥75%	2

Notes:

- Regularly occupied spaces include living room, bed room, dining room, study room, kitchen.
- The windows/ ventilators should not have any obstruction within 2 m from outside surface.
- The openings considered should meet IEQ Credit 2.
- Main door/door opening into approach corridor/ common lobby cannot be considered for cross ventilation.
- Window openings/ventilators into common lobby with permanent opening to exterior can be considered to meet the credit requirement.

Benefits Anticipated:

- Enables good circulation of fresh air
- Flushes out contaminants and provide a better indoor environment

Documents Required:

Precertification Level

- Narrative describing the proposed Cross Ventilation strategies
- Conceptual floor plans with door/ window schedules for each typical dwelling unit.
- Tentative calculations indicating regularly occupied spaces compliant with cross ventilation.

Certification Level

- Narrative describing the implemented Cross Ventilation strategies
- Floor plans with door/ window schedules for each typical dwelling unit.
- Calculations indicating regularly occupied spaces compliant with cross ventilation.
- Photographs of opening and windows promoting cross ventilation.



Cross ventilation

Exhaust Systems

IEQ Credit 4

Points: 2

Intent:

Ensure that bathrooms and kitchen are adequately ventilated, so as to improve the quality of the indoor environment.

Requirements:

Design exhausts systems in bathrooms as per the requirements provided in the table below:

Location	Floor Area	Minimum Airflow
Bathroom	≤ 4.64 sq.m (50 sq.ft)	50 cfm
Kitchen	≤ 9.3 sq.m (100 sq.ft)	100 cfm

❖ Mechanical Exhaust system: (1 point)

(AND / OR)

❖ Ventilators or openings above lintel level: (1 point)

- Incorporated with mesh to keep insects out

Notes:

- For bathrooms with higher floor areas than the above values, airflow has to be proportionally increased.
- Ensure exhaust systems take away the polluted indoor air to the outdoors (i.e. exhaust outlets into common areas are not allowed).

Benefits Anticipated:

- Flushes out contaminants and provide a better indoor environment

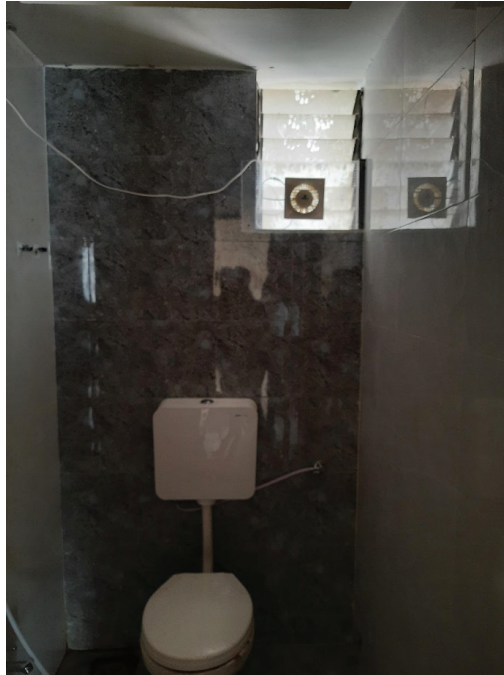
Documents Required:

Precertification Level

- Narrative describing the exhaust systems proposed in the project
- Conceptual floor plan showing the location of exhaust systems or ventilators in bath rooms and kitchens.
- Technical specifications of the proposed exhaust system(s) where applicable.
- Declaration from the developer indicating the proposed exhaust systems

Certification Level

- Narrative describing the exhaust systems installed in the project
- Floor plans showing the location of exhaust systems in bathrooms & kitchens.
- Technical specifications of the installed exhaust system(s) and photographs.
- Purchase invoice/ payment receipts and photographs showing the installed exhaust systems.



Exhaust fan in bathroom

Low VOC Materials, Paints & Adhesives

IEQ Credit 5

Points: 2

Intent:

Encourage use of materials with low emissions so as to reduce adverse health impacts on building occupants

Requirements:

Use low VOC paints, sealants and adhesives to reduce adverse health impacts on building occupants.

- Use lime-based surface treatments / Low VOC paints (1 point)
(AND / OR)
- For adhesives and sealants used within the interiors, ensure that the VOC content does not exceed the limits as specified in the table below (1 point)

Type of material	VOC Limit (g/L less water)
Paints:	
Non-flat (Glossy) paints	150
Flat (Mat) paints	50
Anti-corrosive/ anti-rust paints	250
Varnish	350
Adhesives:	
Glazing adhesive	100
Tile adhesives	65
Wood adhesive	30
Wood flooring adhesive	100

Benefits Anticipated:

- Reduces impact on health of occupants
- Eliminates sick building syndrome

Documentation Required:

Precertification Level

- Narrative with list of proposed low or no VOC content materials (make & model) to be used in the building interiors.
- Cut sheets indicating the VOC levels of the materials
- Declaration from the developer indicating the use of low or no VOC content materials

Certification Level

- Narrative with list of low or no VOC content materials (make & model) used in the building interiors.
- Purchase invoice/ payment receipts of the paint & adhesives sourced for the project
- Manufacturer/ brochure/ cut-sheet/ letter of proposed Low VOC materials, paints and Adhesives.
- Photographs of the labels of the low or no VOC paints & adhesives



Low VOC paint

Building Flush-Out

IEQ Credit 6

Points: 1

Intent:

Avoid occupant's exposure to indoor airborne contaminants before occupying the premises, so as to reduce the adverse health impacts on building occupants

Requirements:

Perform building flush-out for ten days by keeping all windows open before the building is occupied. Flushing is to be carried after paints & coatings and adhesives & sealants have been applied.

(OR)

If the building prefers to carry out the flush-out using forced ventilation systems, the flush-out can be carried out for five days.

Benefits:

- Provides better indoor environment
- Promote health & wellbeing

Documents Required:

Precertification Level

- Narrative and declaration indicating that building flush-out will be carried

Certification Level

- Narrative and declaration indicating that building flush-out has been carried on specified dates
- Photographs of building flush-out being conducted.

Occupant Well-being Facilities

IEQ Credit 7

Points: 1

Intent:

Provide occupant well-being facilities, so as to enhance physical, emotional and spiritual well-being of building occupants.

Requirements:

Demonstrate that the project has community well-being facilities of appropriate size (such as yoga/ meditation room/ reading room or any gathering space and common seating spaces).

Benefits:

- Enhance social connectivity
- Promote health & wellbeing

Documents Required:

Precertification Level

- Narrative with details of proposed community well-being facilities
- Conceptual plans highlighting total area of the facility with dimensions and calculation of number of people it caters to.
- Declaration from the developer indicating the proposed community well-being facilities.

Certification Level

- Narrative with details of provided community well-being facilities
- Plans highlighting total area of the facility with dimensions and calculation of number of people it caters to.
- Photographs of facility provided for occupant's well-being.



Gymnasium



Outdoor sports facility



**INNOVATION & DESIGN
PROCESS**

Innovation & Design Process

Innovative practices ID Credit 1

Points: 2

Intent:

Provide design teams and projects an opportunity to attempt for innovative performance* in green building categories not specifically addressed by the IGBC Green Affordable Housing Rating System.

Requirements:

Credit 1.1: Innovative practices (*1 point for each of the credits; maximum 2 points*)

The projects can also identify the innovation strategies those are not addressed by any existing credits in the rating system. Identify the intent of the proposed innovation credit, to achieve significant, measurable environmental performance requirements for compliance of the credit.

Credit 1.2: Innovative practices

Same as credit 1.1

Benefits Anticipated:

- Leads to more sustainable design/ practices thereby benefiting the environment

Documentation Required:

Precertification Level

- Narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective innovative practices credit. Strategies proposed must be significantly better than standard sustainable design practices
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level

- Narrative describing intent, requirements, potential strategies and technologies adopted in the respective innovation credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Innovation & Design Process

Exemplary ID Credit 2

Points: 2

Intent:

Exemplary performance strategies result in performances that greatly exceed the performance level or expand the scope required by an existing Green Affordable Housing credit. To earn exemplary performance credits, teams must meet the performance level defined by the next step in the threshold progression. For credits with more than 1 compliance path, an Innovation and Design Process point can be earned by satisfying more than 1 compliance path if their benefits are additive.

Requirements:

Credit 2.1: Exemplary Performance (*1 point for each of the credits; maximum 2 points*)

Identify the intent of the proposed Exemplary Performance credit, the proposed requirement for compliance and the proposed documentation to demonstrate compliance and the design approach used to meet the required measures.

Credit 2.2: Exemplary Performance

Same as credit 2.1

Benefits Anticipated:

- Leads to more sustainable design/ practices thereby benefiting the environment

Documentation Required:

Precertification Level

- Narrative describing intent, requirements, proposed potential strategies and technologies adopted to achieve the respective exemplary performance. Strategies proposed must be significantly better than standard sustainable design practices.
- Tentative quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

Certification Level

- Narrative describing intent, requirements, potential strategies and technologies adopted in the respective exemplary performance credits. Strategies adopted must be significantly better than standard sustainable design practices
- Quantitative performance improvements, comparing a baseline and design case.
- Other supporting documents such as drawings, photographs, illustrations, cut sheets, test reports, etc., as applicable

IGBC Accredited Professional

ID Credit 3

Points: 1

Intent:

Support and encourage involvement of IGBC Accredited Professional in green affordable housing projects, so as to integrate appropriate design measures and streamline certification process

Requirements:

Atleast one principal participant of the project team shall be an IGBC Accredited Professional.

Benefits Anticipated:

- Hand holding the project team in designing green buildings.
- Impart knowledge to other team members about green buildings.

Documents Required:

Precertification Level

- A copy of IGBC Accredited Professional certificate of the principal participant.

Certification Level

- A copy of IGBC Accredited Professional certificate of the principal participant.

Abbreviations

- **BEE** – Bureau of Energy Efficiency
- **DEWATS** - Decentralized Wastewater Treatment Systems
- **ECBC** – Energy Conservation Building Code
- **FSI /FAR** – Floor Space Index / Floor Area Ratio
- **LED** – Light emitting diode
- **NREL** – National Renewable Energy Laboratory
- **IMD** – Indian Meteorological Department
- **MoEF** – Ministry of Environment and Forestry
- **NBC** – National Building Code of India
- **RE** – Renewable Energy
- **STP** – Sewage Treatment Plant
- **VOC** – Volatile Organic Compound

Glossary of Terms

Adapted Plants: Plants that reliably grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. Adapted plants are considered to be low maintenance but not invasive.

Aerator is often found at the tip of water faucets. Aerators can be simply screwed onto the faucet head, creating a non-splashing stream and often delivering a mixture of water and air.

Agrifiber is composite panel product derived from recovered agricultural waste fiber from sources including, but not limited to, cereal straw, sugarcane bagasse, sunflower husk, walnut shells, coconut husks, and agricultural prunings. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from woodfiber

BEE Star Rating System for building, developed by Bureau of Energy Efficiency, Ministry of Power, Govt. of India, rates energy efficient buildings based on their actual performance in terms of specific energy use. The Rating is on 1-5 scale, with 5 labelled buildings being the most efficient. (<http://www.beeindia.in/>)

Biodiversity: The variety of life in all forms, levels and combinations, including ecosystems diversity, species diversity, and genetic diversity.

Daylighting is the controlled admission of natural light into a space through glazing with the intent of reducing or eliminating electric lighting. By utilizing solar light, day lighting creates a stimulating and productive environment for building occupants.

The Decentralised wastewater treatment system is a simple design, non-dependent on energy, reliable, long-lasting, tolerant towards inflow fluctuation and low in costs. It can treat organic wastewater from domestic and industrial sources.

Development footprint is the area affected by development or by project site activity. Hardscape, access roads, parking lots, non-building facilities, and the building itself are all included in the development footprint.

Dual flush toilet: A dual-flush toilet is a variation of the flush toilet that uses two handles to flush different levels of water. The smaller level is designed for liquid waste, and the larger is designed for solid waste.

Erosion: A combination of processes in which materials of the earth's surface are loosened, dissolved or worn away, and transported from one place to another by natural agents (such as water, wind or gravel).

E-waste: It includes discarded materials from a range of electronic devices such as computers, refrigerators, televisions, air-conditioners, personal stereos, mobile phones etc.

Fly Ash: The solid residue derived from incineration processes. Fly ash can be used as substitute for Portland cement in concrete.

Flow rate: Flow rate is a parameter used to mark the efficiency of appliances using liquids. For water fixtures, flow rates give the amount of water (in litres) that flows from a particular fixture in a given time (in minutes)

Grass Pavers: Cellular blocks with grass growing in the voids. These are mostly used for external paving, gardens. They need maintenance and have good infiltration capacity.

Heat Island Effect: Occurs when warmer temperatures are experienced in urban landscapes compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to the heat island effect include streets, sidewalks, parking lots and buildings.

Impervious areas are surfaces that promote runoff of precipitation volumes instead of infiltration into the subsurface

Landfills are waste disposal sites for solid waste from human activities

Landscape Area: Area of the site equal to the total site area less the building footprint, paved surfaces, water bodies, patios. Etc.,

Lighting Power Density (LPD) is the installed lighting power, per unit area.

Low-flow fixtures use high pressure to produce a comfortable, pleasing flow without using much water.

LUX (lx) is the SI unit of illuminance and luminous emittance, measuring luminous flux per unit area. It is equal to one lumen per square metre.

Native (Indigenous) Plants: Any plant species that occurs and grows naturally in a specific region. Native plant species do not require watering other than during the initial years of establishment.

Open Space Area: The property area minus the development footprint or as defined by local zoning requirements. Open space must be vegetated and pervious, also includes non-vehicular, pedestrian oriented hardscape spaces.

Open grid pavers are less than 50% impervious and accommodates vegetation in the open cells.

Phytoremediation is a Natural Biological system that has emerged as a safe, efficient and cost-effective solution for remediation of water or soil contaminated by wide array of contaminants. Phytoremediation acts as a powerful physical, chemical and biological filter by the use of plants for the removal of pollutants from contaminated soil or water.

Potable Water: Water suitable for drinking and supplied from wells or municipal water systems.

Projection Factor is a ratio of the length of overhang projection divided by height from windowsill to the bottom end of the overhang (must be permanent)

Recycled content is the proportion, by mass, of pre-consumer or postconsumer recycled material in a product. (IS 14021).

Regularly occupied spaces include living room, bedroom, dining room, study room, kitchen etc.

Sewage Treatment: It is a process of removing contaminants from waste water and house-hold sewage. Its objective is to produce an environmentally safe fluid waste stream suitable for disposal or reuse using advanced technology it is possible to reuse sewage affluent for drinking water.

Sick building syndrome is a situation in which a substantial portion of building occupants experience acute discomfort and negative health effects as result of exposure to contaminated air inside the building.

Solar Reflective index(SRI) is a measure of a material's ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and standard white (reflectance 0.80, emittance 0.90) is 100. Materials with highest SRI values are the coolest choice for paving.

Topsoil conservation: The process of removing and protecting the top soil from any construction or development site for reusing it onsite later.

Transplantation: The process of digging up a plant / tree and moving it to another location.

U – Value: The heat transmission in unit time through unit area of a material or construction and boundary air films, induced by unit temperature difference between the environments on each side.

Vegetated area: The area in the site which has plantation or greenery on it in any form, such as shrubs, grass, trees etc.

Volatile Organic Compounds (VOCs) are carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates and ammonium carbonates). The compounds vaporise (become a gas) at normal room temperatures

Walking distance is the length of the walkable pathway between the building and public transportation.

Window-to-Wall Ratio (WWR) of a building is the percentage of its facade taken up by light-transmitting glazing surfaces, including windows and translucent surfaces such as glass bricks.

About CII (Confederation of Indian Industry)

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society through working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry.

Founded in 1895 and celebrating 125 years in 2020, India's premier business association has more than 9,100 members, from the private as well as public sectors, and an indirect membership of over 300,000 enterprises from around 291 national and regional sectoral industry bodies.

With 62 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 350 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

About IGBC (Indian Green Building Council)

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII) was formed in the year 2001. The vision of the council is, "To enable a sustainable built environment for all and facilitate India to be one of the global leaders in the sustainable built environment by 2025".

The council offers a wide array of services which include developing new green building rating programmes, certification services and green building training programmes. The council also organises Green Building Congress, its annual flagship event on green buildings.

The council is committee-based, member-driven and consensus-focused. All the stakeholders of construction industry comprising of architects, developers, product manufacturers, corporate, Government, academia and nodal agencies participate in the council activities through local chapters. The council also closely works with several State Governments, Central Government, World Green Building Council, bilateral multi-lateral agencies in promoting green building concepts in the country.



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CII – Sohrabji Godrej Green Business Centre



IGBC

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