SECTION 6A
GREEN BUILDING NORMS
(Added as per OM/MAN/176)

6A.1 Green Building Norms

(1) All CPWD constructions shall henceforth be Green.

(2) Whether the constructions undertaken by CPWD are to be certified as Green or not shall be the prerogative of the client organization as it will involve third party inspections/ reviews / registration etc. which will involve both cost and time; hence client's assent to it is mandatory. Infact such certification shall be taken by the client and the role of CPWD shall be that of a facilitator. Accordingly this aspect shall be built in our MoU with clients for every project specifically. The preliminary estimate should include extra provisions, if any to cover the probable cost on certification both internal and by third party if the later is agreed to by clients in the MOU.

(3) **Irrespective of whether the clients require certification for Green construction or not, CPWD shall have internal certification by its own officers'.**

(4) For internal certification, CPWD shall follow GRIHA rating system of TERI.

(5) The responsibility of internal certification indicating whether the specific criterion that falls under their respective domain has been achieved or not should lie with Senior Architect for Architecture related criterion; Superintending Engineer (C) for Civil Engineering related criterion; Superintending Engineer (E) for Electrical Engineering related criterion and Director (Horticulture)/ Superintending Engineer (C) for Horticulture related criterion. The overall internal green certification for the project shall be done by the authority who finalizes and submits the preliminary estimate of the project to the client.

(6) The authority who finalised the preliminary estimate of the project shall develop appropriate methodology of construction as well as planning of the project and shall be responsible to include them in contract documents under a new chapter which may be named as **"Particular Specifications/Methodologies for Green Building".**

(7) Any variations during the execution of the project shall be approved technically by T/S according authority and financially by empowered authority.

(8) The internal green building certification shall be expressed in following manner on following documents for the purpose of maintaining the same on permanent basis-

Sl.No.	Satisfied by	Standard Document where satisfaction is to be certified
1	Senior Architect	Preliminary Drawings / Working Drawings issued for the project. A Green Parameter Table shall be provided over the Title Block where all criterion pertaining to Architecture should be listed and satisfaction should be indicated. Reasons for dissatisfaction should be explicitly mentioned wherever the criteria is not satisfied.
2	Director (H) /Superintending Engineer (C/E) as the case may be	Completion Certificate if the same falls under his own ccmpetency. If the Completion Certificate falls under the competency of the authority other than Director (H) / SE (C/E), the said authority should obtain it from Director (H) / SE (C/E) before recording the Completion Certificate and mention the same in the Completion Certificate. A Green Parameter Table shall be provided in the Completion Certificate where all criterion pertaining to Civil / Electrical / Horticulture should be listed and satisfaction should be indicated. Reasons for dissatisfaction should be explicitly mentioned wherever a criteria is not satisfied.

(9) A copy of the Green Parameter Table of the respective components of the project shall be sent to the preliminary estimate framing authority within fifteen days of its incorporation in

standard works document i.e. preliminary / working drawings in respect of Architectural criterion and Completion Certificate in respect of Civil / Electrical / Horticultural criterion for compilation of all components and to issue a final certification to the client for his record. A copy of the final certificate shall be sent to QCTA unit under the ADG concerned for record.

(10) Whenever a project is executed in packages, the internal rating shall be for (1) each package separately, and (2) project as a whole.

(11) DDoH / EE (C/E) shall facilitate the rating agencies both internal and external (where the client is desirous to have Green Rating and certification from third party agencies) by providing documentary evidences as may be required in support thereof. No document shall be shared with the external rating agencies directly. This check is only to avoid short circuit between CPWD and external rating agencies as such rating is to be obtained by clients and therefore all documents should pass through them only. Communication from the external rating agencies in respect of satisfaction / dissatisfaction of the criterion assessed by them should be indicated in Green Parameter Table in the Column "Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points" of the Table as per form attached.

(12) Periodic QCTA checks shall technically audit the satisfaction and reasons for dissatisfaction of the various criteria as may be achievable till the date of inspection.

(13) **TERI – GRIHA Rating system,** Proforma Green Parameter Tables 1 to 5 and Proforma Green Parameter Certificate is given in Annexure I for comprehension and follow up action.

ANNEXURE I

TERI – GRIHA Green Building Rating System

(Added as per OM/MAN/176)

The criteria have been categorized as follows.

1. Site Selection and Site planning

1.1 Conservation and efficient utilization of resource

Objective – To maximize the conservation and utilisation of resources (land, water, natural habitat, avi fauna, and energy) conservation and enhance efficiency of the systems and operations.

Criterion 1: Site Selection

Criterion 2: Preserve and protect the landscape during construction/compensatory depository forestation.

Commitment: Proper timing of construction, preserve top soil and existing vegetation, staging and spill prevention and erosion and sedimentation control. Replant, on-site, trees in the ratio 1:3 to those removed during construction.

Criterion 3: Soil conservation (till post-construction).

Commitment: Proper top soil laying and stabilization of the soil and maintenance of adequate fertility of the soil to support vegetative growth.

Criterion 4: Design to include existing site features.

Commitment: Minimize the disruption of natural ecosystem and design to harness maximum benefits of the prevailing micro-climate.

Criterion 5: Reduce hard paving on-site and /or provide shaded hard - paved surfaces.

Commitment: Minimize storm water run-off from site by reducing hard paving onsite.

Criterion 6: Enhance outdoor lighting system efficiency.

Commitment: Meet minimum allowable luminous efficacy (as per lamp type) and make progressive use of a renewable energy- based lighting system.

Criterion 7: Plan utilities efficiently and optimize on-site circulation efficiency

Commitment: Minimize road and pedestrian walkway length by appropriate planning and provide aggregate corridors for utility lines.

1.2 Health and well being

Objective –To protect the health of construction workers and prevent pollution.

Criterion 8: Provide at least, the minimum level of sanitation/safety facilities for construction workers.

Commitment: Ensure cleanliness of workplace with regard to the disposal of waste and effluent, provide clean drinking water and latrines and urinals as per applicable standard.

Criterion 9: Reduce air pollution during construction.

Commitment: Ensure proper screening, covering stockpiles, covering bricks and loads of dusty materials, wheel-washing facility, and water spraying.

2. Building planning and construction stage

Conservation and efficient utilization of resources

Objective – To maximize resource (water, energy, and materials) conservation and enhance efficiency of the system and operations.

2.1 Water

Criterion 10: Reduce landscape water requirement.

Commitment: Landscape using native species and reduce lawn areas while enhancing the irrigation efficiency, reduction in water requirement for landscaping purposes.

Criterion 11: Reduce building water use.

Commitment: Reduce building water use by applying low-flow fixtures, etc.

Criterion 12: Efficient water use during construction.

Commitment: Use materials such as pre-mixed concrete for preventing loss during mixing. Use recycled treated water and control the waste of curing water.

2.2 Energy: end use

Criterion 13: Optimize building design to reduce the conventional energy demand.

Commitment: Plan appropriately to reflect climate responsiveness, adopt an adequate comfort range, less air-conditioned areas, daylighting, avoid over-design of the lighting and air-conditioning systems.

Criterion 14: Optimize the energy performance of the building within specified comfort limits.

Commitment: Ensure that energy consumption in building under a specified category is 10%–40% less than that benchmarked through a simulation exercise.

2.3 Energy: embodied and construction

Criterion 15: Utilization of fly ash in the building structure.

Commitment: Use of fly ash for RCC (reinforced cement concrete) structures with infill walls and load bearing structures, mortar, and binders.

Criterion 16: Reduce volume, weight, and time of construction by adopting an efficient technology (e.g. pre-cast systems, ready-mix concrete, etc.).

Commitment: Replace a part of the energy-intensive materials with less energy intensive materials and/or utilize regionally available materials, which use low energy/ energy-efficient technologies.

Criterion 17: Use low-energy material in the interiors.

Commitment: Minimum 70% in each of the three categories of interiors (internal partitions, panelling/ false ceiling/interior wood finishes/ in-built furniture door/window frames, flooring) from low-energy materials/ finishes to minimize the usage of wood.

2.4 Energy: renewable

Criterion 18: Renewable energy utilization.

Commitment: Meet energy requirements for a minimum of 10% of the internal lighting load (for general lighting) or its equivalent from renewable energy sources (solar, wind, biomass, fuel cells, etc). Energy requirements will be calculated based on realistic assumptions which will be subject to verification during appraisal.

Criterion 19: Renewable energy - based hot- water system.

Commitment: Meet 70% or more of the annual energy required for heating water through renewable energy based water-heating systems.

2.5 Recycle, recharge, and reuse of water

Objective– To promote the recycle and reuse of water.

Criterion 20: Wastewater treatment

Commitment: Provide necessary treatment of water for achieving the desired concentration of effluents.

Criterion 21: Water recycle and reuse (including rainwater).

Commitment: Provide wastewater treatment on-site for achieving prescribed concentration, rainwater harvesting, reuse of treated waste water and rainwater for meeting the building's water and irrigation demand.

2.6 Waste management

Objective –To minimize waste generation, streamline waste segregation, storage, and disposal, and promote resource recovery from waste.

Criterion 22: Reduction in waste during construction.

Commitment: Ensure maximum resource recovery and safe disposal of wastes generated during construction and reduce the burden on landfill.

Criterion 23: Efficient waste segregation.

Commitment: Use different coloured bins for collecting different categories of waste from the building.

Criterion 24: Storage and disposal of waste.

Commitment: Allocate separate space for the collected waste before transferring it to the recycling/ disposal stations.

Criterion 25: Resource recovery from waste.

Commitment: Employ resource recovery systems for biodegradable waste as per the Solid Waste Management and handling Rules, 2000 of the MoEF. Make arrangements for recycling of waste through local dealers.

2.7 Health and well-being

Objective –To ensure healthy indoor air quality, water quality, and noise levels, and reduce the global warming potential.

Criterion 26: Use of low-VOC (volatile organic compounds) paints/ adhesives / sealants.

Commitment: Use only low VOC paints in the interior of the building. Use water – based rather than solvent based sealants and adhesives.

Criterion 27: Minimize ozone – depleting substances.

Commitment: Employ 100% zero ODP (ozone depletion potential) insulation; HCFC (hydrochlorofluorocarbon)/ and CFC (chlorofluorocarbon) free HVAC and refrigeration equipments and/ Halon-free fire suppression and fire extinguishing systems.

Criterion 28: Ensure water quality.

Commitment: Ensure groundwater and municipal water meet the water quality norms as prescribed in the Indian Standards for various applications (Indian Standards for drinking [IS 10500-1991], irrigation applications [IS 11624-1986]. In case the water quality cannot be ensured, provide necessary treatment of raw water for achieving the desired concentration for various applications.

Criterion 29: Acceptable outdoor and indoor noise levels.

Commitment: Ensure outdoor noise level conforms to the Central Pollution Control Board– Environmental Standards–Noise (ambient standards) and indoor noise level conforms to the National Building Code of India, 2005, Bureau of Indian Standards, Part 8–Building Services; Section 4–Acoustics, sound insulation, and noise control.

Criterion 30: Tobacco and smoke control.

Commitment: Zero exposure to tobacco smoke for non-smokers and exclusive ventilation for smoking rooms.

Criterion 31: Provide the minimum level of accessibility for persons with disabilities.

Commitment: To ensure accessibility and usability of the building and its facilities by employees, visitors, and clients with disabilities.

3. Building operation and maintenance

Objective – Validate and maintain 'green' performance levels/adopt and propagate green practices and concepts.

Criterion 32: Energy audit and validation.

Commitment: Energy audit report to be prepared by approved auditors of the Bureau of Energy Efficiency, Government of India.

Criterion 33: Building operation and maintenance .

Commitment: Validate and maintain 'green' performance levels/adopt and propogate green practices and concepts. Ensure the inclusion of a specific clause in the contract document for the commissioning of all electrical and mechanical systems to be maintained by the owner, supplier, or operator. Provide a core facility/service management group, if applicable, which will be responsible for the operation and maintenance of the building and the electrical and mechanical systems after the commissioning. Owner/builder/ occupants/service or facility management group to prepare a fully documented operations and maintenance manual, CD, multimedia or an information brochure listing the best practices/do's and don'ts/maintenance requirements for the building and the electrical and mechanical systems along with the names and addresses of the manufacturers/suppliers of the respective system.

Criterion 34: Innovation points.

Commitment: Four innovation points are available under the rating system for adopting criteria which enhance the green intent of a project, and the applicant can apply for the bonus points. Some of the probable points, not restricted to the ones enumerated below, could be

1. Alternative transportation
2. Environmental education
3. Company policy on green supply chain
4. Lifecycle cost analysis
5. Enhanced accessibility for physically/mentally challenged.
6. Any other criteria proposed by the client

Scoring points

The system is guiding and performance-oriented where points are earned for meeting the design and performance intent of the criteria. Each criterion has a number of points assigned to it. It means that a project intending to meet the criterion would qualify for the points. Compliances, as specified in the relevant criterion, have to be submitted in the prescribed format. While the intent of some of the criteria is self-validating in nature, there are others for example : energy consumption, thermal and visual comfort, noise control criteria, and indoor pollution levels need to be validated on-site through performance monitoring. The points related to these criteria (specified under the relevant sections) may be awarded through monitoring, validation, and documents/photographs to support the award of point. QCTA report in respect of such criteria shall be the binding factor for award of points.

The 100 point system consists of some core points, which are mandatory to be met while the rest are optional points, which can be earned by complying with the commitment of the criterion for which the point is allocated. Different levels of certification (one star to five star) can be awarded based on the number of points earned. The minimum points required for certification is 50. Constructions scoring 50 to 60 points, 61 to 70 points, 71 to 80 points, and 81 to 90 points will get one star, 'two stars', 'three stars' and 'four stars' respectively. A score of 91 to 100 points will get the maximum rating viz. five stars.

Evaluation procedure of criterion

List of criteria		Points	Remarks	Unit of CPWD responsible for the criterion
Criteria 1:	Site Selection	1	Partly mandatory	Architecture
Criteria 2:	Preserve and protect landscape during construction /compensatory depository forestation.	5	Partly mandatory	3 by Architecture, 2 by Horticulture
Criteria 3:	Soil conservation (post construction)	4		Civil
Criteria 4:	Design to include existing site features	2	Mandatory	Architecture
Criteria 5:	Reduce hard paving on site	2	Partly mandatory	Architecture
Criteria 6:	Enhance outdoor lighting system efficiency	3		Electrical
Criteria 7:	Plan utilities efficiently and optimize on site circulation efficiency	3		Architecture
Criteria 8:	Provide, at least, minimum level of sanitation/ safety facilities for construction workers	2	Mandatory	Civil
Criteria 9:	Reduce air pollution during construction	2	Mandatory	Civil
Criteria 10:	Reduce landscape water requirement	3		Horticulture
Criteria 11:	Reduce building water use	2		Civil
Criteria 12:	Efficient water use during construction	1		Civil
Criteria 13:	Optimize building design to reduce conventional energy demand	6	Mandatory	Architecture
Criteria 14:	Optimize energy performance of building within specified comfort	12		Electrical
Criteria 15:	Utilization of flyash in building structure	6		Civil
Criteria 16:	Reduce volume, weight and time of construction by adopting efficient technology (e.g. precast systems, ready-mix concrete, etc.)	4		Civil
Criteria 17:	Use low-energy material in interiors	4		Architecture
Criteria 18:	Renewable energy utilization	5		Electrical
Criteria 19:	Renewable energy based hot-water system	3		Electrical
Criteria 20:	Waste water treatment	2		Civil
Criteria 21:	Water recycle and reuse (including rainwater)	5		Civil
Criteria 22:	Reduction in waste during construction	2		Civil
Criteria 23:	Efficient waste segregation	2		Civil
Criteria 24:	Storage and disposal of waste	2		Civil
Criteria 25:	Resource recovery from waste	2		Civil
Criteria 26:	Use of low - VOC paints/ adhesives/ sealants.	4		Civil
Criteria 27:	Minimize ozone depleting substances	3	Mandatory	Electrical
Criteria 28:	Ensure water quality	2	Mandatory	Civil
Criteria 29:	Acceptable outdoor and indoor noise levels	2		Architecture
Criteria 30:	Tobacco and smoke control	1		Architecture
Criteria 31:	Universal Accessibility	1		Architecture
Criteria 32:	Energy audit and validation	Mandatory		Electrical
Criteria 33:	Operations and maintenance protocol for electrical and mechanical equipment	2	Mandatory	Electrical
Total score		100		
Criteria 34:	Innovation (Beyond 100)	4		Architecture, Civil, Electrical, Horticulture
Total score		**104**		

GREEN PARAMETER TABLE 1 – ARCHITECTURE

PACKAGE				
PROJECT				
Nomenclature of criterion		**Maximum Points**	**Points earned**	**Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points**
Criteria 1:	Site Selection	1		
Criteria 2:	Preserve and protect landscape during construction/ compensatory depository forestation.	3		
Criteria 4:	Design to include existing site features	2		
Criteria 5:	Reduce hard paving on site	2		
Criteria 7:	Plan utilities efficiently and optimize on site circulation efficiency	3		
Criteria 13:	Optimize building design to reduce conventional energy demand	6		
Criteria 17:	Use low-energy material in interiors	4		
Criteria 29:	Acceptable outdoor and indoor noise levels	2		
Criteria 30:	Tobacco and smoke control	1		
Criteria 31:	Universal Accessibility	1		
Total score		25		
Criteria 34:	Innovation (Beyond 100)	4		
Total score		**29**		

To be signed by SA

(To be placed on preliminary and
Working drawings above the Title Block)

GREEN PARAMETER TABLE 2 – CIVIL

PACKAGE				
PROJECT				
Nomenclature of criterion		**Maximum Points**	**Points earned**	**Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points**
Criteria 3:	Soil conservation (post construction)	4		
Criteria 8:	Provide, at least, minimum level of sanitation/safety facilities for construction workers	2		
Criteria 9:	Reduce air pollution during construction	2		
Criteria 11:	Reduce building water use	2		
Criteria 12:	Efficient water use during construction	1		
Criteria 15:	Utilization of flyash in building structure	6		
Criteria 16:	Reduce volume, weight and time of construction by adopting efficient technology (e.g. pre-cast systems, ready-mix concrete, etc.)	4		
Criteria 20:	Waste water treatment	2		

Nomenclature of criterion	Maximum Points	Points earned	Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points
Criteria 21: Water recycle and reuse (including rainwater)	5		
Criteria 22: Reduction in waste during construction	2		
Criteria 23: Efficient waste segregation	2		
Criteria 24: Storage and disposal of waste	2		
Criteria 25: Resource recovery from waste	2		
Criteria 26: Use of low - VOC paints/ adhesives/ sealants.	4		
Criteria 28: Ensure water quality	2		
Total score	42		
Criteria 34: Innovation (Beyond 100)	4		
Total score	**46**		

To be signed by SE (C)

(To be placed on Completion Certificate issued by SE).

GREEN PARAMETER TABLE 3 – ELECTRICAL

PACKAGE			
PROJECT			
Nomenclature of criterion	Maximum Points	Points earned	Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points
Criteria 6: Enhance outdoor lighting system efficiency	3		
Criteria 14: Optimize energy performance of building within specified comfort	12		
Criteria 18: Renewable energy utilization	5		
Criteria 19: Renewable energy based hot-water system	3		
Criteria 27: Minimize ozone depleting substances	3		
Criteria 32: Energy audit and validation			
Criteria 33: Operations and maintenance protocol for electrical and mechanical equipment	2		
Total score	28		
Criteria 34: Innovation (Beyond 100)	4		
Total score	**32**		

To be signed by SE(E)

(To be placed on completion certificate issued by SE)

GREEN PARAMETER TABLE 4 – HORTICULTURE

PACKAGE			
PROJECT			
Nomenclature of criterion	**Maximum Points**	**Points earned**	**Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points**
Criteria 2: Preserve and protect landscape during construction /compensatory depository forestation.	2		
Criteria 10: Reduce landscape water requirement	3		
Total score	5		
Criteria 34: Innovation (Beyond 100)	4		
Total score	**9**		

To be signed by DoH / SE (C)

(To be placed on Completion Certificate issued by DoH / SE).

GREEN PARAMETER TABLE 5 – COMPREHENSIVE

PACKAGE			
PROJECT			
Nomenclature of criterion	**Maximum Points**	**Points earned**	**Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points**
Criteria 1: Site Selection	1		
Criteria 2: Preserve and protect landscape during construction /compensatory depository forestation.	5		
Criteria 3: Soil conservation (post construction)	4		
Criteria 4: Design to include existing site features	2		
Criteria 5: Reduce hard paving on site	2		
Criteria 6: Enhance outdoor lighting system efficiency	3		
Criteria 7: Plan utilities efficiently and optimize on site circulation efficiency	3		
Criteria 8: Provide, at least, minimum level of sanitation/safety facilities for construction workers	2		
Criteria 9: Reduce air pollution during construction	2		
Criteria 10: Reduce landscape water requirement	3		
Criteria 11: Reduce building water use	2		
Criteria 12: Efficient water use during construction	1		
Criteria 13: Optimize building design to reduce conventional energy demand	6		
Criteria 14: Optimize energy performance of building within specified comfort	12		
Criteria 15: Utilization of flyash in building structure	6		
Criteria 16: Reduce volume, weight and time of construction by adopting efficient technology (e.g. pre-cast systems, ready-mix concrete, etc.)	4		

Nomenclature of criterion	Maximum Points	Points earned	Remarks indicating reasons for dissatisfaction if points earned are lesser than maximum points
Criteria 17: Use low-energy material in interiors	4		
Criteria 18: Renewable energy utilization	5		
Criteria 19: Renewable energy based hot-water system	3		
Criteria 20: Waste water treatment	2		
Criteria 21: Water recycle and reuse (including rainwater)	5		
Criteria 22: Reduction in waste during construction	2		
Criteria 23: Efficient waste segregation	2		
Criteria 24: Storage and disposal of waste	2		
Criteria 25: Resource recovery from waste	2		
Criteria 26: Use of low - VOC paints/ adhesives/sealants.	4		
Criteria 27: Minimize ozone depleting substances	3		
Criteria 28: Ensure water quality	2		
Criteria 29: Acceptable outdoor and indoor noise levels	2		
Criteria 30: Tobacco and smoke control	1		
Criteria 31: Universal Accessibility	1		
Criteria 32: Energy audit and validation			
Criteria 33: Operations and maintenance protocol for electrical and mechanical equipment	2		
Total score	100		
Criteria 34: Innovation (Beyond 100)	4		
Total score	**104**		

(To be signed by authority under whose competency the preliminary estimate of the project falls)

OFFICE MEMORANDUM
ISSUED BY AUTHORITY OF CHIEF ENGINEER
No..... DATED: ___

GREEN PARAMETER CERTIFICATE

Certified .....that .....the..... package
.....
.....
..... of the project.....
sanctioned.....vide.....No.....dated.....conforms to.....star ratings of GRIHA rating system of TERI as per assessment made by CPWD.

(To be signed by authority under whose competency the preliminary estimate of the project falls)

1. Client
2. QCTA Unit of ADG concerned.