ENVIRONMENTAL MANAGEMENT PLAN (EMP)

1.0 INTRODUCTION

In December 2015, during a summit meeting between Japan and India, the Prime Minister Modi expressed his expectation that the two sides will explore the development of a convention center in Varanasi. Following the above announcement, the Detailed Project Reports (DPR) was prepared by the India side, and JICA (Japanese International Cooperation Agency) conducted the Preparatory Survey to verify the feasibility of the project and to develop the schematic and detailed design of the VCC.

The result of the schematic design was presented at the India-Japan Joint meeting in September 2017, in which it was stated that the two Prime Ministers welcomed the Exchange of Notes for the construction of a state-of-art Convention Centre in Varanasi as a symbol of friendship between Japan and India by Japan's Grant Aid.

The objective of the Project is to construct a VCC that will provide opportunities for social and cultural interactions and the exchange of knowledge, thereby contributing to the socio-economic and tourism development of Varanasi.

The latitude and longitude of the proposed project site is 25°18'46.21"N and 82°59'8.96"E respectively. The terrain of the project site & its surrounding area is plain. The site and study area falls under the premises of Varanasi Municipal Corporation. The soil characteristic of the area is Sandy to sandy loam, Loam to clay loam, Sodic soils/saline (Source: SREP Varanasi, District (2006).

The plot area of the proposed project is approx. 3.3 acres, i.e. 13,354 sq. m. and falls under Category B2 [Built-up area < 20,000 m2 as per EIA Notification 2006]. Hence, it does not require Environmental Clearance from the SEIAA (State Environment Impact Assessment Authority), Government of Uttar Pradesh / EAC (Environment Assessment Committee) of MoEF & CC, GOI. The detail of the proposed project site is given in **Table-1.0**.

Table-1.0: Details of Proposed Project Site

Sl. No.	Parameters	Remarks
1.	Name of the proposed project	Construction of convention centre in Varanasi.
2.	Total project area	Approx 3.3 Acres (13,060sq. m.)
3.	Area provided for proposed development of convention centre.	Approx 10,560 sq. m.
4.	Total built-up area	Approx 9,600 sq. m.
5.	Total ground coverage	Approx 40% (4240 sq. m.)
6.	Height of the proposed building	Ground floor + 28 meter
7.	Latitude and longitude	25°18'46.21"N, 82°59'8.96"E

Sl. No.	Parameters	Remarks
8.	Total population	Permanent – 25 persons Floating – 1210 persons
9.	Total water requirement	25 kld
10.	Total discharge	Permanent-1 kld Floating-20 kld
11.	Proposed capacity of STP(Sewage Treatment Plant)	Sewage treatment plant is not installed, because sewage is discharged to city sewer line.
12.	Total power requirement	Approx. 800 kW
13.	Power backup	100% (2 DG sets, 500KVA/1 set)
14.	Total number of ECS	Surface –18 Basement –102
15.	Total solid waste generation	Permanent – 25 kg / day Floating – 1,200 kg/day Say – Approx. 1.2 TPD
There is proposal of obtaining GRIHA rating for the proposed project.		

The objective of the preparation of Environmental Management Plan (EMP) is to identification and prediction of impacts and suggestive mitigation measures for prevention of environmental aspects.

The Environmental Management plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmentally sustainable manner and understand the potential environmental risks arising from the proposed project and take appropriate actions to minimize those risks. EMP also ensures that the project implementation is carried out in accordance with the planned design and by taking appropriate mitigation actions to reduce adverse environmental impacts during the construction of proposed convention center.

The key benefits of the EMP are that it provides the organization with means of managing its environmental performance thereby allowing it to contribute to improved environmental quality. The other benefits include cost control and improved relations with the stake holders.

Various activities are likely to have some impact on the environmental attributes during its construction as well as operational phase. The impact assessment matrix given in **Table -2.0 & 3.0** reveals the impact associated with each activity of the project on various environmental parameters during construction and operational phases respectively before any mitigation measures are implanted.

Adequate environmental management measures will be incorporated during the entire planning, construction and operating stages of the project to minimize any adverse environmental impact and assure sustainable development of the area. The detailed Environment Management Plan during construction and operation phases have been given in **Table -2.0 & 3.0** respectively.

Table-2.0: Prediction of Impact during Construction Phase & Their Mitigation Measure

Environmental component	Project Activity	Potential Impact	Mitigation Measure
Air	Site Clearance/ Operation	Dust Pollution	Sprinkling of water above the area before Clearing.
	Heavy Vehicle Maintenance/ Operation	Air Pollution Dust Generation	• Vehicles used for transportation of material will be covered with tarpaulin. • Vehicles used for Construction work will be regularly maintained and will be requested to contractor to adhere to CPCB(Central Pollution Control Board) norms.
	Construction of structure and earth work	Dust due to cutting and filling	Wetting of area before clearing.
Noise	Heavy Vehicle Maintenance	Increased vehicular noise	Vehicles used for Construction work shall be regularly maintained and will be requested to contractor to adhere to CPCB norms
	Construction of structure and earth	Noise from vibrators, Concrete batching plants etc.	• Proper maintenance of equipment. • Providing ear plugs to workers employed in close vicinity of noise producing machine.
	DG set operation	Increased noise levels	• DG set adhering to CPCB norms. • Proper maintenance of DG Set.
Water	Construction Staff Water Requirement	Strain on local water sources	Drinking water will be met from municipal supply.
Soil	Storage of petroleum and other chemicals	Pollution due to mixing of construction material.	• Storage of petroleum and other chemicals on impervious floor. • Careful handling of materials will be ensured.
	Construction debris and earth material.	Pollution due to mixing of concrete with soil.	• Mixed Concrete and such debris will be unloading on impervious metal sheets. • Waste or spillage will be collected and sent to the nearest disposal site with the appropriate treatment.
	Transportation of hazardous material	Accidental spilling of hazardous material	• Construction Process does not involve transportation of hazardous material such as lubricant oil and enamel paint except in very small quantities.

Environmental component	Project Activity	Potential Impact	Mitigation Measure
			• In transportation of these materials, all precaution as required by regulation will be taken.
	Demolition waste from existing office building	Contamination of soil	Demolition waste from existing office building will be collected, segregated and handled to authorize recyclers.
	Heavy Vehicle Maintenance/ Operation	Oil spillage	Use of electrically operated machines to the possible extant. Oil tray will be kept below all potential oil spillage points for final disposal of spillage to authorized recyclers.
	Solid waste generation	Improper disposal of plastic/kitchen waste.	Segregation of solid waste will be practiced and segregated waste will be handed over to authorized agency of Nagar Nigam for final disposal.
Ecology	Construction of Structure and earth work	Migration of fauna due to construction	Use of electrically operated machines to the possible extent, and proper maintenance of machines to keep noise level low.

Table-3.0: Prediction of Impact during Operation Phase & Their Mitigation Measure

Environmental component	Project Activity	Potential Impact	Mitigation Measure
Air	Traffic movement on Road	Increased concentration of air pollution at some location	• Although the bidirectional traffic is adopted in the surrounding area now, installation of one-way traffic is considered for reducing congestion. •
	DG set operation	Air Pollution	• DG set adhering to CPCB Norms. • Proper maintenance of DG set. • Exhaust ventilation with chimney in DG set will be installed.
Noise	Traffic movement on Road	Increased vehicular noise at some location	• Although the bidirectional traffic is adopted in the surrounding area now, installation of one-way traffic is considered for reducing congestion.
	DG set operation	Noise from DG set	• DG set will be enclosed in acoustic enclosure with soundproof casing.
Water	Water Requirement	Strain on Ground water	• No ground water is used for drinking water. • Drinking water will be supplied by municipal supply.
Soil	Operation	Soil contamination due to surface run off / Oil and grease dripping from vehicle	Oil and grease spilled in the basement car parking will be pumped up to the waste water pipe connected to the existing city sewer line.
	Solid waste generation	Improper disposal of plastic/kitchen waste.	Segregation of solid waste at source will be practiced and segregated waste will be handed over to authorized agency of Nagar Nigam for final disposal.
Ecology	Operation	Increased exposure to anthropogenic activities.	Enactment and enforcement of laws regulating human intrusion.

2.0 LAND ENVIRONMENT

2.1 Impacts & Management

In the proposed project, soil would be excavated at project site for foundations of convention centre. The construction poses impact on surrounding environment and surrounding land-use directly or indirectly. The possible impact on topography and geology of the area will be negligible due to cutting, filling, excavation of earthworks for piling activities, making roads; construction activities. The impact on soil during construction phase will be marginal and reversible in the nature.

Mitigation measure

It is proposed to remove vegetative cover only from the specific site on which construction is to take place and allowing minimal disturbance to the vegetation in adjacent areas. Land clearing activities only confined to necessary areas. The top soil will be stripped from construction areas and sent to the nearest disposal site with the appropriate treatment. The number, frequency and area of movement of heavy machinery will also be restricted. There will not be any significant impact on topography from the project.

3.0 AIR POLLUTION

Air pollution is the imbalance in air quality to such an extent to cause deleterious effects. The air pollutant concentration at particular time is the function of quantity and type of pollutant introduced into the atmosphere and ability of atmosphere to disperse/absorb these and also on various physicochemical dissipation processes liable to remove the air pollutants through self- dissipation.

The primary air pollutants emitted from various identifiable sources viz. point sources, line sources and non- point sources remain scattered in atmosphere in same chemical form in which these are emitted from sources while secondary pollutants are formed in atmosphere by reaction of two or more primary pollutants.

The point sources include emissions from domestic sources, whereas line sources include vehicular emissions and non-point sources include fugitive emissions from construction activities, dust arising from unpaved and paved areas, road construction, etc.

3.1 CONSTRUCTION PHASE

During site preparation, mechanical shovels and earth movers will be used for site clearance, cut & fill & other site levelling activities. The major construction activities will involve earth work, transportation of construction materials, handling, laying and joining of pipelines, building of structures. These activities will generate dust particles which will be mobilized by wind and affect the ambient air quality. These activities will cause a general increase in levels of suspended particulate matter in ambient air. However, this increase in concentration will be of temporary nature and localized. A marginal increase in the levels of oxides of nitrogen, carbon monoxide and hydrocarbons is envisaged due to movement of vehicles for

transportation of construction material and diesel generator required during construction phase.

Fugitive dust emissions:

Fugitive dust is a type of non- point source air pollution - small airborne particles that do not originate from a specific point. Fugitive dust originates in small quantities over large areas. Significant sources include construction activities, road construction, paved road dust, unpaved road dust, etc

1. Construction Activities:

Construction activities are significant source of dust emissions that may have a substantial temporary impact on local air quality. Construction activities that are the most significant sources of fugitive emissions are:

a. Earth moving, due to excavation, handling, storage and disposal of soil and subsoil materials.

b. Construction aggregate usage, due to the transport, unloading, storage & use of dry & dusty materials (such as cement, sand, etc.).

3.2 OPERATION PHASE

The main source of pollution will be fugitive emissions from traffic movements and point source emissions from increase in concentration of gases from the exhaust of DG sets.

4.0 WATER ENVIRONMENT

4.1 CONSTRUCTION PHASE

Water Conservation Techniques:

Best construction practices will be adopted to reduce the water demand for construction activities:

- Use of curing water: Spraying of curing water and after liberal curing, all concrete structures will be covered with gunny bags, followed by spraying of water.

- Discouraging the washing of vehicles and equipment on the construction site. Workers will not be allowed to wash their personal vehicles on site. Vehicles and equipment that regularly leave the construction site should be washed offsite.

Table-4.0: Water Management Plan

Source	Management
• Groundwater contamination due to domestic sewage. • Open defecation / other allied activity. • Dust emissions due to vehicular movement. • Impact of water movement on and off site and its associated erosions, sedimentation and potential pollution effects.	• Septic tanks followed by soak pits to prevent groundwater contamination. • Provide adequate number sanitation facility and awareness to workers on the subject. • Controlled water sprinkling @ of 1.0 – 1.5 L / sq.m. at the interval of 1 hr is recommended (water requirement subjected climatic / site conditions). • Soil and water management structures will be in place prior to the commencement of construction works, and any activities likely to generate erosion and sedimentation impacts. • Silt fencing with sausage, temporary silt fencing will be installed at selected locations across the site. • Stockpiles will not be located in proximity to existing or proposed drainage lines and storm water inlets. • Provisions will be made to ensure the construction vehicles stick to the access track to prevent mud & dirt being deposited on roads.
• Significant water demand for construction	• Curing water will be sprayed and after liberal curing all concrete structures will be covered with gunny bags, this will conserve water.
• Unsanitary conditions during rainy season.	• Separate toilet facility for male and female and hand washing facility will be provided. • Potable water will be provided and placed in / at various locations readily accessible to all. • The employer will notify each employee of the location of the sanitation facilities and water and will allow each employee reasonable opportunities during the workday to use them. And the employer also will inform the importance good hygiene practices, communicable diseases. • The civil contractor will be held responsible for site sanitation and will be bound by the management to adhere to healthy level of sanitation.

4.2 POST CONSTRUCTION PHASE

4.2.1 Water requirement

Daily fresh water demand will be 25 KLD (9125 cu. m./annum). The fresh water demand will be provided by VMC as per agreement.

Water conservation techniques
Following water conservation techniques have been proposed for the project:

- **Native & xeriscaping plant species:** Choose native plant species that need less water.
- **Creating Hydrozones:** Grouping of plant according to their water needs to provide adequate water to all plants without over or under-watering.
- **Maintain Healthy Soil:** Healthy soils are the basis for a water-smart landscape; they effectively cycle nutrients, minimize runoff, retain water, and absorb excess nutrients, sediments, and pollutants.
- **Mulching:** Incorporate mulch around shrubs and garden plants to help reduce evaporation, inhibit weed growth, moderate soil temperature, and prevent erosion. Adding organic matter and aerating soil can improve its ability to hold water.
- Avoid watering during the heat of the day. Water early in the morning to reduce the evaporation rate.
- Drought tolerant species will be selected.
- Turfs will be avoided to the extent possible.
- Central shut off valve will be provided.
- Sprinkler landscaping system will be used to conserve water.

4.2.2 Waste water generation & treatment

In the peak day, once a week, when the event is held, approximate 20 KLD waste water will be generated. In the normal day, 1 KLD waste water will be generated.
Sewage treatment plant is not installed, because connection pipe (150ϕ) from the site boundary up to the city sewer pipe(300ϕ), which exists in south road 3,600mm below ground, will be constructed.

4.2.3 Impact & Management

Investigated environmental impacts	Measures for minimizing and / or offsetting adverse impacts identified and their Mitigation measures

• Waste water leakage • Odor generation • Seepage to groundwater	• Check valve, flange, at regular defined interval. • Regular physicochemical monitoring of groundwater

4.2.4 Storm Water Management

Construction phase Contaminant	Sources	Impact Mitigation
Sediment & Floatables	Streets, lawns, driveways, roads, construction activities,	During construction, sediment fencing or other erosion control devices will be used to mitigate the short-term adverse impacts of sedimentation.
Oil & Grease	Roads, driveways, parking lots etc.	Oil & Grease trap will be provided to remove oil & grease, suspended matter, and ensure the quality of groundwater.

5.0 SOLID WASTE MANAGEMENT

5.1 Applicable Rules

- Construction & Demolition Waste Management Rules, 2016
- Solid Waste Management Rules, 2016
- Plastic Waste Management Rules, 2016
- Electronic waste Management Rules, 2016
- Hazardous & Other Waste Management Rules, 2016
- Bio-Medical Waste Management Rules, 2016

5.2 Construction phase

Construction material is the main source of waste during construction phase. Most of the construction waste shall be used in land filling and wastes like iron, plastic waste shall be handed over to authorized recycles.

Management of Construction waste as per C&D Rules, 2016 (Duties of the waste generator):

- The responsibility of collection, segregation of concrete, soil and others and storage of construction and demolition waste generated will be of the management.

- It will be ensured that the other waste (such as solid waste) does not get mixed with the construction waste and is stored and disposed separately.

- The waste will be segregated into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar.

- The waste generated will be kept within the premises and later deposited to the waste collection centre made by the local body. It will be ensured that there is no littering or deposition of construction waste so as to prevent obstruction to the traffic or the public or drains.

- Relevant charges will be payed for collection, transportation, processing and disposal as notified by the concerned authorities.

5.3 Post Construction Phase

In the peak day, once a week, when the event is held, approximate 1,200 kg/day solid waste will be generated. In the normal day, 25 kg/day solid waste will be generated.

5.4 Waste Management

Solid Waste Management: as per Solid Waste Management Rules, 2016:
The solid waste generated from the project premises will be segregated and stored in three separate bins namely, bio-degradable, non biodegradable and domestic hazardous wastes. The segregated waste from all three bins will be handed over to authorized waste pickers or waste collectors.
The used sanitary waste will be suitably wrapped and the same will be placed in the bin meant for dry waste or non-biodegradable waste.
The horticulture and garden waste generated from the premises will be kept separately and will be disposed off as per the directions of the local body.
No waste will be thrown, burnt or buried on streets, open public spaces outside his premises or in the drain or water bodies.
The recyclable material will be either the authorized waste pickers or the authorised recyclers. The biodegradable waste will be processes, treated and disposed off through composting or bio-methanation within the premises itself. The residua waste will be given to waste collectors
Plastic Waste Management: as per Plastic Waste Management Rules, 2016
Adequate steps will be taken to minimize the generation of plastic waste at source.
The plastic waste so generated will not be littered and it will be ensured that the segregated waste will be stored at source and handed over to the registered waste pickers, registered recyclers or waste collection agencies.
E-Waste Management : as per E-Waste Management Rules, 2016
It will be ensured that the E-waste generated, is channelized through collection centre or dealer of authorised producer or dismantler or recycler or through the designated take back service provider of the producer to authorised dismantler or recycler
Care will be taken that the end-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material

6.0 NOISE ENVIRONMENT

Noise will be generated during construction as well as post construction phase.

6.1 Construction Phase

During the construction phase, certain activities (such as piling), use of equipment (such as concrete mixer, concrete vibrator, compressors), and movements of vehicles, etc. may generate the noise. The generation of noise is a short term impact and will be limited to the construction site area.

SOURCES	MANAGEMENT
• Vehicular traffic • Heavy moving machinery • Operation of D.G. set, etc.	• The construction area will be shielded from all four sides. • Complete construction work especially heavy earth work will be done during day time. • The vehicles will be regularly maintained and optimum use of the same will be made. • Moving parts of the machines will be maintained properly so as to avoid metal-to metal impact noise. • The D.G. set used will be eco-friendly with minimum noise. • Ear plugs will be provided to the workers.

6.2 Post construction phase

SOURCES	MANAGEMENT
• Operation of D.G. sets	• D.G. sets will be housed in acoustic enclosure with soundproof casing designated to meet CPCB standards, which will help to contain the noise within the permissible standards
• Road traffic	• Although the bidirectional traffic is adopted in the surrounding area now, installation of one-way traffic is considered for reducing congestion • Landscape area will help to absorb noise.

7.0 ENERGY CONSERVATION

- LED shall be used to reduce the power consumption during the operation phase of the project.
- All capacitors will be provided with Harmonic Filters to avoid distortion in Voltage.
- Automatic Power Factor correction panel with capacitor will be used for Common Load & Fixed Capacitor for Transformer to minimize the losses.
- Insulation of exposed walls and roof will be done to minimize heat gains inside the building. This will help to reduce the air conditioning demand of the buildings.

- Emphasis will be given on low maintenance, low wattage and longer life in selection of chokes and lamps for all common area and external light fixtures.

8.0 SOCIO-ECONOMIC IMPACTS

The project will provide employment to the people. Indirect employment is also expected due to the associated activities. It is a positive impact of the project since it will provide employment opportunities to the local people.

Impact: As most of the workers to be employed in the project are local residents no law & order problem is envisaged. It is expected that the workers will attend to their duties from their residence and return to their homes after the day's work. The project proponent shall ensure health and safety of all the employees at work. All efforts will be made to provide and maintain a safe work environment and ensure that the machinery and equipment in use is safe for employees.

Mitigation: Suitable measures will be taken at the temporary construction labour tents to mitigate anticipated impacts due to temporary accommodation of labourers such as provision of clean drinking water, adequate toilet facilities, water and solid waste disposal system.

Other safety precautions to be maintained at work site including provision of PPE(Personal Protection Equipment), guarding of dangerous machine parts, maintenance of equipment as hoists and lifts etc, and adequate provision of different types of fire extinguishers will be made. All applicable rules and regulations pertaining to health and welfare at the workplace of the people will be applied to all workers.

Appendix 7-2 Events Attraction Plan

(1) Collaborative Organizations

In order to successfully attract events to VCC, JST has conducted a survey of major event sponsors in the convention centres and theatres in India. The following table lists the types of events assumed and the potential sponsors.

Table 1 Type of Event and Candidate Sponsors

Event Type	Breakdown	Potential Sponsor
1. Art & Cultural Performances	Hindi play, Hindustani musical play, Ballet, Comedy, Kabuki, Classical music, Kathak dance, Bharatanatyam dance	National School of Drama (NSD), Indian Council for Cultural Relations (ICCR), Sangeet Natak Akademi, Kathak Kendra, Japan Foundation
2. Conventions, Seminars & Meetings	Company award event, Company annual general meeting, University conference, Lecture	Private companies, BHU, Trust, NGO, Ministry of Tourism
3. Community & School Events	School award event, School annual celebration, Students' performance	Local community, school

Source: JST

Possible candidate sponsors are as follows:

1) National School of Drama (NSD)

Established in 1959, the NSD is the only drama training institution in India under the Ministry of Culture. It has a three-year graduate course in fields such as modern Indian theatre, classical Indian drama, Western theatre, theatre architecture, stage technology, stage lighting, etc. It also holds theatre festivals in various parts of India, for example, a contemporary theatre festival was held for 22 days from January to February 2017 at the Kamani Auditorium in Delhi. In Varanasi, over the two months of August and September 2017, it held a workshop of classical drama at the Nagari Natak Mandali auditorium for drama students from all over India, and later organized a performance after the workshop. By conducting the current activities of NSD at VCC, raising the occupancy rates of VCC will be possible.

2) International Council for Cultural Relations (ICCR)

The ICCR, established in 1950, is the government council aimed at cultural exchange in India. It organizes and provides financial support for overseas performances (outgoing) by Indian cultural organizations as well as performances in India (incoming) by foreign cultural groups. The number of events held in India in FY 2014 was 118, 4 of which were held in Varanasi and Lucknow in the UP State, therefore, there is a possibility that these

events can be conducted in VCC. In addition, the regional office of ICCR is located inside BHU and a future cooperation with the regional office and VCC is possible.

3) Sangeet Natak Akademi

Sangeet Natak Akademi is the government institute established in 1952 under the Ministry of Education and aims to preserve and promote culture, such as Indian classical music, dance and theatre. It organized 97 events in India in FY2016, out of which 3 events were held in Varanasi.

4) The Japan Foundation

The Japan Foundation is an independent administrative agency under the Ministry of Foreign Affairs of Japan, having an office in New Delhi, the only office in South Asia. Its main activities are: 1) culture and technology exchange; 2) Japanese language ability support; and 3) Japanese researchers' assistance. It has conducted Japanese language education support at Baranas Hindu University (BHU), photo exhibition of the world heritages in Japan at BHU, and dance performance by the Japanese dance experts at Ghat. They have shown an interest in possible cooperation with VCC in the future.

5) Baranas Hindu University (BHU)

BHU is a comprehensive university composed of 6 institutes, 14 faculties and about 140 departments, and has more than 35,000 students. Some faculties, such as Faculty of Engineering, Faculty of Medicine, Faculty of Business Administration, Faculty of Performing Arts, etc., are known as some of the leading faculties in India. It has a convention hall capable of accommodating 1,500 people on the premises and holds about 130 conferences and seminars annually. However, as the facilities are getting old and amenities such as air-conditioning equipment and small- and medium-sized meeting rooms are not installed, it has been confirmed through the interviews that it is necessary to establish a new hall to attract guests from other cities as well as abroad. It will be possible for VCC to cooperate with BHU.

6) Department of Tourism, UP State

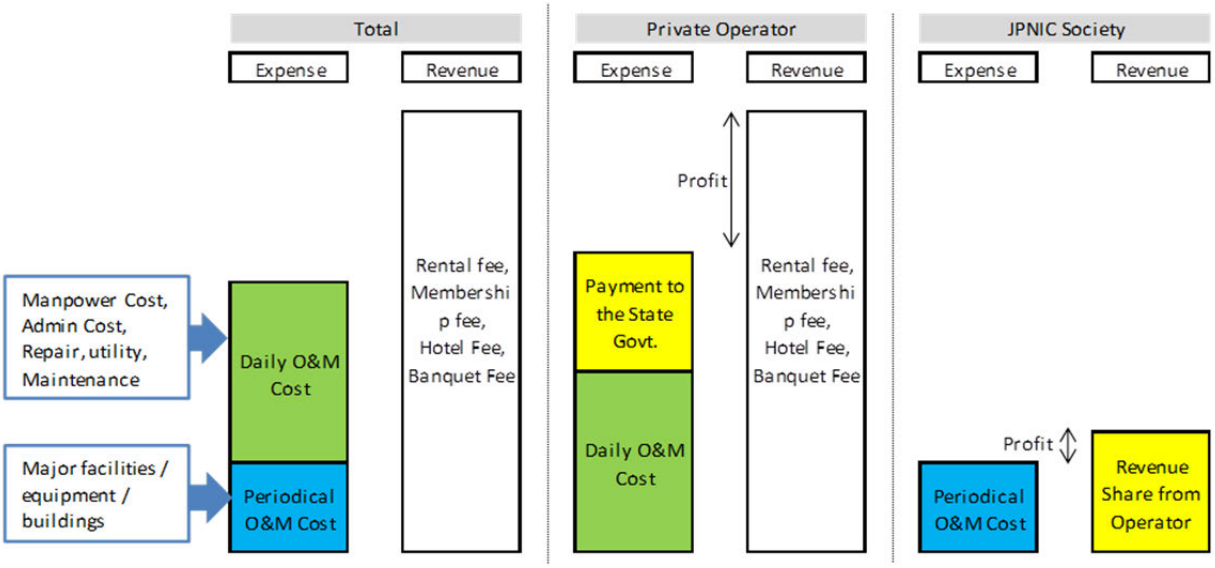
During the peak period for foreign tourists from October to March there is a possibility for a voluntary program to introduce the history, culture, art and theatre of Varanasi in cooperation with the Department of Tourism of UP State. In the long term, it will be possible to consider forming VCC's own Varanasi-based music and dance group composed of local musicians, dancers and directors.

Appendix 7-3 Division of Roles of Government and Private Sector under the Outsourcing Scheme

The result of the benchmark survey conducted on the division of roles of government / private company in the operation of the convention centres and auditoriums in India and abroad is shown below:

1) Jai Prakash Narain International Center (JPNIC, Lucknow)

The convention centre is currently under construction by the Lucknow Development Agency (LDA) as the development body and the Jai Prakash Narain International Centre Society (JPNICS) as the operation body, with the total floor space of 97,496 m2 and the total project cost of 8.64 billion Rs. It has adopted the revenue sharing method for the management, operation and maintenance. Private operators bid on the state government for the annual payment of 1) 31.5 million Rs. or 2) 18% of revenue, whichever is higher, and the hotel group has been awarded. The JPNIC is a complex accommodating hotels, dormitories, sports facilities, museums, and also has individual membership and corporate membership system, and since it has multiple revenue sources, it seems the revenue sharing system was considered to work at the facility.



Source: JST

Figure 1 JPNIC Revenue Sharing Method

The roles between the government and the private operator are summarized in the following table.

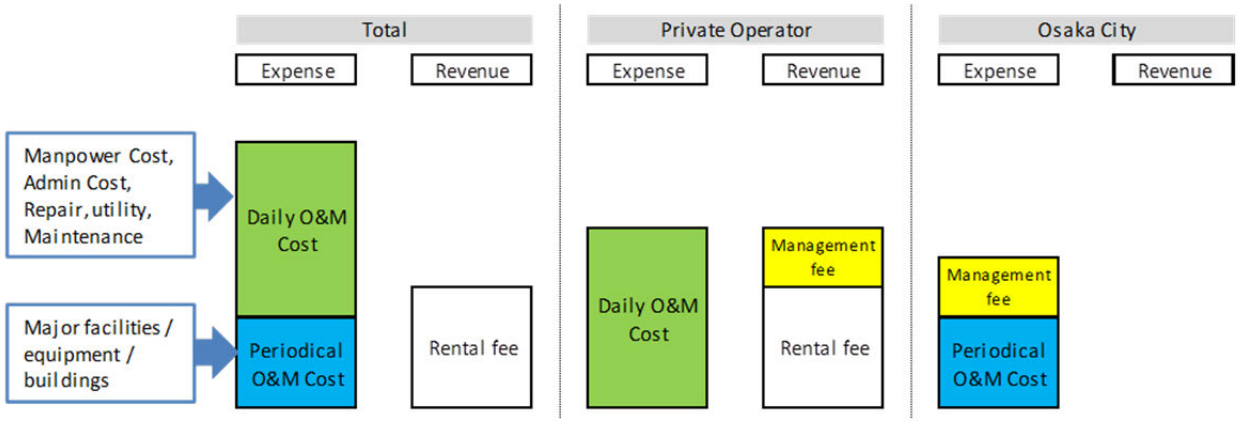
Table 1 Roles between the Government and a Private Operator

		JPNIC Society	Private operator
<Management>			
1. Contract	Tender for private operator, outsourcing contract with JPNIC Society	✔	
2. Fund procurement	Securing necessary funds for operation		✔
3. Tariff settings	Tariff standard and settings, income of a private operator	✔	
4. Operational guidelines & policy making	Guideline and regulations for operation	✔	
5. Finance & accounting	Finance and accounting for operation, revenue sharing settings for JPNIC Society	✔	✔
<Operations>			
6. Event marketing, program development	Event marketing and program development in line with the operational guideline		✔
7. Staff recruitment and salary payment	Appropriate staff allocation for manager, equipment, stage and marketing		✔
8. Asset management	Periodic maintenance, renovation and purchase of the major facilities / equipment (building and equipment)	✔	
9. Daily operation & maintenance	Daily maintenance, renovation and purchase other than major facilities / equipment		✔
10. Utility bills	Utility bill payment for operation		✔
11. Facility competition risk	Reduction in users and revenue due to a competitive facility		✔
12. Demand fluctuation risk	Different from the demand expected at the beginning		✔
13. Risk of O&M cost expansion	Expansion of O&M cost due to factors other than JPNIC Society		✔
14. Operational risk	Temporary closure due to inadequate facilities and equipment, defects of facility management or accidents such as fire		✔

Source: JPNIC

2) Osaka City Central Public Hall

The attraction of citizens' cultural activities, conferences and other events has been conducted by a private company at the historical building and important cultural asset designated by Osaka City. Osaka City selects a private operator through bidding once every five years and it pays the balance between income and expenditure as a management fee to a private operator.



Remarks: When the management fee falls below / above the assumed amount, and when the rental fee income is above / below the assumed amount, the balance will be the profit / loss of an operator

Source: JST

Figure 2 Profit Structure of a Private Operator

At the time of the bidding, a private operator assumes the O&M cost including manpower cost, administrative expenses, repair cost, utility fees and maintenance cost as well as revenues from hall rental fees, and the management fee shall be decided. When the income increases more than expected, or when the O&M costs are kept low, the balance will be a profit of a private operator, therefore, the incentives of a private operator is expected to improve services in both a qualitative and quantitative manner. On the other hand, when the income decreases more than expected, or when the O&M costs increases, the private operator has to bear the loss. At present, the private operator of the Osaka City Central Public Hall is Suntory Publicity Service Co. Ltd., and they are required to achieve the following target indicators:

- An occupancy rate of 65% for the main hall (1,161 people capacity), the small to medium size conference room (500 people capacity), and the small conference room (150 people capacity)
- Attracting 10 or more nationwide or international art and culture events, academic conferences and lecture meetings annually

In addition, the following responsibilities are classified.

Table 2 Roles between Osaka City and Private Operator at Osaka City Central Public Hall

		Osaka City	Private operator
<Management>			
1. Contract	Tender for private operator, outsourcing contract with Osaka City	✔	
2. Fund procurement	Securing necessary funds for operation		✔
3. Tariff settings	Tariff standard and settings, income of a private operator	✔	
4. Operational guidelines & policy making	Guideline and regulations for operation	✔	
5. Finance & accounting	Finance and accounting for operation	✔	✔
<Operations>			
6. Event marketing, program development	Event marketing and program development in line with the operational guideline		✔
7. Staff recruitment and salary payment	Appropriate staff allocation for manager, equipment, stage and marketing		✔
8. Asset management	Periodic maintenance, renovation and purchase of the major facilities / equipment (building and equipment)	✔	
9. Daily operation & maintenance	Daily maintenance, renovation and purchase other than major facilities / equipment		✔
10. Utility bills	Utility bill payment for operation		✔
11. Facility competition risk	Reduction in users and revenue due to a competitive facility		✔
12. Demand fluctuation risk	Different from the demand expected at the beginning		✔
13. Risk of O&M cost expansion	Expansion of O&M cost due to factors other than Osaka City		✔
14. Operational risk	Temporary closure due to inadequate facilities and equipment, defects of facility management or accidents such as fire		✔

Source: Bidding document of the selection of the operator at the Osaka City Central Public Hall

3) Other convention centres

Currently the JST is conducting a survey on the operational method of convention centres in India and the results shall be reflected in the final report.

Appendix 7-4 Roles of Owner/Operator in Convention Centre Operations and Management

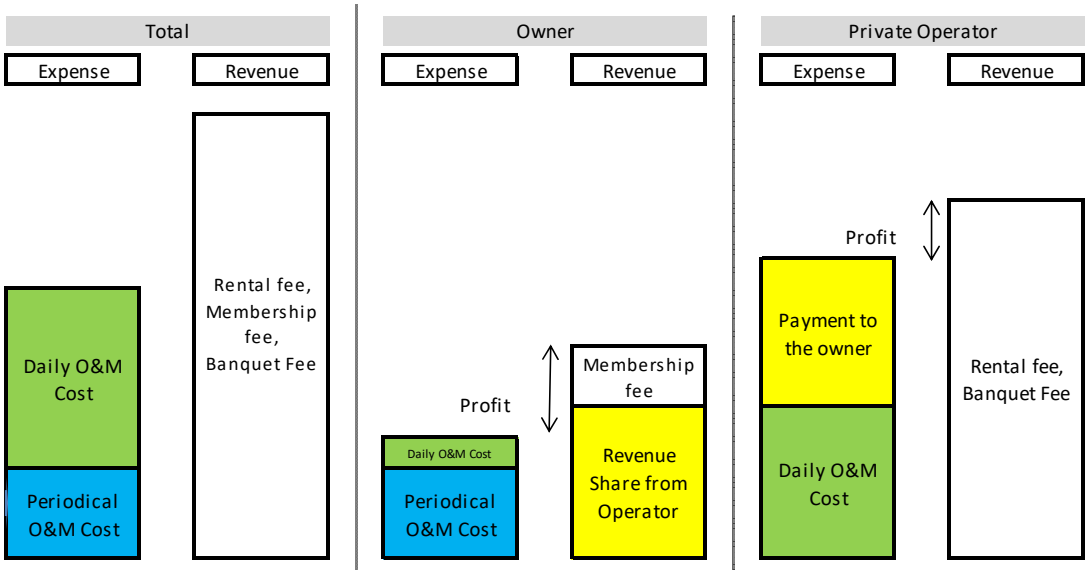
The roles of owner/operator in convention centre and auditorium operations and management in India have been surveyed.

A) India Habitat Centre

Established in 1993 as one of the leading convention centres in India, it is managed by a steering committee composed of members such as the Ministry of Housing and Urban Affairs (MoHUA) and Housing and Urban Development Corporation (HUDCO). The total floor space is approximately 90,000m^2, and it is a complex with auditoriums accommodating 100 to 500 people, medium to small conference rooms, exhibition halls, hostels, restaurants and etc. It holds cultural, art and business related events.

The operations and maintenance have been outsourced to a private sector as a revenue sharing model, and the operator at present is Old World Hospitality Pvt. Ltd. (OWH) who has signed a contract with IHC for ten years.

- OWH is responsible for daily inspection and maintenance expenses, and receives hall rental fee and banquet fee as income.
- OWH pays a part of revenue to IHC as the revenue sharing. As the total revenue increases, the revenue share also increases; therefore, IHC also benefits from increasing revenue.
- IHC receives membership fees and does part of the maintenance such as cleaning without outsourcing.
- The transparency of OWH accounting is secured as the auditor from IHC is working at the OWH office to monitor the daily accounting.



(Source:JST)

Figure A7-4-1 Sharing of Expense and Income between Owner/Operator at IHC

Table A7-4-1 Roles of Owner/Operator at IHC

Item	Owner (IHC)	Private Operator (OWH)
<Management>		
Tariff Settings	✓ (by Tariff Committee)	
Operation Guideline, Policy Making	✓	
Tender Process	✓	
Event Marketing, Programme Development		✓
Revenue Coverage	✓ (Membership Fee)	✓ (Hall Rental, Banquet Fee)
<Cost Coverage>		
Daily Inspection and O&M Expenses	✓ (Part of Cleaning)	✓
Periodical O&M Expenses	✓	
Marketing and Advertisement expenses		✓
Utility Bills		✓

(Source:IHC)

B) National Cooperative Union of India Auditorium

NCUI is an aggregate of cooperatives throughout India and built the NCUI Auditorium for the union member meetings. It has auditoriums accommodating 50 to 620 people, medium to small conference rooms and the exhibition hall. It mainly holds business related conferences.

Axis Communications (Axis), the event management company has been entrusted with the operations and management from NCUI. The contract period is for three years.

- Axis is responsible for daily inspection and maintenance expenses, and receives hall rental fee and banquet fee as income.
- Axis pays a fixed monthly fee to NCUI and also paid a fixed deposit at the time of contract. Even if the income of Axis increases, the payment to NCUI is constant, therefore, there is no upside to NCUI's revenue.
- Under the contract, NCUI is supposed to pay the periodical maintenance fee to Axis immediately, however, according to the interview; Axis makes a payment in advance and claims to NCUI.

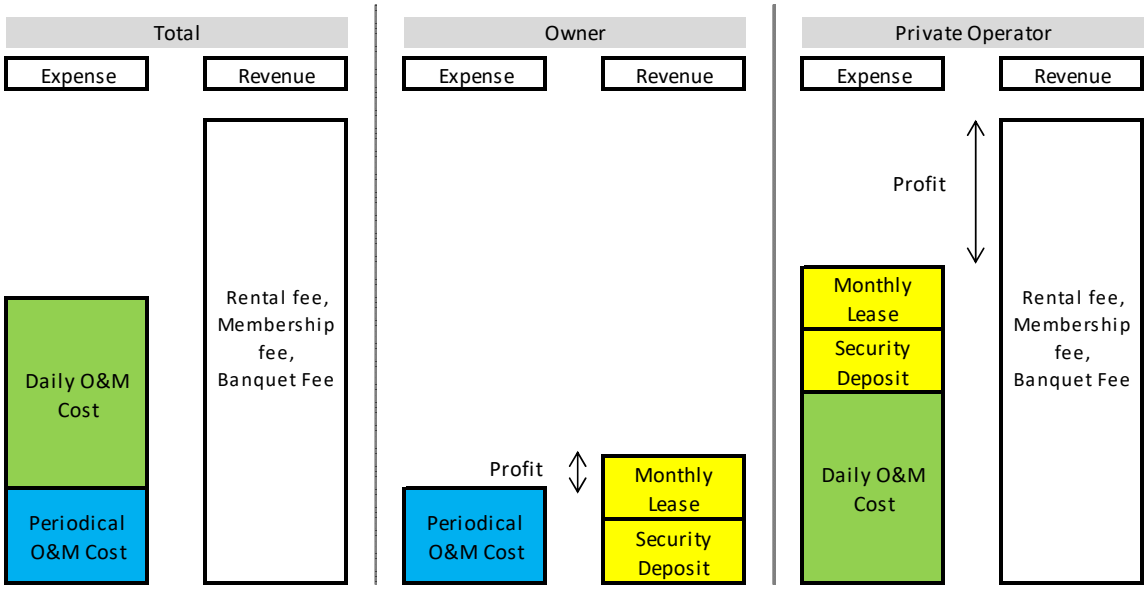


Figure A7-4-2 Sharing of Expense and Income between Owner/Operator at NCUI

Table A7-4-2 Roles of Owner/Operator at NCUI

Item	Owner (NCUI)	Private Operator (Axis)
<Management>		
Tariff Settings	✓ (Proposed by Axis and Decided by NCUI)	✓
Operation Guideline, Policy Making	✓	
Tender Process	✓	
Event Marketing, Programme Development		✓
Revenue Coverage		✓
<Cost Coverage>		
Daily Inspection and O&M Expenses		✓
Periodical O&M Expenses	✓	
Marketing and Advertisement expenses		✓
Utility Bills		✓

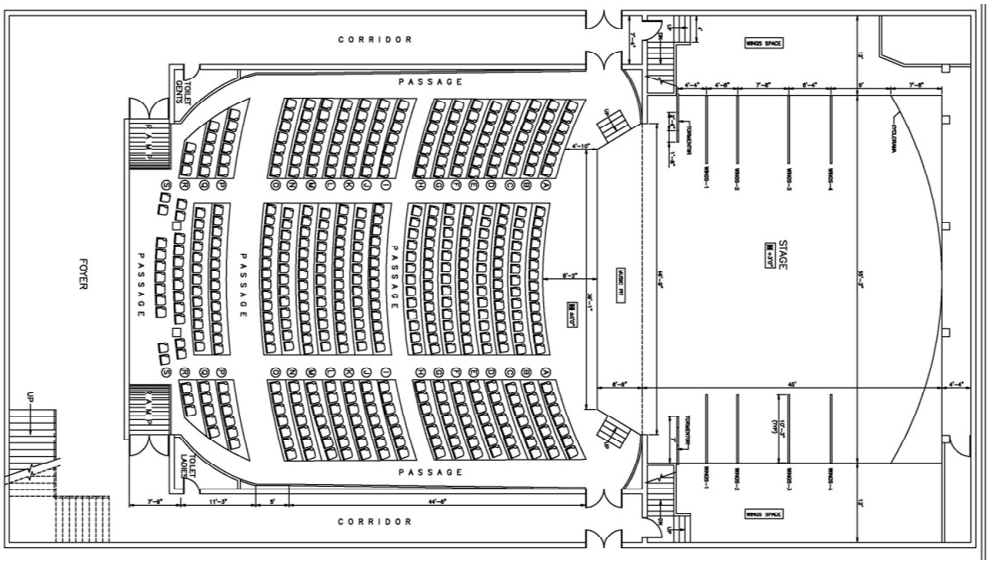
(Source:JST)

Appendix7-5 Survey repot of Existing Auditorium in India

1. KAMANI AUDITORIUM (New Delhi)

Main Hall. 632 seats. The stage size is W=15.0m ×D=14.0m.

The fixing type seat. It has cushioning mat, therefore, it is comfortable setting.



Ground floor Plan

1. Located	Mandi House area, New Delhi,
2. Year of Construction	1971
3. Management and Operation	The Bharatiya Kala Kendra Trust
4. Building Facilities	(1) Lobby (2) Canteen (3) Green Room – Two Green room (one ladies and other gents, and each shower rooms) (4) Control room (5) Toilet facilities – Ladies and gents
5. Auditorium Facilities and Equipment	(1) Seat – 632 Seats (2) Stage – a width of 15m and a depth of 14m (3) 21 flying bars (4) Flying tower – upper height of over 14 meters (5) Sound system – JBL Speakers, Crown Amplifiers and a 32 Channel Sound craft Mixer

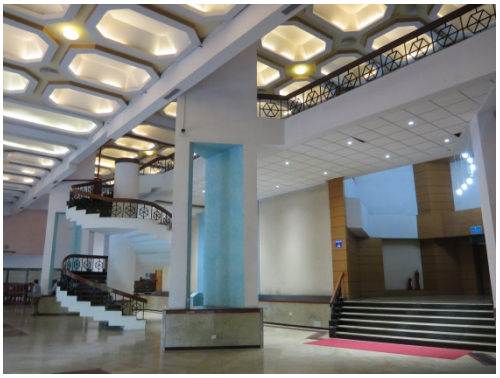
Photos and information source: http://kamaniauditorium.org/

2. Sirifort Auditorium (New Delhi)

Main Hall. 1,865 seats. The stage size is W 26.30×D 9.30m.

It has balcony seats. The lighting equipment and the Sound equipment are enriched.

Green room. It can be separate men/woman and it has shower room and toilet in both rooms.

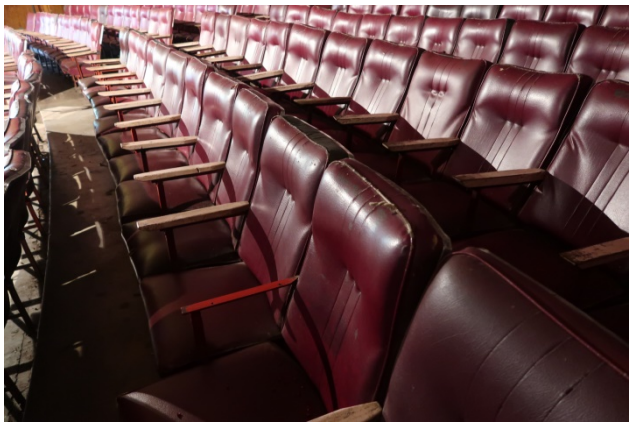


The foyer around entrance. It selled frimnk and snacks.

1. Located	August Kranti Marg, New Delhi
2. Year of Construction	1982
3. Management and Operation	Directorate of Film Festival (DFF) directly under Ministry of Information and Broadcasting
4. Building Facilities	(1) Lobby (2) Canteen Facilities – One private operates Canteen (3) Green Room – Two Green room (one ladies and other gents, and each shower rooms and Toilet) (4) Control room (5) Toilet facilities – Ladies and gents (6) VIP Lounge (7) Parking Facilities – Outside free car parking
5. Auditorium Facilities and Equipment	(1) Seat – 1865 Seats (2) Stage – a width of 26.30m and a depth of 9.30m (3) Film Screen – 16.76m x 7.31m (4) Lighting control with 2048 DMX (5) Sound System – 64 channel missing digital console Model
6. Other Information	Sirifort Auditorium has three more Auditoriums. Auditorium 2 has 396 seats, film projection system Auditorium 3 has 273 seats, Auditorium 4 has 67 seats,

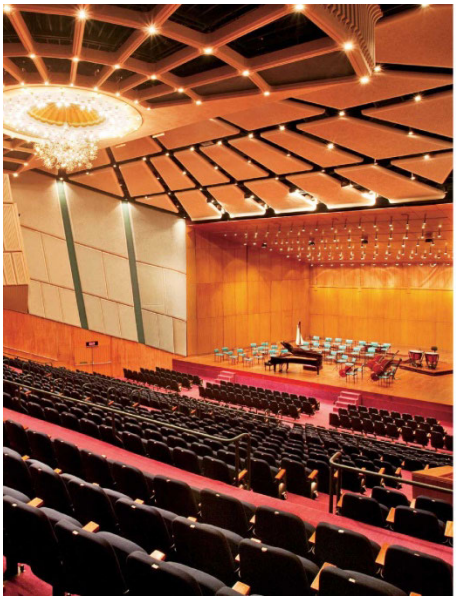
Photos and information source: http://www.delhievents.com/2008/08/siri-fort-auditorium.html

3. Nagari Natak Mandali

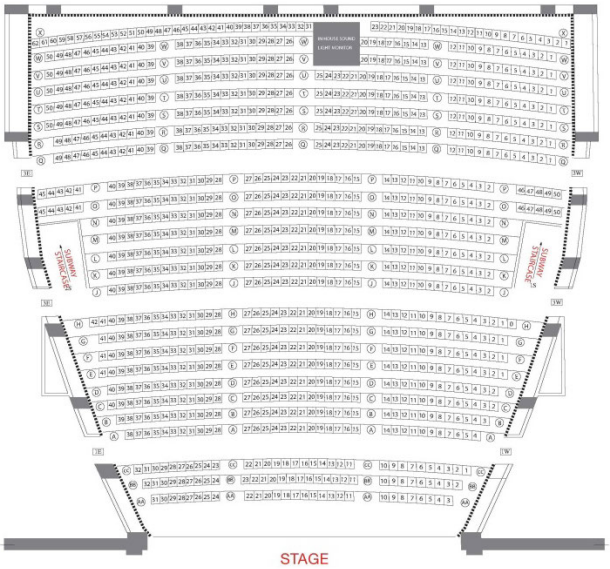
	
Hall	Stage equipment. There has few lighting bars.
	
The seat has been old. Some of them has broken.	Green room.

1. Located	Kabir Chaura, Varanasi
2. Year of Construction	1909
3. Management and Operation	Private trust
4. Building Facilities	(1) Two green room (2) Toilet facilities – Ladies and gents (3) Storage (under stage) (4) Air conditioner
5. Auditorium Facilities and Equipment	(1) Seat – 999 Seats, (only ground floor 656 seats) (2) Stage (3) Lighting control – 10 lights (4) Sound System – 10 mics (5) Generator - 15kw

4. National Centre for the Performing Arts



Jamshed bhabha theatre



Ground floor Plan

1. Located	Mumbai,
2. Year of Construction	1969
3. Management and Operation	
4. Building Facilities	(1) 5 theatres (2) Green room – 10 green room (3) Car parking – basement and open spaces
5. Auditorium Facilities and Equipment	Jamshed bhabha theatre (1) Seats – 1109 seats (2) Stage size – 23.7m x 14.6m, (3) Orchestra Pit (4) 4 control room (5) Light system – 6 light bars

Photos and information source: http://www.ncpamumbai.com/

5. Vigyan Bhawan

APPEARANCE

Main Hall

Hall 3

Hall 6 : 378 seats

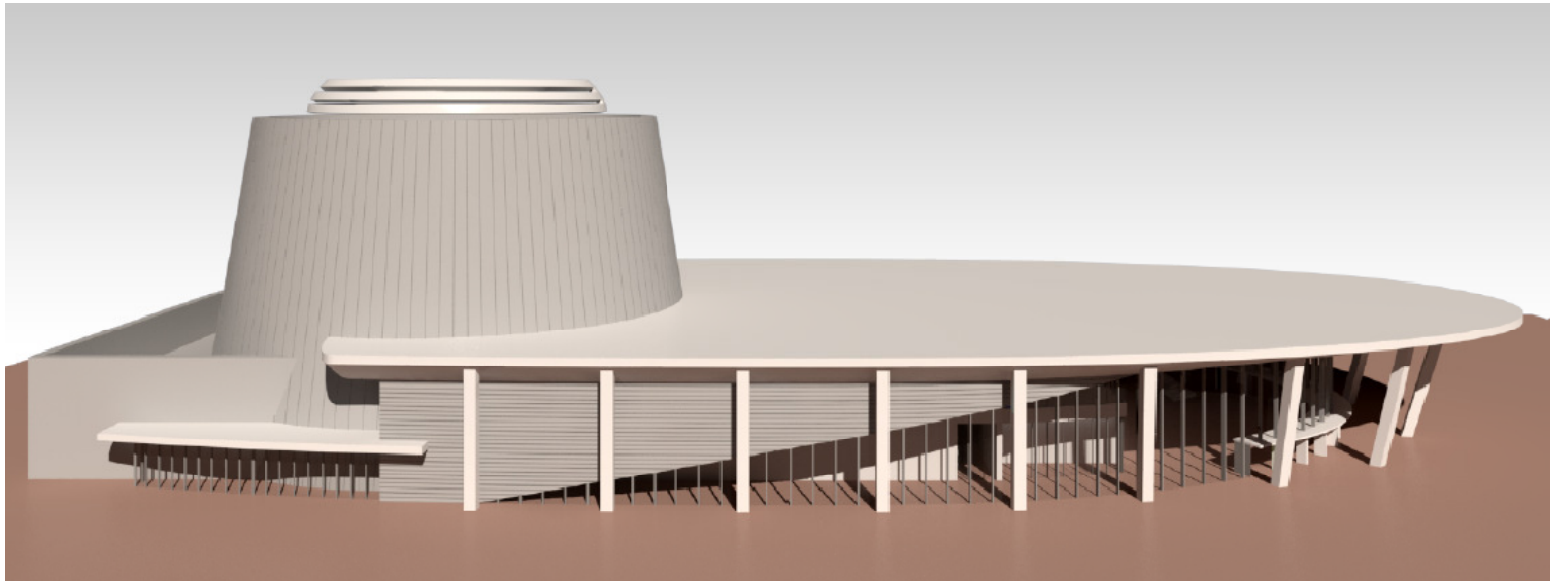
1. Located	New Delhi
2. Year of Construction	1956
3. Management and Operation	CPWD, MoHUA
4. Building Facilities	(1) Main Hall + 6 Halls Main Hall : 1,285 seats Hall 1 : 68 seats (34+34) Hall 2 : 150 seats (75+75) Hall 3 : 178 seats Hall 4 : 278 seats Hall 6 : 378 seats (2) Green room, Lounge, VIP room (3) Kitchen, WC (4) Generator

Photo source: https://i0.wp.com/blog.hubilo.com/wp-content/uploads/2017/04/4.jpg?resize=1024%2C683

GRIHA

(Green Rating for Integrated Habitat Assessment)

GREEN BUILDING RATING SYSTEM 2015 (Version 3.0)



GRIHA ASSESSMENT STUDY REPORT
VARANASI CONVENTION CENTER

March 2018

Appendix7-6 GRIHA Assessment Study Report

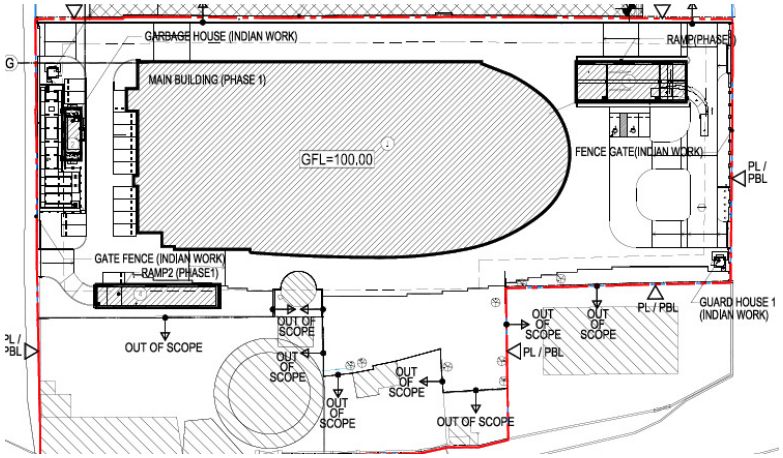
Table of Contents

Introduction

The proposed convention centre is located in Varanasi, UP.

SN	Description	Units	Data
1	Project Name		Varanasi Convention Center
2	Green Building Rating Required		3 Star GRIHA RATING
3	Total Site area	Sq. M	13196.4
4	Total Built Up Area	Sq. M	9825.51 (Including Basement & Services)
5	Total Air Conditioned Area	Sq. M	3800
6	No. of buildings	Nos.	1
7	No. of Floors	Nos.	1Basement+Ground+1Floor

As a strong step towards the social corporate responsibility and commitment for protecting the environment, the company has taken an initiative to build this building as a "Green Building". The project team has evinced keen interest in the same to achieve Green Building Rating. Godrej & Boyce fully appreciates this excellent initiative of the Project team.



Site Plan

Feasibility Study:

Godrej & Boyce was invited to conduct a feasibility study to explore and evaluate the practicability for the project to contend for GRIHA 2015 rating. The GRIHA rating system takes into account the provisions of the National Building Code 2005; the Energy Conservation Building Code 2007 announced by BEE (Bureau of Energy Efficiency) and other IS codes. GRIHA – the National Rating System will evaluate the environmental performance of a building holistically over its entire life cycle, thereby providing a definitive standard for what constitutes a 'green building'. The rating system, based on accepted energy and environmental principles, will seek to strike a balance between established practices and emerging concepts, both national and international. The following aspects of a green building design are looked into in an integrated way.

- Site planning
- Building envelope design
- Building system design (HVAC [heating ventilation and air conditioning], lighting, electrical, and water heating)
- Integration of renewable energy sources to generate energy on-site
- Water and waste management
- Selection of ecologically sustainable materials (with high recycled content, rapidly renewable resources with low emission potential and so on)
- Indoor environmental quality (maintains indoor thermal and visual comfort and air quality)

The objective of the feasibility study was to explore, evaluate and recommend:

- Methodology of achieving the prestigious Green building Rating of GRIHA
- Assessment for meeting prerequisites and credit points as mentioned in GRIHA reference guide.
- Benefits to the owner.
- Implementation of the GRIHA certification

Intangible benefits:

- Green corporate image
- Health and safety of the building occupants
- Enhanced occupant comfort
- Higher productivity of occupants
- Imbibe best operating practices from day-one
- Incorporate latest techniques / technologies

Benefits:

A green building has lower resource consumption as compared to conventional buildings. The following is the percentage reduction of various resources in a building and their respective reasons.

- Green buildings consume 40% to 60% (depending on the range of measures adopted) lesser electricity as compared to conventional buildings. This is primarily because they rely on passive architectural interventions in the building design, and high efficiency materials and technologies in the engineering design of the building.
- Green Buildings also attempt to work towards on-site energy generation through renewable energy utilization to cater to its energy needs. For instance, solar thermal systems can help generate hot-water and replace the conventional electrical geyser in buildings. Solar PV panels can help generate electricity which can reduce the buildings dependence on grid power.
- Green buildings consume 40% to 80% (depending on the range of measures adopted) lesser water as compared to conventional buildings. By utilizing ultra low-flow fixtures, dual plumbing systems, waste-water recycling systems and rain-water harvesting, green buildings not only reduce their demand for water use but also look at on-site supply options to cater to its internal and external (landscape) water demands.
- Green buildings generate lesser waste by employing waste management strategies on site. They may also employ waste to energy or waste to resource (like manure, or
- Green buildings ensure proper safety, health and sanitation facilities for the labourers (during construction) and the occupants (while in use).
- Green buildings restrict the use of high ODP (ozone depleting potential) substances in their systems as well as in finishes.
- Green buildings offer higher image and marketability.
- Green buildings generate lesser pollution both during construction as well as while in use. Through best-practices such as proper storage of construction materials, barricading of the site to prevent air and noise pollution during construction, proper storage and disposal of waste during construction and operation, and so on, ensures reduced impact on the surrounding environment.

All of these can be achieved at a minimal incremental cost with an estimated payback period of about 3–5 years (excepting renewable energy for power generation).

Evaluation of the Study:

During the assessment study, a realistic evaluation was made on the possible points that can be aimed for. The study reveals that the project can aspire to achieve "**THREE STAR Rating**" in GRIHA Rating System, but some serious efforts would be required.

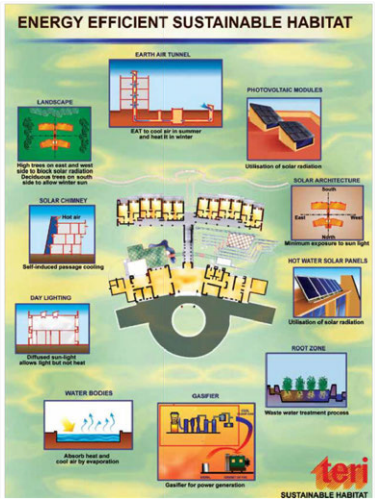
The aim would be to achieve at least 4-5 points higher than the threshold points required for the feasible / achievable and desired rating.

GRIHA
With Total 67.7 Percentile likely points the project can achieve Three Star Level
The summary of evaluation is given as under:

	GRIHA
Total points available	96
Likely / possible	65
Total (Percentile)	67.7

With the participation, ownership and wholehearted effort of the entire project team, it is possible to attempt and aim for the desired and feasible rating.

The detailed point-wise realistic evaluation and action required is highlighted in this report against the respective credits. The checklist of credit points is also attached in this report



Section Wise Break up	Points Attempted
Site Planning	3
Construction Management	9
Energy	7
Occupant comfort and Well-being	10
Water	6
Sustainable Building Materials	10
Solid Waste Management	4
Socio-Economic Strategies	6
Performance Monitoring & Validation	8
Innovation	2

TOTAL MAXIMUM POINTS APPLICABLE	96
TOTAL PERCENTILE	67.7
LIKLEY RATING	3 STAR

Sections	Criterion No.	Criterion Name	Max. Points
Site Planning	1	Site Selection	1
	2	Low-impact design	4
	3	Design to mitigate UHIE	2
	4	Site Imperviousness Factor	1
Construction Management	5	Air and water pollution control	1
	6	Preserve and protect landscape during construction	4
	7	Construction Management Practices	4
Energy	8	Energy efficiency	13
	9	Renewable energy utilization	7
	10	Zero ODP materials	0
Occupant Comfort and Well Being	11	Achieving indoor comfort requirements (visual/thermal/acoustic)	6
	12	Maintaining good IAQ	4
	13	Use of low-VOC paints and other compounds in building interiors	2
Water	14	Use of low-flow fixtures and systems	4
	15	Reducing landscape water demand	4
	16	Water Quality	2
	17	On-site water reuse	5
	18	Rainwater Recharge	2
Sustainable Building Materials	19	Utilization of BIS recommended waste materials in building structure	6
	20	Reduction in embodied energy of building structure	4
	21	Use of low-environmental impact materials in building interiors	4
Solid Waste Management	22	Avoided post-construction landfill	4
	23	Treat organic waste on site	2
Socio-Economic Strategies	24	Labour safety and sanitation	1
	25	Design for Universal Accessibility	2
	26	Dedicated facilities for service staff	2
	27	Increase in environmental awareness	1
Performance Monitoring and Validation	28	Smart metering and monitoring	8
	29	Operation, Maintenance Protocols	0
	30	Performance Assessment for Final Rating	0
	31	Innovation	4
Total			100

New Rating Thresholds	GRIHA Rating
25 – 40	1 star
41 – 55	2 star
56 – 70	3 star
71 – 85	4 star
86 or more	5 star

GRIHA: Project Checklist

Project: VARANASI CONVENTION CENTER

Cr. No.	Criterion name	Max Points	Points Attempted
	Site Planning	**8**	**3**
	Site Selection		
1	The site plan must be in conformity with the development plan/master plan/UDPFI guidelines (mandatory). This should comply with the provisions of eco-sensitive zone regulations, coastal zone regulations, heritage areas (identified in the master plan or issued separately as specific guidelines), water body zones (in such zones, no construction is permitted in the water-spread and buffer belt of 30 meter minimum around the FTL), various hazard prone area regulations, and others if the site falls under any such area (mandatory with no point allocation).		0
	The project site is a Brownfield site OR a redevelopment project OR there are at least 5 basic services (from the list given in GRIHA) within the campus or within 500m walking distance from main entrance of project.	1	1
	Criterion Total	1	1
	Low-impact design		
2	Reduction in environmental impact through design by adoption of various passive design and low-impact site planning strategies.	4	1
	2 strategies adopted - 1 points		
	Criterion Total	4	1
	Design to mitigate UHIE		
3	The percentage of total site area (visible to sky but not including the landscape area) which is either soft paved AND/OR covered with SRI coating > 0.5 AND/OR shaded by trees/vegetated pergolas/solar panels AND/OR any combination of these strategies	2	1
	More than 25% - 1 point		
	Criterion Total	2	1
	Site imperviousness factor		
4	Net Imperviousness factor of site meets the NBC 2005 norms	1	0
	Criterion Total	1	0
	Construction Management	**9**	**9**
	Air and water pollution control		
5	At least 3 measures adopted (from the list given in GRIHA) on site to curb air pollution during construction		0
	Develop and implement a spill prevention plan (to control effects of spill from hazardous materials like bitumen, diesel etc.) on site	1	1
	Criterion Total	1	1

	Preserve and protect landscape during construction		
	Applicability Check: **There are existing mature trees on site that can be preserved**	yes	
	Applicability Check: **Top soil is fertile or can be made fertile through organic means**	yes	
6	All existing mature trees on site are preserved OR transplant mature trees within the site and ensure they survive OR Plant 3 trees for every 1 tree cut of the same native/naturalized species OR any combination of these for all mature trees on site	0	
	Increase total number of trees on site by 25% above the pre-construction phase OR Plant 4 trees for every 1 tree cut of the same native/naturalized species	2	2
	Preserve top soil during construction, maintain its fertility (during construction phase) and use for landscape post-construction	2	2
	Criterion Total	4	4
	Construction Management Practices		
	Implement staging during construction on site	1	1
7	Adopt strategies to prevent/reduce movement of soil (not top soil) outside the site through adoption of various strategies (like soil erosion channels, sedimentation control etc.)	1	1
	Adopt strategies (at least 3 from the list) to manage construction water	1	1
	A construction waste management plan for segregation of construction waste, its safe storage and on-site/off-site recycling is developed and implemented in the project	1	1
	Criterion Total	4	4
	Energy	**20**	**7**
	Energy efficiency		
	Applicability Check **There are Air Conditioned buildings in the project**	yes	
	The project meets the mandatory requirements of ECBC & all fans must be BEE star rated	0	
8	Peak heat gain through building envelope (for each AC building individually) should meet the GRIHA Building Envelope Peak Heat Gain Factor thresholds	2	2
	100% of outdoor lighting lamps meet the luminous efficacy requirements of GRIHA	1	1
	The project EPI (determined through simulations) is below the GRIHA benchmark	0	
	More than 20% reduction - 3 points	10	3
	Criterion Total	13	6
9	**Renewable energy utilization**		

	Would you select Alternative 1 or Alternative 2?	**Alternative 1**	
	Alternative 1: On-site/Off-site renewable energy system installation to offset a part of the annual energy consumption of internal artificial lighting and HVAC systems (Mandatory requirements must be met through On-site renewable energy system)	7	1
	Daytime Commercial/Institutional Building		
	5% (only on site) - 1 points		
	Alternative 2: Off-site renewable energy system to offset 100% building energy demand	0	
	Criterion Total	7	1
	Low ODP materials		
10	All the insulation used in building should be CFCs and HCFCs free All the refrigerant in the HVAC and refrigeration equipment should be CFCs free The fire suppression systems and fire extinguishers installed in the building are free of halon	0	
	Criterion Total	0	
	Occupant comfort and Well-being	**12**	**10**
	Achieving indoor comfort requirements (visual/thermal/acoustic)		
	Comply with either of the two strategies to demonstrate reduction in heat gain through fenestrations and provision of sufficient daylight in indoor living areas	0	
	Would you select Alternative 1 or Alternative 2?	**Alternative 1**	
	Daylight Alternative 1		
11	The WWR and SRR to not exceed 60% and 5% respectively &; All the fenestrations meet the SHGC requirement of ECBC-2007/Weighted Façade average SHGC meets SHGC requirements of ECBC-2007 OR Alternatively use Tables 9 & 10 of SP 41 to design the shading device for the windows OR Conduct solar path analysis for windows of AC as well as non-AC spaces, to ensure that the window is completely shaded for the duration between 10:00 am on 1st April to 15:00 on 30th September OR Any combination of the above strategies on 100% of the fenestrations	0	2
	Minimum of 25% of the living area should meet adequate level of daylight (daylight factors) as prescribed in SP 41	0	
	Adequate daylight factors are achieved in more than 50% of total living area	2	
	Adequate daylight factors are achieved in more than 75% of total living area	4	
	Daylight Alternative 2		

	The mean DA requirements (300 lux or more) are met over the total living area for at least 25% of total annual analysis hours (annual analysis hours – 800 to 1800 each day) The mean DA requirements (3000 lux or more) are never exceeded over the total living area for across the total annual analysis hours (annual analysis hours – 800 to 1800 each day)	0	
	The mean DA requirements (300 lux or more) are met over the total living area for at least 50% of total annual analysis hours (annual analysis hours – 800 to 1800 each day)	0	
	The mean DA requirements (300 lux or more) are met over the total living area for at least 75% of total annual analysis hours (annual analysis hours – 800 to 1800 each day)	0	
	Artificial lighting design to fall within limits (lower and higher range limits) as recommended for space/task specific lighting levels as per NBC and to meet a minimum uniformity ratio of 0.4	0	
	The thermal comfort requirements of NBC 2005 OR ASHRAE 55 OR requirements of Indian Adaptive Comfort Model as mentioned in Appendix 1 must be met	0	
	The indoor noise levels are within the acceptable limits as specified in NBC 2005 and key noise source on site (like DG sets, chiller plants etc.) should have sufficient acoustic insulation as per NBC 2005 norms	2	2
	Criterion Total	6	4
	Maintaining good IAQ		
	Applicability Check **The project has non - AC spaces/ residential spaces with operable windows**	no	
12	Meet the minimum requirements of •CPCB National Ambient Air Quality Standard (NAAQS)for quality of fresh air; and •ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a NBC-2005 for quantity of fresh air	2	2
	Monitoring the CO2, temperature and RH at the occupied spaces or at AHUs for the air conditioned spaces	2	2
	Criterion Total	4	4
	Use of low-VOC paints and other compounds in building interiors		
13	All interior paints are low-VOC and lead-free	1	1
	All adhesives and sealants used shall be low-VOC & that interior composite wood-products do not use urea-formaldehyde as a bonding resin	1	1
	Criterion Total	2	2
	Water	**15**	**6**
	Use of low-flow fixtures and systems		
14	**Applicability Check** **All faucets, which are installed in spaces have water head heights greater than 5 m / 17 feet, in a gravity fed systems (without pressure reduction) are exempt from calculations in this criterion**	yes	
	Reduction in water demand through selection of low-flow fixtures by 30% below the GRIHA base case	0	
	Reduction in water demand through selection of low-flow fixtures by 50% below the GRIHA base case	2	2
	Reduction in water demand through selection of low-flow fixtures by 70% below the GRIHA base case	4	

	Criterion Total	4	2
	Reducing landscape water demand		
15	At least 50% - 4 points	4	4
	Criterion Total	4	4
	Water Quality		
16	**Applicability Check** **Total waste water generated on site is more than 10 clad**	yes	
	Water used for various purposes like drinking, irrigation etc. shall conform to the BIS standards	0	
	The STP & ETP installed on site meets the CPCB norms	2	0
	Criterion Total	2	0
	On-site water reuse		
17	At least 60% -4 points	5	0
	Criterion Total	5	0
	Rainwater Recharge		
18	**Applicability Check** **The CGWB norms suggest that the ground water table is high and ground water recharging should not be done**	yes	
	Recharge of surplus rainwater into aquifer (through appropriate filtration measures)	0	0
	Criterion Total	0	0
	Sustainable Building Materials	**14**	**10**
	Utilization of BIS recommended waste materials in building structure		
19	Minimum 15% replacement of OPC with fly ash or any BIS recommended waste by weight of cement used in structural concrete	1	2
	Minimum than 25% replacement of OPC with fly ash or any BIS recommended waste by weight of cement used in structural concrete	2	
	Minimum 40% of materials (by volume) in building blocks/bricks should be fly ash or any BIS recommended waste, for 100% load bearing and non-load bearing walls	2	2
	Minimum 15% replacement of OPC with fly ash or any BIS recommended waste in plaster/masonry mortar	1	2
	Minimum than 25% replacement of OPC with fly ash or any BIS recommended waste in plaster/masonry mortar	2	
	Criterion Total	6	6
	Reduction in embodied energy of building structure		
20	Not attempting	4	0
	Criterion Total	4	0
	Use of low-environmental impact materials in building interiors		
21	At least 75% - 4 points	4	4
	Criterion Total	4	4
	Solid Waste Management	**4**	**4**
22	**Avoided post-construction landfill**		

	Multi-coloured dustbins/different garbage chutes have been provided to building occupants to ensure segregation of waste at source		
	Dedicated, segregated and hygienic storage spaces in the project site to store different wastes before treatment /recycling	4	4
	Contractual tie-ups with waste recyclers for safe recycling for recyclable wastes like metal, paper, plastic, glass etc.		
	Criterion Total	4	4
	Treat organic waste on site		
23	**Applicability Check** **Total waste generation on site is equal to or more than 100 kg/day**	no	
	Strategies to treat all organic (kitchen and landscape) waste on-site and to convert it into a resource (manure, biogas etc.)	0	0
	Criterion Total	0	0
	Socio-Economic Strategies	**6**	**6**
	Labour safety and sanitation		
	Applicability Check **Families are allowed to live and work at construction sites**	yes	
24	The projects complies with the NBC (2005) safety norms for providing the necessary safety equipment and measures for construction workers	0	
	Provisions for drinking water, hygienic working & living conditions and sanitation facilities provided for the workers	0	
	Crèche facility for children of construction workers	1	1
	Criterion Total	1	1
	Design for Universal Accessibility		
25	The project complies with National Building Code norms on Requirements for Planning of Public Buildings Meant for Use of Physically Challenged	2	2
	Criterion Total	2	2
	Dedicated facilities for service staff		
26	Dedicated resting rooms for the service staff have been provided in the project	1	1
	Toilets for the service staff have been provided in the project	1	1
	Criterion Total	2	2
	Increase in environmental awareness		
27	Measures adopted to create environmental awareness	1	1
	Criterion Total	1	1
	Performance Monitoring & Validation	**8**	**8**
	Smart metering and monitoring		
	The project complies with Basic metering requirements of GRIHA	0	
28	The project complies with Extended metering requirements as mentioned in GRIHA	2	2
	Installation of one-way communicable Smart metering and monitoring system capable of tracking energy and water consumption through a web hosted portal and (also capable of the list mentioned in Appraisal 28.1.3), for at least all meters mentioned in Appraisal 28.1.1 in GRIHA	3	3

	Connect to GRIHA IT platform (linked to smart metering) to allow for two way communication on the list mentioned in Appraisal 28.1.4	3	3
	Criterion Total	8	2
	Operation & Maintenance Protocols		
29	Provision for a core facility/service group responsible for the O&M of the building's systems after installation as per GRIHA requirements. Inclusion of a specific clause in the contract document of the systems supplier for providing training to the core facility/ service group responsible for the O&M of the building systems after installation, on the operating instructions/dos and don'ts/ maintenance requirements for the specific system, as per GRIHA requirements. Development of a fully documented O&M manual/ CD/ Multimedia /information brochure enlisting the best practices for O&M of the building's systems as per GRIHA requirements	0	
	Criterion Total	0	0
	Performance Assessment for Final Rating		
	The energy systems, water systems and solid waste management systems of the building are performing as predicted and match the information provided at the time of award of provisional GRIHA rating	0	
	The visual, thermal and acoustic comfort conditions of the building meet the requirements of GRIHA Criterion 11	0	
30	Any improvement in the following 4 parameters can be attempted by the project, post-GRIHA Provisional Rating, in order to improve its overall GRIHA points tally: •Design to mitigate UHIE – Criterion 3 •Renewable energy installation – Criterion 9 •Noise levels – Criterion 11 •Innovation – Criterion 31	0	0
	Criterion Total	0	0
		96	**63**
	Innovation		
31	2 innovation strategies attempted - 2 points	4	2
	Criterion Total	4	2

Total	**65**
Total (Percentile)	**67.7**

Categories in Detail

GRIHA Rating 2015

(Green Rating for Integrated Habitat Assessment)



Criterion 1: Site Selection

Objective:
Site selection is the first step to a sustainable habitat and needs to be done appropriately. The intent of this criterion is to ensure that the site meets the relevant master plan /local development plans.

Appraisal (maximum points 1)

- 1.1.1: The site plan must be in conformity to the development plan/master plan/UDPFI guidelines (mandatory). This should comply with the provisions of the eco-sensitive zone regulations, coastal zone regulations, heritage areas (identified in the master plan or issued separately as guidelines), water body zones (in such zones, no construction is permitted in the water spread and buffer belt of 30 m minimum around the FTL), various hazard prone area regulations, and others if the site falls under any such area **(mandatory with no point allocation).**

- 1.1.2: The project site is Brownfield site or a redevelopment project or at least 5 services within the campus or within 500 meter walking distance from main entrance of the project. **(1 point)** **(Services -: Grocery Store, Pharmacy, Bank/ATM, Park, Restaurant, Community Center, Gym, School, Bus Stop)**

Google Image highlighting Basic Amenities

Compliance:

- 1.2.1: Submit documentation to demonstrate conformity to local development /master plan
- 1.2.2: Submit documentation to demonstrate either:
  - Site was a Brownfield site OR
  - that the project is a redevelopment project OR
  - at least 5 basic service are located within 500 meter walking distance from main entrance of project

Project Specific
Project team will have to provide environment clearance letter from authority and approved building plans for project during final certification.
Since the project is located within the Varanasi city hence all basic amenities will be around site within walking distance. Project team will have to provide actual photographs of all basic amenities.
Hence as per above strategy project complies for mandatory and 1 point.

MANDATORY
ANTICIPATED - 1 POINT

Criterion 2: Low Impact Design

Objective:
The intent of this criterion is to promote design strategies which enable the project to factor in ways in which the natural site features (topographical/microclimatic) can be protected and/or incorporated into the project design.

Appraisal (maximum points 4) -:

- 2.1.1: Demonstrate reduction in environmental impact through design by adoption of various passive design and low-impact site planning strategies.

Number of Strategies adopted	Points
2	1
3	2
4	4

Compliance:

- 2.2.1: Submit analysis to demonstrate compliance with the Low-Impact Design strategies mentioned in the Appraisal 2.1.1
- 2.2.2: Submit drawings to highlight the Low-Impact Design strategies integrated into the building design/site planning
- 2.2.3: Upload photographs, with descriptions, of the measures incorporated

Project Specific
Project team has adopted 3 strategies which demonstrate reduction in environmental impact through design.
Strategies are as follows-:

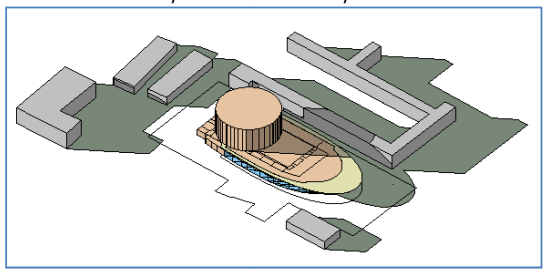
a. Annual solar insolation analysis demonstrating that the heat gain in design case is lower than GRIHA base case.
b. Sun path analysis highlighting that the building shadow will not impact neighboring building.

Hence as per above strategy project team complies for 2 points only.

ANTICIPATED	**- 1 POINT**
NOT APPLICABLE	**- 3 POINT**

Shading Analysis Conclusion:

As per results, the proposed project does not impact the other neighboring towers due to its shadow in the month of March, June, and September . Only in the month of December there will be shadow impact on neighboring building for short time period throughout the day. As per the results in the month of December the shadow on neighboring tower will be at 4:00PM to 5:00PM i.e. for 2 hours there will be shadow effect due to proposed building design. Since the above time slot is not a peak time and will not impact the efficiency of solar hot water system and solar PV system on those towers.



December 22, 1600 Hrs

Heat Gain Analysis Conclusion:

Conclusion:

As per above results the summarized table is mentioned below-:

	Glazing Area (sq ft)				
	North	East	South	West	Total
Proposed Case	0.0	4308.2	2319.8	0.0	6628.0
Baseline	1657.0	1657.0	1657.0	1657.0	6628.0
	Total Solar Energy Incident (Btu/hr sqft)				
	North	East	South	West	
Proposed Case	89.5	101.1	307.2	287.2	
Baseline	89.5	323.4	311.1	287.2	
	Total Annual Peak Heat gain (Btu/hr sqft)				
	North	East	South	West	
Proposed Case	0	435559.02	712642.56	0	
Baseline	148301.5	535873.8	515492.7	475890.4	

Total Proposed Case Btu/hr	1148201.58
Total Baseline Case Btu/hr	1675558.4
% Reduction of Insolation	31.47%

As per above results the heat gain in proposed design is 31.47% less than baseline building through Window facade. Hence project comply the GRIHA Low Impact design criterion.

Criterion 3: Design to mitigate UHIE

Objective:
The intent of this criterion is to ensure incorporation of site design strategies which assist in reduction of Urban Heat Island Effect (UHIE).

Appraisal (maximum points 2)

- 3.1.1: More than 25% of the site surfaces visible to sky (including building roofs but not the landscape area*) are either soft paved/covered with high SRI coating (SRI > 0.5)/shaded by trees/shaded by vegetated pergolas/shaded by solar panels or any combination of these strategies **– (1 point)**

- 3.1.2: More than 50% of the site surfaces visible to sky (including building roofs but not the landscape area*) are either soft paved/covered with high SRI coating (SRI > 0.5)/shaded by trees/shaded by vegetated pergolas/shaded by solar panels or any combination of these strategies **– (2 points)**

Compliance:

- 3.2.1: Submit calculations to demonstrate compliance with Appraisal 3.1.1/3.1.2.

- 3.2.2: Submit site plan, with area statements, highlighting the site surfaces (as mentioned in Appraisal 3.1.1/3.1.2) which are soft paved/covered with high SRI coating/shaded by trees/vegetated pergolas/solar panels.

- 3.2.3: Submit purchase orders for high SRI paints/tiles (if used in the project)

- 3.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed SOLAR PV system and high SRI roof sheet to reduce the urban heat island effect. Project team has highlight SRI value in technical specs of Sheet Metal Roofing
Also project team will proposed open grid pavers on surface parking area.

CRITERION 3	
Site area (sq.m.)	13196.4
Landscape area (sq.m.)	2675.8
Net site area	**10521**
Total area under :	
a. Soft paving (sq.m.)	192.5
b. Paving with vegetated roof / trees / Solar panels (sq.m.)	0
c. Paved area with SRI>0.5 (sq.m.)	0
d. Building roof area under Terrace Garden/High SRI finishes/China Mosaic (sq.m.)	4265.41
Total treated area (sq.m.)	**4457.91**
Percentage treated area (%)	**42.37323418**

ANTICIPATED - 1 POINT
NOT APPLICABLE - 1 POINT

Snap Shot of Tender Documents

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, battens, underlayment, and accessories, shall comply with requirements without failure due to defective manufacture, fabrication, or installation, or due to other defects in construction. Sheet metal roofing shall remain watertight.

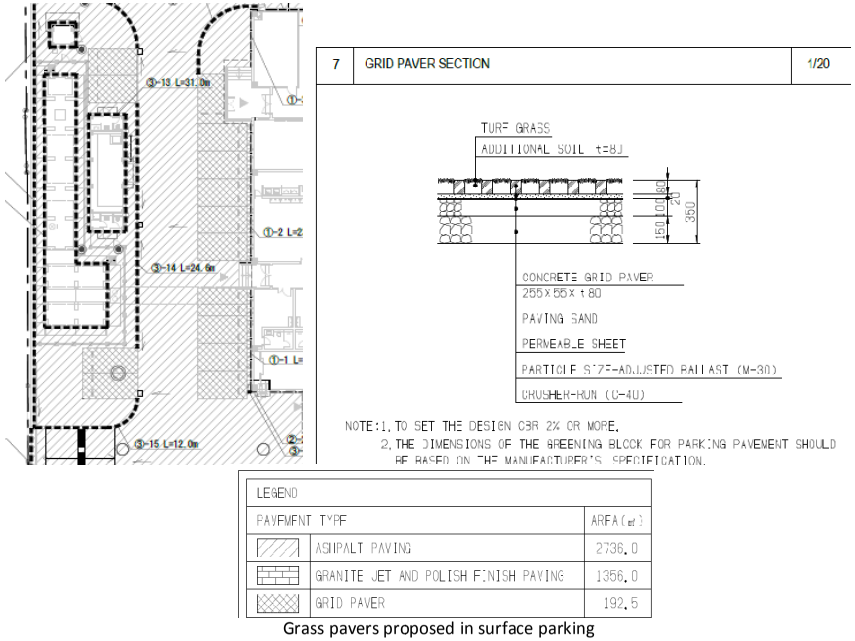
B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual," British Board of Agreement Certified No 98/3481, or applicable standard of the AHJ.

C. Energy Performance: Provide sheet metal roofing according to one of the following when tested in accordance with requirements of the AHJ:

1. Three-year, aged, solar reflectance of not less than 0.55 and emissivity of not less than 0.75
2. Three-year, aged, Solar Reflectance Index (SRI) of not less than 68 when calculated according to ASTM E 1980 or applicable standard of the AHJ.

a. SRI shall be not less than 78 at time of installation to meet the requirements of GRIHA.

Technical Specs highlighted in Sheet Metal Roofing



Grass pavers proposed in surface parking

Criterion 4: Site Imperviousness Factor

Objective:
High imperviousness on site leads to rapid runoff of rainwater, reduces urban rainwater recharge and contributes to conditions of urban flooding. The intent of this criterion is to ensure implementation of site design measures which assist in reduction of overall site imperviousness factor.

Appraisal (Maximum points 1)

- 4.1.1: Net Imperviousness factor of site meets the NBC 2005 norms & the site is designed such that post-construction storm water discharge from the site is zero* – **(1 point)**

Compliance:

- 4.2.1: Submit calculations and drawing demonstrating compliance with Net Imperviousness Factor of NBC 2005
- 4.2.2: Submit calculations demonstrating that post construction, the site does not discharge any storm water outside the site
- 4.2.3: Upload photographs, with description, of the measures implemented

Project Specific
As per NBC requirement, project team will have to maintain imperviousness factor of site below than 70%. Project team will have to reduce hard paved area.

Type of area	*Imperviousness factor (percent)*
Commercial and industrial areas	70-90
Residential areas (high density)	60-75
Residential areas (low density)	35-60
Parks and underdeveloped areas	10-20

As per attached calculation, the net imperviousness factor is 75.

Hence project does not complies credit requirement

NOT APPLICABLE - 1 POINT

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CRITERION 4			
Total site area (sq.m.)	13196.4		
Runoff Coefficients for various surfaces			
Surface type	**Run-off Co-efficient**	**Surface Area (sq.m)**	**Effective Impervious Area**
Roof			
Roofs conventional	0.95	4,265.41	4052.1395
Roof garden < 100 mm thick	0.5	0	0
Roof garden 100 - 200 mm thick	0.3	0	0
Roof garden 200 - 500 mm thick	0.2	0	0
Roof garden > 500 mm thick	0.1	0	0
Impervious Paving on site			
Concrete/ Asphalt/ Kota Paving	0.95	5,521.40	5245.33
Gravel (Open Grid Pavers)	0.5	192.5	96.25
Brick Paving	0.85	0	0
Vegetation			
Slope 0-1%	0.1	0	0
Slope 1% to 3%	0.2	2676	535.164
Slope 3% to 10%	0.25	0	0
Slope > 10%	0.3	0	0
Turf slopes			
0% to 1%	0.25	0	0
1% to 3%	0.35	0	0
3% to 10%	0.4	0	0
>10%	0.45	0	0
Total Impervious Effective Area (sq.m.)		12655.13	9928.8835
Net Impervious Factor (%)			75

Criterion 5: Air and water pollution control

Objective:
The intent of this criterion is to minimize air and water pollution during construction on site.

Appraisal (maximum points – 1)

- 5.1.1: Adopt at least 3 measures (from the list given with first being mandatory) on site to curb air pollution during construction – **(Mandatory)**
  - Provision of 3 meter high barricading around the construction area - Mandatory
  - Wheel washing facility at the vehicular entrance of the site
  - Covering of fine aggregate and excavated earth on site with plastic/geo-textile sheets
  - Water sprinkling on fine aggregate (sand) and excavated earth
  - All diesel gensets on site to have proper chimneys with their outlet facing away from the site
- 5.1.2: Develop and implement a spill prevention plan (to control effects of spill from hazardous materials like bitumen, diesel etc.) on site – **(1 point)**

Compliance:

- 5.2.1: Submit relevant sections of tender document showing that air pollution prevention measures are required to be implemented by the contractor during construction on site.
- 5.2.2: Submit narrative describing the spill prevention plan, with description of spill control measures, adopted on site
- 5.2.3: Upload photographs, with description, of the measures implemented

Project Specific
Project team will be adopting listed below measures on site to curb air pollution during construction.

1. Provision of 3 meter high barricading around the construction area - Mandatory
2. Covering of fine aggregate and excavated earth on site with plastic/geo-textile sheets
3. Water sprinkling on fine aggregate (sand) and excavated earth

Project team will also have to provide separate room for hazardous material storage to prevent spillage.

Sample Photographs

Barricading Site Boundary

Water Sprinkling & Chimneys of DG

Storage of Hazardous Waste

MANDATORY
ANTICIPATED - 1 POINT

Criterion 6: Preserve and protect landscape during construction

Objective:
The intent of this criterion is to ensure preservation of mature trees and fertile top soil on site, thereby minimizing the impact of construction activities on existing landscape.

Non-applicability :

- If there are no mature trees on site, then project is exempt from 6.1.1 & 6.1.2
- If the top soil is not fertile & can't be made fertile through organic means, then project is exempt from 6.1.3

Appraisals (Maximum points 4):

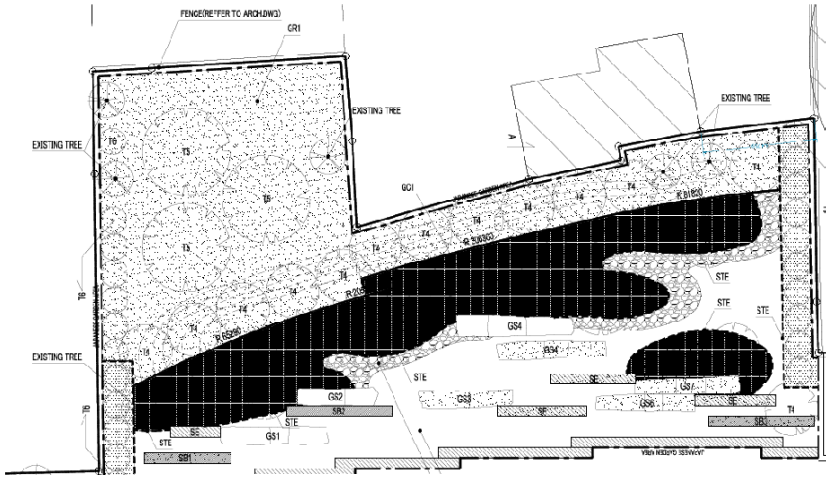
- 6.1.1: Ensure that no existing mature tree is cut on site OR transplant mature trees within the site and ensure they survive OR Plant 3 trees for every 1 tree cut of the same native/naturalized species OR any combination of these for all mature trees on site – **(Mandatory)**
- 6.1.2: Increase total number of trees on site by 25% above the pre-construction phase OR Plant 4 trees for every 1 tree cut of the same native/naturalized species – **(2 points)**
- 6.1.3: Preserve top soil during construction, maintain its fertility (during construction phase) and use for landscape post-construction – **(2 points)**

Compliance:

- 6.2.1: Submit site plan (drawing) of existing landscape plan highlighting (in different colour coding/layer) the following:
  - Existing trees which have been protected and preserved, along with table listing their species
  - Existing trees which have been transplanted
  - Existing trees which have been removed
  - Area from where top soil has been removed
  - Location on site (or off-site) where top soil will be preserved
- 6.2.2: Submit CAD drawing of proposed landscape plan highlighting (in different colour coding/layer) the following:
  - Replantation of new trees in the ratio of 1:3 for each tree which has been cut, with the details about the species that have been planted
  - Replantation of tree done in excess of 25% than the minimum requirement, with the details of the species that existed
  - Landscape area where top soil has been reapplied
- 6.2.3: Submit soil fertility test reports of site's top soil from an ICAR (Indian Council of Agricultural Research)-accredited laboratory
- 6.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed 63 number of new trees which will be planted on site and 7 trees will be retain on site.
As per proposed number of trees we can only cut 21 number of trees. Project team has to provide the list of trees which will be cut and also the approval copy from authority.

Snap Shot of Landscape Plan



LEGEND

KEY	COMMON NAME	BOTANICAL NAME	HIGHT	QTY
T1	BOTTLEBRUSH	CALLISTEMON LANCEOLATUS	4.0 m	2
T2	TEMPLE TREE	PLUMERIA	3.0 m	2
T3	GUAVA	PSIDIUM GUAJAVA	6.0 m	1
T4	CHAMPAKA	MICHELIA CHAMPAKA	6.0 m	17
T5	JACARANDA	JACARANDA MIMOSAEFOLIA	8.0 m	3
T6	ASHOKA	POLYALTHIA LONGIFOLIA	3.0 m	38

Proposed trees in tender docs

ANTICIPATED - 2 POINT

Criterion 7: Construction Management Practices

Objective:
The intent of this criterion is to ensure adoption of good construction management practices on site.

Appraisal (Maximum points 4)

- 7.1.1: Adopt staging during construction on site – **(1 point)**
- 7.1.2: Adopt strategies to prevent/reduce movement of soil (not top soil) outside the site through adoption of various strategies (like soil erosion channels, sedimentation control etc.) – **(1 point)**
- 7.1.3: Adopt strategies (at least 3 from the list below) to manage water during construction – **(1 point)**
  - Using gunny bags for curing and using ponding for curing
  - Monitoring to avoid leaks and water wastage
  - Use of additives to reduce water requirements during curing
  - Use of treated waste water/captured storm water
- 7.1.4: A construction waste management plan for segregation of construction waste, its safe storage and on-site/off-site recycling is developed and implemented in the project – **(1 point)**

Compliance:

- 7.2.1: Submit narrative detailing the following practices on site:
  - staging practices adopted during construction
  - strategies implemented to reduce soil erosion from site
  - strategies adopted to reduce potable water during construction
- 7.2.2: Submit a site plan (drawing) highlighting the following:
  - Site boundary, proposed building footprint and staging boundary on site
  - Location of measures to block soil erosion from site
  - Construction waste storage locations (primary and secondary)
- 7.2.3: Submit narrative highlighting the quantum of waste generated during construction, storage facilities for inert and hazardous wastes and measures employed for its safe disposal/recycling
- 7.2.4: Upload photographs, with description, of the measures implemented

Project Specific

Project team will have to adopt listed below strategies to manage water during construction.

- Using gunny bags for curing and using ponding for curing
- Monitoring to avoid leaks and water wastage
- Use of additives to reduce water requirements during curing

Also project team make temporary sedimentation pit at lowest contour point to reduce movement of soil. Project team will have to provide waste collection area on site for construction waste such as steel scrap, cement bags, debris and plastic.
Hence project team complies for 4 points.

Sample Photographs

Use of Gunny bags for curing during construction

Temporary Sedimentation Pit

Steel Scrap Yard

Empty Cement Bags Yard

ANTICIPATED - 4 POINT

Criterion 8: Energy efficiency

Objective:
The intent of this criterion is to ensure the energy efficiency of the project.

Appraisal (Maximum points 13)

- 8.1.1: Ensure that the project meets the mandatory requirements of ECBC* & all fans must be BEE star rated - **(Mandatory)**
- 8.1.2: Peak heat gain through building envelope (for each AC building individually) should meet the GRIHA Building Envelope Peak Heat Gain Factor thresholds – **(2 points)**

GRIHA Thresholds for Building Envelope Peak Heat Gain Factor (W/sqm)

Climate	Threshold
Composite/Hot & Dry	40
Warm and Humid	35
Moderate	30

- 8.1.3: Demonstrate that 100% of outdoor lighting fixtures (lamps + lamp housing) meet the luminous efficacy requirements of GRIHA – **(1 point)**
  All lamps + lamp housing must demonstrate luminous efficacy of at least 75 lumens/watt.
- 8.1.4: Demonstrate (through simulations) that project EPI is below GRIHA benchmark# - **(Mandatory)**
- 8.1.5: Additional reduction in EPI will be awarded points as mentioned below:

Reduction from EPI Benchmark	Points
10%	2
20%	3
30%	5
40%	7
50%	10

Compliance:

- 8.2.1: Submit documentation (narrative, specification sheets, purchase orders – reflecting full quantities) demonstrating compliance with all mandatory requirements of ECBC
- •8.2.2: Submit specification sheets and purchase orders to demonstrate that all fans being installed in the project at BEE star rated
- •8.2.3: Submit analysis demonstrating that the project complies with the GRIHA Building Envelope Peak Heat Gain Factor thresholds
- •8.2.4: Provide documentation (specification sheets & purchase orders) to demonstrate that all outdoor lamps meet the luminous efficacy levels of 75 lumens/watts
- •8.2.5: Submit narrative and drawings highlighting the various Energy Conservation Measures incorporated in the project
- •8.2.6: Provide simulation reports (along with I/O file) to demonstrate annual energy consumption and reduction vis-a-vis the GRIHA Benchmarks
- •8.2.7: Upload photographs, with description, of the measures implemented

Project Specific

8.1.1 & 8.1.3 Project team has confirmed that listed below ECBC mandatory requirement will be comply. Project team will follow ECBC 2017 to comply only ECBC requirement.

a. All ceiling fans will be atleast 3 star rated

b. Outdoor lighting system efficiency

- *100% of outdoor lighting fixtures (lamps + lamp housing) meet the luminous efficacy requirements of GRIHA i.e. at least 80 lumens/watt.*
- *Façade lighting and façade non-emergency signage of Shopping Complexes shall have separate time switches.*

Table 6-7 Exterior Building Lighting Power for ECBC Buildings

Exterior lighting application	*Power limits*
Building entrance (with canopy)	10 W/m² of canopied area
Building entrance (w/o canopy)	90 W/ linear m of door width
Building exit	60 W/lin m of door width
Building façade	5.0 W/m² of vertical façade area
Emergency signs, ATM kiosks, Security areas façade	1.0 W/m²
Driveways and parking (open/ external)	1.6 W/m²
Pedestrian walkways	2.0 W/m²
Stairways	10.0 W/m²
Landscaping	0.5 W/m²
Outdoor sales area	9.0 W/m²

c. Indoor lighting system-:

- *Over-design of artificial lighting system shall be avoided and the lighting levels in indoor spaces shall be maintained 30% less than LPD value as mentioned in ECBC norms:*

Category	LPD (W/m²)	Lamp category	LPD (W/m²)
Hospitality			
Hotel Dining	9.10	Hotel Lobby	10.9
For Bar Lounge/ Dining	14.1	Motel Dining	9.10
For food preparation	12.1	Motel Guest Rooms	7.70
Hotel Guest Rooms	9.10		
Shopping Complex			
Mall Concourse	12.8	For Family Dining	10.9
Sales Area	18.3	For food preparation	12.1
Motion Picture Theatre	9.60	Bar Lounge/ Dining	14.1
Educational			
Classroom/Lecture	13.7	Card File and Cataloguing	9.10
For Classrooms	13.8	Stacks (Lib)	18.3
Laboratory	15.1	Reading Area (Library)	10.0
Assembly			
Dressing Room	9.10	Seating Area - Performing Arts Theatre	22.6
Exhibit Space - Convention Centre	11.0	Lobby - Performing Arts Theatre	21.5
Seating Area - Gymnasium	4.60	Seating Area - Convention Centre	6.40
Fitness Area - Gymnasium	13.70	Seating Religious Building	16.4
Museum - General Exhibition	16.40	Playing Area - Gymnasium	18.8
Museum - Restoration	18.3		

Table 6-1 Interior Lighting Power for ECBC Buildings – Space Function Method

Category	LPD (W/m²)	Lamp category	LPD (W/m²)
Common Space Types			
Restroom	7.70	Stairway	5.50
Storage	6.80	Corridor/Transition	7.10
Conference/ Meeting	11.5	Lobby	9.10
Parking Bays (covered/ basement)	2.20	Parking Driveways (covered/ basement)	3.00
Electrical/Mechanical	7.10	Workshop	17.1
Business			
Enclosed	10.0	Open Plan	10.0
Banking Activity Area	12.6	Service/Repair	6.80
Healthcare			
Emergency	22.8	Recovery	8.60
Exam/Treatment	13.7	Storage	5.50
Nurses' Station	9.40	Laundry/Washing	7.50
Operating Room	21.8	Lounge/Recreation	8.00
Patient Room	7.70	Medical Supply	13.7
Pharmacy	10.7	Nursery	5.70
Physical Therapy	9.70	Corridor/Transition	9.10
Radiology/Imaging	9.10		

- *Lux Levels: Artificial lighting design to fall within limits (lower and higher range limits) as recommended space/task specific lighting levels as per NBC** and to meet a minimum uniformity ratio of 0.4*

d. Lighting Control

Interior Lighting:

- *Interior lighting in buildings> 500 m2 (5000ft2) shall be equipped with an automatic control device. Inside the building, office spaces < 30 m2 (300 ft2) shall be equipped with occupancy sensors.*
- *For other spaces, this automatic control shall function on a schedule- A schedule is provided for areas not more than 2500 m2 and not more than one floor. Occupancy sensors that shall turn off the lights within 30 min. of occupant leaving the space.*
- *Luminaries located in day lighted area >25 m2(250ft2) shall be equipped with a control device that is capable of reducing the light output of the luminaries in the day lighted areas by at least 50%. Controls only the luminaries which are located entirely in day lighted areas.*

Exterior Lighting Switch:

- *Lighting for all exterior applications shall be controlled by a photo sensor or astronomical time switch*

Exit Signs:

- *Exit signs shall not exceed 5W per face*

e. Transformers

- *The power transformer selected shall satisfy the minimum acceptable efficiency at 50% and 100% load . Permissible total loss values shall not exceed*
  - ✓ *5% of the maximum total loss values mentioned in IS 1180 for oil type transformers in voltage class above 11 kV but not more than 22 kV*
  - ✓ *7.5% of the maximum total loss values mentioned in above IS 1180 for oil type transformers in voltage class above 22 kV and up to and including 33 kV*
- *Transformer losses shall be measured by using calibrated digital meters of class 0.5 or better. For transformers of capacity ≥ 500kVA shall be equipped with additional current transformers(CTs) and potential transformers(PTs) for loss monitoring*
- *All electricity supplies exceeding 100A, 3 phases shall maintain their power factor between 0.95 lag and unity at point of connection*

f. Energy efficient motors

- *All poly phase motors of (capacity >0.375 kW and operating hours >1500 hours/year) and (capacity >50kW and operating hours >500 hours/day) shall follow minimum efficiency level as per IS 12615 for energy efficient motors and shall have motors of IE 2 (high efficiency) class or a higher class*
- *Motor horsepower rating shall not exceed 20% of the calculated maximum load being served.*
- *Motor nameplate shall list nominal full load efficiencies and full load power factor.*

g. Diesel Generator (DG) Sets

BEE star rated DG sets shall be used in all compliant buildings.

(a) minimum 3 stars rating in ECBC Buildings

h. Uninterruptible Power Supply (UPS)

In all buildings, UPS shall meet or exceed the energy efficiency requirements listed in Table 7-4. Any Standards and Labeling program by BEE shall take precedence over requirements listed in this section.

Table 7-4 Energy Efficiency Requirements for UPS for ECBC, ECBC+, SuperECBC building

UPS Size	*Energy Efficiency Requirements at 100% Load*
kVA< 20	90.2%
20<=kVA <= 100	91.9%
kVA > 100	93.8%

i. Unitary air-conditioners ,split air conditioners shall meet table 5.3

Table 5-3 Minimum Requirements for Unitary, Split, Packaged Air Conditioners in ECBC Building

Cooling Capacity (kWr)	Water Cooled	Air Coole
≤ 10.5	NA	BEE 3 St
> 10.5	3.3 EER	2.8 EE

j. Variable Refrigerant Flow (VRF) systems shall meet or exceed the efficiency requirements specified in Table 5-6 as per the ANSI/AHRI Standard 1230 while the Indian Standard on VRF is being developed. BEE Standards and Labeling requirements for VRF shall take precedence over the current minimum requirement.

*Table 5-6 Minimum Efficiency Requirements for VRF Air conditioners for ECBC Building**

		For Heating or cooling or both	
Type	Size category (kWr)	EER	IEER
VRF Air Conditioners, Air cooled	< 40	3.28	4.36
	>= 40 and < 70	3.26	4.34
	>= 70	3.02	4.07

* The revised EER and IEER values as per Indian Standard for VRF corresponding to values in this table will supersede as and when the revised standards are published.

k. Piping & Duct Work:

Piping for heating system shall have minimum R-4 insulation for design operating temperature ≥ 60C, and minimum R-2 insulation for design operating temperature ≥40C and <60 C.

Piping for cooling system with design operating temperature <15C, and refrigerant suction piping for split system shall have minimum R-2 insulation. The insulation exposed shall be protected by aluminium sheet metal, painted canvas, or plastic cover

Insulation of ductwork shall be in accordance with ECBC Table 5.11

Table 5-11 Ductwork Insulation (R value in m².K/W) Requirements

Duct Location	Supply ducts	Return ducts
Exterior	R -1.4	R -0.6
Unconditioned Space	R -0.5	None
Buried	R -0.5	None

l. System Balancing:

HVAC System Balancing with report serving zones for air-conditioned area exceeding 500 m2

Air System Balancing to minimize throttling losses and adjust fan speed to meet design flow conditions (for fan system with capacity >0.75 kW (1 hp)).

Hydronic System Balancing to minimize throttling losses and adjust pump speed or trim pump impeller to meet the design flow conditions

l. AHU: All AHU motors should have minimum efficiency as mentioned below-:

Table 5-12 Mechanical and Motor Efficiency Requirements for Fans in ECBC Buildings

System type	*Fan Type*	*Mechanical Efficiency*	*Motor Efficiency (As per IS 12615)*
Air-handling unit	Supply, return and exhaust	60%	IE 2

m. Pumps:

Chilled and condenser water pumps shall meet or exceed the minimum energy efficiency requirements specified in Table 5-15 through Table 5-17. Requirements for pumps in district chiller systems and hot water pumps for space heating are limited to the installed efficiency requirement of individual pump equipment only. To show compliance, calculate the total installed pump capacity in kilo watt and achieve the prescribed limits per kilo watt of refrigeration installed in the building.

Table 5-15 Pump Efficiency Requirements for ECBC Building

Equipment	*ECBC*
Chilled Water Pump (Primary and Secondary)	18.2 W/ kW, with VFD on secondary pump
Condenser Water Pump	17.7 W/ kW,
Pump Efficiency (minimum)	70%

Snap Shot of Tender Documents

1. Project team has included the ECBC requirement of transformers in tenders

Maximum Allowable Power Transformer Losses

Maximum allowable losses for oil filled hermetically sealed distribution transformers with highest voltage for equipment 36 KV, at 50% and 100% of the load (as per ECBC).

TRANSFORMER CAPACITY KVA	MAXIMUM ALLOWABLE LOSSES (kW) AT 50% KVA OR LOAD (%)	MAXIMUM ALLOWABLE LOSSES (kW) AT FULL LOAD / RATED KVA (%)
1000	3.00	9.00

Transformer losses mentioned in tender specs

2. Project team has included the ECBC requirement of pump efficiency in tenders

PDW	01	Water lift pump	50 x 40 φ × 200 L/min × 60 mAq (Stainless steel)
	02		Type Centrifugal
			Accessories Rubber vibration isolation base
			Efficiency more than 70%
PDWU	01	Domestic water pump unit	50 φ × 200 L/min × 60 mAq × 2 (Stainless steel)
			Type booster pump unit
			Accessories Rubber vibration isolation base
			Control panel with inverter
			Pressure gauge
			Pressure tank
			Alternate operating system for two pumps
			Efficiency more than 70%
FU	01	Domestic water filter unit	100 L/min Stainless casing
			RO filter
PIWU	01	Irrigation water pump unit	50 φ × 200 L/min × 40 mAq × 2 (Stainless steel)
			Type booster pump unit
			Accessories Rubber vibration isolation base
			Control panel with inverter
			Pressure gauge
			Pressure tank
			Alternate operating system for two pumps

Pumps efficiency mentioned in tender specs

3. Project team has included the ECBC requirement of air cooled chiller efficiency in tenders

Specification						
Type	Air cooled screw chiller					
Cooling capacity	104 TR	366 kW		Outdoor temperature	43 degree	
Heating capacity	- TR	- kW				
Chilled water	1,134 L/min	12-7 degree		Pressure drop	27.2 kPa	
COP 3	IPLV 3.7	(ECBC 2017 Table 5-2)				
Refrigerant	R134a					
Accessories	Control panel					
	Spring vibration isolation base					

Chiller COP mentioned in tender specs

Snap Shot of Tender Documents

4. Project team has included the ECBC requirement of AHU motor efficiency in tenders

Air handling unit	Type	FAHU Outdoor water proof
		AHU Indoor floor mounted
	Insulation	Sandwich panel with SUS bolts
	Fan	Centrifugal fan or Plug fan
	Vibration	Spring vibration isolation base
	Motor	4 pole, High efficiency (IE2)
	Filter	Pre MERV 7
		Main MERV 13
	Chilled water	7-12 degree
	Accessories	Marine lump
		Maintenance hatch, 100% Spare filter

AHU motor efficiency mentioned in tender specs

5. Project team has included the ECBC requirement of VRV and Spilt units efficiency in tenders

Air cooled DX unit	1. Air condition: Outcoor DB 43 degree, Indoor DB 24 degree.
	2. Indoor unit is concealed type or Wall mounted type
	3. Specification of cabling, refrigerant pipe, and heat insulation is manufacture standard.
	4. Power supply to unit is Electrical work.
	5. Control wiring between unit and controller is included.
	6. Out door unit noise level is less than 65dB(A)
	7. Indoor unit air flow is strong notch and ESP is external static pressure.
	8. Filter is more than MERV 8.
	9. Vibration: Spring vibration isolation for outdoor unit and Spring hanger for indoor unit.
	10. Accessories: Remote control switch, Drain up system, 100% spare filter, air chamber for concealed indoor unit and standard accessories.
	11. Operation condition should be kept during power cut and recovery.
	12. ACL/DCL should be installed for Inverter in outdoor unit.
	13. High water level alarm function should be installed in indoor drain pan with float switch.
	14. Drain leak sensor should be installed in indoor unit..
	15. Drain pan and filter has antibacteria specification.
	16. Connection point to BMS for operation, alarm and condition.
	17. Concrete base is building work for VRV outdoor unit, Split system outdoor unit include concrete base.
	18. COP: VRV > BER 3.28, Split type > BEE 3 star

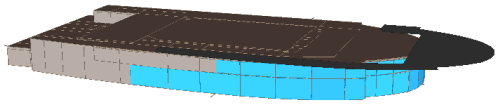
Air Cooled DX unit Efficiency mentioned in tender specs

8.1.2 & 8.1.4

Energy Conservation Features:

Following are the Energy Conservation measures which were proposed for the preliminary analysis:

1. AAC blocks with insulation for external wall
2. PUF insulation on roof
3. Better thermal properties of Glass SHGC - 0.27
4. Better orientation to reduce thermal heat gain
5. Low Window Wall ration to reduce heat gain
6. Optimize design of interior Lighting layout with 0.9 LPD (W/sqft)
7. AHU with VSD and two way valve
8. Primary & Secondary pumping with VFD
9. Air cooled screw chiller with COP 3.1 at ARI condition
10. VRV system for office and supporting zone having 4 COP.



3D-Views

CRITERION 8	
Climate	Composite
Total Envelope Area (sq meter)	2,481.2
Sensible Heat Gain	
Wall Conduction (Watt)	16228
Roof Conduction (Watt)	11902
Window Glass+Frame Conduction (Watt)	32610
Window Glass Solar	9534
Total Sensible Heat Gain From Envelope (watt)	70274
Watt /sqm	28.32228032

	SENSIBLE (KBTU/H)	SENSIBLE (KW)	LATENT (KBTU/H)	LATENT (KW)
WALL CONDUCTION	55.386	16.228	0.000	0.000
ROOF CONDUCTION	40.623	11.902	0.000	0.000
WINDOW GLASS+FRM COND	111.297	32.610	0.000	0.000
WINDOW GLASS SOLAR	32.541	9.534	0.000	0.000
DOOR CONDUCTION	0.000	0.000	0.000	0.000
INTERNAL SURFACE COND	0.000	0.000	0.000	0.000
UNDERGROUND SURF COND	6.686	1.959	0.000	0.000
OCCUPANTS TO SPACE	374.451	109.714	226.576	66.387
LIGHT TO SPACE	86.789	25.429	0.000	0.000
EQUIPMENT TO SPACE	386.910	113.365	0.000	0.000
PROCESS TO SPACE	0.000	0.000	0.000	0.000
INFILTRATION	0.000	0.000	0.000	0.000
TOTAL	1094.682	320.742	226.576	66.387
TOTAL / AREA	0.018	0.056	0.004	0.012

Annual Energy Consumption

The following tabulated values determine the annual energy consumption of the building.

kWh X 1000	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Space Cool	12.94	15.68	19.45	27.46	33.82	38.37	32.89	32.69	31.1	26.65	19.47	15.76	306.27
Vent. Fans	3.3	3.35	3.69	4.4	4.83	5.31	4.56	4.52	4.37	4.29	3.84	3.36	49.84
Pumps & Aux.	0.57	0.49	0.56	0.83	1.19	1.27	1.3	1.3	1.27	0.99	0.54	0.5	10.81
Area Lights	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	7.35	88.22
Total	24.16	26.87	31.05	40.04	47.19	52.3	46.1	45.86	44.09	39.28	31.2	26.97	455.14

Note -: We have assume Building is operating for 13 hours & 5 days a Week. Also project team has removed equipment consumption to determine EPI of building as GRIHA guidelines

Description	Units	Values
Benchmark EPI = (90 * (13/8))	kWh/Sqm/year	146
Total Area	Sq meter	4,000
Total Annual kWh Consumption	kWh/year	455,140
Project Benchmark EPI	kWh/Sqm/year	113.8
% Reduction	%	22.2%
Total Points	points	3

ANTICIPATED - 06 POINT

NOT APPLICABLE - 07 POINT

A-7-6-25

Appendix7-6 GRIHA Assessment Study Report

Criterion 9: Renewable energy utilization

Objective:
To optimize use of energy systems in buildings that maintain a specified indoor climate conducive to the functional requirements of the building.

Appraisal (maximum points – 7 points)

- 9.1.1: On-site/Off-site renewable energy system installation to offset a part of the annual energy consumption of internal artificial lighting and HVAC systems as mentioned in the table below:

Daytime Commercial/ Institutional Buildings	Residential Buildings	24 X 7 occupied buildings	Points
2.5% (Only Site)	-	0.5% (Only Site)	Mandatory
5%	5%	1%	1
10%	10%	3%	2
15%	15%	5%	4
20%	20%	7%	5
25%	25%	10%	7

OR

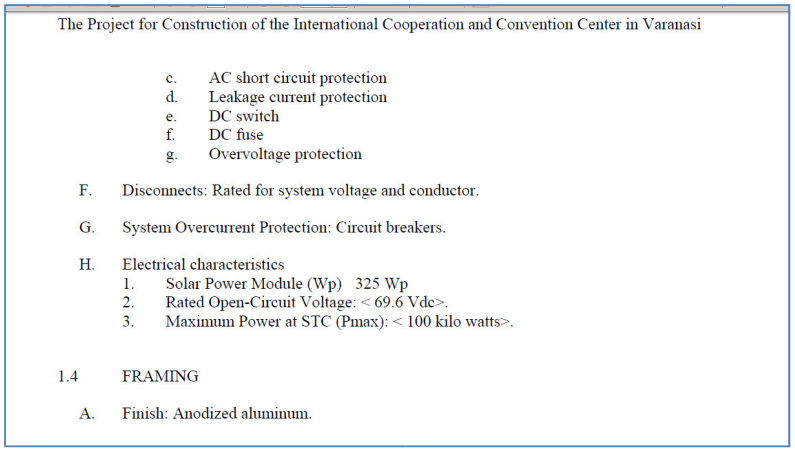
- 9.1.2: Off-site renewable energy system to offset 100% building energy demand (this appraisal is available for only non-residential buildings) – **Mandatory +7 points**

Compliance:

- 9.2.1: Submit calculations/simulations for renewable energy system sizing & on-site annual energy generation potential
- 9.2.2: Submit specification sheets and purchase orders (reflecting full quantities) of the renewable energy system, highlighting the panel performance (as tested under standard test conditions)
- 9.2.3: Submit drawings in CAD format to show location of renewable energy systems
- 9.2.4: Submit documents supporting off-site generation of energy through renewable energy systems. These may be either: Renewable Energy Certificates (RECs) for at least 2 years along with a declaration that the RECs are not being used for any other obligatory requirements and will be purchased every year OR Power Purchase Agreement from the utility for purchase of green power. In the agreement, the address of the particular site must be mentioned
- 9.2.5: Upload photographs, with description, of the measures implemented

Project Specific

Project team has proposed 100 KW Solar PV system which will comply GRIHA requirement.



The Project for Construction of the International Cooperation and Convention Center in Varanasi

c. AC short circuit protection
d. Leakage current protection
e. DC switch
f. DC fuse
g. Overvoltage protection

F. Disconnects: Rated for system voltage and conductor.

G. System Overcurrent Protection: Circuit breakers.

H. Electrical characteristics
1. Solar Power Module (Wp) 325 Wp
2. Rated Open-Circuit Voltage: < 69.6 Vdc>.
3. Maximum Power at STC (Pmax): < 100 kilo watts>.

1.4 FRAMING

A. Finish: Anodized aluminum.

Solar PV Technical Specs

Hence project team complies mandatory requirement.

MANDATORY	
ANTICIPATED	- 05 POINT
NOT APPLICABLE	- 02 POINT

Criterion 10: Low ODP materials

Objective:
The intent of this criterion is to ensure use of materials in building insulation, HVAC & refrigeration equipment and fire fighting systems with low ozone depleting potential.

Appraisal (maximum points – No points)

- 10.1.1 All the insulation used in building should be CFCs and HCFCs free –**(Mandatory)**
- 10.1.2 All the refrigerant in the HVAC and refrigeration equipment should be CFCs free – **(Mandatory)**
- 10.1.3 The fire suppression systems and fire extinguishers installed in the building are free of halon – **(Mandatory)**

Compliance:

- 10.2.1: Submit specification sheets & purchase orders (reflecting full quantities) highlighting that the insulation, HVAC system, refrigeration equipment and fire fighting systems comply with Appraisal 10.1.1

Project Specific
Project team has proposed clean agent fire extinguisher system in technical specification.
In all chillers HFC based refrigerant will be used and in VRV and Split units CFC free refrigerant will be used.
All insulation proposed in project are CFC and HCFC free

.

MANDATORY

Snap Shot of Provision in Technical Docs

1.3 CLEAN AGENT SYSTEMS

A. Performance Requirements:

1. Discharge HFC 227ea within 10 seconds and maintain 7.1 percent concentration. Minimum 620-psig (4278-kPa) calculated working pressure and 360-psig (2484-kPa) initial charging pressure.
2. Discharge FK-5-1-12 within 10 seconds and maintain 6.6 percent concentration. Minimum 620-psig (4278-kPa) calculated working pressure and 360-psig (2484-kPa) initial charging pressure.
3. Discharge IG-541 within 60 seconds and maintain 38 percent concentration. Minimum 2175-psig (15-MPa) calculated working pressure upstream from orifice union, minimum 1000-psig (6895-kPa) calculated working pressure downstream from orifice union, and 2175-psig (15-MPa) initial charging pressure.

Clean Agent First Extinguisher Technical Specs

	Equipment name	Specification
	Air cooled chiller	Type Air cooled screw chiller
		Cooling capacity 104 TR 366 kW Outdoor temperature 43 degree
		Heating capacity - TR - kW
		Chilled water 1,134 L/min 12-7 degree Pressure drop 27.2 kPa
		COP 3 IPLV 3.7 (ECBC 2017 Table 5-2)
		Refrigerant R134a
		Accessories Control panel
		Spring vibration isolation base

Air Cooled Chiller Technical Specs

A-7-6-27

Criterion 11: Achieving indoor comfort requirements (visual/thermal/acoustic)

Objective:
The intent of this criterion is to ensure that the building spaces are designed to deliver visual, thermal and acoustical comfort to building occupants.

Appraisal (maximum points – 6 points)

- 11.1.1: Demonstrate compliance with either of the alternatives mentioned – **(Partly Mandatory)**

Alternative 1	Alternative 2
The WWR and SRR to not exceed 60% & 5% respectively &; All the fenestrations meet the SHGC requirement of ECBC-2007/Weighted Façade average SHGC (for each orientation) meets SHGC requirements of ECBC-2007 OR; Alternatively use Tables 9 & 10 of SP 41 to design the shading device for the windows. OR; Conduct solar path analysis for windows of AC as well as non-AC spaces, to ensure that the window is completely shaded for the duration between 10:00 am on 1st April to 15:00 on 30th September OR; Any combination of the above strategies on 100% of the fenestrations – Mandatory	•Demonstrate that the mean DA requirements (300* lux or more) are met over the total living area for at least 25% of total annual analysis hours (area-weighted) – Mandatory •Demonstrate that the mean DA requirements (3000 lux or more) are never exceeded over the total living area for across the total annual analysis hours – Mandatory
Minimum of 25% of the living area should meet adequate level of daylight (daylight factors) as prescribed in SP 41 – Mandatory	Demonstrate that the mean DA requirements (300* lux or more) are met over the total living area for at least 50%/75% of total annual analysis hours (area-weighted) – 2/4 points annual analysis hours – 800 to 1800 each day
If the adequate daylight factors are achieved in more than 50%/75% of total living area - 2 /4 points	

- 11.1.2: Artificial lighting design to fall within limits (lower and higher range limits) as recommended space/task specific lighting levels as per NBC** and to meet a minimum uniformity ratio of 0.4 – Mandatory
- 11.1.3: Demonstrate that project can achieve the thermal comfort requirements# of NBC 2005 OR ASHRAE 55 OR requirement of Indian Adaptive Comfort Model as mentioned in Appendix 1 – **(Mandatory)**
- 11.1.4: The indoor noise levels should be within the acceptable limits as specified in NBC 2005 and key noise source on site (like DG sets, chiller plants etc.) should have sufficient acoustic insulation as per NBC 2005 norms - **(2 points)**

Compliance:

- 11.2.1: Submit drawings (floor plans, relevant elevations and sections and doors-windows schedule) for the project, detailing various shading devices
- 11.2.2: Submit narrative providing overview of compliance with all appraisals of the criteria
- 11.2.3: Appraisal 11.1.1 – Alternative 1: Submit calculations detailing the WWR and SRR of the project
- 11.2.4: Appraisal 11.1.1 – Alternative 1: Submit calculations demonstrating that all fenestrations comply with either SHGC requirements and/or shading requirements
- 11.2.5: Appraisal 11.1.1 – Alternative 1: Submit simulation reports demonstrating that at least 25% (or more) of total living area of project meets daylight factor requirements of SP 41
- 11.2.7: Submit artificial lighting simulation reports demonstrating that the artificial lighting levels meet the NBC 2005 recommended levels and uniformity of 0.4
- 11.2.8: Submit interior artificial lighting layout drawings
- 11.2.9: Submit simulation reports to demonstrate that thermal comfort conditions as specified in Appraisal 11.1.3 are met in the project
- 11.2.10: Submit drawings and narratives highlighting various measures adopted to meet indoor noise levels of NBC 2005 and to limit noise from noise sources mentioned in Appraisal 11.1.4
- 11.2.11: Submit specification sheets, purchase orders (reflecting full quantities) and BOQ of relevant products used in building to meet Appraisals 11.1.1 – 11.1.4 including but not limited to the following:

  •Glass specifications

  •Interior lamps and luminaries

  •Thermal insulation

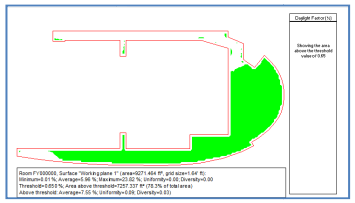
  •Acoustic insulation
- 11.2.12: Upload photographs, with description, of the measures implemented

Project Specific

1. Project team will opt Alternative 1 to comply credit requirement. WWR of the project is less than 40% and project team will be using glass having SHGC <=0.25 which comply ECBC requirement.

Recommended Daylight Factors for Different areas		
S.No	**Location**	**Daylight Factor**
1	Office & Conference Room	1.9
2	Foyer	.625

Kindly note that auditorium, stage and dressing room area are excluded from calculation as per GRIHA guidelines.

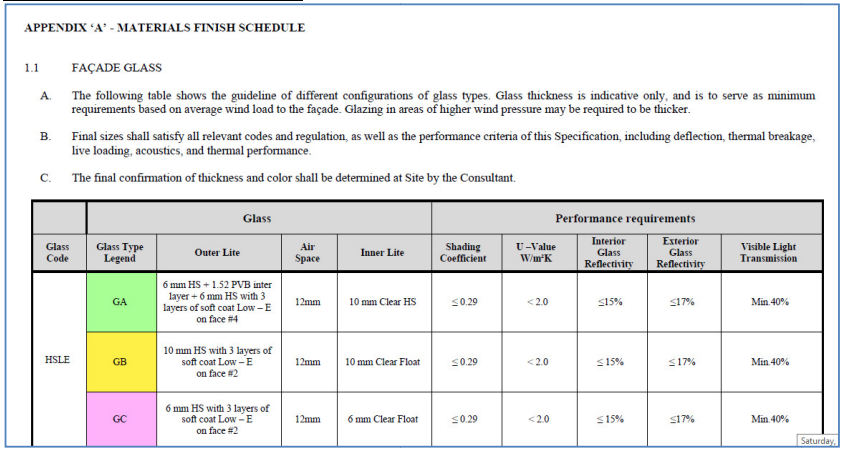


S.No	Level	Description	Regularly Occupied Area (sq ft)	% of Area Getting DF	Regularly Occupied Area Getting Daylight Factor (sq ft)
1	Ground Floor	Foyer	9271	78.30%	7257
2	Ground Floor	Admin Office	694	0%	0
3	Ground Floor	Meeting Room 1	745	0%	0
4	Ground Floor	Meeting Room 2	671	0%	0
5	Ground Floor	VIP Room	441	0%	0
6	First Floor	Foyer	2761	0%	0
			14583		7257
		% of Regularly Occupied Area Getting Daylight Factor 1.9			64.20%

2. Project team has performed a thermal comfort analysis of all occupied conditioned zone. As per results all zone achieve thermal comfort as mentioned in ASHRAE 55
3. Over-design of artificial lighting system shall be avoided and the lighting levels in indoor spaces shall be maintained 30% less than LPD value as mentioned in ECBC Table 7.2
4. Lux Levels: Artificial lighting design to fall within limits (lower and higher range limits) as recommended space/task specific lighting levels as per NBC and to meet a minimum uniformity ratio of 0.4
5. All DG sets and chiller plant will be properly acoustically insulated to reduce noise and complying NBC norms.

ANTICIPATED - 4 POINT
NOT APPLICABLE - 2 POINT

Snap Shot of Tender Documents



APPENDIX 'A' - MATERIALS FINISH SCHEDULE

1.1 FAÇADE GLASS

A. The following table shows the guideline of different configurations of glass types. Glass thickness is indicative only, and is to serve as minimum requirements based on average wind load to the façade. Glazing in areas of higher wind pressure may be required to be thicker.

B. Final sizes shall satisfy all relevant codes and regulation, as well as the performance criteria of this Specification, including deflection, thermal breakage, live loading, acoustics, and thermal performance.

C. The final confirmation of thickness and color shall be determined at Site by the Consultant.

	Glass				Performance requirements				
Glass Code	Glass Type Legend	Outer Lite	Air Space	Inner Lite	Shading Coefficient	U –Value W/m²K	Interior Glass Reflectivity	Exterior Glass Reflectivity	Visible Light Transmission
HSLE	GA	6 mm HS + 1.52 PVB inter layer + 6 mm HS with 3 layers of soft coat Low – E on face #4	12mm	10 mm Clear HS	≤ 0.29	< 2.0	≤15%	≤17%	Min 40%
	GB	10 mm HS with 3 layers of soft coat Low – E on face #2	12mm	10 mm Clear Float	≤ 0.29	< 2.0	≤ 15%	≤ 17%	Min 40%
	GC	6 mm HS with 3 layers of soft coat Low – E on face #2	12mm	6 mm Clear Float	≤ 0.29	< 2.0	≤ 15%	≤17%	Min 40%

Glass properties in tender docs

Criterion 12: Maintaining good IAQ

Objective:
Maintenance of good indoor air quality is imperative for ensuring healthy living conditions for the building occupants. The intent of this criterion is to ensure design and monitoring of ventilation systems such that indoor air quality meets the minimum requirements, as recommended in the standards.
.

Non-applicability: Appraisal 12.1.1 is not applicable for non-AC spaces/residential spaces with operable windows

Appraisal (maximum points – 4)

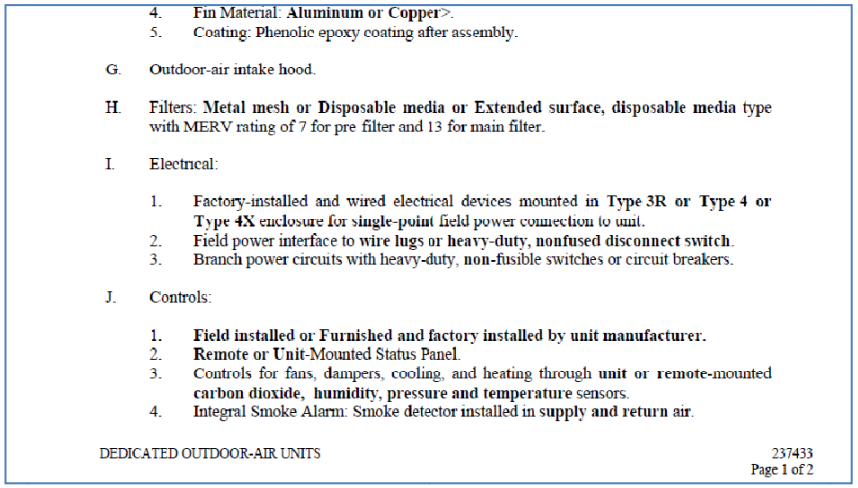
- 12.1.1: Meet the minimum requirements of
  - CPCB National Ambient Air Quality Standard (NAAQS)for quality of fresh air; and
  - ASHRAE Standard 62.1–2010, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata), or a NBC-2005 for quantity of fresh air – **(2 points)**
  - The clause shall cover treatment of outdoor air for predominantly PM 10 and PM 2.5
- 12.1.2: Monitoring the CO2, temperature and RH at the occupied spaces or at AHUs for the air conditioned spaces – **(2 points)**

Compliance:

- 12.2.1: Submit documentation detailing the specifications of the filtration system to demonstrate that fresh air quality meet the minimum requirements of CPCB NAAQS
- 12.2.2: Submit space by space sheet Heat Load Sheet highlighting provision of sufficient fresh air in the HVAC system design as per the ASHRAE 62.1 or NBC 2005 norms
- 12.2.3: Submit drawings (floor plans and/or HVAC system plans) highlighting the location of various CO2, temperature and RH sensors
- 12.2.4: Submit specification sheets and purchase orders (reflecting full quantities) for the filters and sensors installed in the project
- 12.2.5: Upload photographs, with description, of the measures implemented

Project Specific
Project team has provide fresh air as per NBC . Also all DOAS and ERV will have MERV 8 filters . Project team has proposed CO2, temperature and RH at each conditioned zone. Hence project complies for 4 points.

Snap Shot of Tender Documents



4. Fin Material: **Aluminum or Copper**>.
5. Coating: Phenolic epoxy coating after assembly.

G. Outdoor-air intake hood.

H. Filters: **Metal mesh or Disposable media or Extended surface, disposable media** type with MERV rating of 7 for pre filter and 13 for main filter.

I. Electrical:

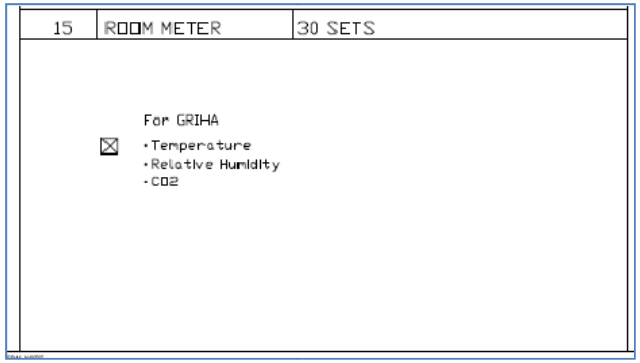
1. Factory-installed and wired electrical devices mounted in **Type 3R or Type 4 or Type 4X** enclosure for **single-point** field power connection to unit.
2. Field power interface to **wire lugs or heavy-duty, nonfused disconnect switch.**
3. Branch power circuits with heavy-duty, **non-fusible** switches or circuit breakers.

J. Controls:

1. **Field installed or Furnished and factory installed by unit manufacturer.**
2. **Remote or Unit**-Mounted Status Panel.
3. Controls for fans, dampers, cooling, and heating through **unit or remote-mounted carbon dioxide, humidity, pressure and temperature** sensors.
4. Integral Smoke Alarm: Smoke detector installed in **supply and return air.**

DEDICATED OUTDOOR-AIR UNITS 237433
Page 1 of 2

Provision of DOAS with MERV 13 filters



Provision of Temp, RH and CO2 sensor in rooms

Criterion 13: Use of low-VOC paints and other compounds in building interiors

Objective:
The intent of this criterion is to promote use of low-VOC and lead-free interior paints as well as low-VOC adhesives and sealants in order to maintain good indoor air quality for the project occupants.

Appraisal (maximum points – 2 point)

- 13.1.1: Ensure that all interior paints are low-VOC *(as mentioned in the GRIHA manual) and lead-free – **(1 point)**
- 13.1.2: Ensure that all adhesives and sealants used shall be low-VOC *& that interior composite wood-products do not use urea-formaldehyde as a bonding resin – **(1 point)**

Compliance:

- 13.2.1: Submit specification sheets for the following:
  - low-VOC and lead-free paints being used in building interiors
  - low-VOC adhesives, sealants used in building interiors
  - composite wood products demonstrating that they do not use urea-formaldehyde as a bonding resin
- 13.2.2: Submit purchase orders (reflecting full quantities) for the above materials
- 13.2.3: Upload photographs, with description, of the measures implemented

Project Specific
Project team has included the LOW VOC requirement in painting work, Carpet work as per GRIHA.

LOW VOC Adhesive and sealant requirement also need to be added in facade work, HVAC ducting work and vinyl flooring work

ANTICIPATED - 2 POINT

Snap Shot of Tender Documents

PART 2 - PRODUCTS

2.1 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards and shall be listed in its "MPI Approved Products Lists," or comply with applicable standards of the AHJ.

B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As selected by the Consultant from RAL color range.

D. VOC Content: Paints and coatings shall comply with VOC limits as stated in the GRIHA

PAINTING 099100
Page 4 of 10

The Project for Construction of the International Cooperation and Convention Center in Varanasi

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation. Comply with the limit of VOC (Volatile Organic Compound) content defined in the GRIHA Rating Manual.

C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams

Criterion 14: Use of low-flow fixtures and systems

Objective:
The intent of this criterion is to ensure reduction in the building water consumption through the use of low-flow fixtures.

Non-applicability: All faucets, which are installed in spaces with water head heights less than 5 m / 17 feet, in a gravity fed systems (without pressure reduction) are exempt from calculations in this criterion

Appraisal (maximum points – 4 point)

- 14.1.1: Reduce water demand through selection of low-flow fixtures by 30% below the GRIHA base case –**(Mandatory)**
- 14.1.2: Reduce water demand through selection of low-flow fixtures by 50% below the GRIHA base case – **(2 points)**
- 14.1.3: Reduce water demand through selection of low-flow fixtures by 70% below the GRIHA base case – **(4 points)**

Compliance:

- 14.2.1: Provide calculations demonstrating compliance with Appraisals 14.1.1 – 14.1.3
- 14.2.2: Submit specification sheets from manufacturers for each fixture indicating the flow rates (at design pressure of 45 psi for faucets)
- 14.2.3: Submit purchase orders (reflecting full quantities) for the low-flow fixtures used in the project
- 14.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team has mentioned the low flow rates of all fixtures in plumbing technical specs.

S.No.	Fixture	Flow rates
1.	Water Closet (dual flush)	6/3 Liters per flush
2.	Conventional Urinals	1 Liters per flush
3.	Lavatory faucet	1.4 Liters per minute
4.	Kitchen faucet	4 Liters per minute

ANTICIPATED - 2 POINT
NOT APPLICABLE - 2 POINT

Snap Shot of Tender Documents

EQUIPMENT NAME	NUMBER	SPECIFICATION
WATER CLOSET	C1	WALL HUNG TYPE COCEALED TANK (6/3 L PER FLUSH) FLUSH PANEL (6/3 L PER FLUSH) SEAT & COVER ROVE HOOK PAPER HOLDER HAND SHOWER SPRAY OTHER OPTIONS*1
WATER CLOSET FOR HANDICAPPED	C2	WALL HUNG TYPE COCEALED TANK (6/3 L PER FLUSH) FLUSH PANEL (6/3 L PER FLUSH) SEAT & COVER ROVE HOOK PAPER HOLDER HAND SHOWER SPRAY OTHER OPTIONS*1
URINAL	U1	WALL HUNG TYPE (1L PER MINUTE) BATTERY TYPE OTHER OPTIONS*1
WATER BASIN	L1	UNDER COUNTER AUTOMATIC FAUCET (1.4L PER MINUTE) OTHER OPTIONS*1
WATER BASIN FOR STAFF	L2	INDEPENDENT BASIN AUTOMATIC FAUCET (1.4L PER MINUTE) OTHER OPTIONS*1
WATER BASIN FOR HANDICAPPED	L3	INDEPENDENT BASIN FAUCET (1.4L PER MINUTE) OTHER OPTIONS*1
WATER BASIN FOR VIP	L4	INDEPENDENT BASIN AUTOMATIC FAUCET (1.4L PER MINUTE) OTHER OPTIONS*1
SERVICE SINK	SK	SERVICE SINK SINK TAP OTHER OPTIONS*1
SHOWER	SW	SHOWER SET SLIDING RAIL SOUP BRAKET TOWEL BAR OTHER OPTIONS*1 7L PER MINUTE
KITCHEN FAUCET	F1	4L PER MINUTE
SINK TAP	F2	1.4L PER MINUTE
SINK TAP	F3	WITH KEY 1.4L PER MINUTE
WATER TAP	F4	OUTDOOR WITH BOX 1.4L PER MINUTE

Flow rates mentioned in tender docs

Criterion 15: Reducing Landscape Water Demand

Objective:
The intent of this criterion is to promote the planting of native/naturalized flora and use of water efficient irrigation system to reduce the demand for landscape water.

Appraisal (maximum points – 4 point)

- 15.1.1: Reduce landscape water demand by at least 30% from the GRIHA base case – **(1 points)**
- 15.1.2: Reduce landscape water demand by at least 40% from the GRIHA base case – **(2 points)**
- 15.1.3: Reduce landscape water demand by at least 50% from the GRIHA base case – **(4 points)**

Compliance:

- 15.2.1: Provide calculations demonstrating compliance with Appraisals 15.1.1 – 15.1.3
- 15.2.2: Submit landscape plan indicating plant list, along with area covered and species
- 15.2.3: Submit manufacturer cut-sheets and purchase orders (reflecting full quantities) for the irrigation systems installed on site
- 15.2.4: Upload photographs, with description, of the measures implemented

Project Specific

Project team has proposed native shrubs and trees for landscaping. Also efficient irrigation system will be used such as drip irrigation and sprinkler to reduce water consumption.

LEGEND

KEY	COMMON NAME	BOTANICAL NAME	HIGHT	QTY	NOTE
T1	BOTTLEBRUSH	CALLISTEMON LANCEOLATUS	4.0 m	2	MULTI-TRUNK
T2	TEMPLE TREE	PLUMERIA	3.0 m	2	MULTI-TRUNK
T3	GUAVA	PSIDIUM GUAJAVA	6.0 m	1	MULTI-TRUNK
T4	CHAMPAKA	MICHELIA CHAMPAKA	6.0 m	17	
T5	JACARANDA	JACARANDA MIMOSAEFOLIA	8.0 m	3	
T6	ASHOKA	POLYALTHIA LONGIFOLIA	3.0 m	38	HEDGE

SYMB	KEY	NAME	QTY	NOTE
	GC1	GROUNDCOVER PLANTS 1	165.8 m²	CHLOROPHYTUM COMOSUM 64POT/M2(80%),ACORUS GRAMINEUS 36POT/m²(20%)
	GC2	GROUNDCOVER PLANTS 2	121.6 m²	LAWN(70%), TRADESCANTIA SPATHACEA 36POT/m²(30%)

Native species mentioned in landscape plan

ANTICIPATED - 4 POINT

Snap Shot of Tender Documents

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Irrigation Main and Lateral Pipe, Sleeving and Pipe Fittings: Comply with the below:

1. PVC pipe shall be virgin, high impact polyvinyl chloride pipe, Type I only conforming to commercial standards CS 207-60, CS 256-63. Type II is not acceptable. Main and laterals shall be schedule 40 PVC pipe and fittings with solvent weld type joints except where risers, valves, etc., require threaded joints. Pipe shall be continuously and permanently marked with the following information: Manufacturer's name, kind of pipe, size, NSF approval and Schedule Number. All pipes shall be installed with fittings of the same schedule and manufacturer.

B. Dripper Line: Flexible linear low-density polyethylene tubing for emitters of length indicated and with plugged end suitable for recycled or reclaimed water. Pipe diameter shall be 17 mm OD, 14

PLANTING IRRIGATION 042000
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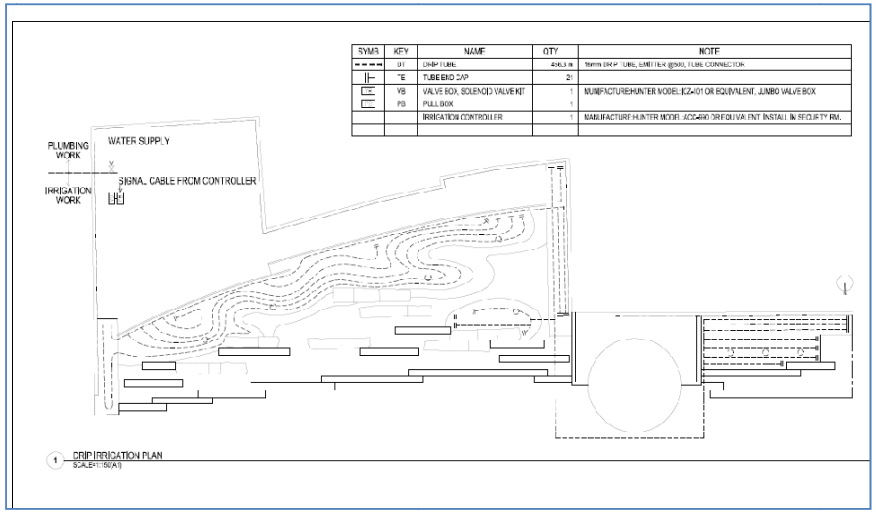

Drip irrigation highlighted on plan

A-7-6-33

Appendix7-6 GRIHA Assessment Study Report

Criterion 16: Water Quality

Objective:
Ensuring quality of water available for use during building operation is important from two perspectives – overall hygiene for building occupants as well as longevity of plumbing systems. It is also important to ensure that the water being discharged from the site meets the relevant disposal norms. The intent of this criterion is to ensure that the water being used in the project meets the relevant national standards.

Appraisal (maximum points – 2 point)

- 16.1.1: Water used for various purposes like drinking, irrigation etc. shall conform to the BIS standards - **(Mandatory)**
- 16.1.2: The STP installed on site meets the CPCB norms – **(2 points)**

Compliance:

- 16.2.1: Submit potable water quality, treated waste water and captured rainwater quality test reports from various sources before and after treatment (if required) - from an NABL accredited laboratory on the quality of potable water
- 16.2.2: Submit narrative (including capacity of water treatment) of the type of treatment plant installed on site along with plumbing drawings of the system
- 16.2.3: Submit the specification details indicating the capacity and components of the water treatment plant along with drawings (product details from the manufacturer)
- 16.2.4: Submit document indicating the quantum of treated water generated along with the use/disposal steps
- 16.2.5: Submit narrative on disposal and reuse of other by-products such as sludge
- 16.2.6: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed domestic water filtration equipment for project. Drinking water will be treated and will comply BIS standards. Project team will be using potable water for landscaping and irrigation since no STP has been proposed on site. Hence project does not comply for 2 points.

MANDATORY
NOT APPLICABLE - 2 POINT

Snap Shot of Tender Documents

The Project for Construction of the International Cooperation and Convention Center in Varanasi

SECTION 223200 - DOMESTIC WATER FILTRATION EQUIPMENT

1.1 QUALITY ASSURANCE

A. Welding: ASME Boiler and Pressure Vessel Code: Section IX

B. Electrical Components, Devices, and Accessories: NFPA 70.

C. Components in Contact with Potable Water: NSF 61.

D. Circulating Pumps: UL 778, HI 1.1-1.2, and HI 1.3.

1.2 PRODUCTS

A. Bag-Type Filters: **Single** bag.

1. Filtration Efficiency: **98** percent for particles **10** micrometers and larger.
2. Pressure Drop: Not to exceed **2 psig (14 kPa)** when clean **when dirty**.
3. Housing: **Stainless steel**.
4. Bag Media: **Cotton or Polyester or PP**.

B. Cartridge Filters:

1. Freestanding Cartridge Filters:

a. Filtration Efficiency: **98** percent for particles **10** micrometer(s) and larger.
b. Pressure Drop: Not to exceed **2 psig (14 kPa)** when clean **when dirty**].
c. Housing: **Stainless steel**.
d. Media: **Activated charcoal or ground charcoal**.
e. Media: **Pleated polyester or pleated PP**.
f. Media: **Wound polyester or wound PP**.

2. Off-Floor Cartridge Filters:

a. Mounting: **In line or Wall**.
b. Filtration Efficiency: **98** percent for particles **10** micrometer(s) and larger.
c. Pressure Drop: Not to exceed **2 psig (14 kPa)** when clean **when dirty**].
d. Housing: **Stainless steel**.
e. Media: **Activated charcoal or ground charcoal**.
f. Media: **Pleated polyester or pleated PP**.
g. Media: **Wound polyester or wound PP**.

C. Carbon Filters:

1 Backwash Initiation Device: **Differential pressure gages or Electric time clock or Water meter**.
2. Filtration Efficiency: **98** percent for particles **20** micrometers and larger.
3. Pressure Drop: Not to exceed **2 psig (14 kPa)** when clean **when dirty**].
4. Media Tank:

a. Construction: **ASME code**.
b. Housing Material: **Stainless steel**.
c. Media: **Activated charcoal or Ground charcoal**.

DOMESTIC WATER FILTRATION EQUIPMENT 223200
Page 1 of 2

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Criterion 17: On Site Water Reuse

Objective:
The intent of this criterion is to promote recycle and reuse of waste water as well as reuse of captured rainwater on site to meet the water demand, thereby reducing the water required from the local municipal supply/groundwater aquifers.

Appraisal (maximum points – 5 point)

- 17.1.1: Demonstrate that the project meets the on-site water reuse requirements (through on-site recycle and reuse of waste water and use of on-site harvested rainwater) in its annual water requirements for domestic use, buildings, landscape and utilities as mentioned below:

On Site Water Reuse	Points
20%	1
40%	2
60%	4
80%	5

Compliance:

- 17.2.1: Submit calculations (Water Balance) demonstrating the total quantity of water treated and harvested and the amount being used for different applications including use within the building and irrigation and that which is recharged into underground aquifers
- 17.2.2: Submit drawings detailing the dual plumbing systems and/or treated waste water storage tanks and/or rainwater capture and storage tanks on site
- 17.2.3: Submit site level plumbing drawings indicating delivery lines for treated waste water and captured rainwater to their respective points of use
- 17.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team will be using potable water for landscaping and irrigation since no STP has been proposed on site. Hence project does not comply for 5 points.

NOT APPLICABLE - 5 POINT

Criterion 18: Rainwater Recharge

Objective:
The intent of this criterion is to promote the recharge of groundwater aquifers.

Non-applicability: If the CGWB norms suggest that the ground water table is high and ground water recharging should not be done, then the project is exempt from this criterion

Appraisal (maximum points – 2 point)

- 18.1.1: Recharge of surplus rainwater into aquifer (through appropriate filtration measures) – **(2 points)**

Compliance:

- 18.2.1: Submit details of rainwater harvesting for ground water recharge and its filtration system to show that adequate preventive measures are being taken to avoid damage to the aquifer by the recharged rainwater
- 18.2.2: Upload photographs, with description, of the measures implemented

Project Specific
Project team has confirmed that water table is very high i.e. less than 5 meters hence project is exempted from rain water harvesting. Project team will have to provide a letter from CGWB.

NOT APPLICABLE - 2 POINT

Criterion 19: Utilization of BIS recommended waste materials in building structure

Objective:
The intent of this criterion is to promote use BIS recommended wastes (such as fly ash, blast furnace slag etc.), having properties similar to conventional construction materials for building construction. These being low embodied energy materials as well as waste products, reduce the need for virgin materials in the building structure and help divert waste from landfills..

Appraisal (maximum points – 6 point)

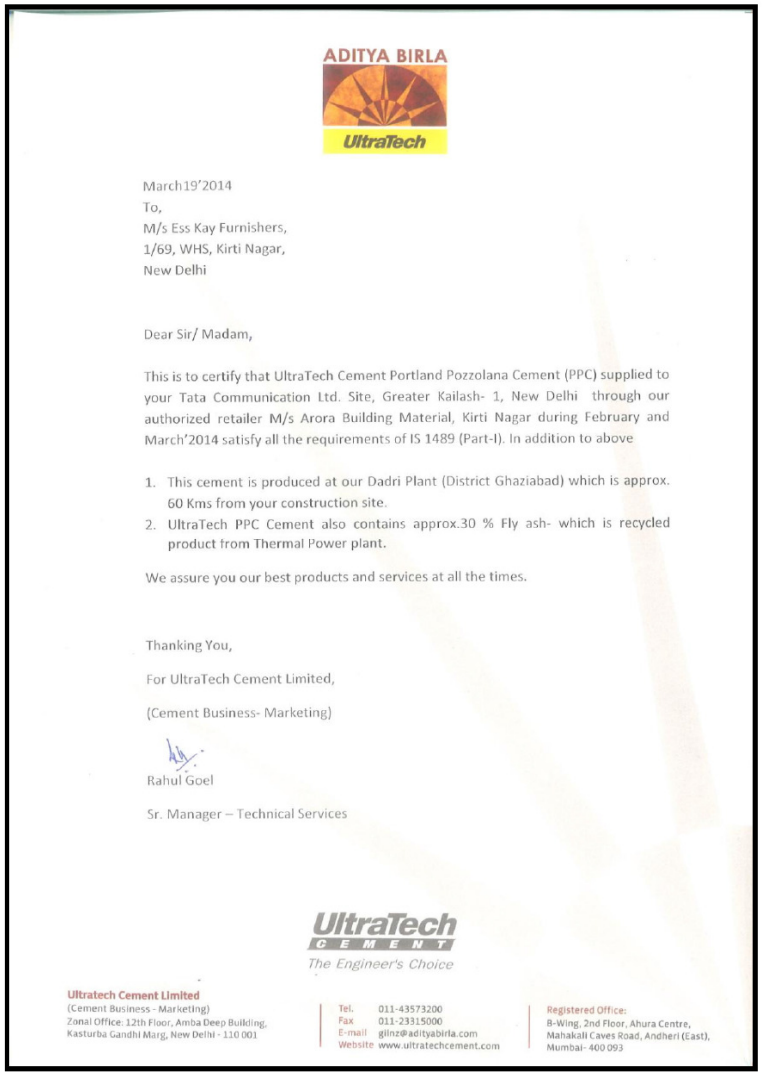
- 19.1.1 Minimum 15% replacement of Ordinary Portland cement with fly ash* by weight of cement used in structural concrete – **(1 point)**
  - If replacement is more than 25% - **(2 points)**
  - 19.1.2 Minimum 40% composition of building blocks/bricks by fly ash* by volume, for 100% load bearing and non-load bearing masonry walls – **(2 points)**
- 19.1.3 Certify minimum 15% replacement of Ordinary Portland cement with fly ash* in plaster/masonry mortar – (1 point)
  - If replacement is more than 25% - **(2 points)**

Compliance:

- 19.2.1: Submit documentation (calculations, manufactures cut-sheets & purchase orders – reflecting full quantities) demonstrating 15% (or higher) replacement of OPC in structural concrete by fly ash*
- 19.2.2: Submit documentation (calculations, manufactures cut-sheets & purchase orders – reflecting full quantities) demonstrating that fly ash* constitutes at least 40% of load bearing and non-load bearing walls (by volume of materials)
- 19.2.3: Submit documentation (calculations, manufactures cut-sheets & purchase orders – reflecting full quantities) demonstrating 15% (or higher) replacement of OPC in plaster and/or masonry mortar by fly ash*
- •19.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed PPC cement , RMC having fly ash content upto 25% and also AAC blocks and fly ash brick will be used having fly ash content atleast 40%. Hence project team complies for 6 point.

ANTICIPATED - 6 POINT



ADITYA BIRLA
UltraTech

March19'2014
To,
M/s Ess Kay Furnishers,
1/69, WHS, Kirti Nagar,
New Delhi

Dear Sir/ Madam,

This is to certify that UltraTech Cement Portland Pozzolana Cement (PPC) supplied to your Tata Communication Ltd. Site, Greater Kailash- 1, New Delhi through our authorized retailer M/s Arora Building Material, Kirti Nagar during February and March'2014 satisfy all the requirements of IS 1489 (Part-I). In addition to above

1. This cement is produced at our Dadri Plant (District Ghaziabad) which is approx. 60 Kms from your construction site.
2. UltraTech PPC Cement also contains approx.30 % Fly ash- which is recycled product from Thermal Power plant.

We assure you our best products and services at all the times.

Thanking You,

For UltraTech Cement Limited,

(Cement Business- Marketing)

Rahul Goel

Sr. Manager – Technical Services

UltraTech CEMENT
The Engineer's Choice

Ultratech Cement Limited
(Cement Business - Marketing)
Zonal Office: 12th Floor, Amba Deep Building,
Kasturba Gandhi Marg, New Delhi - 110 001

Tel. 011-43573200
Fax 011-23315000
E-mail gilnz@adityabirla.com
Website www.ultratechcement.com

Registered Office:
B-Wing, 2nd Floor, Ahura Centre,
Mahakali Caves Road, Andheri (East),
Mumbai- 400 093

Sample certificate

Criterion 20: Reduction in embodied energy of building structure

Objective:
The intent of this criterion is to promote reduction in the embodied energy of the building structure through the use of low-embodied energy materials.

Appraisal (maximum points-4)

- 20.1.1: Demonstrate reduction in combined embodied energy of load-bearing structure and masonry walls by at least 10% below the base case – **(1 point)**
- 20.1.2: Demonstrate reduction in combined embodied energy of load-bearing structure and masonry walls by at least 20% below the base case – **(2 points)**
- 20.1.3: Demonstrate reduction in combined embodied energy of load-bearing structure and masonry walls by at least 30% below the base case – **(4 points)**

  Base Case: RCC structure with burnt clay brick masonry. The live load, equipment load and spans between the design and the base case should be same. The total length of masonry walls between design and base case should be same.

Compliance:

- 20.2.1: Submit calculations (through software output files recommended) demonstrating reduction in embodied energy as per Appraisal 20.1.1 – 20.1.3
- 20.2.2: Submit manufacturer cut-sheets of the low-energy materials used in building structure and masonry walls
- 20.2.3: Submit CAD drawings highlighting the use of low embodied energy materials in the relevant floor plans, with clear dimensioning
- 20.2.4: Submit purchase orders (reflecting full quantity) and relevant sections of the BOQ highlighting the low-energy materials used
- 20.2.5: Upload photographs, with description, of the measures implemented

Project Specific
Project team is not proposing any efficient technologies in structure to reduce the qty of steel and cement.
To comply the credit requirement project team will have to use technologies or materials which are less energy intensive such as-:
1. Pre Stressed Slab Elements
2. Micro concrete Roofing
3. Pre-cast stone block

Hence project team does not complies for 4 points.

Structure	Embodied energy
Steel	HIGH
Portland Cement	
Concrete - 50% GGBS	
Timber Studs and Headers	
Blockwork	LOW

NOT APPLICABLE - 4 POINT

A-7-6-37

Criterion 21: Use of low-environmental impact materials in building interiors

Objective:
The intent of this criterion is to promote installation of low environmental impact materials in the building interiors.

Appraisal (maximum points-4)

- 21.1.1: Project demonstrates that at least 25% of all materials (calculated by surface area) used for building interiors* meets the GRIHA criterion low-impact material requirements – **(1 point)**
- 21.1.2: Project demonstrates that at least 50% of all materials (calculated by surface area) used for building interiors* meets the GRIHA criterion low-impact material requirements – **(2 points)**
- 21.1.3: Project demonstrates that at least 75% of all materials (calculated by surface area) used for building interiors* meets the GRIHA criterion low-impact material requirements – **(4 points)**
  Following materials will be accepted as low-environmental impact:
  •Stones from India
  •Composite wood based products
  •FSC Chain of Custody certified products
  •Manufactured products with at least 5% recycled content
  •Products with EPD (cradle to gate) analyzed and published as per ISO 14025 / ISO 21930
  •Products with water footprint (cradle to gate) analyzed and published as per ISO 14046

  **false ceilings/internal partitions/paneling/in-built furniture/flooring/internal door & window panels & frames*

Compliance:

- 21.2.1: Provide manufacturer cut-sheets highlighting specifications of low environmental impact finishes/products used in the building interiors
- 21.2.2: Provide CAD drawings demarcating (by highlighting with clear dimensions) the use of aforesaid finishes/products in the interior layouts/plans.
- 21.2.3: Submit purchase orders (reflecting full quantities) and relevant sections of the BOQ for the low environmental impact materials used
- 21.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team will be using recycled content material in the project such as glass, steel, cement, fly ash blocks and also composite wood base products will be used such as MDF board, ply board etc. This strategy will help to achieve maximum points.

ANTICIPATED - 4 POINT

Criterion 22: Avoided post-construction landfill

Objective:
The intent of this criterion is to provide infrastructure to future occupants of the project so that they can sustainably manage on-site solid waste during operation phase.

Appraisal (maximum points-4)

- 22.1.1: Provide infrastructure (multi-colored dustbins/different garbage chutes) to building occupants to ensure segregation of waste at source
- 22.1.2: Provide dedicated, segregated and hygienic storage spaces in the project site to store different wastes before treatment /recycling
- 22.1.3: Provide contractual tie-ups with waste recyclers for safe recycling for recyclable wastes like metal, paper, plastic, glass etc.
    - Together – **(4 points)**

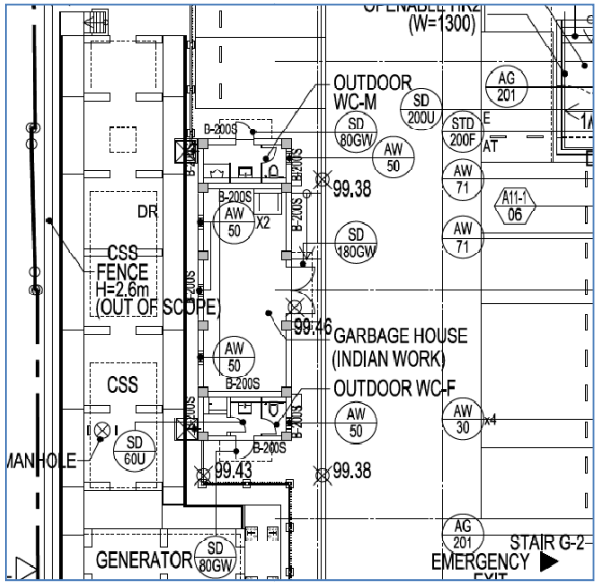
Compliance:

- 22.2.1: Submit the Solid Waste Management plan for the project – detailing the sizing of segregated waste storage facilities, strategy for primary and secondary collection and storage.
- 22.2.2:Submit site plan indicating location of various primary (multi-coloured dustbins) and secondary storage facilities
- 22.2.3: Submit document highlighting tie-up with recyclers for ensuring safe recycling of recyclable wastes
- 22.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed a centralized waste segregation area with dedicated waste storage area for hazardous waste.

ANTICIPATED - 4 POINT

Snap Shot of Provision in Drawings



Garbage House at Site Level

Criterion 23: Treat Organic Waste On Site

Objective:
The intent of this criterion is to promote recycling and reuse of organic waste on site.

Non-applicability: If the total waste generation on site is less than 100 kg/day, then the project is exempt from this criterion.

Appraisal (maximum points-2)

- 23.1.1 Implement strategies to treat all organic (kitchen and landscape) waste on-site and to convert it into a resource (manure, biogas etc.) - **(2 points)**

Compliance:

- 23.2.1: Submit narrative detailing the design and sizing of the on-site waste treatment strategy and highlight method of reuse on site
- 23.2.2: Upload photographs, with description, of the measures implemented

5 ASSESSMENT OF PER CAPITA WASTE QUANTITY

5.1 For purposes of this Section, the following municipal refuse generation rates are recommended:

a) Residential refuse	:	0.3 to 0.6 kg/capita/day
b) Commercial refuse	:	0.1 to 0.2 kg/capita/day
c) Street sweepings	:	0.05 to 0.2 kg/capita/day
d) Institutional refuse	:	0.05 to 0.2 kg/capita/day

Project Specific
Project team has confirmed that there is no dedicated cooking kitchen area in project. Hence the generation of organic waste will be less than 100 KG.
Project is exempted from credit requirement.

NOT APPLICABLE - 2 POINT

Criterion 24: Labour safety and sanitation

Objective:
The intent of this criterion is to ensure safe, healthy and hygienic working & living conditions for construction workers working in the project.

Non-applicability: If no families are allowed to work and live at construction sites, then appraisal 24.1.3 is not applicable

Appraisal (maximum points-1)

- 24.1.1: Ensure compliance with the NBC (2005) safety norms for providing the necessary safety equipment and measures for construction workers – **(Mandatory)**
- 24.1.2: Ensure provisions for drinking water, hygienic working & living conditions and sanitation facilities shall be provided for the workers – **(Mandatory)**
- 24.1.3: Provide a crèche facility for children of construction workers – **(1 point)**

Compliance:

- 24.2.1: Submit relevant sections of tender document showing that the conditions mentioned in Appraisal 24.1.1 and 24.1.2 are required to be implemented by the contractor during construction on site.
- 24.2.2: Submit test reports demonstrating that the drinking water provided to workers meets the relevant BIS drinking water norms
- 24.2.3: Submit narrative on provision of crèche facility for children of construction workers
- 24.2.4: Upload photographs, with description, of the measures implemented

Project Specific
Project team will be have to provide all the health and safety equipment to all labors as per NBC safety norms. Also facilities like drinking water, hygienic working & living conditions and sanitation facilities shall be provided for the workers.
crèche facility will be provided for children of construction workers

MANDATORY
ANTICIPATED - 1 POINT

Sanitation Facility

Drinking Water Facility

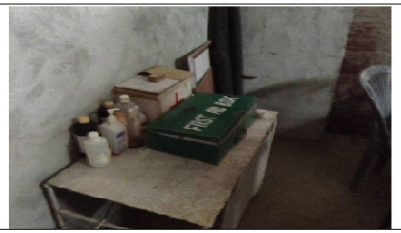
Personal Protective Equipment Store 1

Personal Protective Equipment Store 2

First Aid Facility for Labor

Ambulance Facility for Labor

Labor housing facility



First Aid Box

Sample Photographs

Criterion 25: Design for Universal Accessibility

Objective:
The intent of this criterion is to promote adoption of measures in the project to make it universally accessible.

Appraisal (maximum points-2)

- 25.1.1: Compliance with National Building Code norms on Requirements for Planning of Public Buildings Meant for Use of Physically Challenged - **(2 points)**

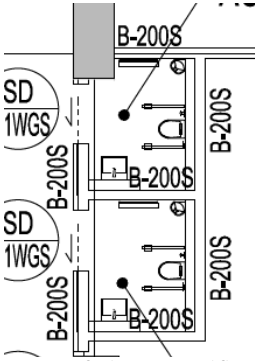
Compliance:

- 25.2.1: Submit drawings demonstrating that the project incorporates design measures for Universal Accessibility as recommended in NBC 2005
- 25.2.2: Upload photographs, with description, of the measures implemented

Project Specific
Project team has proposed listed below disabled facilities in design as per NBC norms.-:
1. Reserved parking for disabled person
2. Ramp with hand rail at main entrance
3. Disabled toilets as per NBC norms
4. Seating Facility in Auditorium
5. Braille assistance has been mentioned in technical specs of elevators

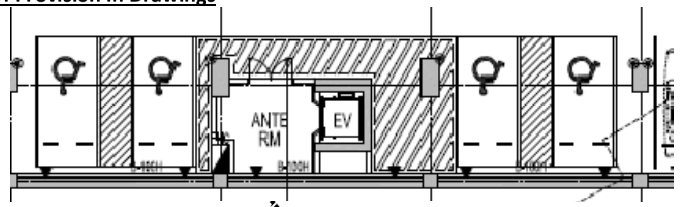
Please note that Audio Assistance has not been highlighted in specs of elevators. Kindly include these features.

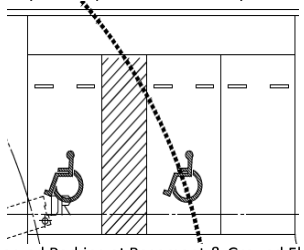
ANTICIPATED - 2 POINT

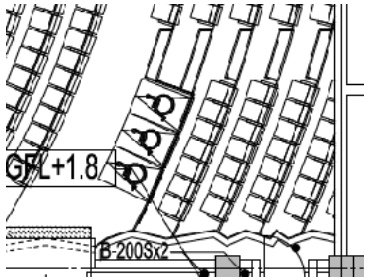


Rest room facility at Ground floor

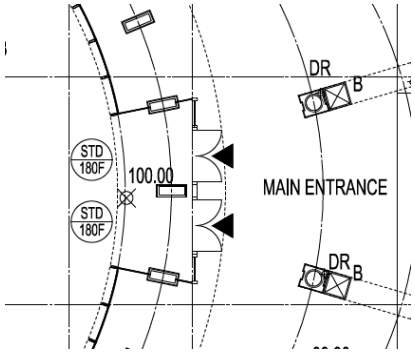
Snap Shot of Provision in Drawings




Reserved Parking at Basement & Ground Floor



Seating facility in Auditorium



No level difference at entry

Criterion 26: Dedicated facilities for service staff

Objective:
The intent of this criterion is to promote provision of resting spaces and toilets dedicated for project's service staff.

Appraisal (maximum points-2)

- 26.1.1: Provide dedicated resting rooms for the service staff on site – **(1 point)**
- 26.1.2: Provide toilets for the service staff on site – **(1 point)**

Guidance for Estimation		
Assume total service staff population to be about 5% of total fixed building occupancy. If staff works in shifts, count the position only once.		
Fixtures	Male	Female
WC	1 per 25	1 per 15
Washbasins	1 per 25	1 per 25
Urinals	Nil up to 6 1 for 7 – 20 2 for 21 – 45 3 for 46 – 70 4 for 71 – 100 Add 3% over 101 – 200 Add 2.5% over 200	

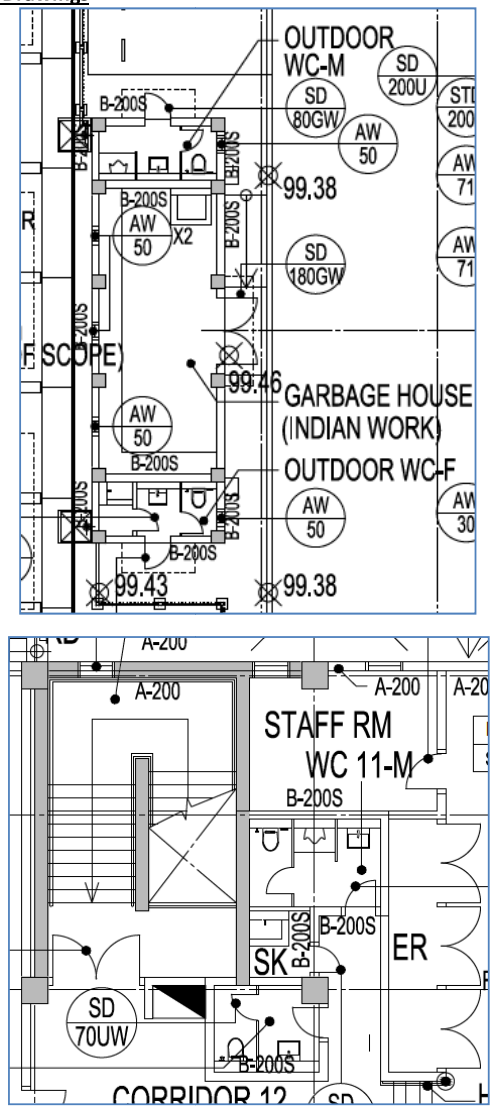
Compliance:

- 26.2.1: Submit drawings demarcating the location of various toilets and/or resting rooms for service staff
- 26.2.2: Upload photographs, with description, of the measures implemented

Project Specific
As per current design, the total number of staff is 20. Project team has proposed listed below dedicated toilets for fixed staff. Also dedicated staff room has been proposed.
Male-:
Water Closet 1, Wash Basin 1, urinals - 1
Female -:
Water Closet 1, Wash Basin 1

ANTICIPATED - 2 POINT

Snap Shot of Provision in Drawings



Dedicated toilets and rest room proposed at Site Level & first Floor

Criterion 27: Increase in environmental awareness

Objective:
The intent of this criterion is to create awareness on sustainability amongst the building users & visitors.

Appraisal (maximum points-1)

- 27.1.1: Adopt measures to create environmental awareness – **(1 point)**

Compliance:

- 27.2.1: Submit narrative with supporting photographs highlighting strategies implemented, in the project, to create environmental awareness

Project Specific
Project team will make a dedicated green wall at main lobby area highlighting Green Features of the building in form of posters. This will help to create environment awareness among building occupants and visitors.
Hence project complies for 1 point
.

ANTICIPATED - 1 POINT

Criterion 28: Smart Metering and Monitoring

Objective:
The intent of this criterion is to promote smart metering and monitoring of energy and water consumption on site to analyze the performance of the building.

Appraisal (maximum points-8)

- 28.1.1: Comply with following Basic metering requirements of GRIHA – Mandatory

Basic Metering Requirements	
Energy	**Water**
Ensure regular monitoring of project's energy consumption by installing digital meters* at the following point sources at the project level for: •Utility grid •On-site renewable energy system •Diesel Genset, Gas Genset etc. •Each building level	Ensure regular monitoring of project's water consumption by installing digital meters* at the following point sources at the project level for: •Municipal Supply •Bore well •Treated water outlet from STP •Captured rainwater •Each building level

- 28.1.2: Comply with Extended metering requirements as mentioned in the table – **(2 points)**

Extended Metering Requirements	
Energy	**Water**
Sub-meter* the following points to monitor energy consumption: •Commercial/Institutional: ➢ HVAC central plant- AHU, Cooling tower, Chillers (BTU meters) and/or distributed units (split/window ACs) ➢ Lighting (Indoor and outdoor) ➢ UPS ➢ Basement parking lighting •Residential: ➢ For Basement Parking Lighting, Community/Recreation center, Water pumping, Outdoor Lighting ➢ Lifts and common areas	Sub-meter* at the following points to monitor water consumption: •Irrigation •Cooling Tower •STP/WTP/ETP •Each apartment/commercial tenant

- 28.1.3: Installation of one-way communicable# Smart metering* and monitoring system capable tracking energy and water consumption through a web hosted portal and also capable of the following, for at least all meters mentioned in 28.1.1 – **(3 points)**
  •Hourly data reporting in near-real-time (no more than 15 minute delay)
  •Energy mix breakdown and consumption patterns
  •Water consumption patterns from various sources
  •Ability to set energy & water consumption targets, alarms and pricing
  •Ability to compare historical trends and benchmark data
  •Real time monitoring with user interface which operates even in mobile devices

- 28.1.4: Connect to GRIHA Online Benchmarking platform (linked to smart metering) to allow for two way communication on the following: – **(3 points)**
  •Monthly energy consumption (with fuel mix) and water consumption (with source split) with GRIHA IT platform
  •Receive, average energy and water consumption (normalized for building typologies, location and area) for display to building occupants to assess building energy and water efficiency

Compliances:

- 28.2.1: Submit drawings indicating the location of various meters in the project
- 28.2.2: Submit specification sheets and purchase orders of the various meters installed in the project
- 28.2.3: Submit details and purchase orders of the Smart Metering system installed in the project
- 28.2.4: Upload photographs, with description, of the measures implemented

**All Energy meters that are installed to be of at least class 1 with Class 1 CT's/PT's, and should have an active RS-485 port, with industry standard Modbus protocol with publicly available register maps.*
**All Water/BTU meters should have an RS 485/RS232 port with publicly available/industry standard Protocol (Modbus,etc.) and register maps*
**All meters/CT should be calibrated by an authorized certified auditor at least every 2 years.*
**The metering and monitoring hardware and software should support compliance with the relevant requirements of "IS/ISO 50001 - Energy Management Systems - Requirements with Guidance for Use".*
 # Project teams may opt for two-way communicable if they want to enable demand response.

Project Specific

Project team will provide basic and extended metering on listed below load and all meters will be monitored on BMS.

Basic Metering Requirements	
Energy	**Water**
•Utility grid	•Municipal Supply
•On-site renewable energy system	•Bore well
•Diesel Genset, Gas Genset etc.	•Each building level
•Each building level	

.

Extended Metering Requirements	
Energy	**Water**
•Commercial/Institutional: ➢ HVAC central plant- AHU, Cooling tower, Chillers (BTU meters) and/or distributed units (split/window ACs) ➢ Lighting (Indoor and outdoor) ➢ UPS	•Irrigation • WTP

Also project team will share the monitoring data with GRIHA with two way communication.

ANTICIPATED - 8 POINT

Snap Shot of Tender Docs

<Other> Fire Alarm	---	Fire Alarm Panel	RS	
BLF Water Consumption	RCP-BF-1	Meter	RS	
Main Irrigation Water Consumption	RCP-BF-1	Meter	RS	
Main Drinking Water Consumption	RCP-BF-1	Meter	RS	
Outdoor Income	RCP-GF-1	Meter	RS	
GF Water Consumption	RCP GF 1	Meter	RS	
1F Water Consumption	RCP-1F-1	Meter	RS	
<Electrical Equipment>				
<<Substation>>				
Cubicle	RCP-GF-1	Cubicle	RS	
LT Panel	RCP-GF-1	LT Panel	RS	
<<Generator>>				
Generator	RCP-GF-1	Generator	RS	
<<Emergency Lighting>>				
CBS	RCP-BF-1	CBS	RS	

NAME	CONTROL PANEL	INPUT/OUTPUT	REMOTE TYPE	OPERATION			MONITORING	
				SET	ON/OFF	ON/OFF STATUS	STATUS	ALARM
<<SMDB>>								
BSM-1	RCP-BF-1	BSM-1	RS				2	3
BSM-2	RCP-BF-1	BSM-2	RS					2
GSM-1	RCP-GF-1	GSM-1	RS					2
1SM-1	RCP-1F-1	1SM-1	RS					2
<<MCC>>								
BMCC-1	RCP-BF-1	BMCC-1	RS					1
BMCC-2	RCP-BF-1	BMCC-2	RS					1
BMCC-3	RCP-BF-1	BMCC-3	RS					1
GMCC-1	RCP-GF-1	GMCC-1	RS					1
1MCC-1	RCP-1F-1	1MCC-1	RS					1
1MCC-2	RCP-1F-1	1MCC-2	RS				2	2
1MCC-3	RCP-1F-2	1MCC-3	RS					1
<<Power DB>>								
BPDB-1	RCP-BF-1	BPDB-1	RS					1
BPDB-2	RCP-BF-1	BPDB-2	RS					1
GPDB-1	RCP-GF-1	GPDB-1	RS					1
GPDB-2	RCP-GF-1	GPDB-2	RS					1
EPDB-1	RCP-GF-1	EPDB-1	RS					1
EPDB-2	RCP-GF-1	EPDB-2	RS					1
1PDB-1	RCP-1F-1	1PDB-1	RS					1
1PDB-2	RCP-1F-2	1PDB-2	RS					1
<<Lighting DB>>								
BSDB-1	RCP-BF-1	BSDB-1	RS					1
BLDB-2	RCP-BF-1	BLDB-2	RS					1
GLDB-1	RCP-GF-1	GLDB-1	RS					1
GLDB-2	RCP-GF-1	GLDB-2	RS					1
ELDB-1	RCP-GF-1	ELDB-1	RS					1
ELDB-2	RCP-GF-1	ELDB-2	RS					1
1LDB-1	RCP-1F-1	1LDB-1	RS					1
1LDB-2	RCP-1F-2	1LDB-2	RS					1
<<AV equipment DB>>								
AVDB-1	RCP-1F-2	AVDB-1	RS					1
AVDB-2	RCP-1F-2	AVDB-2	RS					1
AVDB-3	RCP-GF-1	AVDB-3	RS					1
AVDB-4	RCP-GF-1	AVDB-4	RS					1
Stage Batten Panel	RCP-GF-1	Stage Batten Panel	RS					1
Stage Lighting Panel	RCP-GF-1	Stage Lighting Panel	RS					1

Water & Energy meter considered in BMS specs

Criterion 29: Operation & Maintenance Protocols

Objective:
The intent of this criterion is to ensure implementation of an Operation and Maintenance protocol.

Appraisal

- 29.1.1: Provision for a core facility/service group responsible for the O&M of the building's systems after installation as per GRIHA requirements. Inclusion of a specific clause in the contract document of the systems supplier for providing training to the core facility/ service group responsible for the O&M of the building systems after installation, on the operating instructions/dos and don'ts/ maintenance requirements for the specific system, as per GRIHA requirements. Development of a fully documented O&M manual/ CD/ Multimedia /information brochure enlisting the best practices for O&M of the building's systems as per GRIHA requirements – **(Mandatory)**
  O&M protocol should be submitted for
  •HVAC plant- AHU, Cooling tower, Chillers and pumps , VRF
  •Electrical- Transformer, DG, HT & LT panels
  •Energy Systems: Solar PV, wind mill, bio gasifier etc.
  •STP and/or WTP

Compliance:

- 29.2.1: Submit proof of provision for a core facility/service group responsible for the operation and maintenance of the building's systems after installation. This should be supported with the contract (mutually signed between the respective parties) document or supportive documents, verified and signed by the responsible parties).
  O&M protocol should contain the following:
  •Provision of inspection as per respective system schedules
  •Corrective measures to be implemented according to the periodic inspection report.
  •Records tracking the periodic inspection and maintenance
  •Provision for training staff members

Project Specific
All Vendor will have to submit O&M Manual of all active system and will give training to facility team about the system and its operation. Hence project will complies mandatory requirement.
.
MANDATORY

Criterion 30: Performance Assessment for Final Rating

Objective:
The intent of this criterion is to validate the performance of the energy, water and comfort conditions in the building as predicted during the design and development stage.

Appraisal

- 30.1.1 The energy systems, water systems and solid waste management systems of the building are performing as predicted and match the information provided at the time of award of provisional GRIHA rating
- 30.1.2: The visual, thermal and acoustic comfort conditions of the building meet the requirements of GRIHA Criterion 11
- 30.1.3 Any improvement in the following 4 parameters can be attempted by the project, post-GRIHA Provisional Rating, in order to improve its overall GRIHA points tally:
  •Hard/soft/shaded paving on site – Criterion 3
  •Renewable energy installation – Criterion 9
  •Noise levels – Criterion 11
  •Innovation – Criterion 31

Please note: Reattempt/fresh attempt of a criterion will not be allowed in this; only improved performance will be evaluated.

Compliance:

- 30.2.1: Submit audit report and bills by an independent BEE certified auditor highlighting the following:
  •Annual energy and water consumption
  •Compliance with visual, thermal and acoustic comfort conditions in building interiors
  •Functioning solid waste management strategies

- 30.2.2: Submit narrative/drawings/photographs highlighting improved performance in criteria mentioned in 30.1.3

Project Specific
Project team has will validate the performance of the energy, water and comfort conditions of the building by BEE Energy Auditor after 1 year of operation.

MANDATORY

Criterion 31: Innovation

Objective:
The intent of this criterion is to promote adoption and implementation of innovative strategies in improving the sustainability of the project.

Appraisal (maximum points-4)

- 31.1.1: 1 point per Innovation strategy up to a maximum of 4.
  - •Examples of innovation:
  - •A GRIHA certified professional (Trainer or Evaluator) is involved in the project from beginning to end)
  - •First Mover: Implementation of a technology for the first time in the country.
  - •E-waste recycling
  - •STP technologies which do not use chemicals
  - •Net-Zero Energy/Water

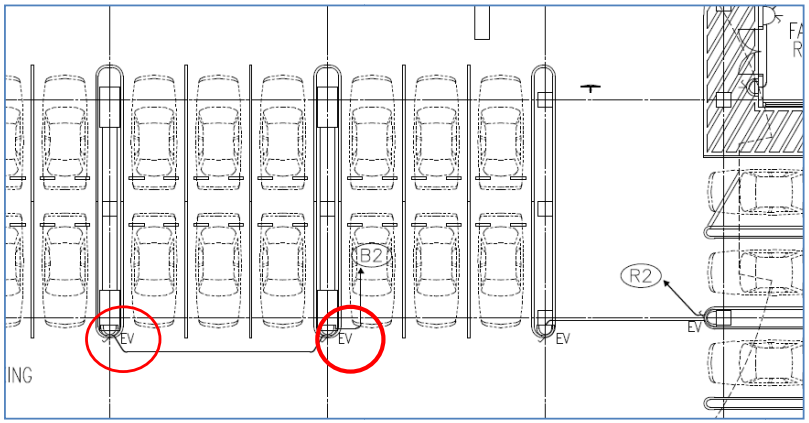
Compliance:

- 31.2.1: Submit supporting documentation for each Innovation strategy

Project Specific
A GRIHA Certified professional will be involved in the project. Also 1 innovation point will be target.
1. Electrical Charging sockets in basement
2. A GRIHA certified professional will be involved in the project.

ANTICIPATED	**- 2 POINT**
NOT APPLICABLE	**- 2 POINT**

Snap Shot of Tender Docs

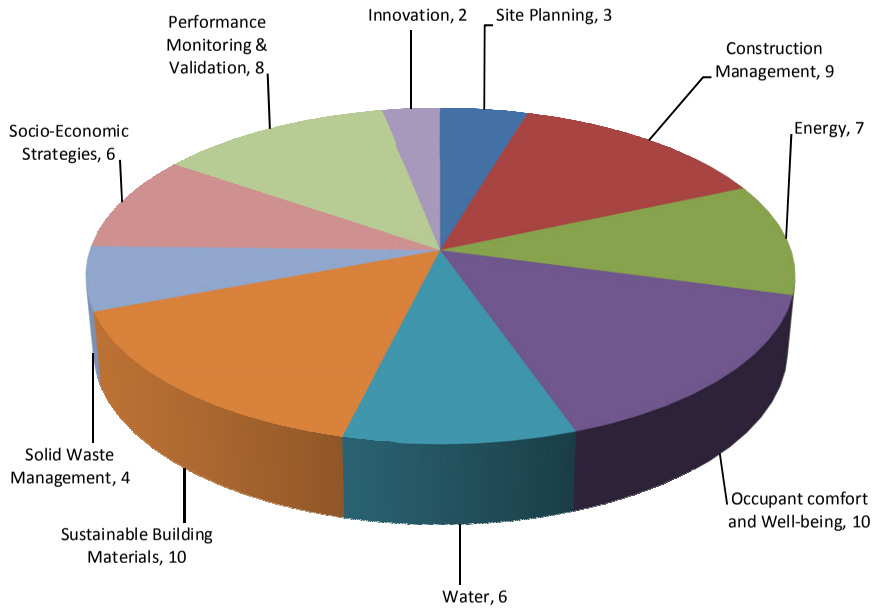


Charging Sockets Considered for Electrical Vehicles

Conclusion:

Based on the above study, we can summarize the summary as below:

Section Wise Break up	Points Attempted
Site Planning	3
Construction Management	9
Energy	7
Occupant comfort and Well-being	10
Water	6
Sustainable Building Materials	10
Solid Waste Management	4
Socio-Economic Strategies	6
Performance Monitoring & Validation	8
Innovation	2



TOTAL MAXIMUM	96
TOTAL PERCENTILE	67.7%
LIKLEY RATING	3 STAR

The study reveals that the project can aspire to achieve " **THREE STAR Rating**" in GRIHA Rating System, but some serious efforts would be required. The aim would be to achieve at least 4-5 points higher than the threshold points required for the feasible / achievable and desired rating.

Appendix7-7 GRIHA Pre-Certification

GRIHA Pre-Certification

Documentation Tool V 2015

HOME PROJECT SUMMARY DOCUMENTATION

Project: The Project for Construction of the International Cooperation and Convention Center in Varanasi (18PC0020)

Status: Pending at Client level

Logged: Chetan Bhoj (Client)

PROJECT SUMMARY

Project Code	18PC0020
Project Name	The Project for Construction of the International Cooperation and Convention Center in Varanasi
Registration Type	GRIHA pre-certification
Built up area (sqm)	5117.50
Site area (sqm)	13196.40
Ground coverage (sqm)	4265.41
No. of stories	
Total cost (Rs.)	118000.00

GRIHA Council

Appendix 7-8 Building Approval

वाराणसी विकास प्राधिकरण, वाराणसी

सेवा में,

सहायक कार्यपालक (अभियन्ता),
केन्द्रीय लोक निर्माण विभाग,
वाराणसी।

पत्रांक– 77/17 */वि0प्रा0/* विपास */2017–18* *दिनांक :* 9-1-18

विषय : ~~केन्द्रीय सन्तुलित~~ *नगर निगम परिसर स्थित मौजूदा प्रेक्षागृह के स्थान पर प्रस्तावित इण्टरनेशनल कार्पोरेशन एण्ड ट्रेनिंग सेन्टर मानचित्र स्वीकृति के सम्बन्ध में।*

महोदय,

कृपया उपरोक्त विषयक का सन्दर्भ ग्रहण करने का कष्ट करें। आप द्वारा प्रस्तुत नगर निगम परिसर स्थित मौजूदा प्रेक्षागृह के स्थान पर प्रस्तावित इण्टरनेशनल कार्पोरेशन एण्ड ट्रेनिंग सेन्टर बनाने की स्वीकृत अध्यक्ष/आयुक्त, वाराणसी विकास प्राधिकरण द्वारा दिनांक 03.01.18 द्वारा निम्न शर्तो के साथ स्वीकृत किया गया है :–

1. आपको वर्तमान विकास प्राधिकरण भवन निर्माण एवं विकास उपविधि, 2016 में दिये गये निर्देशों/शर्तो का पालन करना होगा।
2. रेन वाटर हार्वेस्टिंग एवं सोलर हीटिंग की व्यवस्था स्थल पर सुनिश्चित् करना होगा।
3. भूखण्ड पर प्रति हेक्टेयर 125 पेड़ की दर से कुल 165 पेड़ लगाना होगा।
4. नगर निगम/जल कल विभाग की अनापत्ति प्रमाण पत्र स्वयं प्राप्त करना होगा।
5. विद्युत, फायर एवं श्रम कल्याण विभाग, कार्यालय जिला प्रशासन की अनापत्ति तथा भूकम्परोधी प्रमाण पत्र, स्ट्रक्चर डिजाइन आदि प्रस्तावक को स्वयं प्राप्त करना होगा।

भवदीय,

जोनल अधिकारी।

पत्रांक– */वि0प्रा0/* */2017–18* *दिनांक :*

प्रतिलिपि : सचिव महोदय को सादर सूचनार्थ प्रेषित।

जोनल अधिकारी।

Varanasi Development Authority, VARANASI.

To,

Assistant Executive (Engineer)

Central Public Works Department

Varanasi,

Letter reference-77/17 convention center Vi Pra/2017/18

Dated-9-January-2018

Subject- Regarding approval of the map for the proposed international corporation and training center in the current location of auditorium situated in the premises of Nagar Nigam.

Sir,

Please take note the context of the aforesaid subject. Your offer to construct the International Corporation and training center in the current location of the auditorium situated in the premises of Nagar Nigam has been accepted by the commissioner Varanasai Development Authority on 03-01-18 along with the following conditions.

#1-You will adhere to the guidelines and conditions reflecting in the current Development Authority building construction and development Bye laws 2016.

#2-You will ensure the arrangement of Rain Water Harvesting and Solar Heating in the location.

#3-You will manage the plantation of a total of 165 trees at the rate of 125 trees per hectare in the location.

#4-You will obtain by yourself, the No objection certificate of Nagar Nigam/Water Supply department.

#5-The proposer will obtain by himself the No objection certificate of electricity, fire, labor welfare department, city administration office, and earthquake resistant certification, structure design etc.

Warm Regards,

Zonal officer.

Date

C.C:

To Secretary for purpose of intimation

Appendix 7-9 No Objection Certification (Provisional) of firefighting

कार्यालय संयुक्त निदेशक, फायर सर्विस मुख्यालय, उ0प्र0 लखनऊ

पत्रांकःएफएस/जीडी/1076-2017 दिनांकः नवम्बर, 21 , 2017

सेवा में,

कार्यपालक अभियन्ता,
बी0एच0यू0 परियोजना मण्डल-1
के0लो0नि0 वि0, वाराणसी

विषयः- **वाराणसी कनवेन्शन सेन्टर, नगर निगम, सिगरा, वाराणसी का बी0एच0यू0 परियोजना मण्डल-1 के0लो0नि0वि0, वाराणसी द्वारा भवन निर्माण हेतु प्रोविजनल अग्निशमन अनापत्ति प्रमाण पत्र के संबंध में।**

कृपया उपरोक्त विषयक आपके प्रार्थना पत्र संख्याः23 (142)/पी.एम.बी.एच.यू./2017/1437 दिनांकः 10.11.2017 द्वारा प्रस्तुत संशोधित मानचित्र व यू.आई.डी. नम्बर-2017/35600/VNS/varansi/225/JD दिनांकः23.09.2017 के माध्यम से उक्त प्रश्नगत प्रस्तावित भवन की प्रोविजनल अग्निशमन अनापत्ति प्रमाण पत्र निर्गत किये जाने का अनुरोध किया गया है।

उक्त प्रश्नगत प्रस्तावित भवन के मानचित्रों में प्रस्तावित अग्निशमन व्यवस्थाओं एवं अभिलेखों का परीक्षण श्री योगेन्द्र चौरसिया, अग्निशमन अधिकारी, चेतगंज, वाराणसी/श्री राकेश राय, मुख्य अग्निशमन अधिकारी, वाराणसी/श्री योगेश बाबू द्विवेदी, उप निदेशक, फायर सर्विस वाराणसी परिक्षेत्र, वाराणसी द्वारा किया गया। उनकी आख्या दिनांकः 18.11.2017 का सुसंगत मानकों के अनुसार परिशीलन किया गया, जिसका विवरण निम्नवत् हैः-

भवन की संरचनाः-

PROJECT SITE AREA=	13,196.48 SQ.MT.
PERMISSIBLE BUILDING COVEREGE AREA=	5,278.59 SQ.MT.
PERMISSIBLE COVERAGE RATIO =	40.00 %
PROPOSED BUILDING COVERED AREA	4,241.75 SQ.MT.
PERMISSIBLE COVERAGE RATIO	32.14 %
PERMISSIBLE FLOOR AREA	26,392.96 SQ.MT.
PERMISSIBLE F.A.R.	2.00
PROPOSED AREA UNDER F.A.R.	5,144.13 SQ.MT.
PROPOSED F.A.R.	0.39
BASEMENT AREA	4,459.50 SQ.MT.
LANDSCAPE AREA	2,751.54 SQ.MT.
ROAD AREA	2,825.25 SQ.MT.
SITE AREA	25,485.30 SQ.MT.
PROJECT SITE AREA (A)	13,196.48 SQ.MT.
PROPOSED BUILDING COVERAGE AREAS	
1. MAIN BUILDING	3,859.70 SQ.MT.
2. GARBAGE ST/OUTDOOR WC-M/F	41.75 SQ.MT.
3. RAMP ROOF 1	217.58 SQ.MT.
4. RAMP ROOF 2	122.72 SQ.MT.
TOTAL (B)	4,241.75 SQ.MT.
BUILDING COVERAGE RATIO (B/A)	32.14 %

FLOOR AREA(F.A.R.)			
	1. MAIN BUILDING	2.GARBAGE ST/	TOTAL

		OUTDOOR WC-M/F	
1 ST FLOOR LEVEL	1,380.50 SQ.MT.		
GROUND FLOOR LEVEL	3,721.87 SQ.MT.		
TOTAL FLOOR AREA	5,102.37 SQ.MT.	41.76 SQ.MT.	5,144.13 SQ.MT. (AREA UNDER F.A.R.)

भवन का अधिभोग एवं हैजार्ड श्रेणीः- प्रस्तावित भवन का अधिभोग एन.बी.सी. 2016 पार्ट IV ग्रुप-डी एसेम्बली भवन की श्रेणी के अन्तर्गत वर्गीकृत किया गया है।

ढांचागत व्यवस्थाः-

1. **पहुँच मार्गः-** प्रस्तावित भवन के सामने प्रस्तुत मानचित्र पर सड़क की चौड़ाई 12.00 मीटर प्राविधानित है।
2. **प्रवेश द्वार की चौड़ाई-** प्रस्तावित भवन के मानचित्र में तीन प्रवेश द्वार जिसमें प्रथम एवं दूसरे की क्रमशः चौड़ाई 06.00 मीटर एवं तीसरे की चौड़ाई 04.50 मीटर प्राविधानित है।
3. **सेटबैक :-** भवन के चारों तरफ न्यूमनतम् 10.00 मीटर सेटबैक प्राविधानित है। प्रस्तावित भवन का सेटबैक भवन विनियमावली के मानकों के अनुसार है। सेटबैक को हमेशा अवरोध मुक्त रखा जाय। सेटबैक में किसी भी प्रकार का स्थाई/अस्थाई निर्माण कार्य मान्य नहीं होगा। सेटबैक के छत की लोड वियरिंग क्षमता 45 टन से कम न रखी जाय।
4. **निकास मार्गः-** प्रस्तावित भवन के प्रथम तल से भूतल पर आने हेतु 06 स्टेयर केस प्रत्येक की चौड़ाई 02.00 मीटर तथा मेजनाइन तल से प्रथम तल पर पर आने हेतु 03 स्टेयर केस प्रत्येक की चौड़ाई 02.00 मीटर है एवं 02 स्टेयर केस प्रत्येक की चौड़ाई 02.00 मीटर जो ऊपरी तलों से बेसमेन्ट में आ रही है। इसे 02.00 घन्टा रेटिंग डोर से भूतल पर टर्मिनेट कर दिया जाय तथा बेसमेन्ट से ऊपर जाने हेतु स्टेयर केस सीधे पेरीफरी पर खुले। प्रस्तावित भवन के बेसमेन्ट में दो रैम्प जिसमें एक रैम्प की चौड़ाई 04.00 मीटर एवं दूसरे रैम्प की चौड़ाई 07.20 मीटर का प्राविधानित है। जिसका ढ़ाल 1:8 मानचित्र में प्राविधानित है एवं उस पर फिसलन रहित सतह बिछाई जाय। भवन के बेसमेन्ट का प्रयोग ने-नल बिल्डिंग कोड आफ इण्डिया-2016 पार्ट IIIके क्लाज-12.9 के अनुरुप किया जाना आवश्यक होगा।
5. **ऊँचाई-** प्रस्तावित भवन की ऊँचाई 23.70 मीटर प्राविधानित है।
6. **रिफ्यूज एरिया का विवरणः-** निल।

प्रस्तावित अग्निशमन सुरक्षा व्यवस्था एवं जीवरक्षा प्रणालीः-एन.बी.सी.-2016 के मानकों के अनुसार निम्नांकित अग्नि-शमन सुरक्षा व्यवस्थाएं पूर्ण किया जाना अनिवार्य है।

1. **भूमिगत टैंक-** एन.बी.सी.-2016 के मानकों के अनुसार भूमिगत टैंक 1,50,000 लीटर क्षमता का स्थापित किया जाना आवश्यक है।
2. **पम्पः-** टैंक के पास पम्प रुम में 2280 एल0पी0एम0 क्षमता का मुख्य विद्युत चालित पम्प-एक अदद, 2280 एल0पी0एम0 क्षमता का डीजल चालित पम्प-एक अदद, 2280 एल0पी0एम0 क्षमता का विद्युत चालित स्प्रिंकलर पम्प-एक अदद, 180 एल0पी0एम0 क्षमता का विद्युत चालित जॉकी पम्प-दो अदद, 450 एल0पी0एम0 क्षमता का वाटर कर्टन पम्प मानचित्र पर प्राविधानित है।
3. **होजरीलः-** प्रस्तावित भवन में होजरील लैण्डिंग वाल्व आई.एस.-3844 के मानकों के अनुसार स्थापित किया जाना आवश्यक है।
4. **वेट राइजर सिस्टमः-** प्रस्तावित भवन में वेट राइजर सिस्टम ने-नल बिल्डिंग कोड आफ इण्डिया-2016 के मानकों के अनुसार स्थापित किया जाना आवश्यक है।
5. **यार्ड हाइड्रेन्टः-** प्रस्तावित भवन परिसर में यार्ड हाइड्रेन्ट होज कैबिनेट एवं उसमें डिलीवरी होज पाइप तथा ब्रांच एवं फायर सर्विस इनलेट ने-नल बिल्डिंग कोड आफ इण्डिया-2016 एवं आई0एस0 13039:1991 के मानकों के अनुसार स्थापित किया जाना आवश्यक है।
6. **मैनुअली आपरेटेड इलेक्ट्रिक फायर अलार्म सिस्टम :-** प्रस्तावित भवन में मैनुअली आपरेटेड इलेक्ट्रिक फायर अलार्म सिस्टम ने-नल बिल्डिंग कोड आफ इण्डिया-2016 के मानकों के अनुसार स्थापित किया जाना आवश्यक है।
7. **स्वचालित डिटेक्शन एण्ड फायर अलार्म सिस्टमः-** प्रस्तावित भवन में आटोमेटिक डिटेक्शन एण्ड फायर अलार्म सिस्टम ने-नल बिल्डिंग कोड आफ इण्डिया-2016 के मानकों के अनुसार स्थापित किया जाना आवश्यक है।
8. **स्वचालित स्प्रिंकलर सिस्टमः-** प्रस्तावित सम्पूर्ण भवन में आटोमेटिक स्प्रिंकलर सिस्टम नेशनल बिल्डिंग कोड आफ इण्डिया-2016 के मानकों के अनुसार स्थापित किया जाना आवश्यक है एवं 2280 एलपीएम क्षमता का स्वचालित इलेक्ट्रिकल पम्प स्प्रिंकलर सिस्टम के लिये पूर्ण रूप से डेडीकेटेड होगा।
9. **टैरेस टैंकः-** प्रस्तावित भवन के टैरेस पर 10,000 लीटर क्षमता का टैरेस टैंक स्थापित कराया जाना आवश्यक है।

10. **प्राथमिक अग्निशमन उपकरण):-** प्रस्तावित भवन में प्राथमिक अग्निशमन उपकरण आई.एस.-2190:2010 के अनुसार अधिष्ठापित कराया जाना आवश्यक है।

11. **स्मोक एक्सट्रैक्सनः-**

ए- फायर चेकडोर,स्मोक चेकडोर की लोकेशन व रेटिंग 02.00 घन्टा।

बी- स्मोक रिजर वायर एवं अनुमानित स्मोक लेयर आदि को आधारित करते हुए सम्पूर्ण भवन में एक्सट्रैक्सन सिस्टम नेशनल बिल्डिंग कोड आफ इण्डिया-2016 के मानकों के अनुसार स्थापित किया जाना आवश्यक होगा एवं स्मोक मैनेजमेन्ट सिस्टम का विस्तृत प्लान एक माह के अन्दर उपलब्ध कराया जाय अन्यथा की स्थिति में निर्गत प्रोविजनल अनापत्ति प्रमाण पत्र स्वतः समाप्त हो जायेगी एवं इसके लिये कार्यपालक अभियन्ता, बी0एच0यू0 परियोजना मण्डल-1 के0लो0नि0 वि0, वाराणसी पूर्ण रूप से उत्तरदायी होगें।

12. **एक्जिट साइनेजः-** सम्पूर्ण भवन में एक्जिट साइनेज स्थापित किया जाना आवश्यक है।

13. **पी0ए0 सिस्टमः-** पी0ए0 सिस्टम की व्यवस्था का प्राविधान सम्पूर्ण भवन में किया जाना आवश्यक है।

14. प्रस्तावित भवन में वैकल्पिक विद्युत श्रोत हेतु जनरेटर के अतिरिक्त अन्य व्यवस्था किया जाना आवश्यक है।

15. प्रस्तावित भवन में विद्युत व्यवस्था आई0एस0 1646:1997 के अनुरुप किया जाय।

16. कन्वेन्शन सेन्टर में प्रस्तावित सीटिंग अरेजमेन्ट में दीवार 3 फिट की दूरी नहीं रखी गयी है। इसका संशोधित मानचित्र में उपरोक्त कमी के अतिरिक्त निकास मार्ग की उचित संख्या बढ़ाकर एक माह में अधोहस्ताक्षरी को उपलब्ध कराना सुनिश्चित करें अन्यथा की स्थिति में सशर्त निर्गत प्रोविजनल अनापत्ति प्रमाण पत्र स्वतः ही निरस्त समझा जायेगा।

उपरोक्तानुसार वाराणसी कनवेन्शन सेन्टर, नगर निगम, सिगरा, वाराणसी में प्रस्तावित भवन निमार्ण हेतु प्रोविजनल अग्निशमन अनिापत्ति प्रमाण पत्र इस शर्त के निर्गत किया जाता है कि आवेदक द्वारा भवन में अग्नि से सुरक्षा सम्बन्धी सभी प्रस्तावित प्राविधान भवन निनियमावली तथा नेशनल बिल्डिंग कोड आफ इण्डिया-2016 में उल्लेखित मानकों के अनुसार कराये जायेगें तथा भवन के निर्माणोपरान्त भवन का प्रयोंग करने से पहले भवन में प्राविधानित अग्नि से सुरक्षा व्यवस्थायें मानकों के अनुसार भौतिक रुप से स्थापित कर उनका निरीक्षण/परीक्षण अग्निशमन विभाग से प्राविधानित अग्निशमन व्यवस्थायें मानकों के अनुसार भौतिक रुप से स्थापित कर उनका भौतिक निरीक्षण/परीक्षण अग्निशमन विभाग द्वारा गठित कमेटी से कराकर अन्तिम अग्निशमन अनापत्ति प्रमाण पत्र प्राप्त किया जायेगा अन्यथा निर्गत प्रोविजनल अनापत्ति प्रमाण पत्र स्वतः ही निरस्त मान लिया जायेगा एवं किसी भी प्रकार की जनहानि एवं घटना के लिये कार्यपालक अभियन्ता,बी0एच0यू0 परियोजना मण्डल-1, के0लो0नि0 वि0, वाराणसी पूर्ण रूप से उत्तरदायी होगें।

बिन्दु संख्या-11 पर वांछित स्मोक मैनेजमेन्ट प्लान का विस्तृत विवरण एक माह में उपलब्ध कराया जाय, अन्यथा की स्थिति में यह निर्गत प्रोविजनल अनापत्ति प्रमाण पत्र स्वतः समाप्त हो जायेगा।

3.XI.2017

(अरविन्द कुमार)
संयुक्त निदेशक
फायर सर्विस मुख्यालय
उ0प्र0 लखनऊ।

प्रतिलिपिः- उप निदेशक, फायर सर्विस वाराणसी परिक्षेत्र, वाराणसी/मुख्य अग्निशमन अधिकारी, वाराणसी/अग्निशमन अधिकारी, चेतगंज, वाराणसी को इस निर्देश के साथ प्रेषित कि उपरोक्तानुसार अनुपालन सुनिश्चित करायें तथा प्रस्तावित कन्वेन्शन सेन्टर के बेसमेन्ट के लिये स्मोक मैनेजमेन्ट प्लान एक माह में अधोहस्ताक्षरी को हस्ताक्षरित करते हुए उपलब्ध कराये।

2. आयुक्त, वाराणसी मण्डल, वाराणसी को इस अनुरोध के साथ प्रेषित है कि उपरोक्तानुसार अनुपालन कराने एवं बिन्दु संख्या-11 पर वांछित स्मोक मैनेजमेन्ट प्लान का विस्तृत विवरण उपलब्ध कराने हेतु अपने स्तर से भी निर्देशित करने का कष्ट करें।

3. जिलाधिकारी, वाराणसी को इस अनुरोध के साथ प्रेषित है कि उपरोक्तानुसार अनुपालन कराने एवं बिन्दु संख्या-11 पर वांछित स्मोक मैनेजमेन्ट प्लान का विस्तृत विवरण उपलब्ध कराने हेतु अपने स्तर से भी निर्देशित करने का कष्ट करें।

4. नगर आयुक्त, वाराणसी को इस अनुरोध के साथ प्रेषित है कि उपरोक्तानुसार अनुपालन कराने एवं बिन्दु संख्या-11 पर वांछित स्मोक मैनेजमेन्ट प्लान का विस्तृत विवरण उपलब्ध कराने हेतु अपने स्तर से भी निर्देशित करने का कष्ट करें।

Office of the Joint Director, Fire Fighting Service Head Quarter, (UP) Lucknow.

Letter reference-FS/GD/1076-2017 Date 21 Nov 2017

To,
Executive Engineer
BHU Planning Circle-1
CPWD Varanasi

Subject- Regarding provisional Fire Fighting NOC certificate of Varanasi Convention Center, Nagar Nigam Sigra for the building construction by CPWD BHU planning circle -1

It has been requested to release a provisional fire fighting NO OBJECTION CERTIFICATE for the proposed building in subject by means of your application no 23 (142) /PMBHU/2017/1437 dated 10-Nove. 2017 and the modified maps and UID number 2017/35600/VNS/Varanasi/225/JD dated 23 Sep. 2017 submitted for the proposed building in subject.

The proposed fire fighting systems and documentations proposed in the maps of the building in subject have been surveyed by Mr. Yogendra Chaurasia firefighting officer, Chetganj, Varanasi, Mr. Rakesh Rai, chief firefighting officer Varanasi, Mr. Yogesh Babu Dwivedi, Deputy Director Fire service, Varanasi region. Their report dated 18 Nov 2017 has been in perusal in accordance to the relevant standards, following are those details-

Please get additional text translated. Ideally the entire letter. If not then at least the parts marked in rectangle in the attachment.

Occupancy & Hazard Category Of The Building - the occupancy of the proposed building has been notified under the category of assembly building NBC 2016 Part IV group D.

1- Approach road – A 12 meter road is provisioned on the map in front of the proposed building.
2- Width of the entrance gate – In the plan of the proposed building three gates have been provided, of which the width of the First and second gates are 6 meters respectively and the third gate width is 4.5 meters.
3- Setback – A minimum of 10 meter set back has been provided on all the four sides of the periphery of the building. The setback of the proposed building is in accordance to the standards of the building regulations. Setback is to be kept always obstacle free. Any temporary/permanent construction in the setback will be unacceptable. The load bearing capacity of the basement slab in the setback is to be maintained at not less than 45 tones.
4- Exit way – in the proposed building, there are 6 staircases each of width 2.0 meters to come down from 1st floor to ground floor. To come down from mezzanine floor to ground floor there are 3 staircase each of 2 meter width and 2 staircases of 2 meter width each for coming from the upper floor to the basement floor. These should be terminated on ground floor by 2 hour rating door and the stair case to go upwards from basement, to open directly on the periphery. Two ramps are provided in the proposed building with one ramp 4 meter wide and another ramp 7.20 meter wide. As per the proposed plan the slope of which is **1:8** and to be coated with an anti-skid layer. It would be necessary to use the basement of the building according to the clauses **12.9** of the National Building Codes of India **2016** Part 3.
5- Height – the height of the proposed building is proposed as **23.70** meters.
6- Refuge area description – Nil.

Proposed Fire Fighting Safety System and Life Saving System – the following firefighting arrangements are necessary to be completed in accordance with the standards of NBC 2016.

1- Underground Tank – It is necessary to provide an underground tank of 150,000 liters according to the NBC 2016 standards.
2- Pump –In a pump room next to the tank 2280 LPM capacity electricity operated 1 number of pump, in the pump house near the tank, 2280 LPM capacity diesel operated pump-1 number, 2280 LPM capacity electricity operated sprinkler pump-1 number, 180 LPM capacity electricity operated jockey pump 2 numbers, 450 LPM capacity water curtain pump-1number have been proposed in the plan.
3- Hose Reel – it is essential to establish hose reel landing valve in the proposed building according to the IS 3844 standards.
4- Wet Riser System - it is essential to establish hose reel landing valve in the proposed building according to the IS 3844 standards.
5- Yard Hydrant - it is essential to establish yard hydrant hose cabinet, and delivery hose pipe there in, and branch & fire service inlet in the proposed building according to the National Building Code of India-2016, and IS 13039:1991 standards.
6- Manually Operated Electric Fire Alarm System - it is essential to establish Manually Operated Electric Fire Alarm System in the proposed building according to the National Building Code of India-2016, standards.

7- Automatic Detection & Fire Alarm System - it is essential to establish Automatic Detection & Fire Alarm System in the proposed building according to the National Building Code of India-2016, standards.
8- Automatic Sprinkler System - it is essential to establish Automatic Sprinkler System in the proposed entire building according to the national building code of India-2016 standards, and the 2280 LPM capacity automatic electrical pump will be fully dedicated to sprinkler system.
9- Terrace Tank - it is essential to establish a 10,000 liter Terrace Tank on the terrace of the proposed building.
10- Elementary Fire Fighting Equipment - it is essential to establish Elementary Fire Fighting Equipment in the proposed building according to the IS 2190:2010 standards.
11- Smoke Extraction –
A – The location of fire check door, smoke check door and rating 2 hour
B – It would be necessary to establish a smoke extraction system in the entire building on the basis of the smoke reservoir and estimated smoke layer etc., according to the national building code of India 2016 and an exclusive plan of smoke management system must be made available in a month, otherwise the issued no objection certificate will automatically be cancelled and for which executive engineer CPWD BHU planning region-1 will be solely responsible.
12- Exit Signage – It is necessary to establish Exit Signage in the entire building.
13- P A System - It is necessary to establish P A System in the entire building.
14- It is essential to arrange an optional electricity supply system other than generator.
15- The electrical systems are to be established according to the IS 1646:1997.
16- - In the proposed seating arrangement in the convention center, a distance of three feet is not maintained from the wall. After refining the above by providing appropriate additional exit ways, please provide the revised plan to the under signee within a month otherwise the issued conditional provisional no objection certificate will be automatically cancelled.

According to the afore said and for the proposed construction of the Varanasi convention center in Nagar Nigam Varanasi, a provisional firefighting no objection certificate is being issued on such condition that in the building all the proposed firefighting provisions will be constructed by the applicant according to the standards as mentioned in the building construction regulation and national building code of India 2016, and after the completion of construction of the building and prior to start the use of the building, all the provisioned firefighting systems must be physically installed and observed/investigated according to the provisions & standards as established by the fire department and then must be physically inspected/investigated by the committee so formulated by firefighting department, and consecutively obtain the final no objection certificate otherwise the provisional certificate will deem automatically to be cancelled and the executive engineer CPWD Varanasi, shall be solely responsible for any untoward incident, accident or loss of life.

A detailed description of the desired smoke management plan on the point no 11, to be provided within a month, otherwise this no objection certificate shall deem to be automatically cancelled.

Arvind Kumar

Joint Director

Fire Service HQ

Lucknow

Copied Forwarded to:

1- Deputy Director Fire Services Varanasi zone, Varanasi, Chief Firefighting Officer Varanasi, Firefighting Officer Chetganj Varanasi, with instruction to get the afore said compliance executed and, to make the smoke management plan for the basement of the proposed convention center, available to the under signatory within a month.
2- Commissioner Varanasi with a request to get the compliance of the aforesaid executed and to ensure to instruct accordingly from his level also to make the detailed description available of the desirable smoke management plan on the above point no- 11.
3- District Collector, Varanasi with a request to get the compliance of the aforesaid executed and to ensure to instruct accordingly from his level also to make the detailed description available of the desirable smoke management plan on the above point no- 11.
4- City Commissioner, Varanasi with a request to get the compliance of the aforesaid executed and to ensure to instruct accordingly from his level also to make the detailed description available of the desirable smoke management plan on the above point no- 11.

Appendix 7-10 Approval for cutting tree in the Project site

कार्यालय प्रभागीय वनाधिकारी, वाराणसी वन प्रभाग, वाराणसी

(वन भवन, एच0आई0जी0–36, अशोक विहार कालोनी, फेज–1, पहड़िया, वाराणसी)
दूरभाष–0542 2585574
ई–मेल–dfovrns@yahoo.in

पत्रांक– / 22–1, दिनांक, वाराणसी, मार्च, 21 ,2018

सेवा में,

नगर आयुक्त
नगर निगम, वाराणसी।

विषयः– Regarding issue of NOC for felling trees for Varanasi Convention Centre (VCC) site in the campus of Nagar Nigam, Varanasi.

सन्दर्भः– आपका पत्र संख्या–342/अ0न0आ0/2017–18 दिनांक 20.03.2017 ।

महोदय,

कार्यापालक अभियन्ता, बी0एच0यू0 परियोजना मण्डल–1, केन्द्रीय लोक निर्माण विभाग, बी0एच0यू0 वाराणसी के पत्रांक– 23(142)/पी.एम.बी.एच.यू./2017/1612 दिनांक 30.12.2017 तथा पत्रांक–23(142)/पी.एम.बी.एच.यू./2018/118 दिनांक 02.02.2018 द्वारा वाराणसी कॉन्वेंशन सेन्टर के निर्माण कार्य में बाधक वृक्षों का मूल्यांकन एवं पातन अनुमति मांगी गई थी। इस सम्बन्ध में जाँचोपरान्त कुल 22 वृक्ष निर्माण कार्य में बाधक पाये गये थे, जिसके सन्दर्भ में इस कार्यालय के पत्रांक–2831/22–1 दिनांक 06.02.2018 द्वारा उक्त वृक्षों का मूल्यांकन देते हुए प्रति वृक्ष 100.00 रूपये की दर से 22 वृक्षों का पातन अनुमति शुल्क जमा कराने तथा काटे जाने वाले वृक्षों की दोगुनी संख्या में पौधों का रोपण करा कर उसकी पश्चात्वर्ती देख–रेख कराये जाने के अण्डरटेकिंग देने हेतु लिखा गया था।

उपरोक्त के सम्बन्ध में कार्यापालक अभियन्ता, बी0एच0यू0 परियोजना मण्डल–1, केन्द्रीय लोक निर्माण विभाग, बी0एच0यू0 वाराणसी द्वारा पातन अनुमति शुल्क मु0 2200.00 (दो हजार दो सौ रूपये) मात्र जमा कराये जाने तथा आपके सन्दर्भित पत्र द्वारा काटे जाने वाले 22 वृक्षों की दोगुनी संख्या अर्थात् 44 पौधों का रोपण करा कर उसकी पश्चत्वर्ती देख–रेख कराये जाने का अण्डरटेकिंग प्राप्त होने के उपरान्त उक्त 22 वृक्षों की पातन अनुमति निर्गत की जाती है। वृक्षों का विवरण निम्नवत् है –

क्र0 सं0	प्रजाति	दशा	व्यास वर्ग (सेमी0)	वृक्षों की संख्या
1	अशोक	हरा, खड़ा	10–20	01
2	अशोक	हरा, खड़ा	30–40	08
3	अशोक	हरा, खड़ा	40–50	03
4	अशोक	हरा, खड़ा	60–70	01
5	शहतूत	हरा, खड़ा	10–20	02
6	शहतूत	हरा, खड़ा	30–40	01
7	छितवन	हरा, खड़ा	20–30	02
8	पुत्रंजीवा	हरा, खड़ा	20–30	01
9	नीम	हरा, खड़ा	50–60	01
10	आँवला	हरा, खड़ा	10–20	02
			योग	22 वृक्ष

कृपया उपरोक्त वृक्षों के काटे जाने के उपरान्त प्रकाष्ठ का ढुलान इस कार्यालय से अभिवहन पास लेकर कराया जाये।

भवदीय

(मूलचन्द्र)
प्रभागीय वनाधिकारी
वाराणसी वन प्रभाग, वाराणसी

संख्या– 3395/ सम दिनांकित।

प्रतिलिपि – कार्यापालक अभियन्ता, बी0एच0यू0 परियोजना मण्डल–1, केन्द्रीय लोक निर्माण विभाग, बी0एच0यू0 वाराणसी को उपरोक्त के क्रम में सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

प्रतिलिपि – क्षेत्रीय वन अधिकारी, वाराणसी रेंज को उनके पत्रांक–198/22–1 दिनांक 03.02.2018 के क्रम में सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

(मूलचन्द्र)
प्रभागीय वनाधिकारी
वाराणसी वन प्रभाग, वाराणसी

Office of the Divisional Forest Officer, Varanasi Forest Division, Varanasi

(Forest Building, HIG-36, Ashok Vihar Colony, Phase-1, Phedia, Varanasi)

Telephone: - 0542 2585574 / E-Mail:-dfovrns@yahoo.in

Sheet Number: - / 22-1, / Date: - Varanasi, March 21, 2018

To,

Municipal Commissioner,

Varanasi Nagar Nigam

Subject: - Regarding issue of NOC for felling trees of Varanasi convention Centre (VCC) site in the campus of Nagar Nigam, Varanasi.

Context: - Your letter no 342 / A.N.A. / 2017-18 dated 20.3.2017|

Sir,

In ref to the letter number 23 (142) / PMBHU / 2017/1612 dated 30.12.2017 of Executive Engineer, BHU Project Circle-1, Central Public Works Department, BHU Varanasi, and letter number 23 (142) / PMBHU / 2018/118 dated 2.2.2018, seeking fee and permission to cut the trees that are an obstacle in the construction work of Varanasi Convention Center.

In this connection, it was found that only 22 trees are obstructing the construction work. In this context and vide circular - 2831 / 22-1 dated 06.02.2018, it was decided to levy a permit fee of Rs 100/- per tree to be cut and submitting a written undertaking to plant and take care of double the number of trees that are being cut.

In relation to the above, Executive Engineer, B.H.U. Project Circle -1, Central Public Works Department, BHU after depositing the Cutting permission fee of INR 2200.00 (Rupees Two Thousand Two Hundred only) and submitting the undertaking of planting and taking care of 44 trees which is double the number of 22 trees that are being cut, would be permitted to cut the above mentioned 22 trees. The details of the trees are as follows:-

S.No.	Species	Condition	Diameter class (C.M)	Number of trees
1	Ashoka	Green, Standing	10-20	01
2	Ashoka	Green, Standing	30-40	08
3	Ashoka	Green, Standing	40-50	03
4	Ashoka	Green, Standing	60-70	01
5	Mulberry (Shatut)	Green, Standing	10-20	02
6	Mulberry (Shatut)	Green, Standing	30-40	01
7	Chitvan	Green, Standing	20-30	02
8	Putrjiva	Green, Standing	20-30	01
9	Azadirachta indica (Neem)	Green, Standing	50-60	01
10	Indian Gooseberry (Amla)	Green, Standing	10-20	02
			Total	**22**

After the above trees have been cut, the transportation of the cut trees should be done after collecting a pass from this office.

Yours faithfully

(Moolchandra)

Divisional Forest Officer

Varanasi Forest Division, Varanasi.

Number: - 3395 / even dated.

Copy:- Executive Engineer, B.H.U. Project Circle-1, Central Public Works Department, BHU, Varanasi, in the order of the above, sent for information and necessary action.

Copy: - Regional Forest Officer, Varanasi Range sent to the notice and necessary action in the order of his letter -198 / 22-1 dated 03.02.2018.

(Moolchander)

Divisional Forest Officer

Varanasi Forest Division, Varanasi.

Appendix 7-11 Project Monitoring Report

Project Monitoring Report
on
The Project for Construction of The International Cooperation and Convention Center in Varanasi / (Phase II)
Grant Agreement No. 1760420 / 1860100
July, 2018

Organizational Information

Signer of the G/A (Recipient)	**Ministry of Finance** Person in Charge Mr. S. Selvalumar Joint Secretary Department of economic Affairs, Ministry of Finance Contacts Address: New Delhi, 110001, India Phone/FAX: 23093881/23092024 Email: jsabc-dea@nic.in
Executing Agency	**Project Management Unit (PMU) for the Project** Person in Charge Mr. R. P. Singh Project Director Project Management Unit for the Project Contacts Address: Behind central office, BHU, Varanasi 221005 India Phone/FAX:0542-236-9418/0542-236-8184 Email: pmbhuvns@gmail.com
Line Ministry	**Ministry of Housing and Urban Affairs** Person in Charge Mr. Sumit Gakhar Under Secretary Contacts Address: Behind central office, BHU, Varanasi 221005 India Phone/FAX: 011-23062040 Email: gakhar.sumit@gmail.com

General Information:

Project Title	[Phase I] The Project for Construction of The International Cooperation and Convention Center in Varanasi
	[Phase II] The Project for Construction of The International Cooperation and Convention Center in Varanasi (Phase II)
E/N	[Phase I] Signed date: 14th September, 2017 Duration: 31st December, 2023
	[Phase II] Signed date: 18th May, 2018 Duration: 31st December, 2023
G/A	[Phase I] Signed date: 15th September, 2017 Duration: 31st December, 2022

	[Phase II] Signed date: 18th May, 2018 Duration: 31st December, 2022
Source of Finance	[Phase I] Government of Japan: Not exceeding JPY 2,240 million Government of India: INR 285.4 million
	[Phase II] Government of Japan: Not exceeding JPY 802 million Government of India: INR 131.1 million

1: Project Description

1-1 Project Objective

The objective of the Project is to construct a Varanasi Convention Centre (VCC) that will provide opportunities for social and cultural interactions and the exchange of knowledge, thereby contributing to the socio-economic and tourism development of Varanasi.

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

In December 2015, during a summit meeting between Japan and India, the prime ministers of India and Japan issued a joint statement in the form of the “Japan and India Vision 2025 Special Strategic and Global Partnership”, in which they expressed their satisfaction in the strengthened ties between the cities of Kyoto and Varanasi, two ancient and historic cities integral to their respective cultural heritages. Prime Minister Modi also expressed his expectation that the two sides will explore the development of a convention center in Varanasi.
Following the above announcement, the Detailed Project Reports (DPR) for the Varanasi Convention Centre (VCC) were prepared by the India side and submitted to the Japan side. In response, JICA conducted the Data Collection Survey on Varanasi Convention Centre from November 2016 to May 2017. At the India-Japan Joint Statement in November 2016, while the survey was still being conducted, Prime Minister Modi expressed appreciation for Japan’s efforts to support the construction of a convention center in Varanasi and recognized its symbolic importance as a sign of strengthening bilateral ties.
Based on the results of the survey, both governments agreed in principle to the function and size of the requested facility. Furthermore, JICA decided to conduct the Preparatory Survey (hereinafter referred to as “the Survey”) and dispatch the Survey team to verify the feasibility of the requested project (hereinafter referred to as “the Project”) and to develop the project plan, schematic design and detailed design of the building and equipment, and prepare the draft bidding documents and cost estimation.
The result of the schematic design was presented at the India-Japan Joint meeting in September 2017, in which it was stated that “the two Prime Ministers welcomed the exchange of notes for the construction of a state-of-art Convention Centre in Varanasi as a symbol of friendship between Japan and India and expressed their hope for its early completion”. This project has a symbolic importance as proof of Japan-India bilateral close relations. Overall goal of this project is to contribute to the socio-economic and tourism development of Varanasi.

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr 2021)
Operation Number of visitors at the facility	-	50,211 visitors/year
Operation Number of international events at the facility	-	6 events/year
Qualitative indicators to measure the attainment of project objectives		
・ Create opportunities for social and cultural interactions of the people by a variety of event at the facility. ・ Bring economic spill-over effects in local industries through tourism development. ・ Promote events for strengthening international relations. ・ Strengthen the bilateral relationship between India and Japan.		

2: Details of the Project

2-1 Location

Components	**Original** *(proposed in the outline design)*	**Actual**
1.	The project site is the southern part of the premises of Varanasi Municipal Corporation, where the existing Auditorium is located, and is shown in Attachment 1. It covers an area of 10,560 m^2. The project site covers the southern section of the premises starting from the south wall of the existing Municipality Cooperation Office Building, and excludes the areas occupied by the existing C.R.P.F. house, petrol station, elevated water tank, and SWM maintenance.	

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
(1) Building Works	a) Facility components: The total building coverage of VCC is 4,265 m^2, with a total floor area of 9,772 m^2, which includes the basement. b) Zoning Plan: The 1200-seat Main Hall, surrounded by the foyer, is located at the center of the facility. c) Specifications of Each Room ・ Hall: 843 m^2, 1,200seats (Fixed flip up seat, stepped floor) ・ Stage: 438 m^2 ・ Gallery/ Meeting Room :165 m^2 ・ Greenrooms: 221 m^2 ・ VIP Room: 46 m^2 ・ Toilets for the Audience ・ Basement Parking: 3,930 m^2,102 lots d) Structural works e) Aluminum Louver of the Tower f) Ornament on the Eaves g) Signage Work	
(2) Electrical Works	a) Low voltage power supply system within the Project site including installation of distribution panels, cables, conduit pipes and outlets, and PV panels. b) Emergency power supply system providing a diesel engine generator c) Lighting system within the Project site including installation of lighting fixtures, cables, conduit pipes and switches d) Local area network (LAN) within the Project site including installation of switches, cables and LAN outlets e) Telecommunications system applying VoIP within the Project site f) Lightning protection system g) AV System for the Meeting Rooms h) Solar Panels and Generators	

(3) Mechanical Works	a) Water supply system b) Sewage system c) Wastewater treatment facility d) Water tanks e) Fire extinguishing facility	
(4) Stage System Works	a) Stage mechanical system facilities b) Stage Sound system c) Stage Acoustic system d) Stage Lighting system e) Stage AV system	
(5) External work related to the building	a) Road and Path b) Fence c) Parking lots within the site	
(6) Other works	a) Furniture Work b) Generator House	

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original		Actual
	(proposed in the outline design)	*(at the time of signing the Grant Agreement)*	
	The tentative implementation schedule for the project is expected as attached hereto Attachment 4	The same as in the outline design	

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations

See Attachment 2.

2-4-2 Activities

See Attachment 3.

2-4-3 Report on RD

See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant (Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
Total				

Note: 1) Date of estimation: August, 2017
2) Exchange rate: 1.00 US Dollar =112.83 JPY, 1.00 INR = 1.89 JPY

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 INR)	
	Original ***(proposed in the outline design)***	**Actual** ***(in case of any modification)***	**Original[1),2)]** ***(proposed in the outline design)***	**Actual**
1.	Site Clearance Preparation Works 1) Demolition of the existing building 2) Removal of unnecessary existing structures and trees		2,400	
2.	Installation of Utility Work (Water, Electricity, Sewage and Internet, etc.)		1,450	
3.	Necessary Approvals for Construction		100	
4.	External Works 1) Landscaping and Planting Works 2) Fencing, Guard House, Generator House and Garbage House 3) General Furniture		25,000	
5.	Fee for Authorization to Pay		20	
6.	Taxes		387,533	
Total			**416,503**	

Note: 1) Date of estimation: August 2017
2) Exchange rate: 1 US Dollar =112.83 JPY, 1.00 INR = 1.89 JPY
3) Cost for both Phase I and Phase II

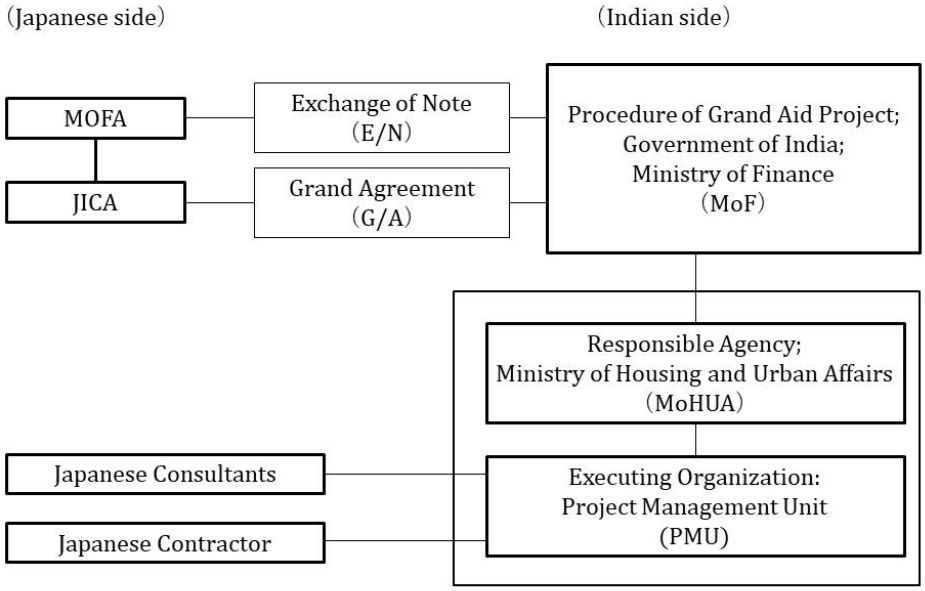
Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery, etc.
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)*
Name: Project Management Unit (PMU)
Role:
Financial situation: Budget for MoHUA
Institutional and organizational arrangement (organogram):



human resources (number and ability of staff):
Project Director (PD): Mr. R. P. Singh (CPWD)
Executive Engineer (EE): Mr. A. K. Singh (CPWD)
Operations Manager (OM): Mr. Ramesh Singh (VMC)
Assistant Engineer (AE): Mr. Abhishek Verma (CPWD)

Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 6 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 6 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spare parts, etc.)

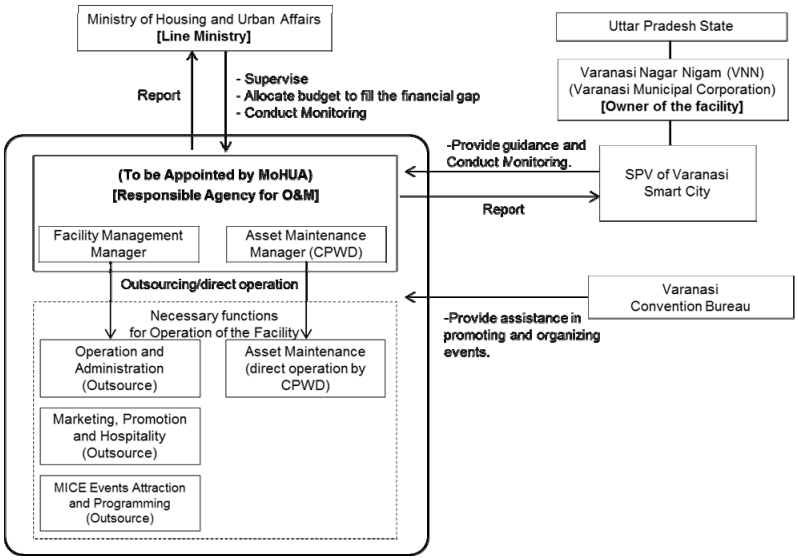
Original *(at the time of outline design)*

MoHUA proposed from the previous survey that SPV is in charge of the operations management for VCC. However, the existing development list of SPV has not yet formalized for the organization setting-up and development policy concerning the operations of VCC.

Meanwhile, CPWD appointed as the executing agency from MoHUA is suitable for management of construction projects as described above, and has plentiful architects and engineers. However with respect to the operations of theatre facilities with international standard, CPDW has no specialists to assign. For this reason, the Advisory Committee (AC) was established at this design stage, not only for providing the direction of the Project and determining important policies, but also supporting PMU for providing advice in important prerequisites during the design stage toward future operations management.

For operation stage, MoHUA issued the letter that CPWD will be responsible for operating management for VCC and VCC will be financed by their annual budget. Following the letter, CPWD prepared the standard operation procedure (SOP) including operations / maintenance organization and financial plan was submitted from PMU in November 2017.

The organization of operations and maintenance based on this SOP is as shown in the following figure. CPWD will be in charge of the asset maintenance management of VCC, but some parts of the operation tasks, such as marketing and event management, MICE events attraction and programming and operation and administratio, are proposed to be outsorced.
Establishment of organization body of VCC, including non-profit entity, requires further study.



Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)* Occupancy Rate 30% : INR 40,080,000 Occupancy Rate 50% : INR 41,492,000 Occupancy Rate 70% : INR 42,914,000
Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks (*at the time of outline design)*

Potential Risks	Assessment
1. High underground water level	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	From investigation of the neighboring area, it was confirmed that level of underground water in this area is not so high. However, the result of the soil investigation survey shows high underground water level. There is a doubt of water leakage from the water supply pipe network.
	Mitigation Measures:
	By the recipient side, all the existing water pipes in the site were removed before commencement of the work.
	Action required during the implementation stage:
	The actual situation will be confirmed in the excavation work.
	Contingency Plan (if applicable):
2. Cost for the Phase II Work	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	It depends on the procurement procedure. In the event of direct contract, it is expected that the contractor may propose high cost for the Phase II work, and it may be hard to negotiate.
	Mitigation Measures:
	Careful evaluation / confirmation of the proposed cost
	Action required during the implementation stage:
	Contingency Plan (if applicable):

3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

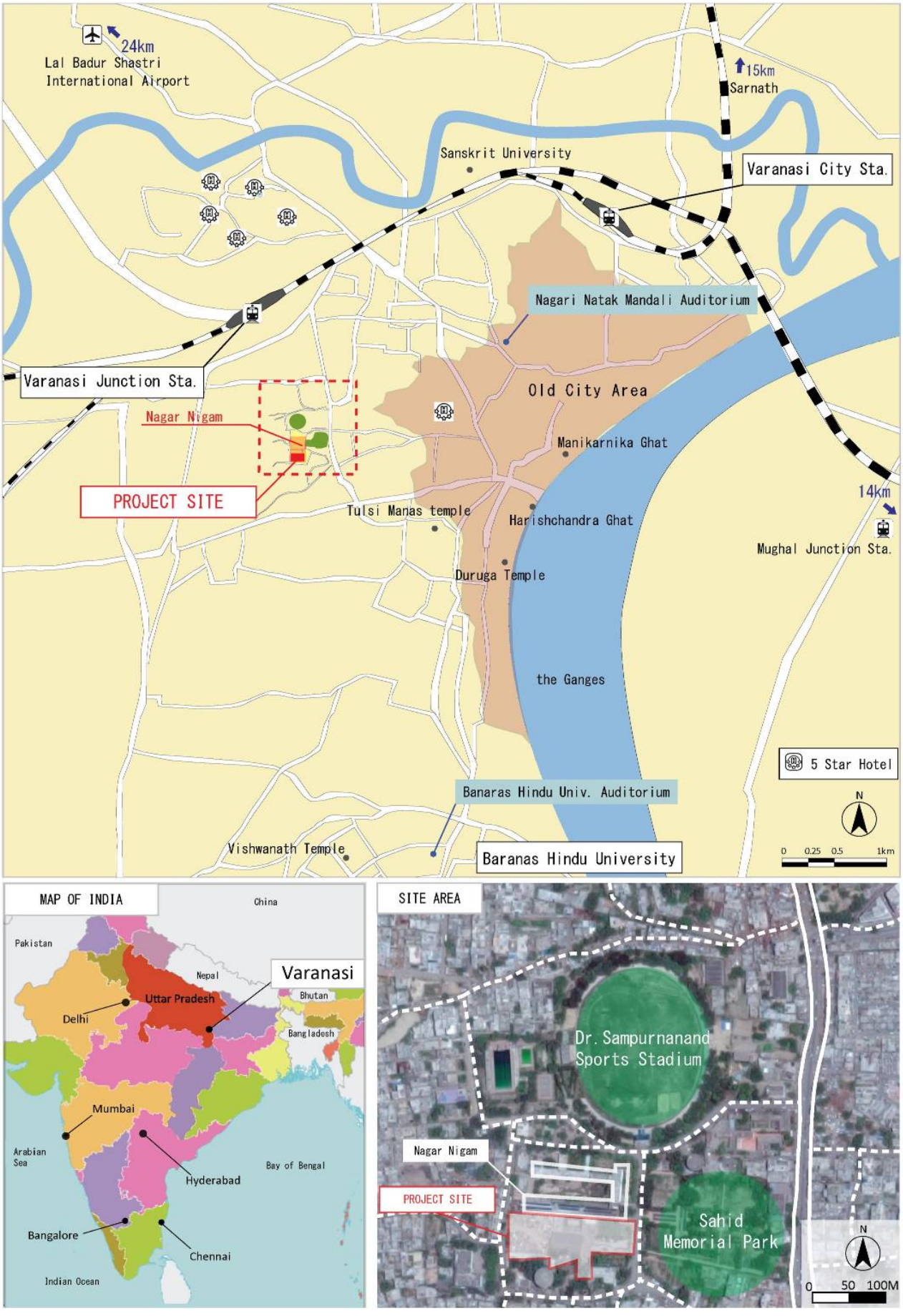
5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant
   Appendix - Photocopy of Contractor's Progress Report (if any)
   - Consultant Member List
   - Contractor's Main Staff List
4. Implementation Schedule
5. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
6. Environmental Management Plan
7. Monitoring sheet on price of specified materials (Quarterly)
8. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
9. Pictures (by JPEG style by CD-R) (PMR (final)only)
10. Equipment List (PMR (final)only)
11. Drawing (PMR (final)only)
12. Report on RD (After project)

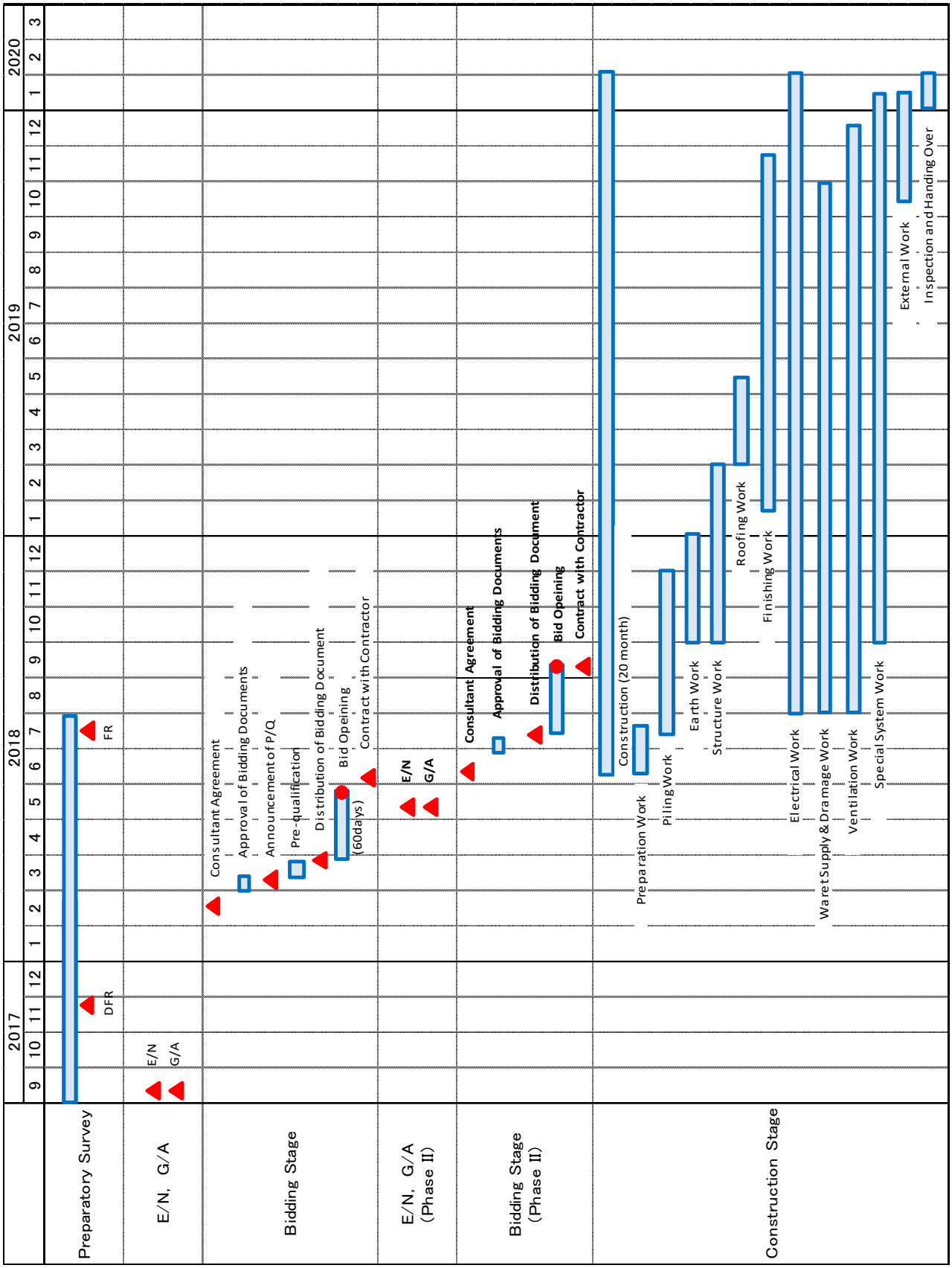
Attachment 1 Project Location Map



Attachment 2 Specific obligations of the Recipient which will not be funded with the Grant

Cost to be borne by Indian Side			
	Item	Quantity	Cost (1,000 INR)
1.	Site Clearance Preparation Works 1) Demolition of the existing building 2) Removal of unnecessary existing structures and tre es	1 set	2,400
2.	Installation of Utility Work (Water, Electricity, Sewage and Internet, etc.)	1 set	1,450
3.	Necessary Approvals for Construction	1 set	100
4.	External Works 1) Landscaping and Planting Works 2) Fencing, Guard House, Generator House and Garbage House 3) General Furniture	1 set	25,000
5.	Fee for Authorization to Pay	1 set	20
6.	Taxes	1 set	387,533
Total			**416,503**

Attachment 4 Implementation Schedule (Phase I + II)



Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C-D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials

(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)

-
-
-

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)

（Actual Expenditure by Construction and Equipment each）

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Sheet 1 Tax with respect to corporate income (Corporate Tax)

【Points of Attention】The Taxation Rates in India are revised annually during the Budget Session of the Indian Parliament. The Rates quoted below are as per the Indian Finance Act of 2017.

Items	Exemption	How to exempt	Applicable Law	Rate (%)	How to calculate	Information pertaining to seeking Exemption	Remarks
Corporate tax on Japanese companies (income tax on commercial, industrial and service industries)	○	Exempt (Advanced)	Income Tax Act, 1961	50% + Education Cess 2% Secondary & Higher Education Cess 1% + Surcharge (2% for Income <= 10Crore and 5% for Income > 10Crore)	Details in Annexure 1	Application to: Director General of Income Tax, Ministry of Finance Procedure: 1) The Executing Agency shall submit a tax exemption letter to the Director General of Income Tax of the Ministry of Finance 2) Exemptions sought under Sections 10 (42) 3) Assessment within the IT Department. After confirmation, an Exemption Notification shall be issued by the Ministry of Finance. 4) This Notification will be published in the Official Gazette of India. 5) The specified income categories under this notification will be exempt from taxation.	
Corporate tax for third-country companies	○	Exempt (Advanced)	Income Tax Act, 1961	50% + Education Cess 2% Secondary & Higher Education Cess: 1% + Surcharge (2% for Income <= 10Crore and 5% for Income > 10Crore)	Details in Annexure 1	Application to: Director General of Income Tax, Ministry of Finance Procedure: 1. The Executing Agency shall submit a tax exemption letter to the Director General of Income Tax of the Ministry of Finance 2. Exemptions sought under Sections 10 (42) 3. Assessment within the IT Department. After confirmation, an Exemption Notification shall be issued by the Ministry of Finance. 4. This Notification will be published in the Official Gazette of India. 5. The specified income categories under this notification will be exempt from taxation.	
Corporate tax on local contractor	—	—	Income Tax Act, 1961	25-30%	Details in Annexure 1		

Appendix 7-12 TAX Information Sheet

Annexure 1

CALCULATION OF TAXBLE INCOME

Calculation of Taxable Income under Corporate Income Tax:

Particulars	Amount
Profit as per Books of Accounts	xxx
Add • Depreciation debited to Profit & Loss Account • Expense which have been debited to Profit & Loss Account but are not allowable as deduction under Income Tax Act	 Xxx Xxx
Less- • Depreciation allowable as deduction u/s 32 of Income Tax Act,1961 • Expenditure which are not claimed in Profit & Loss account but are allowable as deduction under Income Tax	 Xxx Xxx
Add: Any other Income / Expense under any head of Income Tax	xxx
Gross Total Income	
Less: Deduction allowable under chapter VI of Income Tax	xxx
Taxable Income	
Taxable Liability	xxx

Income tax rate of Companies

Particulars	Tax (%)
In case of a Domestic Company	
-Where its total turnover or gross receipt during the previous year 2015-16 does not exceeds Rs. 50 Crore	25
- Any other Domestic Company	30
In case of a Foreign Companies - Royalty received from Government or an Indian concern in pursuance of an arrangements made by it with the Indian concern after March 31, 1961 but before April 1, 1976, or fees for rendering technical services	50
- - Other Income	40

CALCULATION OF TAXBLE INCOME

Surcharge

Particular	If net income does not exceeds Rs. 1 Crore	In net 9income is in range of Rs. 1Core-Rs.10 Crore	If net income exceeds Rs. 10 Crore
Domestic Company	Nil	7%	12%
Foreign Company	Nil	2%	5%

Sheet 2 Tax with respect to personal income（Personal Income Tax）

【Points of Attention】The Taxation Rates in India are revised annually during the Budget Session of the Indian Parliament. The Rates quoted below are as per the Indian Finance Act of 2017.Withholding Tax in India is referred to as Tax Deducted at Source (TDS)

Items	Exemption	How to exempt	Applicable Law	Rate (%)	How to calculate	Information pertaining to seeking Exemption	Remarks
Personal income tax on Consultant (other than Resident Indian) hired by Japanese company	○	Exempt (Advanced)	Sections 10(8A), 10(8B) & 10(88) of the Income Tax Act, 1961	As defined in Annexure 2	As per Annexure 3	Application to: Income Tax Department, MoF, GOI Procedure: 1). Individual first has to file IT Return on the Income Tax Portal of India 2). Claim exemption under Sections 10(8A), 10(8B) & 10(88) of the Income Tax Act, 1961	—
Personal income tax on Japanese employees of the Japanese Company	○	Exempt (Advanced)	Sections 10 (6) (vi) of the Income Tax Act, 1961	As defined in Annexure 2	As per Annexure 3	Application to: Income Tax Department, MoF, GOI Procedure: 1). Individual first has to file IT Return on the Income Tax Portal of India 2). Claim exemption under Sections 10 (6) (vi) of the Income Tax Act, 1961	All employees need to apply for PAN else Rate of Taxation will be Equal to Maximum Rate for Income Tax.
Personal income tax on employees of the local contractor and Japanese Employees not covered under Sections 10(8A), 10(8B), 10(88) & 10(6)(vi) of the Income Tax Act, 1961	—	—-	Income Tax Act, 1961)	As defined in Annexure 2	As per Annexure 3	Not Available as per Section 10(8A), 10(8B), 10(88) & 10(6)(vi) of the Income Tax Act, 1961	This largely includes Japanese Employees who spend more than 90 days in India and thus are not eligible for exemption as per Point 1 above.

Withholding tax on Japanese People	○	Exempt (Advanced)	Tax Deducted at Source under Section 195 of the Income Tax Act, 1961	As defined in Annexure 2	As per Annexure 3	Application to: Income Tax Department, MoF, GOI Procedure: 1. The Japanese company will need a Tax Allotment Number 2. He will deduct TDS from the salary of the applicable employees. 3. TDS Returns need to file quarterly.	—
Withholding tax on People from Third Country	○	Exempt (Advanced)	Tax Deducted at Source under Section 195 of the Income Tax Act, 1961	As defined in Annexure 2	As per Annexure 3	Application to: Income Tax Department, MoF, GOI Procedure: 1. The Japanese company will need a Tax Allotment Number 2. He will deduct TDS from the salary of the applicable employees. 3. TDS Returns need to filed quarterly.	—
Withholding tax on Local Contractor	—	—	Tax Deducted at Source under Section 195 of the Income Tax Act, 1961	As defined in Annexure 2	As per Annexure 3	Application to: Income Tax Department, MoF, GOIProcedure: 1. The Japanese company will need a Tax Allotment Number 2. He will deduct TDS from the salary of the applicable employees. 3. TDS Returns need to filed quarterly.	—

Annexure 2

Income Tax Slab Rates for FY 2017-18 (AY 2018-19)

PART I: Income Tax Slab for Individual Tax Payers & HUF (Less Than 60 Years Old)

Income Slab	Tax Rate
Income up to Rs 2,50,000*	No tax
Income from Rs 2,50,000 – Rs 5,00,000	5%
Income from Rs 5,00,000 – 10,00,000	20%
Income more than Rs 10,00,000	30%
Surcharge: 10% of income tax, where total income exceeds Rs.50 lakh up to Rs.1 crore. Surcharge: 15% of income tax, where the total income exceeds Rs.1 crore.	
Cess: 3% on total of income tax + surcharge.	

Income Tax Slab Rates for FY 2017-18 (AY 2018-19)

PART II: Income Tax Slab for Senior Citizens (60 Years Old Or More but Less than 80 Years Old)

Income Slab	Tax Rate
Income up to Rs 3,00,000*	No tax
Income from Rs 3,00,000 – Rs 5,00,000	5%
Income from Rs 5,00,000 – 10,00,000	20%
Income more than Rs 10,00,000	30%
Surcharge: 10% of income tax, where total income exceeds Rs.50 lakh up to Rs.1 crore. Surcharge: 15% of income tax, where the total income exceeds Rs.1 crore.	
Cess: 3% on total of income tax + surcharge.	

Annexure 2

Income Tax Slab Rates for FY 2017-18 (AY 2018-19)

PART III: Income Tax Slab for Senior Citizens (80 Years Old Or More)

Income Slab	Tax Rate
Income up to Rs 2,50,000*	No tax
Income up to Rs 5,00,000*	No tax
Income from Rs 5,00,000 – 10,00,000	20%
Income more than Rs 10,00,000	30%
Surcharge: 15% of income tax, where total income exceeds Rs.1 crore.	
Cess: 3% on total of income tax + surcharge.	

Annexure 3

Income from Salary

Income from salary can be computed as follows:

Particulars	Amount
Basic Salary	-
Add	-
1. Fees, Commission and Bonus	-
2. Allowances	-
3. Perquisites	-
4. Retirement Benefits	-
5. Fees, Commission and Bonus	-
Gross Salary	-
Less: Deductions from Salary	-
1. Entertainment Allowance u/s 16	-
2. Professional Tax u/s 16	-
3. House Rent Allowance u/s 10(13A)	-
4. Any Other Allowance u/s 10	-
Net Salary	-
Less	-
Deduction Chapter VI of Income Tax Act	
Taxable Salary	-
Tax Due	-

(Sheet3) Indirect Tax (such as GST)

【Points of Attention】Since 01 July 2017, the Goods & Services Taxes of India Act has been implemented. Under this Act, most indirect taxes and duties have been made redundant. Hence, Excise, Service Tax and VAT have been subsumed into GST.

Items	Exemption	How to exempt	Applicable Law	Rate(%)	How to calculate	Information pertaining to seeking Exemption	Remarks
Goods & Services Tax (GST)	—	Reimburse	The Goods & Services Tax Act, 2017	**GST rates for goods** http://www.cbec.gov.in/resources//htdocs-cbec/gst/goods-rates-booklet-03July2017.pdf http://www.cbec.gov.in/resources//htdocs-cbec/gst/services-booklet-03July2017.pdf **GST rates for services** http://www.cbec.gov.in/resources//htdocs-cbec/press-release/Press-Release-10-11-2017.pdf **Revised rates** http://www.cbec.gov.in/resources//htdocs-cbec/press-release/CBEC_Press_Release_dt_16.11.2017after_on_GST%20Rate_Changes.pdf	As per GST Act/ Taxation Report submittedGST	**1.** Issuing tax registration certificate Application to: Central Board of Excise & Customs, MoF, GoI Procedure a) A non-resident taxable person shall electronically submit an application, along with a valid passport, for registration, duly signed, in FORM GST REG-09, at least five days prior to the commencement of business at the Common Portal either directly or through a Facilitation Centre notified by the Commissioner. b) A person applying for registration as a non-resident taxable person shall be given a temporary reference number by the Common Portal for making an advance deposit of tax under section 27 and the acknowledgement under sub-rule (5) of rule 1 shall be issued thereafter. c) The person applying for registration under sub-rule (1) shall make an advance deposit of tax in an amount equivalent to the estimated tax liability of such person for the period for which registration is sought, as specified in Section 27 of The Goods & Services Tax Act, 2017. d) The provisions of Rule 2 and Rule 3 relating to verification and grant of registration shall mutatis mutandis, apply to an application submitted under this rule. Explanation. – The application for registration made by a non-resident taxable person shall be signed by his authorized signatory who shall be a	—

						person resident in India having a valid PAN. Duration: 15 Days	
						2. GST regular tax exemption permission application Application to : Central Monitoring AgencyProcedure: a) The G/A signed between JICA and the Indian Gov. for this project allows for the Indirect Taxes to be borne by the MOHUA or t UDD. b) Hence, the GST incurred on this project is to be borne by MOHUA & State UDD. c) While Exemption is not permitted, the Japanese companies can seek Reimbursement of the GST paid at the end of the year as per the below mentioned procedure. d) The Application for Reimbursement will be sent by JICA. e) The GST paid to suppliers/vendors/contractors/Sub-contractors either domestics or foreigners are to be reimbursed by MOHUA in the center or UDD in the state on the basis of challans & the Returns of GST by the concerned parties. All the above vendors/suppliers are supposed to submit the copy of challans & Returns to the Executive Agency. f) The Executive Agency will then submit the documents to the government for reimbursement - the MOHUA in the center & UDD in the state. g) Due date of tax return: There are two concepts, -if Turnover is less than 1.5 crore per year, GST Return is to be filed Quarterly; -if turnover exceeds 1.5 crore per year, GST Return is to be filed Monthly.	—

(Sheet4) Duties etc.

【Points of Attention】Since 01 July 2017, the Goods & Services Taxes of India Act has been implemented. Under this Act, most indirect taxes and duties have been made redundant. Hence, Excise, Service Tax and VAT have been subsumed into GST.

Items	Exemption	How to exempt	Applicable Law	Rate(%)	How to calculate	Information pertaining to seeking Exemption	Remarks
Issuing Import Export Code (IEC)	—	—	Indian Custom Act, 1962	—	—	Application to: Director General of Foreign Trade (DGFT) Procedure: 1. Any company/ person who wishes to import & export any item/ material for the project needs to apply to the DGFT for The IEC code. 2. The following documents are required to be submitted along with application: PAN, Bank statement of the applicant, Cancelled cheque, Statutory fees of INR. 2000 by DD in the name of DGFT, Passport size photograph of the directors/partners, copy of registration of the organization 3. DGFT shall issue the IEC Code. Duration: 1 month	—
Overseas import products	—	Reimburse	Indian Custom Act, 1962	**Custom Tariff Rates** http://cbec.gov.in/Cbec_Revamp_new/htdocs-cbec/customs/cst1617-020217/cst1617-0202-idx	—	Application to: MOHUA or MOU&D Procedure: 1. The G/A signed between JICA and the Indian Gov. for this project allows for the Indirect Taxes to be borne by the MOHUA or UDD. 2. Hence, the Customs duty paid to the Customs authority for this project is to be borne by MOHUA & State UDD. 3. While Exemption is not permitted, the Japanese companies can seek Reimbursement of the Customs duties paid at the end of the year as per below mentioned procedure. 4. The Application for Reimbursement will be sent by JICA.	—

					5. The Custom duty incurred in the import/export for the project is to be borne by MOHUA & State UDD. 6. The Custom duty paid to custom authority is to be reimbursed by MOHUA in the center or State UDD in on the basis of challans of the custom duty. 7. The Executive Agency will submit the documents to the government - MOHUA in the center & UDD in the state for reimbursement.

(Sheet 5) Other taxes and levies

【Points of Attention】The Taxation Rates in India are revised annually during the Budget Session of the Indian Parliament. The Rates quoted below are as per the Indian Finance Act of 2017.

Items	Exemption	How to exempt	Applicable Law	Rate(%)	How to calculate	Information pertaining to seeking Exemption	Remarks
Other taxes & levies	○	Exempt (Advanced)	Local Laws	—	As per Varanasi Municipal Corporation Bylaws	Application to: State UDD Procedure: 1. The G/A signed between JICA and the Indian Gov. for this project allows for all indirect taxes to be borne by the MOHUA or UDD. 2. Hence, any local/ municipal taxes to be paid under this project should be Exempted by the State UDD.	—