महाराष्ट्र वन विभाग

दूरध्वनी क्र.022-69309286
Email Id:dfommcu@gmail.com

महाराष्ट्र शासन
वन विभाग
विभागीय वन अधिकारी, कांदळवन विभाग- उत्तर कोकण
यांचे कार्यालय
अभिमान-२, ५ वा मजला, तीन हात नाका, नौपाडा, ठाणे पश्चिम.

पत्र/ईमेलद्वारे: कक्ष-०२/योजना/ 2930 / सन २०२६-२७. दिनांक: 19 /10/२०२६.

प्रति,

१. मा. मुख्य वनसंरक्षक,
कांदळवन कक्ष, मुंबई.

२. माहिती व प्रसिद्धी अधिकारी (वने),
मा. प्रधान मुख्य वनसंरक्षक यांचे कार्यालय, नागपूर.
Email: - mahaforestpublicity@gmail.com

विषय: कांदळवन कक्षांतर्गत विविध पुनर्स्थापना (Restoration) कामांसाठी प्रस्तावित Hi-Tech Mangrove Nursery (अद्ययावन कांदळवन रोपवाटिका) चे सविस्तर प्रकल्प अहवाल (DPR) तयार करण्याकरिता सार्वजनिक बांधकाम विभागाच्या अनुसूची दरपत्रकात (State Schedule of Rates - SSR) समाविष्ट नसलेल्या अनुसूचीबाह्य (Non-Schedule) बाबींसाठी दरपत्रके मागविण्याबाबत.

संदर्भ:- मे. टंडन अर्बन सोल्यूशन, प्रा.लि. मुंबई यांचे पत्र क्र. TUSPL/Various_Works/ २९ दि.१५.१०.२०२६.

कांदळवन परिसंस्थेमध्ये राबविण्यात येणाऱ्या विविध विकासकामांमध्ये विविध शासकीय/निम शासकीय विभाग तसेच खाजगी संस्थांकडून कांदळवन पुन:स्थापन योजनेकरीता संबंधितांकडून वसूल करण्यात आलेल्या रक्कमेतून कांदळवन पुन:स्थापन योजनेचे अनुषंगाने राबविण्याच्या विविध उपक्रमांच्या अंमलबजावणीकरीता कांदळवन कक्ष / कांदळवन प्रतिष्ठान यांना तांत्रिक सहाय्य सेवा उपलब्ध करुन घेणेकामी सल्लागार नेमणूक करण्याचे दृष्टीने या कार्यालयामार्फ़त ई निविदा प्रसिद्ध करणेत आलेली होती.

सदर निविदा प्रक्रियेद्वारे मे. टंडन अर्बन सोल्यूशन प्रा. लि, मुंबई यांना सल्लागार म्हणून नियुक्त करणेत आलेले असून या कार्यालयाकडून कार्यारंभ आदेश देण्यात आलेले आहेत. प्रकरणी नियुक्त प्रकल्प सल्लागार हे सदर प्रकल्पातील प्रस्तावित Hi-tech Mangrove Nursery या कामासाठी सविस्तर प्रकल्प अहवाल (Detailed Project Report - DPR), अंदाजपत्रक तयार करीत असून त्यानुषंगाने प्रकल्पासाठी DPR तयार करण्याकरिता आवश्यक तंत्रज्ञान, कार्यपद्धती व तांत्रिक तपशील निश्चित करण्याची कार्यवाही सुरू आहे. DPR तयार करताना आवश्यक असलेल्या अनेक बाबी महाराष्ट्र सार्वजनिक बांधकाम विभागाच्या अनुसूची दरपत्रकात (State Schedule of Rates - SSR) समाविष्ट नसल्याचे निदर्शनास आले असून अशा अनुसूचीबाह्य (Non-Schedule) बाबींसाठी वास्तव बाजारभाव तसेच सविस्तर तांत्रिक तपशील प्राप्त करणे आवश्यक आहे, जेणेकरून DPR मधील अंदाजपत्रके अचूक व प्रमाणित स्वरूपात तयार करता येतील.

त्याअनुषंगाने, या कार्यालयामार्फत पात्र उत्पादक, पुरवठादार, विक्रेते, सेवा संबंधित संस्थांकडून DPR तयार करण्यासाठी आवश्यक असलेल्या अनुसूचीबाह्य बाबींसाठी दरपत्रके तसेच सविस्तर तांत्रिक तपशील मागविणेकामी संदर्भीय पत्रान्वये या कार्यालयास विनंती करण्यात आलेली आहे. त्यास अनुसरून सदर दरपत्रकांसोबत संबंधित बाबींचे संपूर्ण तपशील, तांत्रिक तपशिल (Technical Specifications), उत्पादकाचे नाव (Make), मॉडेल क्रमांक (Model No.) (लागू असल्यास), कामाचे स्वरूप (Scope of Work), स्थापनेचे तपशील व इतर आवश्यक तांत्रिक माहिती विहित नमुन्यामध्ये यासोबत जोडण्यात आलेला आहे.

तरी सदरची जाहिरात ही आपले कार्यालयाच्या संकेतस्थळावर आणि सुचना फलकावर प्रसिद्धी करण्यात यावी ही विनंती.

(वि.पो.खाडे)
विभागीय वन अधिकारी,
कांदळवन विभाग-उत्तर कोकण.

प्रतिलिपी :- सर्व वनक्षेत्रपाल यांना सुचना फलकावर प्रसिद्धी करणेकामी रवाना.
प्रत :- मे. टंडन अर्बन सोल्यूशन, प्रा.लि. मुंबई यांना माहिती व आवश्यक कार्यवाहीकरिता रवाना.
C:\MDNK\17. 308_Mangrove Restoration\2. Hi-Tech Mangrove Nursary\General Letters.docx

Government of Maharashtra

Forest Department

Mangrove Division- North Konkan

Abhimaan II, 5th Floor, Teen Haat Naka, Naupada, Thane (W)-400 602.

Email- dfommcu@gmail.com.

PIM Notice No. DFO/MDNK/Hi-Tech Nursery/01/2026-27. **Date:-** 15 / 10 /2026.

REQUEST FOR QUOTATION (RFQ)

Subject:- Request for Quotation and Technical Specifications for Preparation of Detailed Project Reports (DPR) for Various Restoration Works under Mangrove Cell.

Mangrove Cell is a specialized Division under the Forest Department, Government of Maharashtra, responsible for conservation, protection and restoration of mangrove ecosystems across the State. The Mangrove Cell functions through two divisions, namely Mangrove Division North Konkan (MDNK) and Mangrove Division South Konkan (MDSK).

The jurisdiction of Mangrove Division North Konkan (MDNK) extends across Mumbai City, Mumbai Suburban, Thane and Palghar districts, whereas Mangrove Division South Konkan (MDSK) covers Raigad, Ratnagiri and Sindhudurg districts.

Mangrove Division North Konkan (MDNK) intends to implement various conservation, restoration and eco-development projects within its jurisdiction. In this regard, MDNK is in the process of finalizing appropriate technologies, methodologies and technical specifications for preparation of Detailed Project Reports (DPRs) for such projects.

It is observed that several components required for DPR preparation involve non-scheduled items not covered under the State Schedule of Rates (SSR). Therefore, it is necessary to obtain market-based rates and detailed technical specifications for such items to ensure accurate estimation and standardization in DPR preparation.

Accordingly, MDNK hereby invites quotations along with detailed technical specifications from eligible agencies, vendors and suppliers for the relevant items required for preparation of DPRs. The rates shall be submitted for non-schedule items, along with complete specifications, make, model (if applicable), scope of work and technical details, in the prescribed format as provided.

Item No .	Item description	Rate in Rs.	Unit
1.	Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based **Administration Block** (G+1) having a Total Built-up Area of 400 Sq.m. (200 Sq.m. on each floor), including Temporary Foundation System, Internal Partitions, Internal Finishes, Furniture, Staircase, Roof Terrace, Electrical, Plumbing, HVAC, Fire Safety System, and all associated Architectural, Structural, Mechanical, Electrical and Plumbing Works, as per the Detailed Technical Specifications attached, complete in all respects and as directed by the Engineer-in-Charge.. (Detail specifications are attached as Annexure-1) Reference design can is attached herewith annexure 2.		Per Job
2.	Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based G+1 Residential Accommodation Building, having an Approximate Total Built-up Area of 336.00 Sq. M. (168.00 Sq. M. per Floor),		Per Job

Item No .	Item description	Rate in Rs.	Unit
	comprising 16 Nos. Single-Occupancy Rooms (8 Rooms per Floor), Common Kitchen and Dining Facility on the Ground Floor, Separate Male and Female Toilet Blocks on Each Floor, External Steel Staircase, Access Corridors, Complete Electrical, Plumbing, Sanitary and Allied Services, including Furniture, Fixtures and Associated Civil Works, on Turnkey Basis for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra. (Detail specifications are attached as Annexure-1) Reference design can is attached herewith annexure 2.		
3.	Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of Prefabricated Modular Container-Based G+1 Residential Accommodation Building for Project Manager and Nursery Manager, having a Total Built-up Area of approximately 92.90 Sq. M. (46.45 Sq. M. per Floor), comprising Two Independent Fully Furnished 2-BHK Residential Units (One Unit on Each Floor), each consisting of Two Bedrooms, Living and Dining Area, Modular Kitchen, Attached and Common Toilets, Study/Work Space, Split Air-Conditioning, Furniture, Fixtures and Equipment, including External Steel Staircase, Access Verandah, Complete Electrical, Plumbing, Sanitary, Water Supply, Drainage, Fire-Safety and Allied Services, together with Design and Construction of Base Platform, Foundations, Structural Supports, Anchoring Arrangements, Site Preparation and Associated Civil Works, using Corrosion-Resistant Materials suitable for Marine and Coastal Environmental Conditions, on Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra. (Detail specifications are attached as Annexure-1) Reference design can is attached herewith annexure 2.		Per Job
4.	Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of a Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based Visitor Interpretation and Environmental Education Centre, having an Approximate Built-up Area of 150.00 Sq. M., comprising Reception and Visitor Orientation Area, Mangrove Interpretation Gallery, Audio-Visual Mini Theatre, Exhibition and Display Area, Interactive Digital Information Kiosks, Environmental Education and Awareness Zone, Mangrove Nursery Viewing Gallery, Office and Staff Desk, Separate Male and Female Toilet Facilities, Store and Utility Room, Accessible Entrance Ramp, Covered Verandah and Visitor Circulation Areas, including Complete Interior Development, Thematic Exhibition Displays, Digital Interpretation Equipment, Audio-Visual Systems, Furniture, Fixtures, Signage, Electrical Installations, Lighting, Ventilation, Solar Photovoltaic System with Grid Backup, Rainwater Harvesting, Plumbing, Sanitary and Fire-Safety Systems, together with Design and Construction of Base Platform, Foundations, Structural Supports, Anchoring Arrangements, Site Development, Landscaping, Drainage and Associated Civil Works, using Durable, Energy-Efficient and Corrosion-Resistant Materials suitable for Marine and Coastal Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra. (Detail specifications are attached as Annexure-1) Reference design can is attached herewith annexure 2.		Per Job

Item No.	Item description	Rate in Rs.	Unit
5.	Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of G+1 Storeyed Prefabricated Modular Container-Based Laboratory Complex having an Approximate Total Built-up Area of 720.00 Sq. M., comprising Propagule and Seed Quality Laboratory, Nursery Quality Control Laboratory, Soil, Sediment and Water Quality Laboratory, Plant Health and Plant Pathology Laboratory, Tissue Culture Laboratory, Central Instrument Room, Chemical and Glassware Store, Sample and Seed Repository, Laboratory Documentation and Data Management Room (LIMS), Laboratory Support and Utility Areas, Central Nursery Control Room with PLC, SCADA and IoT-Based Monitoring System, GIS and Drone Operations Room, Meeting and Training Room, Sanitary Facilities and Associated Circulation Areas, including Complete Laboratory Furniture, Scientific Instruments, Equipment, HVAC, HEPA Filtration, Laminar Airflow Systems, Electrical Installations, Data Networking, CCTV Surveillance, Fire-Safety Systems, Solar Photovoltaic System, DG and UPS Backup, Rainwater Harvesting, Laboratory Wastewater Treatment and Recycling System, Plumbing and Sanitary Installations, together with Complete Base Platform, Foundations, Structural Supports, Staircases, Accessibility Arrangements, Site Development and Associated Civil Works, using Durable, Energy-Efficient and Corrosion-Resistant Materials suitable for Coastal and Marine Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra. (Detail specifications are attached as Annexure-1) Reference design can is attached herewith annexure 2.		

Terms and Conditions:

1. Interested vendors / agencies / suppliers, as per the specifications mentioned and in accordance with the Project Information Memorandum (PIM), are required to submit their sealed quotations on the firm's letterhead.
   The quotation shall be submitted either by hand delivery or by post, addressed to:
   The Divisional Forest Officer, Mangrove Division–North Konkan (MDNK),
   5th Floor, Abhiman–II Building,
   Teen Haat Naka, Naupada, Thane (West)
   OR
   sent by email to dfommcu@gmail.com in PDF format / scanned copy,
   on or before the due date, i.e. **26 / 10 /2026 up to 12.00 Hrs.**
2. The rates quoted shall be inclusive of all taxes and duties and exclusive of GST, which shall be shown separately, if applicable.
3. Vendors / agencies / suppliers shall specifically mention the Item Number against which the quotation is being submitted.
4. The sealed quotation envelope shall clearly mention the Quotation Number and the Item Number(s) for which the quotation is being submitted.
5. Conditional quotations and/or quotations received after the due date and time shall not be considered and will be summarily rejected.
6. This Quotation Notice along with the Project Information Memorandum (PIM) has been uploaded on https://mahaforest.gov.in & https://mangroves.maharashtra.gov.in/ website for reference and viewing by interested vendors / agencies / suppliers.
7. Prior to submission of the Techno-Commercial Offer, interested vendors /agencies / suppliers may visit the project site at their own cost to assess site conditions.

Note:-

For Additional information, contact:

1. Mr. D. S. Patil
   M/s. Tandon Urban Solutions Pvt. Ltd. (TUSPL)
   Appointed Project Consultant,
   Mobile: 98927 31835.
2. Mr. Kunal Kasar.
   Department Engineer,
   Mangrove Division-North Konkan.
   Contact No.022-69309286.

(Deepak P. Khade)
Divisional Forest Officer,
Mangrove Division North Konkan.

Copy for Publishing at Notice Board of: All Range Forest Offices of MDNK.

Annexure-I
Detail Specification

Item No 1: Prefabricated Modular Container-Based Administration Block (G+1)

1. Scope of Supply and Work:

The work shall comprise the design, engineering, fabrication, supply, transportation, installation, testing and commissioning of a temporary, portable, reusable and relocatable prefabricated modular container-based Administration Block (G+1) having a total built-up area of approximately 400 Sq.m. (200 Sq.m. on each floor). The work shall include temporary foundations, modular structural frame, insulated wall and roof panels, flooring, partitions, doors, windows, staircase, toilets, furniture, electrical works, plumbing, HVAC, fire safety, CCTV, LAN, rooftop solar photovoltaic system, illuminated name board, testing, commissioning, documentation and handing over complete in all respects.

2. General Technical Specifications

The building shall be factory fabricated under controlled conditions using modular steel construction suitable for repeated dismantling and reinstallation. The building shall be designed for coastal and mangrove environmental conditions with a minimum design life of 25 years and shall comply with NBC 2016 and all relevant BIS standards.

3. Modular Building System

The structural frame shall be fabricated from IS 2062 Grade E350 structural steel. RHS/SHS/CHS sections shall conform to IS 4923. Primary members shall generally be 4–8 mm thick and secondary members not less than 3.2 mm. The complete frame shall be hot-dip galvanized (minimum 550 g/sq.m. zinc coating) and finished with epoxy zinc-rich primer and polyurethane paint. Connections shall be by high-strength Grade 8.8 galvanized bolts. Preferred manufacturers include Tata Steel Nest-In, JSW, Everest, EPACK, Pennar, Interarch, Kirby or approved equivalent.

4. Wali, Roof and Floor Construction :-

External walls shall comprise 75 mm insulated PUF sandwich panels with 0.50 mm PPGI sheets on both faces and PUF density of 40±2 kg/m³. Internal partitions shall comprise 50 mm insulated PUF panels. A minimum of ten partitioned functional spaces shall be provided. Roof panels shall be minimum 80 mm insulated sandwich panels complete with flashings, gutters and waterproof sealing. Floors shall comprise structural steel deck, 18 mm BWP marine plywood and anti-skid vinyl flooring or vitrified tiles. Toilet floors shall be finished with anti-skid ceramic tiles.

5. Doors and Windows

External doors shall be insulated steel doors with galvanized skins and PUF core. Internal doors shall be insulated steel or aluminium glazed doors. Toilet doors shall be WPC/FRP. Windows shall be powder-coated aluminium with toughened safety glass, mosquito mesh and EPDM gaskets. Hardware shall be Godrej, Dorma, Dorset, Hafele, Yale, Ozone or approved equivalent.

6. Temporary Foundation

The modular building shall rest on removable steel pedestals or precast RCC blocks with anchor bolts and levelling arrangements, permitting dismantling and relocation without permanent RCC foundations.

7. Internal Accommodation and Partitions

The Administration Block shall comprise a Ground Floor and First Floor having a total built-up area of approximately 400 Sq.m. (200 Sq.m. on each floor). The internal layout shall be developed using factory-manufactured insulated modular partition panels of 50 mm thick PUF sandwich construction with 0.50 mm thick PPGI sheets on both sides. All partition panels shall be demountable, reusable and suitable for repeated dismantling and reinstallation. The partition system shall extend from the finished floor level to the underside of the insulated roof/ceiling and shall be complete with aluminum joint sections, door frames, trims, sealants and all necessary accessories.

The Ground Floor (approximately 200 Sq.m.) shall comprise a Reception and Waiting Area (approximately 25 Sq.m.), Open Office (approximately 50 Sq.m.), Manager's Cabin (approximately 20 Sq.m.), Meeting Room (approximately 25 Sq.m.), Record Room (approximately 15 Sq.m.), Pantry (approximately 10 Sq.m.), Male Toilet (approximately 7 Sq.m.), Female Toilet (approximately 7 Sq.m.), and the remaining area shall comprise the staircase, entrance lobby and circulation.

The First Floor (approximately 200 Sq.m.) shall comprise a Technical Office (approximately 45 Sq.m.), GIS & Planning Room (approximately 25 Sq.m.), Training/Conference Room (approximately 50 Sq.m.), Utility/Store Room (approximately 15 Sq.m.), Office Cabin (approximately 20 Sq.m.), and the remaining area shall comprise circulation space, staircase lobby and access to the roof terrace.

The total internal partitioning shall consist of not less than ten (10) enclosed functional spaces, excluding toilets, pantry, staircase and circulation areas. The final room arrangement may be modified marginally to suit the modular structural grid, provided that the total built-up area and the minimum functional areas specified above are maintained and approved by the Engineer-in-Charge.

8. Toilets

Two separate toilets (Male and Female) shall be provided. Each toilet shall include one EWC, one wash basin, health faucet, bib cock, floor trap, mirror, soap dispenser, towel ring, exhaust fan, LED light, tissue holder and dust bin. Wall dado shall be provided up to 2.1 m height using ceramic tiles and floors shall have anti-skid tiles.

9. Staircase

Access to the first floor shall be through a prefabricated galvanized steel staircase having a minimum clear width of 1.20 m with 6 mm chequered plate treads, intermediate landing, anti-slip nosing and handrails on both sides. A galvanized maintenance ladder with safety cage shall be provided for rooftop access.

10. Electrical Installation

Complete concealed FRLS copper wiring, modular switches, LED lighting, distribution boards, earthing, lightning protection, UPS provision, power outlets and emergency lighting shall be provided. Approved makes: Polycab, Finolex, Havells, Legrand, Schneider or equivalent.

11. Plumbing and Sanitary

Complete plumbing, drainage, sanitary fixtures, CP fittings, water storage tank, pumps and distribution piping shall be provided. Fixtures shall be Jaquar, Hindware, Cera, Parryware or approved equivalent.

12. HVAC

Energy-efficient inverter split air-conditioning units of suitable capacity shall be installed. Makes shall include Daikin, Carrier, Blue Star, Mitsubishi or approved equivalent.

13. Fire Safety

The building shall include an addressable fire alarm system, smoke detectors, manual call points, hooters, emergency lighting, exit signage and portable fire extinguishers in accordance with NBC 2016 and the requirements of the local Fire Authority.

14. CCTV, LAN and Communication

Provide IP-based CCTV cameras, NVR, CAT-6 LAN cabling, network rack, Wi-Fi access points, communication outlets and associated accessories.

15. Rooftop Solar PV System

Provide a grid-connected rooftop solar photovoltaic system of approximately 10 kWp complete with mono PERC modules, inverter, galvanized mounting structure, protection system, earthing, lightning arrestor, monitoring and net-metering provisions.

16. Name Board

Provide one externally illuminated building name board measuring 3.0 m × 1.0 m fabricated from ACP with stainless steel or acrylic LED illuminated letters mounted on a galvanized frame. The signboard shall be weatherproof and suitable for coastal conditions.

17. Painting and Corrosion Protection

All exposed steel surfaces shall receive epoxy primer and polyurethane finish over hot-dip galvanizing. Damaged galvanized surfaces shall be repaired with zinc-rich paint.

18. Accessibility

The building shall comply, wherever applicable, with NBC 2016, the Rights of Persons with Disabilities Act, 2016, the Rights of Persons with Disabilities Rules and the Harmonised Guidelines and Standards for Universal Accessibility in India, 2021. Entrance ramps, non-slip flooring, handrails and accessible circulation shall be provided as applicable.

19. Testing, Commissioning and Documentation

The contractor shall carry out testing of structural, electrical, plumbing, HVAC, fire protection, CCTV and solar systems and submit as-built drawings, operation manuals, warranties, test certificates and structural stability certificate before handing over.

20. Warranty and Applicable Codes

The structural system shall carry a minimum 10-year warranty. Equipment shall carry the manufacturer's standard warranty of not less than one year unless otherwise specified. The work shall comply with NBC 2016, IS 2062, IS 800, IS 875, IS 1893, IS 4923, IS 4759, IS 710 and other relevant BIS standards.

Item No 2: Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based G+1 Residential Accommodation Building having an Approximate Total Built-up Area of 336.00 Sq. M. (168.00 Sq. M. per Floor), comprising 16 Nos. Single-Occupancy Residential Rooms (8 Rooms per Floor), Common Kitchen and Dining Facility, Separate Male and Female Toilet and Bathroom Blocks on Each Floor, External Steel Staircase, Access Corridors, Complete Furniture, Fixtures, Equipment, Electrical, Plumbing, Sanitary, Fire-Safety and Allied Services, including Design and Construction of the Complete Base Platform, Foundations, Structural Supports, Anchoring Arrangements, Site Preparation, Drainage and Associated Civil Works, suitable for Marine and Coastal Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra.

2. Area and Accommodation Requirements

The proposed prefabricated accommodation building shall be constructed in Ground plus One (G+1) configuration, having an indicative overall floor plate of 28.00 m × 6.00 m and a total built-up area of approximately 336.00 Sq. M., comprising 168.00 Sq. M. on the ground floor and 168.00 Sq. M. on the first floor.

The building shall accommodate a minimum of 16 persons in 16 separate single-occupancy residential rooms, comprising eight rooms on each floor. Each residential room shall have indicative internal dimensions of approximately 2.75 m × 3.50 m, subject to the approved architectural layout.

The ground floor shall accommodate eight residential rooms, one common kitchen and dining facility of approximately 30.00 Sq. M., and separate male and female toilet and bathroom blocks. The first floor shall accommodate eight residential rooms and separate male and female toilet and bathroom blocks.

The building shall be provided with an external steel staircase, suitable covered access corridors, safety railings, natural and mechanical ventilation, lighting, furniture, fixtures, water supply, drainage and all necessary utilities. The final layout shall be designed to accommodate all specified facilities while satisfying applicable building, sanitation and fire-safety requirements. The indicative floor plate may be adjusted through approved detailed design where necessary.

3. General Scope of Work

The work shall comprise complete design, detailed engineering, preparation of architectural and structural drawings, factory fabrication, manufacture, procurement, supply, transportation, loading, unloading, handling, lifting, assembly, erection, installation, testing and commissioning of the prefabricated modular accommodation building, including the base platform, foundations and associated civil works.

The contractor shall provide the complete structural framework, insulated wall panels, internal partitions, roofing, flooring, doors, windows, external staircase, access corridors, furniture, kitchen equipment, dining furniture, sanitary fixtures, electrical installations, water supply arrangements, wastewater drainage, ventilation systems, fire-safety equipment and all necessary accessories for making the building fully functional and habitable.

The building shall be specifically designed for temporary use and future dismantling, transportation and reinstallation. The principal modular building components shall be reusable and relocatable, with suitable bolted connections, lifting arrangements and service interfaces. The contractor shall prepare and submit architectural drawings, structural design calculations, fabrication drawings, foundation drawings, equipment schedules, electrical and plumbing layouts, corrosion-protection specifications, quality assurance plans and installation methodology for approval by the Engineer-in-Charge before execution.

4. Structural Steel Framework

The primary structural framework shall comprise engineered structural steel columns, beams, hollow sections, channels, bracing members, floor support members and modular frames manufactured from structural steel conforming to IS 2062 or equivalent applicable Indian Standards.

The structural design shall conform to IS 800, IS 875, IS 1893 and other relevant standards. The framework shall be designed for dead loads, imposed loads, wind loads, seismic forces, lifting loads, transportation loads, erection loads and all applicable load combinations.

Considering the coastal location, all exposed structural steel components shall be provided with an approved marine-suitable corrosion-protection system. The atmospheric corrosivity shall be assessed in accordance with ISO 9223, with C5 adopted as the preliminary minimum design basis for exposed carbon steel unless the site-specific assessment establishes a different requirement.

Hot-dip galvanising conforming to IS 4759 / ISO 1461 or an approved protective coating system comprising appropriate surface preparation, zinc-rich primer, high-build epoxy intermediate coating and UV-resistant polyurethane finish shall be adopted as appropriate to the exposure and design requirements.

The contractor shall submit the proposed coating system, surface preparation grade, dry film thickness, expected durability and inspection procedures for approval. All damaged coatings, welded joints, cut edges and drilled surfaces shall receive approved protective treatment.

The structure shall incorporate bolted and demountable connections wherever practicable to facilitate dismantling, relocation and reuse.

5. Modular Container Construction

The building shall be constructed using factory-manufactured prefabricated modular container units or engineered modular steel-framed units designed for residential occupancy.

The modular units shall be suitable for transportation, lifting, handling, installation, dismantling and reassembly. Each module shall be provided with engineered lifting points, structural connections, alignment arrangements and appropriate interfaces for electrical, plumbing and other services.

The modular system shall be designed to minimise on-site welding and permanent connections. Major structural components, wall panels, roof panels, floor assemblies, doors, windows and service components shall be removable and reusable to the maximum practicable extent.

All modular units shall be manufactured under factory-controlled conditions and subjected to dimensional, structural, welding and protective coating inspections before dispatch.

6. External Wall Panels and Internal Partitions

External walls shall comprise factory-manufactured insulated sandwich panels having corrosion-resistant pre-coated steel or aluminium facings and an approved insulating core.

The panel thickness and insulation performance shall be determined through the approved thermal, structural and fire-safety design. The panel system shall provide adequate thermal insulation, weather resistance, moisture protection, structural integrity and acoustic comfort suitable for residential use.

The insulating core shall satisfy the applicable fire-performance requirements for the proposed residential building. All external panel facings shall be provided with marine-suitable protective finishes.

Internal partitions shall comprise suitable lightweight, moisture-resistant prefabricated panels with durable, washable finishes. Toilet and kitchen partitions shall be manufactured using waterproof or moisture-resistant materials suitable for frequent cleaning.

All panel joints, corners, exposed edges and service penetrations shall be properly sealed to prevent water ingress and corrosion.

Exposed critical fasteners shall preferably be stainless steel Grade A4/316 or other approved corrosion-resistant materials.

7. Roofing System

The building shall be provided with a lightweight insulated roofing system comprising engineered structural steel roof framing and factory-manufactured insulated roofing panels.

The roofing system shall be designed for applicable wind uplift, rainfall and maintenance loads, with particular consideration of the coastal wind conditions prevailing at Kelwe.

Roofing panels shall have suitable marine-grade protective finishes and adequate thermal insulation.

Appropriate roof slopes, flashing, ridge covers, gutters, rainwater downpipes and weatherproof joints shall be provided.

All roofing fasteners, brackets and accessories shall be corrosion-resistant and compatible with the roofing materials.

The roof shall be designed to prevent leakage, water accumulation and deterioration of the modular structure.

8. Flooring System

The modular flooring system shall comprise suitable structural steel floor framing, engineered load-bearing floor panels and approved moisture-resistant floor substrates.

The floor assembly shall be designed for the applicable residential and circulation loads, with adequate stiffness, strength and resistance to vibration.

Residential rooms and common circulation areas shall be provided with commercial-grade, durable, washable and slip-resistant vinyl or equivalent approved flooring.

Kitchen, toilet and bathroom areas shall be provided with waterproof floor assemblies, anti-skid finishes and suitable slopes towards drainage outlets.

All flooring materials shall be moisture-resistant, dimensionally stable and suitable for humid coastal environmental conditions.

9. Residential Rooms and Minimum Furniture

The building shall comprise 16 Nos. single-occupancy residential rooms, with eight rooms on each floor. Each room shall have indicative internal dimensions of approximately 2.75 m × 3.50 m and shall be provided with adequate natural lighting, ventilation, electrical connections and furniture.

Each room shall be provided with one single bed having minimum dimensions of 900 mm × 1,980 mm, complete with one high-density foam mattress measuring approximately 900 mm × 1,980 mm × 100 mm. Accordingly, a total of 16 beds and 16 mattresses shall be provided.

Each room shall be provided with one wardrobe measuring approximately 900 mm × 500 mm × 1,800 mm, manufactured from powder-coated steel or approved moisture-resistant material, making a total of 16 wardrobes.

Each room shall be provided with one study or utility table measuring approximately 900 mm × 500 mm × 750 mm and one suitable chair, making a total of 16 tables and 16 chairs.

Each room shall be provided with one ceiling fan having a nominal sweep of 1,200 mm or an equivalent wall-mounted fan, one LED room light of minimum 18 W, one LED reading light of minimum 6 W and two suitable electrical socket outlets. The total minimum provision shall comprise 16 fans, 16 room lights, 16 reading lights and 32 socket outlets.

Each room shall be provided with one entrance door having indicative minimum dimensions of 900 mm × 2,100 mm and one corrosion-resistant aluminium sliding window measuring approximately 1,200 mm × 1,200 mm, complete with suitable glazing, mosquito mesh and locking arrangement.

Each room shall also be provided with one mirror measuring approximately 450 mm × 600 mm, one set of corrosion-resistant clothes hooks, one waste bin of minimum 10-litre capacity and suitable moisture-resistant curtains or window blinds.

All furniture and fittings shall be durable, washable, moisture-resistant and suitable for repeated handling and relocation.

10. Common Kitchen and Dining Facility

The ground floor shall be provided with one common kitchen and dining facility having an indicative area of approximately 30.00 Sq. M., subject to the approved architectural layout.

The kitchen shall be provided with one cooking counter having minimum dimensions of 3,000 mm × 600 mm × 850 mm, with an SS 316 working surface or approved equivalent corrosion-resistant material.

One washing and preparation counter measuring approximately 1,800 mm × 600 mm × 850 mm shall be provided, together with one double-bowl stainless-steel kitchen sink measuring approximately 1,200 mm × 500 mm, preferably manufactured from SS 316.

The kitchen shall be provided with one three-burner cooking range, one two-zone electric induction cooktop, one exhaust hood having a minimum indicative width of 1,500 mm, subject to the cooking equipment and ventilation design, and two exhaust fans having a minimum nominal sweep of 300 mm each.

One refrigerator having a minimum capacity of 300 litres and one microwave oven having a minimum capacity of 25 litres shall be provided.

One drinking water purification system having a minimum rated capacity of 25 litres per hour shall be provided, subject to confirmation of the incoming water quality and necessary treatment requirements. One drinking water cooler having a minimum storage capacity of 40 litres shall also be provided.

The kitchen shall be provided with two stainless-steel or approved corrosion-resistant storage racks, each measuring approximately 1,200 mm × 450 mm × 1,800 mm, and two wall-mounted storage cabinets measuring approximately 1,200 mm × 350 mm × 600 mm.

The dining facility shall be provided with two dining tables, each measuring approximately 1,800 mm × 900 mm × 750 mm, and a total of 16 suitable dining chairs.

The kitchen and dining facility shall be provided with a minimum of four LED ceiling lights of approximately 20 W each, two ceiling fans having a nominal sweep of 1,200 mm each, two ABC dry powder fire extinguishers of 4 kg capacity each, two waste bins of minimum 50-litre capacity each for wet and dry waste, and two floor drains having a minimum nominal outlet size of 100 mm.

All kitchen equipment shall be provided with suitable electrical connections, water supply, wastewater drainage, ventilation, equipment supports and necessary safety arrangements.

Where LPG is proposed, the cooking fuel storage and distribution arrangement shall comply with applicable fire and gas safety requirements.

11. Toilet and Bathroom Blocks

Separate male and female toilet and bathroom blocks shall be provided on the ground floor and first floor, making a total of four blocks.

The complete building shall be provided with a minimum of eight Western-type ceramic water closets, each with a suitable dual-flush cistern having nominal 3/6-litre flushing capacity.

A minimum of four wall-mounted ceramic urinals shall be provided within the male toilet blocks.

A total of eight washbasins, each having indicative minimum dimensions of 500 mm × 400 mm, shall be provided with suitable taps, waste fittings and drainage connections.

A minimum of eight shower points shall be provided, complete with corrosion-resistant shower fittings and necessary water supply connections.

Eight health faucets, eight mirrors measuring approximately 450 mm × 600 mm, eight wall-mounted soap dispensers, eight toilet paper holders and eight sets of towel or clothes hooks shall be provided.

A minimum of four exhaust fans having a nominal sweep of 200 mm each shall be provided, together with eight LED light fixtures of minimum 12 W each, suitable for wet-area installation.

Eight floor drains having a minimum nominal outlet size of 100 mm shall be provided, along with eight moisture-resistant toilet cubicle partition sets.

A minimum of eight bathroom or cubicle doors having indicative dimensions of 750 mm × 2,100 mm shall be provided, subject to the final approved sanitary layout.
All toilet and bathroom areas shall be provided with waterproof flooring, anti-skid finishes, suitable drainage slopes, moisture-resistant wall finishes, adequate ventilation and privacy arrangements.
The final distribution of fixtures between male and female blocks shall be determined through the approved layout and applicable occupancy requirements.

12. External Steel Staircase, Access Corridors and Railings

The building shall be provided with a suitable external steel staircase connecting the ground floor and first floor, including structural steel stringers, treads, landings, handrails, guardrails and associated supports.
The staircase shall have an indicative minimum clear width of 1,500 mm, subject to the approved fire and emergency egress design.
The first-floor access corridor shall have an indicative minimum clear width of 1,500 mm, subject to applicable building regulations and detailed planning.
All stair treads and corridor walking surfaces shall be provided with durable, slip-resistant finishes suitable for outdoor marine conditions.
Staircase and corridor guardrails shall have an indicative minimum height of 1,100 mm, subject to applicable safety requirements.
The external staircase and corridor structural components shall be provided with marine-suitable corrosion protection. Demountable bolted connections shall be adopted wherever practicable.
A minimum of eight weather-resistant LED lighting fixtures shall be provided for the staircase and access corridors, with final locations established through the approved lighting design.
The number and arrangement of staircases and exits shall be verified against applicable fire-safety and emergency evacuation requirements. Additional exits or staircases shall be provided where required by the approved design.

13. Doors, Windows and Hardware

All doors and windows shall be manufactured from suitable corrosion-resistant materials and provided with durable hardware suitable for coastal environmental conditions.
Residential entrance doors shall have indicative minimum dimensions of 900 mm × 2,100 mm and shall be provided with frames, hinges, locking arrangements, handles, stoppers and necessary accessories.
Bathroom and toilet doors shall have indicative minimum dimensions of 750 mm × 2,100 mm, subject to applicable access requirements. Windows shall comprise powder-coated aluminium sliding frames with suitable glazing, mosquito screens, locking arrangements and weatherproof seals.
All exposed hinges, screws, handles, brackets and other hardware shall be manufactured from suitable corrosion-resistant materials. Door and window joints shall be properly sealed against rainwater penetration.

14. Electrical Installations and Minimum Equipment

The work shall include the complete electrical distribution and wiring system for the building, comprising one main electrical distribution board, two floor distribution boards, suitably rated circuit protection devices, electrical wiring, conduits, switches, sockets, lighting fixtures, fans, exhaust fans, earthing and all necessary accessories.
The main distribution board shall be provided with suitable MCB/MCCB protection, residual-current protection and circuit identification. The floor distribution boards shall be designed for the connected electrical loads.

The minimum electrical equipment shall include 16 residential room LED lights of minimum 18 W each, 16 reading lights of minimum 6 W each, 16 room fans having a nominal sweep of 1,200 mm or equivalent, and 32 electrical socket outlets.

The building shall also be provided with a minimum of 12 common-area LED lights of approximately 18 W each and eight external weatherproof LED lights of approximately 20 W each, with IP65 or higher ingress protection as appropriate. A minimum of six rechargeable emergency lights having at least 90 minutes of rated autonomy shall be provided, together with four illuminated exit signs.

A minimum of 20 suitable smoke detectors shall be provided in residential rooms and circulation areas, with final detector locations and any additional detection or alarm devices determined through the approved fire-safety design. Detector selection for the kitchen shall avoid unsuitable smoke-detector placement near cooking equipment.

A complete earthing system and suitable surge protection devices shall be provided. Lightning protection shall be installed where required by the approved risk assessment.

Electrical installations shall comply with applicable Indian Standards, Central Electricity Authority safety regulations and relevant statutory requirements.

All external electrical enclosures shall generally have a minimum IP65 rating, while equipment installed in wet areas shall have protection suitable for the actual exposure conditions. All circuits shall be tested for insulation resistance, polarity, earthing continuity, protective-device operation and other applicable electrical safety requirements before commissioning.

15. Water Supply, Storage and Pumping System

The work shall include the complete internal water supply and distribution system for the residential accommodation building, kitchen, toilet blocks and associated facilities.

A minimum total overhead water storage capacity of 5,000 litres shall be provided, subject to confirmation through the final water demand calculations and structural design. The tanks shall be manufactured from suitable potable-water-compatible, UV-resistant and corrosion-resistant materials.

The building shall be provided with two water transfer pumps, one duty and one standby, having an indicative minimum motor capacity of 1 HP each, subject to approved hydraulic calculations.

One automatic water level controller shall be provided for the pumping and storage arrangement. Internal water supply pipelines shall comprise suitable CPVC, PPR, HDPE or equivalent approved corrosion-resistant materials, selected according to the required operating pressures, temperatures and water quality. A minimum of six suitably located isolation valves shall be provided for maintenance and isolation of the water distribution system.

All pipelines shall be adequately supported, protected and arranged to facilitate inspection, maintenance and future disconnection during relocation.

The design shall include appropriate provision for water storage, overflow, cleaning, drainage and prevention of contamination.

16. Wastewater Drainage and Sanitary Plumbing

The building shall be provided with a complete internal wastewater and soil drainage system comprising suitable uPVC or HDPE pipelines, floor traps, soil pipes, waste pipes, vent pipes, inspection points, cleaning arrangements and necessary fittings.

The drainage system shall be designed with adequate slopes and capacities to prevent blockages, leakage, backflow and odour.

Wastewater generated from toilets, bathrooms and kitchen facilities shall be conveyed through suitable closed drainage pipelines to the designated external collection or treatment facility.

No untreated wastewater shall be discharged into the surrounding mangrove ecosystem, natural drains, creeks, water bodies or environmentally sensitive areas.
External sewage treatment or disposal facilities shall be provided where required by the approved project utility design and applicable environmental requirements.

17. Fire Safety and Emergency Arrangements

The building shall be provided with appropriate fire-safety arrangements suitable for residential occupancy.
A minimum of six ABC dry powder fire extinguishers of 4 kg capacity each shall be provided at suitable locations within the residential building and circulation areas, in addition to the two fire extinguishers specified for the common kitchen and dining facility.
A minimum of two fully equipped first-aid boxes shall be provided, one on each floor. Two emergency evacuation plan display boards shall be provided at prominent locations, manufactured from suitable durable and weather-resistant materials. Emergency lighting, illuminated exit signs, smoke detection and safe evacuation arrangements shall be provided as specified in the approved fire-safety design.
The contractor shall ensure that the wall panels, roof panels, internal partitions and other construction materials satisfy the applicable fire-performance requirements.
The location and number of exits, staircases, fire extinguishers, detectors and emergency lighting fixtures shall be verified and supplemented as required by the approved design and statutory provisions.

18. Marine Environment Material Specifications

All materials used in the construction of the building shall be selected considering the humid, saline and marine-influenced environmental conditions of Kelwe, Palghar.
Exposed structural steel shall be provided with a corrosion-protection system suitable for the assessed atmospheric corrosivity category, with C5 adopted as the preliminary minimum design basis for exposed carbon steel.
Hot-dip galvanising, zinc-rich epoxy primers, high-build epoxy coatings, UV-resistant polyurethane finishes or other approved marine-suitable systems shall be adopted as appropriate to the exposure and design requirements.
Exposed critical fasteners, frequently wetted fittings and selected external hardware shall preferably be manufactured from stainless steel Grade 316/316L or approved equivalent corrosion-resistant materials.
Aluminium doors and windows shall be provided with suitable powder-coated or other approved protective finishes.
Kitchen sinks and exposed frequently wetted kitchen surfaces shall preferably be SS 316 or another approved corrosion-resistant material.
External electrical enclosures shall generally be provided with minimum IP65 ingress protection, with appropriate higher protection where required.
All timber, composite boards, furniture panels and interior finishes shall be moisture-resistant, durable and suitable for high-humidity conditions. Galvanic corrosion between dissimilar metals shall be prevented through suitable material selection, compatible fasteners, isolation washers and other protective arrangements.

19. Base Platform, Foundations and Associated Civil Works

The scope of work shall include the complete design, engineering and construction of the base platform, foundations, structural supports, anchoring arrangements and associated civil works required for the proposed G+1 prefabricated modular residential accommodation building.

The contractor shall undertake necessary site verification, topographical assessment, geotechnical investigation and structural design to determine the appropriate foundation arrangement, taking into consideration the actual soil bearing capacity, groundwater conditions, coastal exposure, wind uplift, seismic forces, structural reactions and drainage requirements.

The foundation system may comprise suitably designed RCC isolated footings, combined footings, strip foundations, pedestals, ground beams, precast foundation units or other approved foundation arrangements based on the geotechnical investigation and structural requirements.

The work shall include site clearance, setting out, excavation, necessary dewatering, preparation of foundation beds, compacted filling, granular sub-base, PCC levelling courses, RCC foundations, reinforcement steel, formwork, curing, foundation pedestals, anchor bolts, base plates, non-shrink grouting and all necessary structural connections.

The base platform shall be designed to provide adequate support and stability to the complete modular accommodation building. The platform elevation shall be determined considering site topography, groundwater conditions, stormwater accumulation, local flooding and long-term protection of the modular flooring system.

Where a continuous RCC base platform or plinth slab is adopted, it shall be designed for the applicable structural loads and ground conditions. Where an elevated support platform is adopted, suitable structural supports, underfloor clearance, access arrangements and protection against moisture shall be provided.

Concrete grade, reinforcement cover, cement type, water-cement ratio, permeability requirements and other durability provisions shall be selected in accordance with IS 456 and the assessed environmental exposure conditions. Where aggressive chlorides or sulphates are present in soil or groundwater, suitable additional durability measures shall be adopted.

The contractor shall provide appropriate surface grading, stormwater drainage, erosion protection and necessary drainage outlets around the platform to prevent water accumulation. The foundation anchoring arrangement shall permit safe removal of the modular superstructure during future relocation. The modular building shall be connected to the foundation system using suitable engineered base plates, anchor bolts and demountable structural connections.

The entire base platform, foundation system, anchoring arrangements, site preparation, drainage and associated civil works shall form an integral part of the complete turnkey scope.

20. Transportation, Installation and Relocation Requirements

The contractor shall be responsible for factory packing, loading, transportation, unloading, lifting, positioning, assembly, alignment, structural interconnection, installation of utilities and commissioning of all prefabricated modular units.

The contractor shall prepare and submit a detailed transportation, lifting and erection methodology, including lifting point design, crane requirements, temporary supports, installation sequence and safety arrangements.

All modules shall be designed for safe handling, transportation and future relocation.

The building shall incorporate suitable bolted connections, removable wall and roof panels, accessible service connections and appropriate lifting arrangements to facilitate dismantling and reuse. The contractor shall submit a detailed dismantling, transportation, storage and reassembly manual at the time of handing over. The reusable and relocatable requirement shall apply primarily to the modular superstructure. Cast-in-situ RCC foundations and permanent ground-level civil works need not be relocatable unless specifically required by the approved design.

21. Testing, Commissioning and Quality Assurance

The contractor shall carry out all necessary factory and site quality inspections, including verification of materials, structural dimensions, welding quality, bolted connections, protective coatings, panel installation, waterproofing, plumbing connections, drainage arrangements, electrical installations and equipment functionality.

The structural steel framework shall be inspected for dimensional accuracy, fabrication quality and corrosion protection. Protective coating thickness and quality shall be verified in accordance with the approved coating specification and quality assurance plan. Water supply pipelines shall be subjected to appropriate pressure testing, and drainage pipelines shall be checked for leakage and proper flow. Electrical installations shall be tested for insulation resistance, earthing continuity, polarity, protective-device operation and other applicable safety requirements. All fans, lighting fixtures, pumps, water purification equipment, kitchen appliances, ventilation equipment and other installed systems shall be tested for satisfactory operation.

The contractor shall submit material test certificates, inspection reports, coating compliance certificates, approved drawings, structural calculations, equipment data sheets, testing records, warranties, operating manuals, maintenance instructions and as-built drawings.

22. Applicable Standards and Statutory Requirements

The design, fabrication, construction, installation and commissioning shall comply with the latest applicable editions of relevant Indian Standards, including IS 800 for structural steel design, IS 2062 for structural steel materials, IS 875 for design loads, IS 1893 for seismic design, IS 456 for reinforced concrete design and durability, and other relevant electrical, plumbing, fire-safety and building standards.

Marine corrosion protection shall be designed with reference to ISO 9223, ISO 12944, IS 4759 / ISO 1461 and other applicable coating and galvanising standards.

The building shall comply with the applicable provisions of the National Building Code of India and relevant statutory requirements governing residential occupancy, sanitation, structural safety, electrical safety, fire safety and construction.

All materials and equipment shall be new, of approved quality and suitable for their intended use and environmental exposure.

23. Completion and Handing Over

The contractor shall complete the entire work in all respects and hand over the prefabricated modular residential accommodation building in a safe, structurally stable, weatherproof, thermally insulated, corrosion-protected, fully furnished and habitable condition.

The completed facility shall include all specified residential rooms, kitchen and dining equipment, toilet and bathroom facilities, furniture, electrical installations, plumbing, water supply arrangements, wastewater drainage, ventilation, fire-safety systems, external staircase, access corridors, base platform, foundations and associated civil works. The building shall be designed and constructed to facilitate future dismantling, transportation and relocation of the modular superstructure.

The contractor shall hand over the completed facility together with approved architectural and structural drawings, foundation drawings, equipment schedules, inspection reports, testing certificates, operation and maintenance manuals, warranty documents, as-built drawings and relocation instructions.

The work shall be completed to the satisfaction of the Engineer-in-Charge and in accordance with the approved drawings, technical specifications and applicable statutory requirements.

Item No 4: Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of a Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based Visitor Interpretation and Environmental Education Centre, having an Approximate Built-up Area of 150.00 Sq. M., comprising Reception and Visitor Orientation Area, Mangrove Interpretation Gallery, Audio-Visual Mini Theatre, Exhibition and Display Area, Interactive Digital Information Kiosks, Environmental Education and Awareness Zone, Mangrove Nursery Viewing Gallery, Office and Staff Desk, Separate Male and Female Toilet Facilities, Store and Utility Room, Accessible Entrance Ramp, Covered Verandah and Visitor Circulation Areas, including Complete Interior Development, Thematic Exhibition Displays, Digital Interpretation Equipment, Audio-Visual Systems, Furniture, Fixtures, Signage, Electrical Installations, Lighting, Ventilation, Solar Photovoltaic System with Grid Backup, Rainwater Harvesting, Plumbing, Sanitary and Fire-Safety Systems, together with Design and Construction of Base Platform, Foundations, Structural Supports, Anchoring Arrangements, Site Development, Landscaping, Drainage and Associated Civil Works, using Durable, Energy-Efficient and Corrosion-Resistant Materials suitable for Marine and Coastal Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra.

DETAILED TECHNICAL SPECIFICATION

Visitor Interpretation and Environmental Education Centre

1. Name of Work

Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of a Temporary, Portable, Reusable and Relocatable Prefabricated Modular Container-Based Visitor Interpretation and Environmental Education Centre having an Approximate Built-up Area of 150.00 Sq. M. and a Preliminary Maximum Simultaneous Occupancy of 50 Persons, comprising Reception and Visitor Orientation Area, Mangrove Interpretation Gallery, Fully Air-Conditioned Audio-Visual Mini Theatre, Exhibition and Display Area, Interactive Digital Information Kiosks, Digital Interactive Teaching and Presentation System, Environmental Education Zone, Mangrove Nursery Viewing Gallery, Office and Staff Facilities, Separate Male and Female Public Toilet Blocks, Universal Accessible Toilet for Persons with Disabilities, Store and Utility Room, Accessible Entrance Ramp, Covered Verandah and Visitor Circulation Areas, including Complete Thematic Interior Development, Professional Audio-Visual Systems, Desktop Computer Systems, Interactive Touchscreen Equipment, Digital Educational Content, Furniture, Fixtures, Electrical Installations, Air-Conditioning and Fresh-Air Ventilation Systems, Rooftop Solar Photovoltaic System with Grid Backup, Rainwater Harvesting, Plumbing, Sanitary, Fire-Safety and Allied Services, together with Design and Construction of Complete Base Platform, Foundations, Structural Supports, Anchoring Arrangements, Site Development, Landscaping, Drainage and Associated Civil Works, using Durable, Energy-Efficient and Corrosion-Resistant Materials suitable for Marine and Coastal Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra.

2. Building Configuration and Occupancy

The proposed Visitor Interpretation and Environmental Education Centre shall be developed as a single-storey prefabricated modular container-based building having an approximate built-up area of 150.00 Sq. M., comprising approximately six interconnected modified ISO container modules or an equivalent engineered modular arrangement.

The centre shall be designed for a preliminary maximum simultaneous occupancy of 50 persons, including visitors, students, researchers, educational groups, staff and other users. The proposed audio-visual mini theatre shall have a minimum seating capacity of 20 persons, while the remaining

visitors shall be accommodated within the reception, interpretation gallery, exhibition and education areas, subject to the approved occupancy and circulation plan.

The centre shall include reception and visitor orientation, interpretation gallery, audio-visual mini theatre, exhibition displays, interactive digital kiosks, environmental education zone, nursery viewing gallery, staff office, public toilet facilities, accessible toilet, store, utility area, covered entrance verandah and accessible entrance ramp.

The contractor shall prepare detailed architectural drawings demonstrating the accommodation of all specified facilities within the available building area. Where the required circulation, sanitary facilities, equipment clearances, fire exits or accessible facilities cannot be accommodated within the indicative area, the contractor shall submit a rationalised layout for approval before finalisation of the building configuration.

3. General Scope of Work

The work shall comprise complete architectural planning, structural design, engineering, geotechnical assessment, foundation design, factory fabrication, procurement, supply, transportation, loading, unloading, lifting, erection, assembly, installation, interior development, thematic exhibition development, equipment installation, testing and commissioning of the complete Visitor Interpretation and Environmental Education Centre.

The contractor shall provide the complete base platform, foundations, modular structural steel framework, insulated wall panels, roofing, flooring, doors, windows, ceilings, internal partitions, reception counters, exhibition displays, digital interactive systems, professional audio-visual equipment, computer systems, seating arrangements, furniture, electrical installations, air-conditioning, mechanical ventilation, solar photovoltaic system, rainwater harvesting, plumbing, sanitary facilities, fire-safety arrangements, signage, landscaping and associated civil works.

The building shall be designed as a temporary, portable, reusable and relocatable modular superstructure suitable for coastal and marine-influenced environmental conditions.

All architectural drawings, structural calculations, fabrication drawings, foundation drawings, electrical and mechanical layouts, equipment schedules, interpretation content and technical data sheets shall be submitted for approval by the Engineer-in-Charge before procurement and execution.

4. Structural Steel Framework

The structural framework shall comprise engineered structural steel columns, beams, channels, hollow sections, bracing members, floor supports and associated structural components conforming to IS 2062 or equivalent applicable standards.

Structural design shall conform to IS 800, IS 875, IS 1893 and other relevant standards, considering dead loads, imposed loads, wind loads, seismic forces, lifting loads, transportation loads, erection loads and applicable load combinations.

All exposed structural steel shall be provided with marine-suitable corrosion protection, with C5 adopted as the preliminary minimum atmospheric corrosion design basis for exposed carbon steel, subject to site-specific exposure assessment.

Hot-dip galvanising conforming to IS 4759 / ISO 1461 or an approved high-durability protective coating system incorporating suitable surface preparation, zinc-rich primer, high-build epoxy intermediate coating and UV-resistant polyurethane finish shall be provided.

Bolted and demountable structural connections shall be preferred wherever practicable to facilitate future dismantling and relocation.

5. Prefabricated Modular Container Construction

The building shall comprise approximately six modified ISO container modules or an equivalent engineered prefabricated modular steel-framed building system.

All structural modifications to containers, including removal of wall portions, formation of openings and interconnection of modules, shall be supported by approved structural design and necessary reinforcement.

Each modular unit shall incorporate suitable lifting points, structural connections, transport restraints, alignment arrangements and accessible utility interfaces.

The modular system shall permit safe transportation, installation, dismantling and reassembly without substantial damage to its principal reusable components.

6. External Wall Panels and Internal Partitions

External walls shall comprise insulated prefabricated sandwich panels or suitably insulated modified container walls having corrosion-resistant metal facings and an approved insulating core.

The wall system shall provide adequate thermal insulation, weather resistance, acoustic comfort, moisture protection and fire performance suitable for public assembly and educational use.

Non-combustible or appropriately fire-rated insulation materials shall be adopted in accordance with applicable fire-safety requirements.

Internal partitions shall comprise lightweight, durable, moisture-resistant panels with washable finishes. Toilet partitions shall be waterproof or suitably moisture-resistant.

All joints, exposed edges, openings and service penetrations shall be properly sealed against moisture ingress.

7. Roofing System

The building shall be provided with a lightweight insulated roofing system supported on engineered structural steel framing.

The roof shall be designed for applicable coastal wind uplift, rainfall, maintenance loads and the additional loads associated with the rooftop solar photovoltaic system.

The roof shall incorporate suitable slopes, flashing, gutters, downpipes, weatherproof joints and corrosion-resistant fasteners.

Roof insulation shall provide adequate thermal performance for the air-conditioned public building.

8. Flooring and Internal Finishes

The modular flooring shall comprise engineered structural steel floor framing, suitable load-bearing panels and moisture-resistant substrates.

The flooring shall be designed for the approved public occupancy, exhibition equipment loads and concentrated loads from digital installations.

Finished floors shall comprise commercial-grade anti-skid vinyl, epoxy or equivalent approved flooring suitable for frequent public use and cleaning.

Wet areas shall have waterproof flooring, anti-skid finishes and appropriate drainage slopes.

Internal ceilings shall comprise suitable insulated or moisture-resistant ceiling panels with durable finishes and provisions for recessed lighting, air-conditioning outlets, speakers and other services.

9. Reception and Visitor Orientation Area

The centre shall be provided with one reception and visitor orientation area near the principal entrance.

One reception counter having indicative dimensions of 2,400 mm × 700 mm × 1,050 mm shall be provided, incorporating a suitably designed accessible counter section.

The reception shall include two staff chairs, one lockable storage cabinet, suitable electrical and data outlets and one 55-inch commercial-grade digital information display.

The reception display shall present visitor orientation information, nursery activities, visitor safety instructions, operating information and environmental education content.
Suitable LED lighting, signage and circulation arrangements shall be provided.

10. Mangrove Interpretation Gallery

The centre shall be provided with a mangrove interpretation gallery containing a minimum of eight thematic interpretation panels, each having indicative dimensions of 1,200 mm × 900 mm.
The gallery shall include a minimum of two three-dimensional educational models or dioramas having indicative minimum dimensions of 1,500 mm × 900 mm each.
One introductory wall graphic having indicative dimensions of 3,000 mm × 1,500 mm shall be provided.
The interpretation themes shall include mangrove ecology, biodiversity, coastal protection, carbon sequestration, mangrove restoration, nursery technology, climate resilience and conservation.
All thematic content shall be scientifically reviewed and approved before fabrication.

11. Professional Audio-Visual Mini Theatre

The Visitor Interpretation Centre shall be provided with one fully equipped, air-conditioned and acoustically treated audio-visual mini theatre having a minimum seating capacity of 20 persons, subject to the approved architectural and fire-safety design.
The theatre shall be designed for screening educational documentaries, environmental awareness films, animated presentations, scientific demonstrations, training programmes and visitor orientation material.

11.1 Theatre Seating and Interior

A minimum of 20 individual visitor chairs shall be provided, arranged in suitable rows with adequate sightlines, circulation space and emergency access.
The chairs shall comprise durable, washable upholstered or moulded seats with corrosion-resistant supporting frames.
The theatre shall be provided with suitable acoustic wall treatment, acoustic ceiling treatment, light control, blackout blinds or equivalent arrangements, and durable flooring.
Accessible wheelchair seating positions and companion seating shall be incorporated into the approved seating layout without obstructing circulation or evacuation.

11.2 Main Audio-Visual Display

The theatre shall be provided with one professional large-format LED display having a minimum diagonal screen size of 85 inches.
The display shall have a minimum native resolution of 3840 × 2160 pixels (4K UHD), minimum refresh rate of 60 Hz, suitable viewing angles, anti-glare treatment and brightness appropriate to the controlled indoor environment.
The display shall have a minimum of two HDMI inputs, suitable digital connectivity and commercial-duty operation.
The display shall be installed using an engineered mounting arrangement suitable for the modular structure.
Alternatively, a professional laser projection system may be proposed with an appropriately sized screen, subject to approval of image brightness, resolution, viewing conditions and maintenance requirements.

11.3 Desktop Computer and Presentation Control System

The theatre shall be provided with one dedicated desktop computer system for controlling presentations, audio-visual content, educational films and other multimedia applications.

The desktop computer shall have a minimum Intel Core i7 / AMD Ryzen 7 class processor or equivalent current-generation performance, 16 GB RAM, 1 TB NVMe solid-state storage, suitable integrated or dedicated graphics capable of 4K output, Gigabit Ethernet, Wi-Fi connectivity, Bluetooth, USB 3.x ports, HDMI or DisplayPort outputs and licensed operating system.

One LED monitor having a minimum diagonal screen size of 24 inches and Full HD resolution shall be provided for the operator.

The computer shall be provided with a suitable keyboard, optical mouse, licensed office/presentation software, multimedia playback software and necessary drivers.

One online UPS having a minimum capacity of 2 kVA, with a minimum backup autonomy of 15 minutes at the approved connected control-system load, shall be provided for the desktop computer and critical audio-visual control equipment.

11.4 Professional Audio System

The theatre shall be provided with one professional multichannel audio system comprising a minimum of four full-range speakers, one suitable subwoofer, one digital audio processor or amplifier and all necessary audio cabling and accessories.

The audio system shall be designed to provide clear speech reproduction and suitable sound coverage throughout the theatre.

One wireless handheld microphone and one wireless lapel microphone shall be provided, complete with receivers, charging arrangements and accessories.

The audio system shall include suitable volume control, source selection and protection arrangements.

11.5 Audio-Visual Control and Connectivity

The theatre shall be provided with one suitable audio-visual control desk or rack, incorporating media source selection, display control, audio control and equipment management facilities.

The system shall support HDMI, USB, network-based media playback and presentation from the dedicated desktop computer.

Necessary signal cables, network cables, connectors, equipment racks, ventilation arrangements and cable management systems shall be provided.

11.6 Theatre Lighting

The theatre shall be provided with suitable dimmable LED lighting, including general lighting, presentation lighting and safe circulation lighting.

A minimum of six dimmable LED ceiling lights shall be provided, subject to the approved illumination design.

Emergency lighting and exit signage shall remain functional independently of the normal theatre lighting controls.

11.7 Theatre Air-Conditioning and Ventilation

The mini theatre shall be provided with a dedicated air-conditioning system of suitable capacity determined through a detailed cooling load calculation considering 20 occupants, lighting, audio-visual equipment, building envelope, solar heat gain and local climatic conditions.

As a preliminary equipment allowance, a minimum of two inverter-type air-conditioning units of approximately 2.0 TR nominal cooling capacity each shall be considered, subject to confirmation or modification through the approved cooling load calculations.

The air-conditioning system shall be supplemented by a suitable treated fresh-air ventilation arrangement designed for the approved occupancy and applicable indoor air quality requirements.

Outdoor condenser units shall be suitable for coastal service and shall be provided with corrosion-resistant supports and protective treatment.

Condensate drainage, refrigerant piping, insulation, electrical connections, vibration isolation and necessary controls shall be provided.

12. Exhibition and Display Area

The centre shall be provided with a dedicated exhibition area comprising a minimum of four exhibition display units, each having indicative dimensions of 1,200 mm × 600 mm × 900 mm.

A minimum of four wall-mounted information panels having indicative dimensions of 1,200 mm × 900 mm shall be provided.

One interactive demonstration model illustrating mangrove nursery operations, seed collection, seed germination, seedling development and plantation shall be provided.

All exhibition structures shall be durable, moisture-resistant and suitable for frequent public use.

13. Interactive Digital Information Kiosks

The centre shall be provided with a minimum of four commercial-grade interactive digital information kiosks for environmental education and visitor engagement.

13.1 Touchscreen Display

Each kiosk shall comprise one commercial-grade capacitive multi-touchscreen having a minimum diagonal screen size of 43 inches.

The touchscreen shall have a minimum native resolution of 3840 × 2160 pixels (4K UHD), support at least 10 simultaneous touch points, have a suitable anti-glare and scratch-resistant protective surface and provide brightness appropriate for the indoor installation environment.

The touch response shall be suitable for smooth interactive operation, including scrolling, zooming, selection, multimedia playback and interactive educational applications.

13.2 Integrated Computing Hardware

Each kiosk shall be provided with an integrated industrial or commercial-grade computer having a minimum Intel Core i5 / AMD Ryzen 5 class processor or equivalent performance, 16 GB RAM, 512 GB solid-state storage, suitable graphics capability, Ethernet connectivity, Wi-Fi and necessary USB interfaces.

The kiosk shall support automatic startup, scheduled shutdown, content recovery and unattended public operation.

13.3 Kiosk Enclosure and Mounting

Each kiosk shall be installed within a durable, tamper-resistant and corrosion-resistant enclosure suitable for the humid coastal environment.

The enclosure shall provide safe access for maintenance, appropriate ventilation, secure cable management and suitable protection against accidental damage.

At least one kiosk shall be designed and positioned for wheelchair-accessible operation, with appropriate screen height, reach range and clear floor space.

13.4 Interactive Software and Content

Each kiosk shall be provided with suitable licensed interactive software and educational content covering mangrove biodiversity, ecological services, nursery technology, restoration techniques, climate resilience and conservation.

The system shall support interactive maps, photographs, diagrams, videos, animations, quizzes and other educational modules.

The software shall support local offline operation of essential educational content.

The contractor shall provide complete installation, software configuration, testing, commissioning and operating documentation.

14. Environmental Education Zone and Digital Interactive Teaching Board

The centre shall be provided with one environmental education and information zone suitable for guided learning, student activities, scientific demonstrations and small-group educational sessions.

The area shall be provided with a minimum of two modular educational tables measuring approximately 1,500 mm × 750 mm × 750 mm each and eight suitable chairs.

14.1 Digital Interactive Teaching and Presentation Board

In place of the conventional wall-mounted writing or presentation board, one digital interactive flat-panel teaching board shall be provided.

The digital interactive board shall have a minimum diagonal screen size of 75 inches, native 4K UHD resolution of 3840 × 2160 pixels, a minimum of 20 simultaneous touch points and suitable anti-glare toughened glass protection.

The board shall be provided with an integrated or slot-in computing module having a minimum Intel Core i5 / AMD Ryzen 5 class processor or equivalent, 16 GB RAM, 512 GB solid-state storage, licensed operating system and suitable connectivity.

The board shall support digital writing, drawing, annotation, screen sharing, multimedia presentation, interactive lessons, document display and saving or exporting of educational content.

A minimum of two digital writing pens or styluses shall be provided.

The system shall include suitable wall mounting, electrical connections, HDMI, USB, network connectivity, Wi-Fi and necessary software.

The interactive board shall be installed at a height suitable for the intended users, with accessible controls and an approved mounting arrangement.

One lockable storage cabinet and suitable electrical outlets shall be provided in the education area.

15. Mangrove Nursery Viewing Gallery

The centre shall be provided with a nursery viewing window or gallery overlooking the proposed nursery or designated demonstration area.

The viewing arrangement shall comprise suitable safety glazing having an indicative minimum clear viewing width of 3,000 mm and height of 1,500 mm, subject to the approved architectural and structural design.

The glazing shall be installed in corrosion-resistant framing and provided with suitable shading and weatherproofing.

A minimum of two interpretation panels shall be provided adjacent to the viewing window, explaining nursery operations, seedling production, irrigation, monitoring and restoration activities.

16. Office and Staff Facilities

The centre shall be provided with one office or staff work area comprising one work desk measuring approximately 1,500 mm × 750 mm × 750 mm, one ergonomic office chair, two visitor chairs and one lockable storage cabinet.

One desktop computer system shall be provided with a minimum Intel Core i5 / AMD Ryzen 5 class processor or equivalent, 16 GB RAM, 512 GB solid-state storage, minimum 23-inch Full HD monitor, keyboard, mouse and licensed operating system.

One multifunction printer and scanner shall be provided.

The office shall have suitable electrical outlets, data connectivity, lighting and air-conditioning or mechanical ventilation as required by the approved design.

17. Public Toilet and Sanitary Facilities for 50 Persons

The sanitary facilities shall be designed considering a preliminary maximum simultaneous occupancy of 50 persons, including visitors and staff.

The design shall comply with the applicable provisions of the National Building Code of India 2016, particularly Part 9 concerning plumbing services, and relevant accessibility standards.

For preliminary planning, the following minimum sanitary provision shall be adopted for the centre, subject to confirmation through the final fixture calculations and applicable occupancy classification.

17.1 Male Toilet Block

The male toilet block shall comprise a minimum of one Western-type water closet, two wall-mounted ceramic urinals and two washbasins.The water closet shall be provided with a suitable dual-flush cistern, health faucet, toilet paper holder, soap dispenser and other necessary accessories.

The urinals shall be provided with suitable flushing arrangements, privacy partitions and drainage connections.

17.2 Female Toilet Block

The female toilet block shall comprise a minimum of three Western-type water closets and two washbasins. Each water closet shall be provided with a suitable dual-flush cistern, health faucet, toilet paper holder, sanitary waste disposal bin and other necessary accessories.

17.3 Universal Accessible Toilet

One separate unisex accessible toilet shall be provided for persons with disabilities, wheelchair users and visitors requiring assisted access. The accessible toilet shall have indicative minimum internal dimensions of 2,200 mm × 2,000 mm, subject to the approved accessibility layout and the current applicable standards.

The toilet shall be provided with one accessible Western-type water closet, one accessible washbasin, suitable horizontal and vertical grab bars, accessible mirror, toilet paper holder, soap dispenser, emergency assistance alarm and other necessary accessories. The entrance shall have an appropriate clear opening width, preferably not less than 900 mm, with an outward-opening or suitable sliding door arrangement and accessible hardware.

Adequate wheelchair manoeuvring and transfer space shall be provided.

17.4 Consolidated Minimum Sanitary Equipment

The complete building shall therefore have the following proposed minimum facilities:

- Five Western-type water closets, comprising one male, three female and one accessible toilet.
- Two male urinals.
- Five washbasins, comprising two male, two female and one accessible basin.
- Five health faucets or equivalent approved ablution arrangements.
- Five mirrors.
- Five soap dispensers.
- Five toilet paper holders.
- Five floor drains or more as required by the layout.
- Suitable exhaust ventilation for all toilet blocks.
- One cleaner's sink with necessary water supply and drainage.
- One accessible emergency assistance alarm system.
- Suitable sanitary waste disposal arrangements.

All toilet floors shall be waterproofed and provided with anti-skid finishes, proper drainage slopes and moisture-resistant wall finishes.

The contractor shall submit the final fixture calculations showing the applicable NBC occupancy category, visitor gender distribution, staff provision and accessible facilities.The sanitary fixture quantities shall be increased wherever required by the applicable standards or approving authority.

18. Accessible Entrance Ramp and Barrier-Free Circulation

The building shall be provided with an accessible entrance ramp connecting the external approach to the principal entrance.The ramp shall have a suitable clear width, gradient, landings, handrails, edge protection and slip-resistant surface in accordance with the applicable Harmonised Guidelines and Standards for Universal Accessibility in India.

The principal entrance, reception, interpretation gallery, education zone, theatre and accessible toilet shall be connected by an accessible circulation route. Door clearances, turning spaces, signage, furniture arrangements and equipment controls shall be designed for use by persons with disabilities.

The building shall be provided with appropriate accessible identification and directional signage.

19. Entrance Verandah and Covered Deck

The centre shall be provided with a covered entrance verandah or deck comprising engineered structural supports, durable decking, weather-resistant roofing and suitable safety railings wherever

required. The decking shall comprise approved wood-plastic composite, weather-resistant timber or equivalent durable material suitable for coastal environmental conditions. The verandah shall provide safe visitor access and suitable protection against rain and direct sunlight.

20. Doors, Windows and Glazing

The building shall be provided with suitable aluminium-framed glazed entrance doors, internal doors, toilet doors and windows. The main entrance shall incorporate safety glazing, corrosion-resistant frames, locking arrangements, handles, door closers and weatherproof seals. Windows shall comprise powder-coated aluminium frames with suitable glazing and opening arrangements. Double-glazed units may be adopted where required by the thermal and acoustic design. All exposed hardware shall be corrosion-resistant and suitable for coastal environmental conditions.

21. Complete Air-Conditioning and Mechanical Ventilation System

The Visitor Interpretation Centre shall be provided with a complete energy-efficient air-conditioning and mechanical ventilation system serving the mini theatre, interpretation gallery, digital kiosk zone, environmental education area, reception and other regularly occupied spaces as required by the approved design.

The contractor shall prepare a detailed room-wise cooling load calculation considering the maximum simultaneous occupancy of 50 persons, heat loads from computer systems, audio-visual equipment, digital displays, lighting, glazing, solar radiation, roof and wall insulation, fresh-air requirements and local climatic conditions. A preliminary aggregate air-conditioning capacity of approximately 10–12 TR may be considered for initial planning only, subject to confirmation or modification through the approved cooling load calculation.

The air-conditioning system may comprise inverter-type split units, ducted units or an approved equivalent arrangement suitable for the architectural layout.

The mini theatre shall be provided with a dedicated cooling and fresh-air arrangement as specified in Clause 11.7.

All regularly occupied areas shall be provided with adequate outdoor air ventilation in accordance with applicable ventilation and indoor air quality requirements.

Outdoor condenser units shall be suitable for marine-influenced environmental conditions and provided with corrosion-resistant heat exchanger protection, mounting brackets and fasteners.

All systems shall include refrigerant piping, thermal insulation, condensate drainage, electrical connections, control systems, vibration isolation and suitable maintenance access.

22. Electrical Installations and Lighting

The work shall include complete electrical installations comprising main distribution board, sub-distribution boards, wiring, conduits, switches, sockets, equipment connections, LED lighting, emergency lighting, earthing, protective devices and necessary accessories.

The main distribution board shall be provided with suitable overcurrent protection, residual-current protection, surge protection and circuit identification.

A minimum of 20 general LED lighting fixtures shall be provided throughout the building, together with eight adjustable exhibition/display lights and six external weatherproof LED lights, subject to the approved illumination design.

The center shall be provided with a minimum of six rechargeable emergency lights having at least 90 minutes of rated autonomy and suitable illuminated exit signs.

Dedicated electrical circuits shall be provided for air-conditioning equipment, digital kiosks, interactive teaching board, theatre equipment, computer systems, solar photovoltaic equipment and other significant electrical loads.

All electrical installations shall comply with applicable Indian Standards, Central Electricity Authority safety regulations and statutory requirements.

23. Data Network and Digital Infrastructure

The centre shall be provided with a suitable structured data network for connecting the desktop computers, interactive kiosks, digital teaching board, audio-visual systems and other digital equipment. The network shall comprise suitable Category 6 or better data cabling, one managed Gigabit Ethernet network switch having a minimum of 16 ports, one suitable network router and a minimum of two Wi-Fi access points, subject to the approved coverage design.

One lockable network equipment cabinet shall be provided with suitable ventilation, cable management and power distribution. Necessary network outlets, patch panels, patch cords and accessories shall be provided.

The network shall support local communication, content distribution and internet connectivity when an external internet service is available.

24. Solar Photovoltaic System with Grid Backup

The building shall be provided with a rooftop solar photovoltaic system integrated with the electrical distribution system.

A preliminary installed capacity of 10 kWp is proposed, subject to confirmation through roof area assessment, shading analysis, structural loading, electrical demand and applicable grid interconnection requirements.

The system shall comprise suitable solar photovoltaic modules, corrosion-resistant mounting structures, inverter, DC and AC protection devices. cabling, earthing, surge protection, monitoring equipment and necessary accessories.

The mounting system shall be designed for the applicable coastal wind loads.

Grid power shall remain available as backup. Critical digital equipment shall be provided with suitable UPS protection as specified.

25. Rainwater Harvesting and Roof Drainage

The building shall be provided with a suitable rainwater collection system comprising roof gutters, downpipes, leaf screens, first-flush diversion arrangements and connections to the designated rainwater harvesting or storage facility.

The system shall be designed based on the approved roof catchment area, rainfall characteristics and site drainage requirements.

Suitable inspection and maintenance arrangements shall be provided.

26. Fire Safety and Emergency Arrangements

The centre shall be provided with appropriate fire-safety arrangements suitable for public visitor occupancy and the installed electrical and audio-visual equipment.

A minimum of four ABC dry powder fire extinguishers of 4 kg capacity each shall be provided at suitable locations.

Suitable CO_2 or other approved extinguishers shall be provided near sensitive electrical equipment where required.

Smoke detection, fire alarm, emergency lighting, exit signage and safe evacuation arrangements shall be provided in accordance with the approved fire-safety design.

A minimum of two fully equipped first-aid boxes shall be provided.

The final number and arrangement of exits, staircases, fire extinguishers, detectors and other safety facilities shall comply with applicable statutory requirements.

27. Interpretation Signage and Thematic Graphics

The centre shall be provided with complete internal and external identification, directional, educational and interpretation signage.

One principal external building identification signboard having indicative minimum dimensions of 4,000 mm × 600 mm shall be provided.

A minimum of six directional and facility identification signs and four large-format thematic graphics shall be provided.

All external signage shall be manufactured using UV-resistant, moisture-resistant and corrosion-resistant materials.

Thematic content shall cover mangrove conservation, biodiversity, coastal resilience, nursery technology, ecological restoration and environmental awareness.

28. Digital Content Development and Integration

The contractor shall develop, configure and install suitable digital educational content for the mini theatre, interactive kiosks, digital teaching board and interpretation displays.

The minimum content package shall include four educational presentations or films covering visitor orientation, mangrove ecosystems, nursery technology and mangrove conservation and restoration.

A minimum of four interactive learning modules shall be provided for the digital kiosks.

The content shall incorporate appropriate graphics, photographs, diagrams, animations, narration and interactive features.

The content shall be provided in English and Marathi, with additional languages as approved by the Engineer-in-Charge.

All content and software shall be appropriately licensed for public educational use.

The contractor shall submit scripts, storyboards, content layouts and final media files for approval before installation.

29. Water Supply and Plumbing

The work shall include complete internal water supply arrangements for the public toilets, accessible toilet, cleaner's sink, drinking water facilities and other required services.

Water supply pipelines shall comprise suitable CPVC, PPR, HDPE or equivalent approved corrosion-resistant materials.

The water storage and pumping capacities shall be determined through the approved demand calculations for the 50-person occupancy and expected visitor turnover.

Suitable isolation valves, overflow arrangements, cleaning provisions and maintenance access shall be provided.

30. Wastewater Collection and Drainage

The building shall be provided with a complete internal wastewater and sanitary drainage system comprising suitable uPVC or HDPE pipelines, traps, floor drains, soil pipes, waste pipes, vent pipes and inspection points.

The drainage system shall be designed to prevent leakage, blockage, backflow and odour.

Wastewater shall be conveyed to the designated external collection or treatment facility.

No untreated wastewater shall be discharged into surrounding mangrove areas, creeks, natural drains or environmentally sensitive locations.

31. Store and Utility Room

The centre shall be provided with one store and utility room comprising a minimum of two corrosion-resistant storage racks having indicative dimensions of 1,200 mm × 450 mm × 1,800 mm each.

One lockable storage cabinet, suitable lighting and ventilation shall be provided.

The room shall be arranged for safe storage of maintenance tools, cleaning materials and spare exhibition equipment.

32. Base Platform, Foundations and Associated Civil Works

The work shall include complete design, engineering and construction of the base platform, foundations, structural supports, anchoring arrangements and associated civil works required for the Visitor Interpretation and Environmental Education Centre.

The contractor shall undertake necessary site verification, topographical assessment, geotechnical investigation and structural design to determine the appropriate foundation arrangement.

The foundation design shall consider soil bearing capacity, groundwater conditions, coastal exposure, wind uplift, seismic forces, structural reactions, drainage requirements and the modular building configuration.

The foundation system may comprise suitably designed RCC isolated footings, combined footings, strip foundations, pedestals, ground beams, precast foundation units or other approved arrangements.

The work shall include site clearance, setting out, excavation, necessary dewatering, preparation of foundation beds, compacted filling, granular sub-base, PCC levelling courses, RCC foundations, reinforcement steel, formwork, curing, foundation pedestals, base plates, anchor bolts, non-shrink grouting and all necessary structural connections.

The base platform shall provide adequate structural support, stability and protection against ground moisture and water accumulation.

The finished platform level shall be determined considering site topography, local flooding, stormwater accumulation and approved drainage requirements.

Concrete grade, reinforcement cover, cement type, water-cement ratio, permeability requirements and other durability provisions shall be selected in accordance with IS 456 and the assessed environmental exposure conditions.

The foundation anchoring arrangement shall permit safe removal of the modular superstructure during future relocation.

33. External Site Development and Landscaping

The work shall include necessary external site development comprising entrance paving, pedestrian access, accessible pathways, surface drainage, minor grading, landscape preparation and planting.

Suitable slip-resistant paving shall be provided at the entrance and along visitor access routes.

Native and locally appropriate plant species shall be used for landscaping wherever practicable.

No site development activity shall damage existing Mangrove or protected vegetation.

34. Marine Environment Material Specifications

All construction materials, structural members, roofing, wall panels, doors, windows, fasteners, external fittings, electrical enclosures, solar mounting structures and mechanical equipment supports shall be selected considering the humid, saline and marine-influenced environmental conditions at Kelwe.

Exposed structural steel shall be protected using an approved marine-suitable corrosion protection system, with C5 adopted as the preliminary minimum design basis for exposed carbon steel. Hot-dip galvanising, zinc-rich primers, high-build epoxy coatings, UV-resistant polyurethane finishes or other approved systems shall be adopted as appropriate.

Exposed critical fasteners and frequently wetted fittings shall preferably be SS 316/316L or approved equivalent corrosion-resistant materials.

Outdoor air-conditioning condenser units, external electrical enclosures and solar photovoltaic mounting structures shall be suitable for coastal environmental exposure.

All furniture, cabinetry, interior panels, exhibition structures and finishes shall be moisture-resistant and suitable for high-humidity conditions.

The contractor shall submit material specifications, protective coating data sheets, equipment catalogues and compliance certificates for approval before procurement.

35. Transportation, Installation and Relocation

The contractor shall be responsible for factory packing, loading, transportation, unloading, lifting, positioning, assembly, alignment, structural interconnection, installation of services and commissioning of all modular units.

A detailed transportation, lifting and erection methodology shall be submitted for approval before installation.

The modular units shall be designed for safe handling, transportation and future relocation.

Suitable bolted connections, removable panels, accessible service interfaces and engineered lifting arrangements shall be provided.

The contractor shall submit a detailed dismantling, transportation, storage and reassembly manual at the time of handing over.

36. Testing, Commissioning and Quality Assurance

The contractor shall undertake all necessary factory and site inspections, including material verification, structural dimensional checks, welding inspections, bolted connection inspections, protective coating inspections, waterproofing tests, plumbing pressure tests, drainage tests, electrical safety tests and functional testing of installed equipment.

The complete audio-visual mini theatre shall be tested for display performance, audio clarity, microphone operation, multimedia playback, computer connectivity, lighting control and overall functionality.

The interactive digital kiosks shall be tested for touchscreen response, software functionality, offline content availability, network connectivity and safe unattended operation.

The digital interactive teaching board shall be tested for touch accuracy, annotation, screen sharing, computer operation and multimedia presentation.

The air-conditioning system shall be tested for cooling performance, condensate drainage, electrical safety, control operation and ventilation performance.

The solar photovoltaic system shall be tested and commissioned in accordance with applicable requirements.

The contractor shall demonstrate all installed systems to the Engineer-in-Charge and designated operating staff.

37. Applicable Standards and Statutory Requirements

The design, fabrication, construction, installation and commissioning shall comply with the latest applicable editions of relevant Indian Standards, including IS 800, IS 2062, IS 875, IS 1893, IS 456 and other applicable electrical, plumbing, fire-safety and building standards.

Sanitary fixture provision shall be determined in accordance with the applicable provisions of the National Building Code of India 2016, particularly Part 9 relating to plumbing services, considering the actual building occupancy classification and approved visitor capacity.

Accessibility provisions shall comply with the applicable Harmonised Guidelines and Standards for Universal Accessibility in India 2021 and other relevant statutory requirements.

Marine corrosion protection shall be designed with reference to ISO 9223, ISO 12944, IS 4759 / ISO 1461 and other applicable coating and galvanising standards.

All equipment shall be new, of approved quality and suitable for the intended service conditions.

38. Completion and Handing Over

The contractor shall complete the entire work in all respects and hand over the Visitor Interpretation and Environmental Education Centre in a safe, structurally stable, weatherproof, thermally insulated, corrosion-protected, fully equipped and operational condition.

The completed facility shall include all specified interpretation spaces, audio-visual mini theatre, desktop computer systems, interactive digital kiosks, digital teaching board, exhibition displays, educational content, furniture, sanitary facilities, accessible toilet, air-conditioning, ventilation, electrical installations, solar photovoltaic system, rainwater harvesting, plumbing, fire-safety arrangements, base platform, foundations, site development and associated civil works.

The contractor shall provide operational training to designated staff for the audio-visual system, digital kiosks, digital teaching board, computer systems, air-conditioning equipment, solar photovoltaic system and other installed facilities.

The contractor shall hand over approved drawings, equipment schedules, interpretation content files, software documentation, inspection reports, testing certificates, warranties, operation and maintenance manuals, as-built drawings and relocation instructions.

Item No 5 : Design, Engineering, Fabrication, Supply, Transportation, Installation, Testing and Commissioning of G+1 Storeyed Prefabricated Modular Container-Based Laboratory Complex having an Approximate Total Built-up Area of 720.00 Sq. M., comprising Propagule and Seed Quality Laboratory, Nursery Quality Control Laboratory, Soil, Sediment and Water Quality Laboratory, Plant Health and Plant Pathology Laboratory, Tissue Culture Laboratory, Central Instrument Room, Chemical and Glassware Store, Sample and Seed Repository, Laboratory Documentation and Data Management Room (LIMS), Laboratory Support and Utility Areas, Central Nursery Control Room with PLC, SCADA and IoT-Based Monitoring System, GIS and Drone Operations Room, Meeting and Training Room, Sanitary Facilities and Associated Circulation Areas, including Complete Laboratory Furniture, Scientific Instruments, Equipment, HVAC, HEPA Filtration, Laminar Airflow Systems, Electrical Installations, Data Networking, CCTV Surveillance, Fire-Safety Systems, Solar Photovoltaic System, DG and UPS Backup, Rainwater Harvesting, Laboratory Wastewater Treatment and Recycling System, Plumbing and Sanitary Installations, together with Complete Base Platform, Foundations, Structural Supports, Staircases, Accessibility Arrangements, Site Development and Associated Civil Works, using Durable, Energy-Efficient and Corrosion-Resistant Materials suitable for Coastal and Marine Environmental Conditions, on a Complete Turnkey Basis, for the Proposed Hi-Tech Mangrove Nursery at Kelwe, Taluka and District Palghar, Maharashtra.

2. Building Configuration and General Requirements

The proposed laboratory complex shall comprise a Ground plus One (G+1) prefabricated modular container-based building with an approximate total built-up area of 720.00 Sq. M., subject to confirmation through approved architectural drawings.

The building shall be developed using approximately 18–20 modified ISO container modules or an equivalent engineered prefabricated modular steel-framed building system.

The building shall accommodate specialised laboratory rooms on the ground floor and nursery monitoring, GIS, drone-related office functions, meeting and training facilities on the first floor.

The contractor shall prepare detailed architectural plans, structural drawings, service layouts, equipment connection drawings, foundation drawings, fire-safety plans and accessibility details for approval by the Engineer-in-Charge.

The final design shall provide adequate room dimensions, circulation, structural stability, ventilation, lighting, drainage, accessibility, fire safety and serviceability.

3. General Scope of Work

The scope shall include complete design, engineering, procurement, fabrication, transportation, loading, unloading, lifting, erection, assembly, installation, testing and commissioning of the laboratory complex.

The work shall include site preparation, geotechnical investigation, foundations, base platform, structural steel framework, modular units, roofing, external walls, internal partitions, flooring, ceilings, doors, windows, staircases, corridors, toilet blocks, electrical installations, HVAC, ventilation, plumbing, water supply, wastewater treatment, fire protection, power backup, solar photovoltaic system, rainwater harvesting and associated civil works.

The contractor shall provide all necessary sleeves, service ducts, conduits, cable trays, pipe supports, equipment platforms, floor drains, utility connections and provisions required for future installation of laboratory equipment.

The supply, installation and commissioning of specialised laboratory scientific instruments, analytical equipment, tissue culture apparatus, testing instruments, laboratory process machinery

and scientific monitoring devices shall remain outside the scope of this item unless specifically stated otherwise.

4. Structural Steel Framework

The primary structural framework shall comprise suitable prefabricated structural steel columns, beams, channels, hollow sections, bracing members, floor beams, roof members and associated structural components conforming to IS 2062 or equivalent applicable standards.

Structural design shall conform to IS 800, IS 875, IS 1893 and other relevant Indian Standards.

The structural framework shall be designed for dead loads, imposed loads, equipment loads where defined, wind loads, seismic forces, transportation loads, lifting loads and applicable load combinations.

The design shall consider the coastal wind environment, structural stability, lateral loads, uplift resistance and corrosion protection.

All exposed structural steel shall be provided with an approved marine-suitable protective system, with C5 adopted as the preliminary minimum atmospheric corrosion design basis for exposed carbon steel, subject to the site-specific exposure assessment.

The protective system shall comprise hot-dip galvanising conforming to IS 4759 / ISO 1461 or an approved protective coating system incorporating suitable surface preparation, zinc-rich primer, high-build epoxy intermediate coating and UV-resistant polyurethane finish.

Bolted and demountable connections shall be preferred wherever practicable to facilitate dismantling and relocation of the modular superstructure.

5. Prefabricated Modular Container Construction

The building shall comprise approximately 18–20 modified ISO container modules or an equivalent engineered modular system, subject to final architectural and structural design.All structural modifications to container modules, including removal of wall portions, formation of openings and interconnection of modules, shall be supported by approved structural calculations and necessary reinforcement.

Each modular unit shall be provided with suitable lifting points, structural connections, transport restraints, alignment arrangements and accessible utility interfaces.The modular system shall permit safe transportation, installation, dismantling and future reassembly. All structural components shall be fabricated under controlled factory conditions and inspected before dispatch.

6. External Wall Panels and Internal Partitions

External walls shall comprise insulated prefabricated sandwich panels or suitably modified container walls provided with approved thermal insulation and internal lining systems.

The external wall assembly shall provide adequate thermal insulation, moisture resistance, weather protection, acoustic comfort and fire performance suitable for laboratory and office occupancy.Non-combustible or appropriately fire-rated insulation materials shall be adopted as required by the approved fire-safety design.

Internal partitions shall comprise suitable lightweight prefabricated panels with durable, washable and moisture-resistant finishes. Laboratory partitions shall have smooth, non-porous, chemically resistant surfaces suitable for cleaning and maintenance. Partitions around wet laboratory areas, chemical storage and utility rooms shall be selected considering the intended chemical exposure, moisture conditions and applicable fire requirements.

7. Roofing System

The building shall be provided with an insulated roofing system comprising engineered structural steel roof framing and factory-manufactured insulated roofing panels. The roof shall be designed for applicable wind uplift, rainfall, maintenance loads and additional loads associated with the rooftop solar photovoltaic system.The roof shall incorporate suitable slopes, flashing, gutters, rainwater downpipes, weatherproof joints and corrosion-resistant fasteners.

Roofing materials shall have suitable marine-environment protective finishes and adequate thermal insulation.The roof shall be provided with necessary provisions for solar photovoltaic mounting, rainwater collection and safe maintenance access.

8. Flooring System

The modular flooring system shall comprise engineered structural steel floor framing, suitable load-bearing panels and moisture-resistant substrates.

The flooring shall be designed for the applicable laboratory, office, training and circulation loads, including concentrated loads from future equipment where specified. Laboratory floors shall be provided with seamless or suitably jointed chemical-resistant epoxy flooring or equivalent approved laboratory-grade finishes.The proposed minimum epoxy flooring thickness shall be determined based on the selected system and intended use, with a nominal 2–3 mm self-levelling epoxy system considered for preliminary tender planning.

Office, control room, meeting room and circulation areas shall be provided with durable anti-skid vinyl, epoxy or equivalent approved flooring.

Toilet and wet utility areas shall be provided with waterproof flooring, anti-skid finishes and suitable drainage slopes.All floor penetrations shall be properly sealed.

9. Laboratory Interior Civil Infrastructure

The laboratory rooms shall be provided with suitable civil and architectural infrastructure for future installation of scientific equipment.

The work shall include laboratory-grade flooring, washable wall finishes, suitable ceiling systems, service ducts, electrical conduits, water supply points, drainage points, ventilation provisions and equipment connection interfaces.

Laboratory sinks and fixed service counters shall be included only as building infrastructure, where shown on the approved architectural and services drawings.

For preliminary planning, a minimum of one utility sink and one service counter shall be provided in each of the four principal ground-floor laboratories, subject to the final laboratory utility layouts. The counters shall comprise durable, moisture-resistant and chemically resistant materials suitable for general laboratory utility use.

All laboratory service points shall be clearly identified and provided with suitable isolation arrangements.

10. Tissue Culture Laboratory Civil Infrastructure

The tissue culture laboratory shall be provided with suitable architectural and building-service provisions for the future installation of specialised tissue culture equipment.

The room shall have smooth, washable wall finishes, sealed joints, suitable laboratory-grade flooring, moisture-resistant ceilings and appropriate ventilation provisions.

Internal zoning shall accommodate the washing, media preparation, sterilisation, inoculation, culture growth and hardening functions indicated in the conceptual drawing, subject to detailed laboratory planning.

The contractor shall provide suitable electrical outlets, dedicated power circuits, water supply points, drainage connections, HVAC provisions and service penetrations required for future laboratory equipment.

Specialised tissue culture equipment, including autoclaves, laminar airflow cabinets, growth chambers, incubators and other scientific apparatus, shall not be included in this item.

11. Central Instrument Room Infrastructure

The central instrument room shall be provided with suitable structural flooring, laboratory-grade finishes, electrical distribution, earthing, HVAC, ventilation, data network infrastructure and necessary service connections.

The room shall be designed to accommodate future laboratory instruments, subject to the equipment loads and utility requirements supplied by the Department.

Suitable equipment support platforms, service ducts, cable trays and power outlets shall be provided.

Scientific instruments and analytical equipment shall remain excluded from the scope.

12. Sample and Seed Repository Infrastructure

The sample and seed repository shall be provided with moisture-resistant flooring, insulated wall finishes, suitable ventilation, electrical outlets and provisions for future temperature-controlled storage equipment.

A minimum of two corrosion-resistant storage racks having indicative dimensions of 1,200 mm × 450 mm × 1,800 mm each shall be provided.

The room shall have suitable electrical and data connections for future installation of seed storage and monitoring equipment.

Specialised seed storage refrigerators, cold chambers and scientific storage equipment shall remain excluded from this item.

13. Laboratory Documentation and Data Room

The laboratory documentation and data room shall be provided with suitable office-grade flooring, insulated wall finishes, LED lighting, electrical outlets, data cabling, air-conditioning and necessary furniture.

The room shall include a minimum of two work desks, two office chairs and two lockable storage cabinets.

The building infrastructure shall provide suitable power and network connections for future laboratory information management systems.

Specialised LIMS software, laboratory databases, servers and scientific data acquisition equipment shall remain excluded.

14. Laboratory Support and Utility Area

The laboratory support area shall accommodate utility services, general washing facilities, electrical distribution, UPS arrangements, HVAC service connections and other building support functions.

The area shall be provided with one general-purpose stainless-steel utility sink, suitable water supply, drainage, floor traps, electrical outlets, ventilation and maintenance access.Suitable service racks, cable trays, pipe supports and utility connections shall be provided.

The support area shall be designed for safe maintenance and segregation of electrical and wet utility services.

15. Central Nursery Control Room – Civil and Building Services

The first-floor central nursery control room shall be provided with suitable structural flooring, insulated walls, false ceiling, LED lighting, air-conditioning, electrical outlets, data network cabling and appropriate furniture.

The room shall be designed to accommodate future PLC, SCADA, IoT dashboard, CCTV monitoring and environmental monitoring systems.

The work shall include suitable control room furniture, workstations or operator desks, electrical distribution, earthing, cable trays, data outlets and equipment mounting provisions.

A minimum of six operator workstations, comprising suitable desks and chairs, shall be provided as building furniture, subject to the approved layout.

PLC panels, SCADA software, IoT sensors, specialised monitoring systems and associated control equipment shall remain excluded from this item

16. GIS and Drone Room – Civil and Building Services

The GIS and Drone Room shall be provided with suitable office-grade flooring, insulated walls, LED lighting, air-conditioning, electrical outlets, data connectivity and secure storage provisions.

The room shall include a minimum of two work desks, two ergonomic chairs and two lockable storage cabinets.

Suitable electrical and data outlets shall be provided for future GIS workstations, drone data processing equipment and charging facilities.

GIS software, specialised GIS computers, drones, drone batteries, charging equipment and related scientific equipment shall remain excluded.

17. Meeting and Training Room

The first-floor meeting and training room shall be provided with suitable flooring, insulated wall finishes, false ceiling, LED lighting, air-conditioning, electrical outlets and furniture. The room shall be designed for a preliminary seating capacity of 20 persons, subject to the approved architectural and occupancy design. A minimum of one conference table or modular training table arrangement suitable for 20 persons and 20 chairs shall be provided.

One wall-mounted writing board having indicative dimensions of 1,800 mm × 1,200 mm shall be provided.

Necessary electrical and data provisions shall be provided for future audio-visual presentation equipment.

Specialized audio-visual equipment and computer systems shall remain excluded unless separately included in the approved schedule.

18. Staircases, Corridors and Circulation Areas

The building shall be provided with suitable internal or external staircases, corridors, landings and access arrangements in accordance with the approved architectural and fire-safety design.

The ground-floor conceptual drawing indicates a central corridor approximately 2.0 m wide.

Staircases shall comprise engineered structural steel or approved equivalent construction with slip-resistant treads, suitable landings, handrails and guardrails.

Staircase clear widths, number of exits, travel distances and other egress requirements shall comply with applicable building and fire-safety standards.

All exposed steel components shall be provided with suitable marine-environment corrosion protection.

19. Doors, Windows and Glazing

The building shall be provided with suitable entrance doors, laboratory doors, internal doors, toilet doors and corrosion-resistant windows.

Main entrance doors shall have indicative minimum dimensions of 1,200 mm × 2,100 mm or as required by the approved accessibility and egress design.

Laboratory doors shall have suitable clear openings for personnel and future equipment movement.

Windows shall comprise corrosion-resistant powder-coated aluminium frames with suitable glazing, locking arrangements and weatherproof seals.

Laboratory doors and windows shall be selected considering fire performance, hygiene, ventilation, acoustic requirements and the intended laboratory use.

20. Electrical Power Distribution System

The work shall include complete three-phase electrical distribution infrastructure for the laboratory complex.

The system shall comprise one main low-voltage distribution panel, suitable floor-wise distribution boards, laboratory sub-distribution boards, power cabling, cable trays, conduits, switches, socket outlets, earthing, protective devices and associated accessories.

The main distribution panel shall be provided with suitable overcurrent protection, residual-current protection where applicable, surge protection, metering and circuit identification.

Dedicated electrical circuits shall be provided for HVAC, laboratory utility points, future equipment connections, lighting, office areas, control room, meeting room, pumps and other building services.

The electrical design shall be based on a detailed connected load assessment, demand factor and diversity calculation.

The final transformer, main panel, DG and UPS capacities shall be determined from the approved electrical load schedule.

21. Laboratory Electrical Infrastructure

Each laboratory shall be provided with suitable general-purpose electrical outlets, dedicated equipment connection points, earthing terminals and data outlets.

As a preliminary minimum, each of the four principal laboratories shall be provided with at least eight 6/16 A socket outlets distributed along the service counters and walls, subject to final equipment connection requirements.

The tissue culture laboratory shall be provided with suitable additional dedicated electrical circuits and power outlets for future specialised equipment.

The central instrument room shall be provided with suitable dedicated power connection provisions based on the approved future equipment schedule.

All laboratory electrical installations shall incorporate appropriate circuit protection, earthing and safety arrangements.

Scientific equipment and associated proprietary electrical control panels shall remain excluded.

22. Lighting System

The building shall be provided with energy-efficient LED lighting throughout all laboratories, offices, control rooms, corridors, staircases, toilets, stores and utility areas.

Laboratory lighting shall be designed to provide appropriate illumination levels for the intended work activities, with uniform distribution and suitable glare control.

For preliminary planning, laboratory work areas shall generally target maintained illuminance appropriate to the relevant tasks, with approximately 500 lux considered for routine laboratory bench work, subject to detailed lighting design.

Office and control room lighting shall be designed for suitable visual comfort and computer-related activities.

The building shall be provided with emergency lighting, illuminated exit signs and suitable external lighting.

All lighting fixtures shall be selected considering the intended room conditions, moisture exposure and maintenance requirements.

23. Earthing, Lightning Protection and Electrical Safety

The electrical installation shall include a complete protective earthing system, equipment bonding, suitable earth electrodes, earth conductors and associated accessories.

Sensitive electrical and data equipment areas shall be provided with appropriate earthing and surge protection.

Lightning protection shall be provided where required by the approved lightning risk assessment.

The electrical installation shall comply with applicable Indian Standards and Central Electricity Authority safety regulations.

24. HVAC and Air-Conditioning System

The laboratory complex shall be provided with a complete energy-efficient HVAC and air-conditioning system serving the laboratory rooms, central instrument room, documentation room, central nursery control room, GIS room, meeting room and other occupied spaces as required by the approved design.

The contractor shall prepare detailed room-wise cooling load calculations considering room occupancy, equipment heat loads where defined, lighting, glazing, solar heat gain, insulation, ventilation requirements and local climatic conditions.

The system may comprise inverter-type split air-conditioning units, ducted units, packaged units or an approved combination.

The HVAC design shall provide suitable temperature control, fresh-air ventilation, condensate drainage, filtration and maintenance access.

Outdoor condenser units shall be suitable for marine-influenced conditions and provided with corrosion-resistant supports and protective treatment.

Specialised cleanroom HVAC, process cooling and scientific equipment-integrated temperature control systems shall remain excluded unless expressly included in the approved building-services scope.

25. Mechanical Ventilation and Exhaust

The building shall be provided with suitable mechanical ventilation and exhaust systems for laboratories, chemical storage, utility rooms, toilets and other areas requiring controlled air movement.

Ventilation rates shall be determined based on the approved room functions, occupancy, expected contaminants and applicable safety standards.

General exhaust fans, ducts, grilles, louvers, dampers, supports and controls shall be included.

Where hazardous fumes or chemical vapours are expected, the need for dedicated local exhaust systems shall be assessed during detailed design.

Specialised laboratory fume hoods, biosafety cabinets and process extraction equipment shall remain excluded unless separately specified.

26. Water Supply System

The work shall include complete water supply arrangements comprising water storage, pumping, distribution pipelines, isolation valves, fittings and necessary connections.

The water supply system shall serve sanitary facilities, general laboratory utility sinks, cleaning points, emergency eyewash connections and other approved building service points.

A preliminary minimum domestic and utility water storage capacity of 10,000 litres may be considered, subject to final demand calculations and confirmation of the availability of external water supply.

Water distribution pipelines shall comprise suitable CPVC, PPR, HDPE or equivalent corrosion-resistant materials.

Water storage tanks shall be provided with suitable overflow, drain, access and cleaning arrangements.

Specialised purified water systems, laboratory-grade deionised water plants and scientific water treatment equipment shall remain excluded.

27. Plumbing and Sanitary Installations

The building shall be provided with suitable male and female toilet facilities and other sanitary arrangements as required by the approved occupancy and building classification.

The conceptual first-floor drawing indicates separate male and female toilet blocks.

The final number of water closets, urinals, washbasins and accessible sanitary fixtures shall be determined in accordance with applicable provisions of the National Building Code of India and relevant accessibility standards.

All sanitary fixtures shall be of approved quality and provided with suitable water supply, drainage, ventilation and accessories.

Toilet floors shall be waterproofed and provided with anti-skid finishes.

An accessible toilet facility shall be provided where required by the approved building design and applicable accessibility requirements.

28. Laboratory Utility Sinks and Drainage Points

General-purpose laboratory utility sinks shall be provided at locations indicated in the approved service layouts.

The sinks shall be manufactured from suitable stainless steel or approved chemically resistant materials appropriate to the anticipated use.

The drainage system shall include suitable traps, waste pipes, inspection points and isolation arrangements.

Laboratory drainage shall be segregated from domestic sanitary drainage where required by the nature of the expected effluent.

Untreated laboratory wastewater shall not be discharged directly into natural drains, creeks or surrounding mangrove areas.

29. Wastewater Collection and Treatment System

The building shall be provided with suitable wastewater collection, segregation, treatment and disposal arrangements for domestic wastewater and general laboratory wastewater.

The conceptual drawing indicates a wastewater recycling system comprising collection tank, treatment plant and treated water tank.

The contractor shall prepare wastewater generation estimates and identify the expected wastewater characteristics.

The treatment system shall be designed for the approved wastewater quantity and quality, with suitable segregation of hazardous laboratory effluent.

A preliminary treatment capacity of 5 KLD may be considered for planning, subject to verification through detailed water balance and wastewater generation calculations.

The system shall include suitable collection tanks, treatment units, pumps, pipelines, valves, control arrangements and treated water storage.

Treated water may be reused for approved non-potable applications, subject to applicable quality standards and regulatory requirements.

Specialised treatment of hazardous chemical waste, biological waste or concentrated laboratory process waste shall require a separate approved waste management arrangement and shall not be assumed to be handled by a conventional wastewater treatment plant.

30. Rainwater Harvesting System

The building shall be provided with a rooftop rainwater harvesting system comprising gutters, downpipes, leaf screens, first-flush diversion arrangements, filtration and connections to the designated storage or recharge system.

The rainwater harvesting system shall be designed based on the approved roof catchment area, local rainfall and project water management requirements.

The system shall include suitable inspection and maintenance arrangements.

32. Rooftop Solar Photovoltaic System

The laboratory complex shall be provided with a rooftop solar photovoltaic system connected to the building electrical distribution system.

The installed capacity shall be determined through roof area assessment, shading analysis, structural design and electrical load calculations.

For preliminary planning, a solar photovoltaic capacity of approximately 30 kWp may be considered, subject to confirmation through detailed design.

The system shall comprise suitable photovoltaic modules, corrosion-resistant mounting structures, inverter, protection devices, cabling, earthing, surge protection and monitoring equipment.

The mounting system shall be designed for applicable coastal wind loads.

31. DG Set Backup System

The building shall be provided with a suitable diesel generator backup system for essential building services.

The DG set capacity shall be determined based on the approved essential load schedule, motor starting requirements and required operating diversity.

The system shall comprise the DG set, acoustic enclosure, exhaust arrangement, fuel system, electrical protection, automatic mains failure or changeover arrangement and necessary accessories.

The DG set shall comply with applicable emission, noise and statutory requirements.

32. UPS Backup Infrastructure

The building shall be provided with suitable UPS backup infrastructure for essential building electrical loads, including control room infrastructure, data network equipment, emergency monitoring provisions and other approved critical services.

The UPS capacity and autonomy shall be determined based on the approved critical load schedule.
The system shall comprise UPS equipment, batteries, distribution arrangements, protective devices, ventilation and necessary accessories.
UPS systems integrated into specialised laboratory instruments shall remain excluded.

33. Fire Detection and Fire Protection

The laboratory complex shall be provided with suitable fire detection, alarm and fire protection systems.
The system shall include fire alarm control equipment, smoke or heat detectors as appropriate, manual call points, alarm sounders, emergency lighting, exit signage and portable fire extinguishers.
Suitable ABC and CO2 fire extinguishers shall be provided at locations determined through the approved fire-safety design.
The fire-safety design shall consider laboratory occupancy, chemical storage, electrical rooms, staircases and emergency evacuation.
The final fire protection arrangements shall comply with applicable National Building Code provisions and local fire authority requirements.

34. CCTV and Data Network Infrastructure

The work shall include structured data cabling, network outlets, cable trays, conduits, equipment racks and associated passive network infrastructure.
The building shall be provided with CCTV surveillance infrastructure comprising suitable camera locations, cabling, power connections and mounting provisions.
For preliminary planning, a minimum of 12 CCTV camera points may be considered, covering entrances, corridors, staircases, external approaches and other security-sensitive areas.
The final camera arrangement shall be approved by the Engineer-in-Charge. Specialised scientific monitoring systems, nursery IoT sensors, PLC/SCADA equipment and proprietary laboratory data acquisition systems shall remain excluded.

35. Base Platform, Foundations and Associated Civil Works

The work shall include complete design, engineering and construction of the base platform, foundations, structural supports, anchoring arrangements and associated civil works required for the G+1 prefabricated modular laboratory complex.
The contractor shall undertake necessary site verification, topographical assessment, geotechnical investigation and structural design to determine the appropriate foundation system.
The foundation design shall consider soil bearing capacity, groundwater conditions, coastal exposure, wind uplift, seismic forces, structural reactions, equipment loads, drainage requirements and the proposed modular building configuration.
The foundation system may comprise RCC isolated footings, combined footings, strip foundations, pedestals, ground beams, precast foundation units or other approved arrangements depending on the actual geotechnical and structural requirements.
The work shall include site clearance, setting out, excavation, necessary dewatering, preparation of foundation beds, compacted filling, granular sub-base, PCC levelling courses, RCC foundations, reinforcement steel, formwork, curing, foundation pedestals, base plates, anchor bolts, non-shrink grouting and all necessary structural connections.
The base platform shall provide adequate structural support, stability and protection against ground moisture and water accumulation. The finished platform level shall be determined considering site topography, local flooding, stormwater accumulation and approved drainage requirements.
Concrete grade, reinforcement cover, cement type, water-cement ratio, permeability requirements and other durability provisions shall be selected in accordance with IS 456 and the assessed environmental exposure conditions.
The foundation anchoring arrangement shall permit safe removal of the modular superstructure during future relocation.

36. External Site Development and Drainage

The work shall include necessary external site development comprising entrance paving, pedestrian access, accessible pathways, surface drainage, minor grading, landscape preparation and planting.

Suitable stormwater drainage shall be provided around the building to prevent water accumulation and protect foundations.External paving shall be durable, slip-resistant and suitable for the intended pedestrian and maintenance access. Native and locally appropriate plant species shall be used for landscaping wherever practicable.

No site development activity shall damage existing Mangrove or protected vegetation.

37. Marine Environment Material Specifications

All construction materials, structural members, roofing, wall panels, doors, windows, fasteners, external fittings, electrical enclosures, solar mounting structures and mechanical equipment supports shall be selected considering the humid, saline and marine-influenced conditions at Kelwe.

Exposed structural steel shall be protected using an approved marine-suitable corrosion protection system, with C5 adopted as the preliminary minimum atmospheric corrosion design basis for exposed carbon steel.Hot-dip galvanising, zinc-rich primers, high-build epoxy coatings, UV-resistant polyurethane finishes or other approved systems shall be adopted as appropriate.

Exposed critical fasteners and frequently wetted fittings shall preferably be SS 316/316L or approved equivalent corrosion-resistant materials.Outdoor air-conditioning condenser units, electrical enclosures, DG set accessories and solar photovoltaic mounting structures shall be suitable for coastal environmental exposure.

All furniture, cabinetry, interior panels and finishes shall be moisture-resistant and suitable for high-humidity conditions.

38. Transportation, Installation and Relocation

The contractor shall be responsible for factory packing, loading, transportation, unloading, lifting, positioning, assembly, alignment, structural interconnection, installation of services and commissioning of all modular units.

A detailed transportation, lifting and erection methodology shall be submitted for approval before installation.

The modular units shall be designed for safe handling, transportation and future relocation.

Suitable bolted connections, removable panels, accessible service interfaces and engineered lifting arrangements shall be provided.

The contractor shall submit a detailed dismantling, transportation, storage and reassembly manual at the time of handing over.

39. Testing, Commissioning and Quality Assurance

The contractor shall undertake all necessary factory and site inspections, including material verification, structural dimensional checks, welding inspections, bolted connection inspections, protective coating inspections, waterproofing tests, plumbing pressure tests, drainage tests, electrical safety tests and functional testing of installed building services.

The structural steel framework shall be inspected for fabrication quality, dimensional accuracy, connection integrity and corrosion protection.

Protective coating thickness and quality shall be verified in accordance with the approved coating specification.

Water supply pipelines shall be pressure-tested, and drainage pipelines shall be checked for leakage and satisfactory flow.

Electrical installations shall be tested for insulation resistance, earthing continuity, polarity, protective-device operation and other applicable safety requirements.

HVAC, ventilation, pumps, wastewater treatment, solar photovoltaic system, DG set, UPS, lighting, fire alarm and other building service systems shall be tested and commissioned.

The contractor shall submit material test certificates, inspection reports, equipment data sheets, testing records, warranty documents, approved drawings and as-built drawings.

40. Applicable Standards and Statutory Requirements

The design, fabrication, construction, installation and commissioning shall comply with the latest applicable editions of relevant Indian Standards, including IS 800, IS 2062, IS 875, IS 1893, IS 456 and other relevant electrical, plumbing, fire-safety and building standards.

Marine corrosion protection shall be designed with reference to ISO 9223, ISO 12944, IS 4759 / ISO 1461 and other applicable protective coating standards.

The building shall comply with applicable provisions of the National Building Code of India and relevant statutory requirements governing laboratory occupancy, structural safety, accessibility, sanitation, electrical safety and fire safety.

Solar photovoltaic installations, DG sets, wastewater treatment and other building services shall comply with applicable statutory and regulatory requirements.

All materials and equipment shall be new, of approved quality and suitable for their intended service conditions.

41. Exclusions – Specialised Laboratory Scientific Equipment

The scope of this item shall specifically exclude the procurement, supply, installation and commissioning of specialised laboratory scientific instruments and equipment, including but not limited to analytical instruments, testing apparatus, tissue culture equipment, autoclaves, incubators, laminar airflow cabinets, biosafety cabinets, growth chambers, scientific refrigerators, specialised cold storage equipment, microscopes, laboratory process machinery, GIS scientific workstations, drones, PLC/SCADA systems, IoT scientific sensors and proprietary laboratory information management software.

The contractor shall, however, provide the approved building infrastructure, electrical outlets, service ducts, water supply points, drainage connections, HVAC provisions, data network points, equipment support arrangements and other utility interfaces necessary for future installation of such equipment.

Any specialised utility requirements not identified in the approved laboratory equipment interface schedule shall be addressed separately through an approved design variation.

42. Completion and Handing Over

The contractor shall complete the entire work in all respects and hand over the G+1 prefabricated modular laboratory complex in a safe, structurally stable, weatherproof, thermally insulated, corrosion-protected and fully serviceable condition.

The completed facility shall include all specified civil, structural, architectural, electrical, mechanical, HVAC, plumbing, sanitary, fire-safety, power backup, solar photovoltaic, rainwater harvesting, wastewater treatment, site development and associated works.

The contractor shall provide operational training to designated staff for all installed building service systems.

The contractor shall hand over approved architectural and structural drawings, foundation drawings, equipment schedules, service layouts, inspection reports, testing certificates, warranties, operation and maintenance manuals, as-built drawings and relocation instructions.

The work shall be completed to the satisfaction of the Engineer-in-Charge and in accordance with the approved drawings, technical specifications and applicable statutory requirements.

21. Laboratory Electrical Infrastructure

Each laboratory shall be provided with suitable general-purpose electrical outlets, dedicated equipment connection points, earthing terminals and data outlets.

As a preliminary minimum, each of the four principal laboratories shall be provided with at least eight 6/16 A socket outlets distributed along the service counters and walls, subject to final equipment connection requirements.

The tissue culture laboratory shall be provided with suitable additional dedicated electrical circuits and power outlets for future specialised equipment.

The central instrument room shall be provided with suitable dedicated power connection provisions based on the approved future equipment schedule.

All laboratory electrical installations shall incorporate appropriate circuit protection, earthing and safety arrangements.

Scientific equipment and associated proprietary electrical control panels shall remain excluded.

22. Lighting System

The building shall be provided with energy-efficient LED lighting throughout all laboratories, offices, control rooms, corridors, staircases, toilets, stores and utility areas.

Laboratory lighting shall be designed to provide appropriate illumination levels for the intended work activities, with uniform distribution and suitable glare control.

For preliminary planning, laboratory work areas shall generally target maintained illuminance appropriate to the relevant tasks, with approximately 500 lux considered for routine laboratory bench work, subject to detailed lighting design.

Office and control room lighting shall be designed for suitable visual comfort and computer-related activities.

The building shall be provided with emergency lighting, illuminated exit signs and suitable external lighting.

All lighting fixtures shall be selected considering the intended room conditions, moisture exposure and maintenance requirements.

23. Earthing, Lightning Protection and Electrical Safety

The electrical installation shall include a complete protective earthing system, equipment bonding, suitable earth electrodes, earth conductors and associated accessories.

Sensitive electrical and data equipment areas shall be provided with appropriate earthing and surge protection.

Lightning protection shall be provided where required by the approved lightning risk assessment.

The electrical installation shall comply with applicable Indian Standards and Central Electricity Authority safety regulations.

24. HVAC and Air-Conditioning System

Specialised cleanroom HVAC, process cooling and scientific equipment-integrated temperature control systems shall remain excluded unless expressly included in the approved building-services scope.

25. Mechanical Ventilation and Exhaust

The building shall be provided with suitable mechanical ventilation and exhaust systems for laboratories, chemical storage, utility rooms, toilets and other areas requiring controlled air movement.

Ventilation rates shall be determined based on the approved room functions, occupancy, expected contaminants and applicable safety standards.

General exhaust fans, ducts, grilles, louvers, dampers, supports and controls shall be included.

Where hazardous fumes or chemical vapours are expected, the need for dedicated local exhaust systems shall be assessed during detailed design.

Specialised laboratory fume hoods, biosafety cabinets and process extraction equipment shall remain excluded unless separately specified.

26. Water Supply System

The work shall include complete water supply arrangements comprising water storage, pumping, distribution pipelines, isolation valves, fittings and necessary connections.

The water supply system shall serve sanitary facilities, general laboratory utility sinks, cleaning points, emergency eyewash connections and other approved building service points.

A preliminary minimum domestic and utility water storage capacity of 10,000 litres may be considered, subject to final demand calculations and confirmation of the availability of external water supply.

Water distribution pipelines shall comprise suitable CPVC, PPR, HDPE or equivalent corrosion-resistant materials.

Water storage tanks shall be provided with suitable overflow, drain, access and cleaning arrangements.

Specialised purified water systems, laboratory-grade deionised water plants and scientific water treatment equipment shall remain excluded.

27. Plumbing and Sanitary Installations

The building shall be provided with suitable male and female toilet facilities and other sanitary arrangements as required by the approved occupancy and building classification.

The conceptual first-floor drawing indicates separate male and female toilet blocks.

The final number of water closets, urinals, washbasins and accessible sanitary fixtures shall be determined in accordance with applicable provisions of the National Building Code of India and relevant accessibility standards.

All sanitary fixtures shall be of approved quality and provided with suitable water supply, drainage, ventilation and accessories.

Toilet floors shall be waterproofed and provided with anti-skid finishes.

An accessible toilet facility shall be provided where required by the approved building design and applicable accessibility requirements.

28. Laboratory Utility Sinks and Drainage Points

General-purpose laboratory utility sinks shall be provided at locations indicated in the approved service layouts.

The sinks shall be manufactured from suitable stainless steel or approved chemically resistant materials appropriate to the anticipated use.

The drainage system shall include suitable traps, waste pipes, inspection points and isolation arrangements.

Laboratory drainage shall be segregated from domestic sanitary drainage where required by the nature of the expected effluent.

Untreated laboratory wastewater shall not be discharged directly into natural drains, creeks or surrounding mangrove areas.

29. Wastewater Collection and Treatment System

The building shall be provided with suitable wastewater collection, segregation, treatment and disposal arrangements for domestic wastewater and general laboratory wastewater.

The conceptual drawing indicates a wastewater recycling system comprising collection tank, treatment plant and treated water tank.

The contractor shall prepare wastewater generation estimates and identify the expected wastewater characteristics.

The treatment system shall be designed for the approved wastewater quantity and quality, with suitable segregation of hazardous laboratory effluent.

A preliminary treatment capacity of 5 KLD may be considered for planning, subject to verification through detailed water balance and wastewater generation calculations.

The system shall include suitable collection tanks, treatment units, pumps, pipelines, valves, control arrangements and treated water storage.

Treated water may be reused for approved non-potable applications, subject to applicable quality standards and regulatory requirements.

Specialised treatment of hazardous chemical waste, biological waste or concentrated laboratory process waste shall require a separate approved waste management arrangement and shall not be assumed to be handled by a conventional wastewater treatment plant.

30. Rainwater Harvesting System

The building shall be provided with a rooftop rainwater harvesting system comprising gutters, downpipes, leaf screens, first-flush diversion arrangements, filtration and connections to the designated storage or recharge system.

The rainwater harvesting system shall be designed based on the approved roof catchment area, local rainfall and project water management requirements.

The system shall include suitable inspection and maintenance arrangements.

32. Rooftop Solar Photovoltaic System

The laboratory complex shall be provided with a rooftop solar photovoltaic system connected to the building electrical distribution system.

The installed capacity shall be determined through roof area assessment, shading analysis, structural design and electrical load calculations.

For preliminary planning, a solar photovoltaic capacity of approximately 30 kWp may be considered, subject to confirmation through detailed design.

The system shall comprise suitable photovoltaic modules, corrosion-resistant mounting structures, inverter, protection devices, cabling, earthing, surge protection and monitoring equipment.

The mounting system shall be designed for applicable coastal wind loads.

31. DG Set Backup System

The building shall be provided with a suitable diesel generator backup system for essential building services.

The DG set capacity shall be determined based on the approved essential load schedule, motor starting requirements and required operating diversity.

The system shall comprise the DG set, acoustic enclosure, exhaust arrangement, fuel system, electrical protection, automatic mains failure or changeover arrangement and necessary accessories.

The DG set shall comply with applicable emission, noise and statutory requirements.

32. UPS Backup Infrastructure

The building shall be provided with suitable UPS backup infrastructure for essential building electrical loads, including control room infrastructure, data network equipment, emergency monitoring provisions and other approved critical services.

The UPS capacity and autonomy shall be determined based on the approved critical load schedule.
The system shall comprise UPS equipment, batteries, distribution arrangements, protective devices, ventilation and necessary accessories.
UPS systems integrated into specialised laboratory instruments shall remain excluded.

33. Fire Detection and Fire Protection

The laboratory complex shall be provided with suitable fire detection, alarm and fire protection systems.
The system shall include fire alarm control equipment, smoke or heat detectors as appropriate, manual call points, alarm sounders, emergency lighting, exit signage and portable fire extinguishers.
Suitable ABC and CO2 fire extinguishers shall be provided at locations determined through the approved fire-safety design.
The fire-safety design shall consider laboratory occupancy, chemical storage, electrical rooms, staircases and emergency evacuation.
The final fire protection arrangements shall comply with applicable National Building Code provisions and local fire authority requirements.

34. CCTV and Data Network Infrastructure

The work shall include structured data cabling, network outlets, cable trays, conduits, equipment racks and associated passive network infrastructure.
The building shall be provided with CCTV surveillance infrastructure comprising suitable camera locations, cabling, power connections and mounting provisions.
For preliminary planning, a minimum of 12 CCTV camera points may be considered, covering entrances, corridors, staircases, external approaches and other security-sensitive areas.
The final camera arrangement shall be approved by the Engineer-in-Charge. Specialised scientific monitoring systems, nursery IoT sensors, PLC/SCADA equipment and proprietary laboratory data acquisition systems shall remain excluded.

35. Base Platform, Foundations and Associated Civil Works

The work shall include complete design, engineering and construction of the base platform, foundations, structural supports, anchoring arrangements and associated civil works required for the G+1 prefabricated modular laboratory complex.
The contractor shall undertake necessary site verification, topographical assessment, geotechnical investigation and structural design to determine the appropriate foundation system.
The foundation design shall consider soil bearing capacity, groundwater conditions, coastal exposure, wind uplift, seismic forces, structural reactions, equipment loads, drainage requirements and the proposed modular building configuration.
The foundation system may comprise RCC isolated footings, combined footings, strip foundations, pedestals, ground beams, precast foundation units or other approved arrangements depending on the actual geotechnical and structural requirements.
The work shall include site clearance, setting out, excavation, necessary dewatering, preparation of foundation beds, compacted filling, granular sub-base, PCC levelling courses, RCC foundations, reinforcement steel, formwork, curing, foundation pedestals, base plates, anchor bolts, non-shrink grouting and all necessary structural connections.
The base platform shall provide adequate structural support, stability and protection against ground moisture and water accumulation. The finished platform level shall be determined considering site topography, local flooding, stormwater accumulation and approved drainage requirements.
Concrete grade, reinforcement cover, cement type, water-cement ratio, permeability requirements and other durability provisions shall be selected in accordance with IS 456 and the assessed environmental exposure conditions.
The foundation anchoring arrangement shall permit safe removal of the modular superstructure during future relocation.

36. External Site Development and Drainage

The work shall include necessary external site development comprising entrance paving, pedestrian access, accessible pathways, surface drainage, minor grading, landscape preparation and planting.

Suitable stormwater drainage shall be provided around the building to prevent water accumulation and protect foundations.External paving shall be durable, slip-resistant and suitable for the intended pedestrian and maintenance access. Native and locally appropriate plant species shall be used for landscaping wherever practicable.

No site development activity shall damage existing Mangrove or protected vegetation.

37. Marine Environment Material Specifications

All construction materials, structural members, roofing, wall panels, doors, windows, fasteners, external fittings, electrical enclosures, solar mounting structures and mechanical equipment supports shall be selected considering the humid, saline and marine-influenced conditions at Kelwe.

Exposed structural steel shall be protected using an approved marine-suitable corrosion protection system, with C5 adopted as the preliminary minimum atmospheric corrosion design basis for exposed carbon steel.Hot-dip galvanising, zinc-rich primers, high-build epoxy coatings, UV-resistant polyurethane finishes or other approved systems shall be adopted as appropriate.

Exposed critical fasteners and frequently wetted fittings shall preferably be SS 316/316L or approved equivalent corrosion-resistant materials.Outdoor air-conditioning condenser units, electrical enclosures, DG set accessories and solar photovoltaic mounting structures shall be suitable for coastal environmental exposure.

All furniture, cabinetry, interior panels and finishes shall be moisture-resistant and suitable for high-humidity conditions.

38. Transportation, Installation and Relocation

The contractor shall be responsible for factory packing, loading, transportation, unloading, lifting, positioning, assembly, alignment, structural interconnection, installation of services and commissioning of all modular units.

A detailed transportation, lifting and erection methodology shall be submitted for approval before installation.

The modular units shall be designed for safe handling, transportation and future relocation.

Suitable bolted connections, removable panels, accessible service interfaces and engineered lifting arrangements shall be provided.

The contractor shall submit a detailed dismantling, transportation, storage and reassembly manual at the time of handing over.

39. Testing, Commissioning and Quality Assurance

The contractor shall undertake all necessary factory and site inspections, including material verification, structural dimensional checks, welding inspections, bolted connection inspections, protective coating inspections, waterproofing tests, plumbing pressure tests, drainage tests, electrical safety tests and functional testing of installed building services.

The structural steel framework shall be inspected for fabrication quality, dimensional accuracy, connection integrity and corrosion protection.

Protective coating thickness and quality shall be verified in accordance with the approved coating specification.

Water supply pipelines shall be pressure-tested, and drainage pipelines shall be checked for leakage and satisfactory flow.

Electrical installations shall be tested for insulation resistance, earthing continuity, polarity, protective-device operation and other applicable safety requirements.

HVAC, ventilation, pumps, wastewater treatment, solar photovoltaic system, DG set, UPS, lighting, fire alarm and other building service systems shall be tested and commissioned.

The contractor shall submit material test certificates, inspection reports, equipment data sheets, testing records, warranty documents, approved drawings and as-built drawings.

40. Applicable Standards and Statutory Requirements

The design, fabrication, construction, installation and commissioning shall comply with the latest applicable editions of relevant Indian Standards, including IS 800, IS 2062, IS 875, IS 1893, IS 456 and other relevant electrical, plumbing, fire-safety and building standards.

Marine corrosion protection shall be designed with reference to ISO 9223, ISO 12944, IS 4759 / ISO 1461 and other applicable protective coating standards.

The building shall comply with applicable provisions of the National Building Code of India and relevant statutory requirements governing laboratory occupancy, structural safety, accessibility, sanitation, electrical safety and fire safety.

Solar photovoltaic installations, DG sets, wastewater treatment and other building services shall comply with applicable statutory and regulatory requirements.

All materials and equipment shall be new, of approved quality and suitable for their intended service conditions.

41. Exclusions – Specialised Laboratory Scientific Equipment

The scope of this item shall specifically exclude the procurement, supply, installation and commissioning of specialised laboratory scientific instruments and equipment, including but not limited to analytical instruments, testing apparatus, tissue culture equipment, autoclaves, incubators, laminar airflow cabinets, biosafety cabinets, growth chambers, scientific refrigerators, specialised cold storage equipment, microscopes, laboratory process machinery, GIS scientific workstations, drones, PLC/SCADA systems, IoT scientific sensors and proprietary laboratory information management software.

The contractor shall, however, provide the approved building infrastructure, electrical outlets, service ducts, water supply points, drainage connections, HVAC provisions, data network points, equipment support arrangements and other utility interfaces necessary for future installation of such equipment.

Any specialised utility requirements not identified in the approved laboratory equipment interface schedule shall be addressed separately through an approved design variation.

42. Completion and Handing Over

The contractor shall complete the entire work in all respects and hand over the G+1 prefabricated modular laboratory complex in a safe, structurally stable, weatherproof, thermally insulated, corrosion-protected and fully serviceable condition.

The completed facility shall include all specified civil, structural, architectural, electrical, mechanical, HVAC, plumbing, sanitary, fire-safety, power backup, solar photovoltaic, rainwater harvesting, wastewater treatment, site development and associated works.

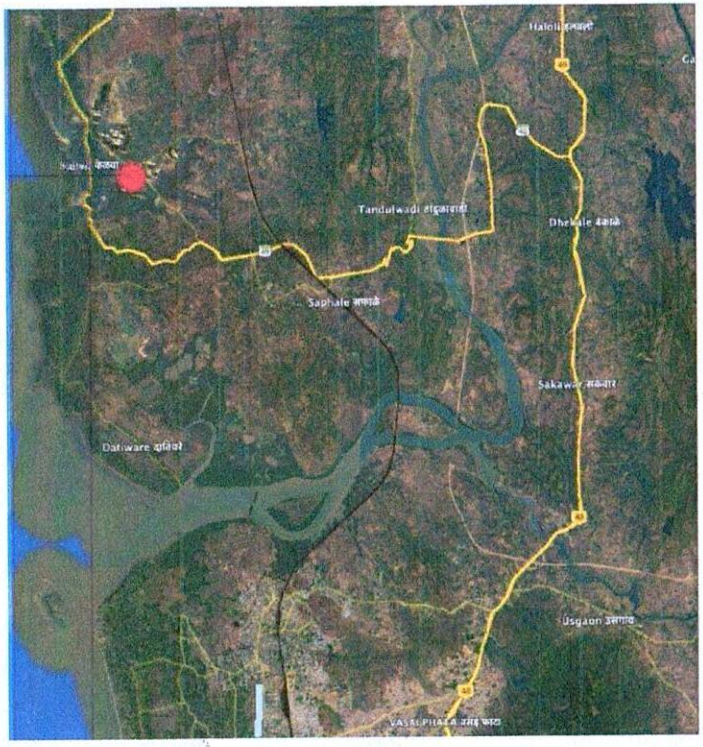
The contractor shall provide operational training to designated staff for all installed building service systems.

The contractor shall hand over approved architectural and structural drawings, foundation drawings, equipment schedules, service layouts, inspection reports, testing certificates, warranties, operation and maintenance manuals, as-built drawings and relocation instructions.

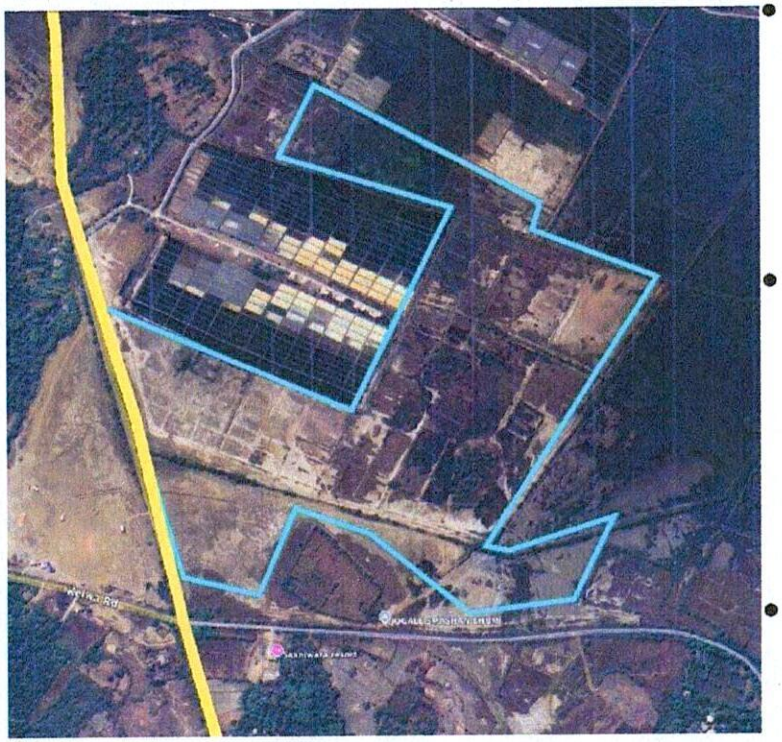
The work shall be completed to the satisfaction of the Engineer-in-Charge and in accordance with the approved drawings, technical specifications and applicable statutory requirements.

Site proposed for the Installation of the Componets

Village Kelwe, Taluka Palghar, District Palghar



Palghar coast — Kelwe, near Saphale

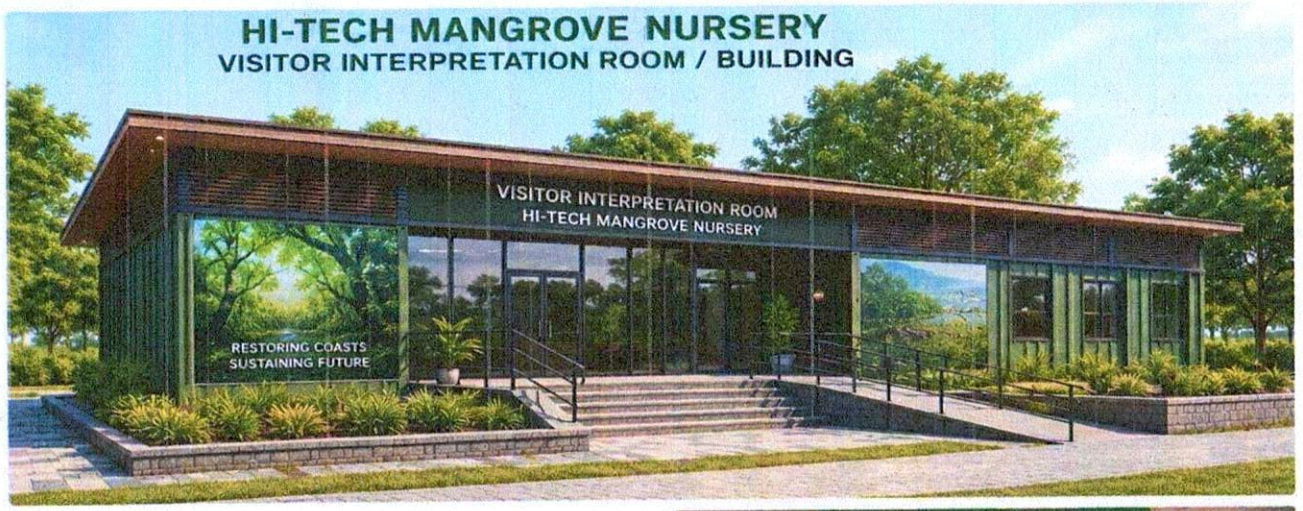


The plot (boundary in cyan)

- Roughly 110 km north of Mumbai on the North Konkan coast, close to existing mangrove tracts
- Single plot shared by the bio-char plant and the hi-tech mangrove nursery, so biochar feeds the growing media directly
- Ground levels between about 3.0 m and 5.2 m, served by 9.0 m and 6.0 m wide internal roads

19 Visitor Interpretation Building — concept design

Container-based modular building | 6 modules, about 150 sq.m | solar powered with rainwater harvesting



COMPONENTS / SPACES

1. Entry / Reception & Orientation
2. Interpretation Gallery
3. Audio Visual / Mini Theatre
4. Exhibition / Display Area
5. Interactive Digital Kiosks
6. Information & Education Zone
7. Nursery Viewing Window
8. Washroom (M/F)
9. Store / Utility
10. Office / Staff Desk
11. Verandah / Covered Deck
12. Ramp (Accessible)
13. Rainwater Harvesting System (Roof)
14. Solar PV System (Roof)
15. Native Landscaping
16. Signage / Interpretation Panels

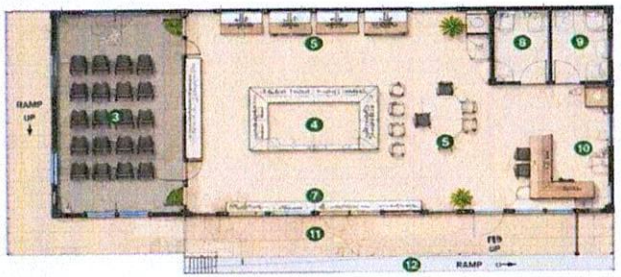
KEY FEATURES

- Sustainable Container Based Building
- Energy Efficient Design
- Solar Powered
- Rainwater Harvesting
- Natural Ventilation
- Accessible for All
- Digital & Interactive Learning Experience

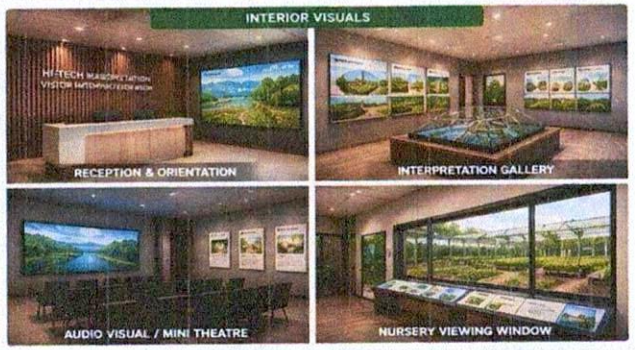
BUILDING SPECIFICATIONS

Type	Container Based (Modified ISO Containers)
Structure	Steel Frame Support
No. of Modules	6 Modules (Approx.)
Built-up Area	~ 150 sq.m (Approx.)
Floor	Anti-Skid Vinyl / Epoxy
Roof	Insulated Roof Panel
Wall	Insulated Sandwich Panel
Ventilation	Natural + Mechanical
Power	Solar PV + Grid Backup
Water	Rainwater Harvesting
Fire Safety	Extinguisher, Smoke Detector, Emergency Lights

FLOOR PLAN (NTS)



INTERIOR VISUALS



SUSTAINABLE SYSTEMS

- SOLAR PV PANELS
- RAINWATER HARVESTING
- NATURAL VENTILATION
- LED LIGHTING
- LOW ENERGY EQUIPMENT
- GREEN LANDSCAPING

MATERIALS & FINISHES

Exterior Wall	Insulated Metal Panel / Container Finish
Roof	Insulated Metal Roof with Solar Panels
Flooring	Anti-Skid Vinyl / Epoxy
Ceiling	Insulated Panel / Wood Finish
Windows	Double Glazed Glass
Doors	Aluminum / Glass
Railing	MS with Powder Coating
Decking	WPC / Weather Wood



FRONT ELEVATION



REAR ELEVATION

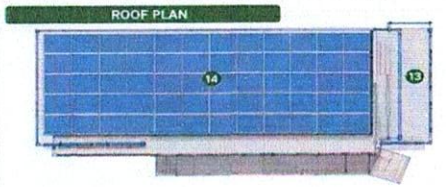


SIDE ELEVATION - 01



SIDE ELEVATION - 02

ROOF PLAN

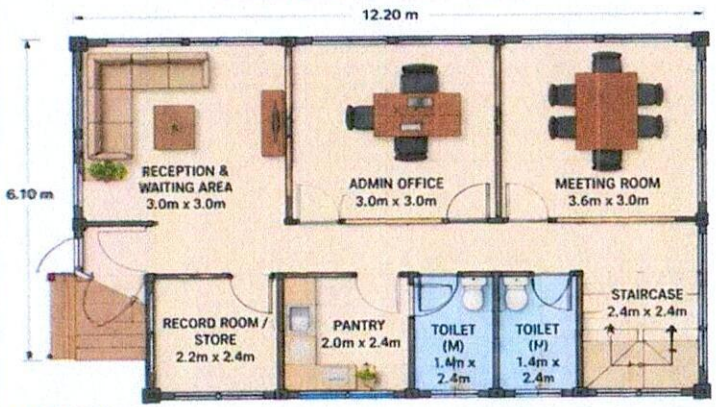


HI-TECH MANGROVE NURSERY – ADMINISTRATION BLOCK

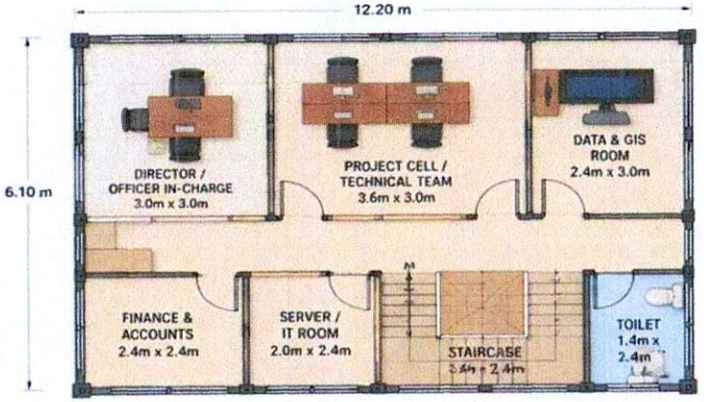
CONTAINER BASED ADMINISTRATION BUILDING FOR FOREST DEPARTMENT

Modular & Portable | Eco–Friendly | Rapid Construction | Low Maintenance | Disaster Resilient | Cost Effective | Expandable

FLOOR PLAN – GROUND FLOOR (G)



FLOOR PLAN – FIRST FLOOR (1)



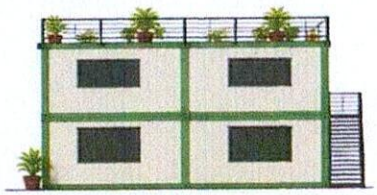
3D VIEW – EXTERIOR



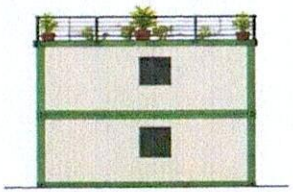


ELEVATIONS


FRONT ELEVATION


REAR ELEVATION


RIGHT SIDE ELEVATION


LEFT SIDE ELEVATION

INTERIOR VIEWS


RECEPTION & WAITING


MEETING ROOM


OFFICER CABIN

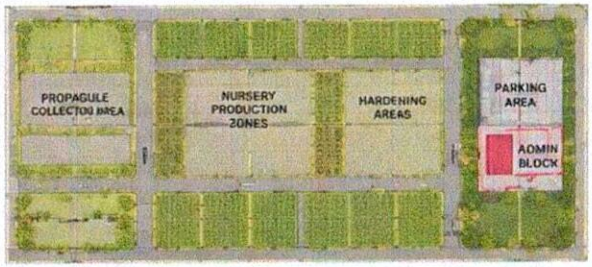

PROJECT CELL / WORKSTATIONS


DATA & GIS ROOM


PANTRY


TOILET

KEY PLAN – LOCATION IN NURSERY



BUILDING SPECIFICATIONS

Structure	ISO Shipping Containers (40ft High Cube)	Doors	Steel Flush Door
No. of Containers	4 Nos. (2 x 2 Stack)	Windows	Sliding Windows with Toughened Glass
Built-up Area	148.8 sq.m. (1600 sq.ft.)	Electrical	Concealed Wiring
Floor Height	2.70 m (Each Floor)	Power Backup	5 KVA Inverter
Overall Height	6.30 m (G + 1 with Parapet)	Water Supply	Overhead Tank + Pump
Foundation	RCC Pile / Strip Foundation	Toilets	Ceramic Tiles, Western Fittings
Staircase	External MS Staircase	Fire Safety	Fire Extinguishers, Smoke Detector (Optional)
Insulation	PUF Insulated Panels	Connectivity	LAN, Wi-Fi, CCTV Provision
Flooring	Vinyl / Laminated Flooring		

BUILDING FEATURES

- ✓ Quick to install and relocate
- ✓ Durable and weather resistant
- ✓ Designed for hot & humid climate
- ✓ Energy efficient and eco-friendly
- ✓ Provision for expansion (add more containers)
- ✓ Suitable for remote nursery locations

TENTATIVE COST ESTIMATE

- Approx. Cost : ₹ 30 – 35 Lakhs (Excluding GST & Transportation)

Note: Cost may vary based on site conditions and specifications.

HI-TECH MANGROVE NURSERY – LABORATORY COMPLEX

CONTAINER BASED BUILDING – G+1 STOREY

MODERN • AUTOMATED • DATA DRIVEN • QUALITY ASSURED

GROUND FLOOR PLAN



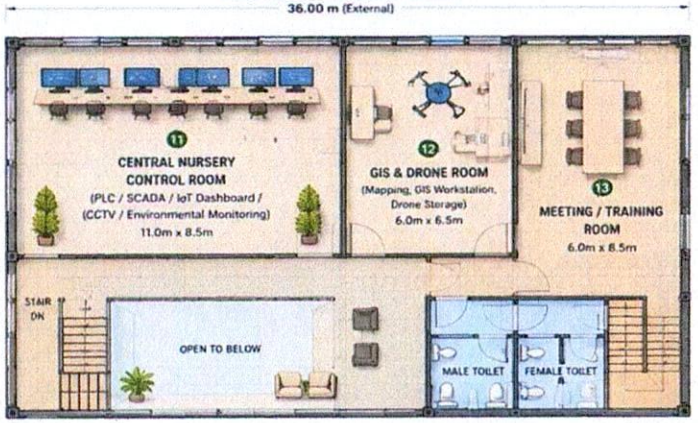
BUILDING SPECIFICATIONS

Building Type	:	Container Based (Modified ISO Containers)
Structure	:	Steel Frame Support
No. of Floors	:	G + 1 Storey
Total Built-up Area	:	~ 720 sqm (Approx.)
Roof	:	Insulated Metal Deck with Rainwater Collection
Wall	:	Insulated Sandwich Panels
Floor	:	Anti-Skid Vinyl / Epoxy Flooring (Lab Grade)
Ventilation	:	HVAC + Natural Ventilation
Power	:	3 Phase with Backup (Solar + DG)
Water	:	RO + Rainwater Harvesting

KEY PLAN



FIRST FLOOR PLAN



LABORATORY LEGEND

1. Propagule & Seed Quality Laboratory
2. Nursery Quality Control Laboratory
3. Soil, Sediment & Water Quality Laboratory
4. Plant Health & Plant Pathology Laboratory
5. Tissue Culture Laboratory
6. Central Instrument Room
7. Chemical & Glassware Store
8. Sample & Seed Repository
9. Laboratory Documentation & Data Room
10. Laboratory Support Area
11. Central Nursery Control Room (PLC / SCADA / IoT)
12. GIS & Drone Room
13. Meeting / Training Room

LABORATORIES – SUB COMPONENTS

1 PROPAGULE & SEED QUALITY LAB
- Propagule Receiving
- Seed Cleaning & Processing
- Seed Grading
- Moisture Testing
- Viability Testing
- Germination Testing
- Seed Storage (Cold Storage (4–10°C))

2 NURSERY QUALITY CONTROL LAB
- Seedling Growth Assessment
- Root Development Assessment
- Morphological Evaluation
- Quality Inspection Area
- Digital Documentation

3 SOIL, SEDIMENT & WATER QUALITY LAB
- Soil Testing
- Sediment Analysis
- Water Quality Testing
- Salinity Analysis
- Media Preperation

4 PLANT HEALTH & PLANT PATHOLOGY LAB
- Sample Receiving
- Disease Diagnosis
- Pest Identification
- Fungal Analysis
- Sterilization Room

5 TISSUE CULTURE LAB
- Washing Room
- Media Preparation
- Sterilization Room
- Inoculation Room
- Culture Growth Room
- Hardening Room

Air Conditioned | HEPA / Laminar Flow | Drain & Water Point | Data Point | Exhaust | Emergency Eye Wash | Fire Extinguisher

ELEVATIONS (CONTAINER BASED BUILDING)



FRONT ELEVATION

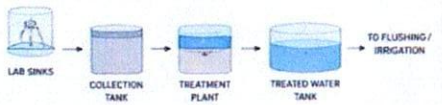


SIDE ELEVATION

RAINWATER HARVESTING SYSTEM



WASTE WATER RECYCLING SYSTEM



POWER SYSTEM



BUILDING FEATURES

- Modular & Scalable Design
- Thermal Insulated for Energy Efficiency
- Smart Access Control & CCTV Surveillance
- Laboratory Grade Finishes
- IoT Enabled Environment Monitoring
- Fire Detection & Safety System
- Barrier Free Access

CONTAINER SPECIFICATIONS

Container Size	:	40 ft (L) x 8 ft (W) x 9.5 ft (H)
No. of Containers (Approx.)	:	18 – 20 Nos.
Structure	:	Corten Steel Modified Containers
Insulation	:	PU / Rockwool Sandwich Panels
Flooring	:	Marine Ply + Vinyl / Epoxy

Admin Residence – Project Manager and Nursery Manager

PREFAB CONTAINER RESIDENCE – PROJECT MANAGER & NURSERY MANAGER

G+1 TWO BLOCK RESIDENCE (2 BHK EACH UNIT)

PROJECT SUMMARY

Total Built-up Area	: 1000 sq ft (≈92.9 sq m)
Configuration	: G+1 (Two Levels)
Each Floor Area	: 500 sq ft (≈46.45 sq m)
Total Area	: 1000 sq ft (≈92.9 sq m)
Footprint	: 10.0 m (L) x 5.0 m (W)
Floor Height	: 2.75 m
No. of Units	: 2 (Ground + First Floor)
Use	
Ground Floor	**- Project Manager**
First Floor	**- Nursery Manager**



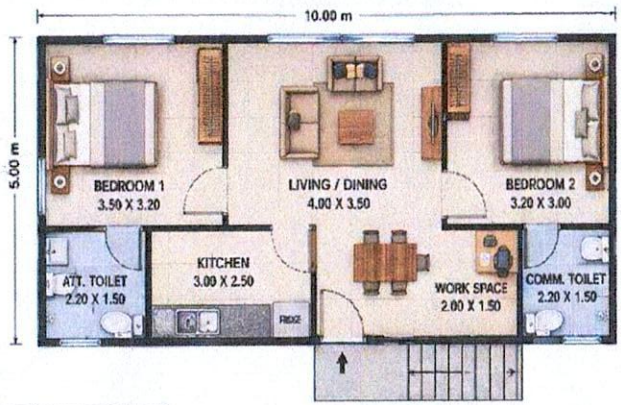
SPECIFICATIONS

• Structure	: Prefabricated Steel Container
• Wall	: Insulated Sandwich Panel
• Floor	: Marine Plywood with Vinyl Flooring
• Roof	: Insulated Roof Panel
• Doors	: Steel Door with Powder Coating
• Windows	: Aluminium Sliding with Mosquito Mesh
• Electrical	: Concealed Wiring with DB
• AC Provision	: Split AC in Bedrooms
• Fan	: Ceiling Fans in Living/Dining
• Water	: Overhead Tank 1000–2000 Ltrs.
• Additional	: Solar Ready, Rainwater Drainage, Fire Extinguisher, Smoke Detector

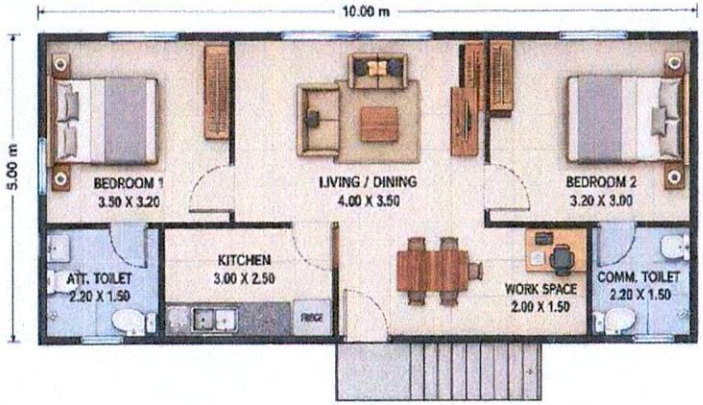
KEY FEATURES

- 2 BHK in each floor
- Living & Dining Area
- Modular Kitchen
- Attached Toilet + Common Toilet
- Small Work / Study Space
- AC in Bedrooms & Fans in Hall
- Fully Furnished
- Energy Efficient & Low Maintenance

GROUND FLOOR PLAN (PROJECT MANAGER)



FIRST FLOOR PLAN (NURSERY MANAGER)



FRONT 3D VIEW



SIDE ELEVATION



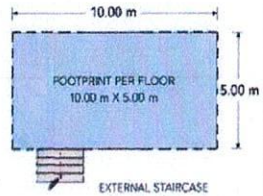
DIMENSIONS

Length (Each Block)	: 10.00 m
Width (Each Block)	: 5.00 m
Floor Height	: 2.75 m
Total Height (G+1)	: 5.80 m (approx.)
Stair Width	: 1.20 m
Verandah Width	: 1.50 m

FURNITURE & FITTINGS (EACH UNIT)

- 2 Double Beds with Side Tables
- Wardrobes
- Sofa Set
- Dining Table (4–6 Seater)
- Study / Work Desk with Chair
- Modular Kitchen with Sink & Storage
- Refrigerator
- Curtains / Blinds
- AC in Bedrooms, Fans in Living / Dining

BLOCK PLAN (TOP VIEW)

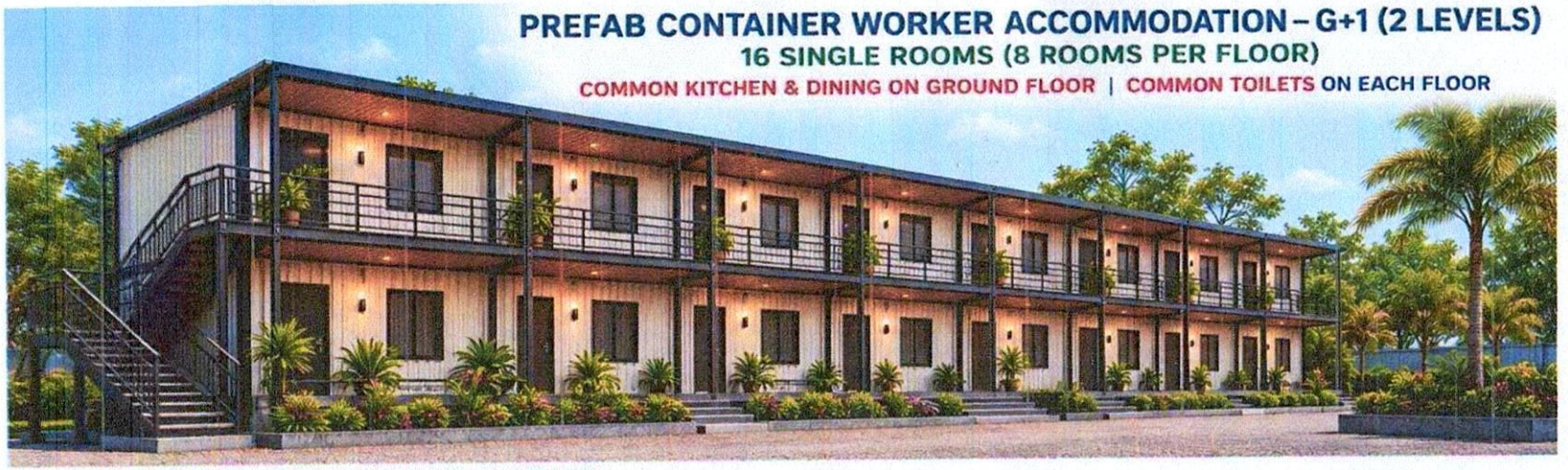


NOTE: All dimensions are in meters. Furniture layout is indicative. Final may vary as per site conditions.

PREFAB CONTAINER WORKER ACCOMMODATION – G+1 (2 LEVELS)

16 SINGLE ROOMS (8 ROOMS PER FLOOR)

COMMON KITCHEN & DINING ON GROUND FLOOR | COMMON TOILETS ON EACH FLOOR



KEY FEATURES

- 16 Single Rooms (8 per Floor)
- Common Kitchen & Dining (Ground Floor Only)
- Common Toilets on Each Floor (Male & Female)
- Each Room with Bed, Wardrobe, Table, Chair, Fan, Light
- Well Ventilated & Naturally Lit
- Spacious Layout (No Space Constraint)
- Durable Prefab Container Structure
- Cost Effective & Quick Installation
- Ideal for Work Sites, Projects, Farms & Industrial Sites

SPECIFICATIONS

Structure	: Prefabricated Steel Container
Floors	: G+1 (2 Levels)
Total Rooms	: 16 Single Rooms
Room Size	: 2.75 m x 3.50 m (Each Room)
Common Kitchen	: 1 (Ground Floor Only) 6.0 m x 5.0 m with dining
Common Toilets	: 2 Blocks (Each Floor) (Male + Female)
Staircase	: External Steel Staircase (1.5 m wide)
Floor Height	: 3.0 m (each floor)
Corridor Width	: 2.0 m (external)
Roof	: Insulated Sandwich Panel Roof
Wall	
Floor	: Insulated Sandwich Panel
Doors	: Vinyl Flooring
Windows	: Steel Door
Ventilation	: Aluminium Sliding with Grill & Mesh
Electrical	: Concealed Wiring
Water	: with DB Overhead Tank Pump
Sanitary	: Western Commode & Wash Basin
Suitable For	: 16 Workers (Single Occupancy)

GROUND FLOOR PLAN (COMMON KITCHEN + 8 ROOMS + TOILETS)



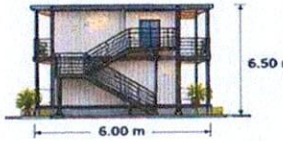
FIRST FLOOR PLAN (8 ROOMS + TOILETS)



FRONT ELEVATION



SIDE ELEVATION



REAR ELEVATION



TYPICAL SINGLE ROOM



- Single Bed
- Wardrobe
- Table & Chair
- Ceiling Fan
- LED Light
- Power Socket
- Good Ventilation

COMMON KITCHEN & DINING (GROUND FLOOR)



- Cooking Range
- Sink
- Storage Rack
- Refrigerator
- Dining Table
- Water Cooler

COMMON TOILETS (EACH FLOOR)



Male Block
- 2 Urinals
- 2 WC
- 2 Wash Basins

Female Block
- 3 WC
- 3 Wash Basins

SECTION VIEW

