

B CORE AND SHELL

B10 SUPERSTRUCTURE

B1010 Structural Frame

Refer to report, "Greenspaces MEP Design Report by Spectral Services Consultants Pvt. Ltd."

B1020 Roof Deck Construction

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Roof Trellises: Open frame construction of decorative pre-finished metal fabrications; mechanically anchored to roof structural deck; designed to resist wind uplift loads and loads from photovoltaic panels and equipment.

B1030 Parking Deck Construction

Parking structural systems are integrated to respond to outdoor environmental conditions, compounded expansion and contraction requirements, safety of floor surfaces for use by both automobile and pedestrian, drainage and floor slope, and ideal structural bays that allow for maximum number of parking spaces.

Parking design includes provisions for safety and security, including open glass stairwells and glass-backed elevators; security devices such as video, audio and emergency buttons that call into the booth or local police station; public telephones; elimination of potential hiding places, such as under open stairs; handicap accessibility with vehicles close to stair and elevator cores having a direct path to key movement patterns of the garage; ventilation to avoid carbon monoxide build-up; non-slip floor surfacing; cleanability; points of intersection between man and the automobile for adequate safety of movement; energy efficient lighting; and balance between daylighting, interior lighting and exterior control addressed on the exterior design of the façade while providing adequate lighting within. Lights are vandal resistant and easy to maintain.

Parking design includes signage and wayfinding, including automobile location marking, floor coding and wall mounted signage for autos and pedestrians marking major internal pedestrian access points as well as external major roads and buildings.

B20 EXTERIOR ENCLOSURE

B2010 Exterior Walls

Energy Simulation: Design includes analysis of the building envelope performance using energy simulation computer modeling and life cycle analysis tools to optimize the performance of all components of the building envelope. Design team will make informed decisions about the components of the building envelope based on life cycle performance.

Quality Assurance: Design includes comprehensive building envelope quality assurance program to ensure that critical wall assembly elements are properly designed with proper integration of related components of the building façade, and effectively installed at the time of original construction.

Activities include:
pre-design and design phase reviews
bid phase review
submittals review

pre-installation review
field and/or laboratory mock-ups
on-site construction observation
close out activities

Exterior Envelope: Design includes redundant exterior wall assemblies incorporating a concealed air space and drainage plane to resist uncontrolled bulk rainwater penetration and to improve the overall thermal performance at the building enclosure. Major elements include:

Exterior cladding that shed the majority of bulk rainwater penetration before it enters the concealed spaces of the wall assembly, and serves as an initial line of defense against rainwater penetration.

Drainage cavity air space, that collects and controls rainwater that passes through the exterior cladding element and re-direct that water to the building exterior; passively ventilated for pressure equalization across the cavity to maintain dry anchors, wall ties, and similar penetrations.

Internal drainage plane and vapor control, serving as a primary line of defense against uncontrolled rainwater penetration, and control of vapor as necessary to prevent condensation and potential mold growth on the dry side of the exterior wall assembly.

Thermal insulating layer located inboard of the internal drainage and vapor control plane.

Exterior Masonry Walls: Factory- or site-constructed masonry unit walls reinforced against shrinkage (as required by material properties) and structural loads where indicated.

Autoclaved Aerated Concrete Block (AAC): Engineered building material of silica sand, lime, cement, gypsum, water, fly-ash and aluminum powder, producing a light weight, fire-resistant block with high thermal and acoustical insulation properties, and complying with IS 2185 (Part 3).

Water Absorption: Maximum 12 percent.

Densities: Minimum 900 kg/m³ for non-structural block partitions; minimum 1500 kg/m³ for load-bearing structural partitions.

Unit Dimensions: 600 mm long by 300 mm high by 200 mm wide; and 500 mm long by 250 mm high by 100 mm wide typical.

Fly Ash Content: Minimum 25 percent, regional material as defined by LEED.

High-volume-fly-ash (HVFA) cellular lightweight concrete (CLC) cast on-site into blocks and air-cured at ambient temperatures with controlled water spray according to approved quality-assurance and quality-control procedures. Proprietary foam generating equipment approved for use on this Project.

Density: Range of 551- to 600-Kg/Cu/ M

Minimum compressive Strength: 3 N/sq. mm.

Thickness: 75 mm to 230 mm.

Face Size: 600 mm by 200 mm typical.

Thermal Performance: K = 0.16 W/m deg K.

HVFA CLC Block Performance Characteristics:

Air Barrier and Vapor Retarder: Integral material designed to control the movement of air across the exterior wall assembly, withstand pressures caused by wind, stack effect, and mechanical systems. Air barrier resides within the wall assembly; remains continuous in three-dimensions from roof-to-wall-to-foundation, consists of materials and components that are, either individually or collectively, sufficient in stiffness and rigidity to resist air pressure differentials across the exterior wall assembly without permanent deformation or failure; and are durable and structurally rigid enough to withstand the construction process.

Vapor retarder designed to control or otherwise limit the flow of water in its vapor form, diffusive vapor flow, or vapor "drive", across an exterior wall system or assembly.

Thermal Insulation: Building exterior envelope insulation, foam-plastic board insulation of extruded polystyrene, 50 mm thick, ~~glass fiber board insulation, mineral wool board insulation, glass fiber blanket insulation, mineral wool blanket insulation~~, and installation accessories.

Products with recycled content.

VOC Limit for Glass Fiber Blanket Insulation: Provide either GreenGuard certified, or formaldehyde-free products.

Exterior Stucco Walls: Exterior portland cement plasterwork (stucco) on metal lath and unit masonry; accessories; base coats and finish coats; drainage plane incorporated into the assembly.

Galvanized steel lath with recycled content.

Portland cement: ASTM C 150, Type I.

Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match Architect's sample.

Lime.

Sand Aggregate.

Finish-Coat Plaster: Ready-mixed portland cement, aggregates, coloring agents, and proprietary ingredients; or acrylic-based finish coatings of factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats.

Accessories: Zinc metal weep screeds, external-corner reinforcement, cornerbeads, casing beads, expansion and control joint materials.

Dimension Stone Cladding System: An exterior wall covering system consisting of dimension stone panels and trim together with anchors, backup structure, adhesives, fasteners, and sealants used to secure the stone to building structure and to produce a weather-resistant covering.

Stone Cladding System Performance Criteria:

PERFORMANCE	REQUIRED OUTCOME	TEST / METHOD
structural	withstand effects of gravity, wind, and equipment loads and stresses; national building code of India.	engineering analysis
periodic maintenance equipment loads	actual loads imposed by maintenance equipment for this project.	engineering analysis
shrinkage and creep	progressive vertical shortening of building frame.	engineering analysis
interstory drift	maximum horizontal building movement equal to quotient resulting from dividing floor-to-floor height at any floor by 400.	engineering analysis
safety factor for stone	three	based on granite
deflection	not more than 1/720 of assembly's clear span.	engineering analysis
seismic	withstand the effects of earthquake motions; National Building Code of India	engineering analysis
air infiltration	not more than 0.3 L/s per sq. m (0.06 cfm/sq. ft.) of wall area, at 75 Pa (1.57 lbf/sq. ft.).	Energy Conservation Building Code of India ASTM E 283
water penetration	no uncontrolled water back of dimension stone cladding at 20 percent of positive design wind load, but not less than 479 Pa (10 lbf/sq. ft.).	ASTM E 331
thermal movement	range 67 deg C (120 deg F), ambient; 100 deg C (180 deg F), for material surfaces	

Stone: Granite from a regionally manufactured source within a radius of 800 km (500 mi); uniform, medium-grained, gray stone; honed finish.

Thickness: Not less than 40 mm (5/8 inches).

Metal-Grid Substructure: Integrated system that combines metal struts, fittings, fasteners, and stone anchors and that is engineered expressly for mechanically installing dimension stone cladding; stainless steel designed to withstand loads indicated without exceeding allowable working stresses established.

Material: Stainless steel.

Architectural Louvers: Fixed, horizontal, drainable-blade, including custom-sized units.

Structural Performance: Withstand gravity loads and wind loads; comply with National Building Code of India.

Seismic rated products.

Thermal movement rated products.

Air-performance, water-penetration, air-leakage, and wind-driven rain rated products.

Airborne sound transmission loss rated products.

Materials: Extruded aluminum.

Finish: High-performance factory 2-coat fluoropolymer, 70 percent PVDF.

Architecturally Integrated Photovoltaics: Renewable energy system of photovoltaic (PV) modules that produce electricity on site directly from the sun without additional energy supply or environmental impact. PV Systems are architecturally integrated into building structural components, including exterior sun control devices at windows, and trellis structures at rooftop, site entry, and parking structure.

System Delivery Type: Interfaced with utility power grid.

System Components:

PV modules.

Charge controller / battery power regulator.

Power storage system.

Power conversion equipment.

Backup power supplies.

Wiring and safety systems.

Support and mounting hardware.

Trellis structures.

Photovoltaic Panels: Solid-state panels that convert sunlight into electricity, without producing noise, producing no pollution, and no depletion of materials; and requiring little or no maintenance.

PV Cell Type: Thin-film, vacuum-deposited solar cells 4-5 watts per ft², PV array area (full sun).

Exterior Sun Control Devices: Design includes integration of PV-integrated exterior sun control with building exterior curtain walls and interior light shelves to reduce building peak heat gain and cooling requirements, improve the natural lighting quality of building interiors and user visual comfort by controlling glare and reducing contrast ratios, and to differentiate the building facades.

General Performance: No permanent damage or deformation of louver blades or assembly; no noise or metal fatigue caused by louver blade rattle or flutter; no permanent damage to fasteners and anchors.

Factory engineered to withstand wind loads and seismic loads, National Building Code of India; and loads imposed by integrated PV panels.

Products withstand thermal stresses, design temperature change 82 degC (180 deg F).

Materials: Extruded aluminum

Configuration: Horizontal cantilever.

Blade Profile: Airfoil blade, 45-deg, 150 mm wide.

Anchoring: Fixed to reinforcing through exterior aluminum framed curtainwalls; sealed penetrations.

Exterior Balconies: Construction of galvanized steel shapes and decorative metal fabrications; paint finish; mechanically anchored to building superstructure, cantilevered or cable-supported.

Balcony Walls and Railings: Guardrails for protection of occupants.

Delegated Design: Engineering analysis by a qualified professional engineer.

Structural Performance: Withstand effects of gravity loads and loads and stresses under conditions.

Handrails and Top Rails of Guards: Uniform load of 0.73 kN/m (50 lbf/ft.) applied in any direction; concentrated load of 0.89 kN (200 lbf) applied in any direction.

Infill of Guards: Concentrated load of 0.22 kN (50 lbf) applied horizontally on an area of 0.093 sq. m (1 sq. ft.).

Materials: Steel tubes, bars, and shapes with high-percentage post-consumer recycled content.

Finish for Steel: ~~Stainless steel~~ Hot dip galvanized and shop color-powder-coated.

Exterior Soffits: Cement board panels for paint at less prominent areas; portland cement plasterwork (stucco) on metal lath at prominent areas.

Building Expansion Control: Architectural joint systems for building interiors, building exteriors, and open-air structures (e.g. parking decks).

Seismic rated and fire-resistance rated products.

Load rated products at parking decks.

Exposed Metal Finish: Aluminum.

Compression seals of EPDM or silicone.

Exterior Sealant Joints:

Exterior Silicone Joint Sealant: Single component, pourable, traffic grade, neutral curing.

Isolation and contraction joints in cast-in-place concrete slabs.

Joints between plant-precast architectural concrete paving units.

Exterior Urethane Joint Sealant: Immersible, single component, pourable, traffic grade.

Joints in pedestrian plazas.

Joints in swimming pool decks.

Exterior Silicone Joint Sealant: Single component, stain-resistant, non-sag, neutral curing, Class 100/50.

Construction joints in cast-in-place concrete.

Joints between plant-precast architectural concrete units.

Control and expansion joints in unit masonry.

Joints in exterior stucco finish systems.

Joints between metal panels.

Perimeter joints at walls and exterior doors curtainwalls and louvers.

Control and expansion joints in ceilings and overhead surfaces.

Preformed Joint Sealant: Preformed, seismic, pre-compressed, open-cell foam sealant with integral color silicone seal, for exterior building joints 20 mm and wider, of varying material and movement requirements.

B2020 Exterior Windows

Glazed Curtainwall Systems: Factory-pre-finished aluminum-framed glass assemblies anchored to main structural and supplemental framing; pressure-equalized system with internal drainage and thermally broken frames; capable of being re-glazed from the inside.

Curtainwall design integrates with the following:

- exterior sun control devices
- perimeter fire resistive joint systems
- high-performance insulated glazing units, including structural-sealant-glazing systems
- window washing equipment anchors
- flexible connections to air, vapor, and moisture control layers on the exterior envelope

Delegated Design: Provide comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

General Performance: Provide curtainwall systems that perform without failure due to defective manufacture, fabrication, installation, or defects in construction. Performance is based on both preconstruction testing and field quality control testing of customized glazed aluminum curtainwalls.

Curtainwall Performance Criteria:

PERFORMANCE	REQUIRED OUTCOME	TEST / METHOD
general structural	withstand movements of supporting structure, including story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.	engineering analysis
wind load	withstand effects of wind loads; comply with National Building Code of India	engineering analysis
periodic maintenance equipment loads	actual loads imposed by maintenance equipment for this Project	engineering analysis
maximum inward and outward uniform pressures	no evidence of deflection exceeding specified limits; no evidence of material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span when tested at 150 percent of positive and negative wind-load design pressures.	ASTM E 330; duration as required by design wind velocity, but not less than 10 seconds
deflection	limit edge deflection each lite in direction perpendicular to plane of the lite, to L/175 of the lite edge length or 3/4 inch (19.1 mm), whichever is less	engineering analysis
seismic	withstand the effects of earthquake motions; comply with National Building Code of India	engineering analysis
water penetration, static	zero, under minimum 720 Pa (15 lbf/sq. ft.)	ASTM E 331
water penetration, dynamic	zero, under minimum 720 Pa (15 lbf/sq. ft.)	AAMA 501.1
thermal movement range	67 deg C (120 deg F), ambient; 100 deg C (180 deg F), for material surfaces	
energy	U-factor not more than 2.55 W/sq. m x K (0.45 Btu/sq. ft. x h x deg F)	Energy Conservation Building Code of India
condensation resistance	No less than 45	Energy Conservation