

11.3.1 Architectural and Structural Requirements of Buildings

All new buildings shall be designed to be architecturally pleasing in appearance and to withstand the tropical climate with minimal maintenance.

Architectural plan, all elevations and 3D view of buildings shall be agreed before other detail plans are prepared.

All buildings (control room building and switchyard panel room (SPR) building etc.) shall be designed by a reinforced concrete frame following code provisions of BNBC 2020. All anticipated loads required for structural design shall be determined in accordance with the code provisions. Buildings, structures and components thereof, shall be designed and constructed to support all loads, including dead loads, without exceeding the allowable stresses or specified strengths (under applicable factored loads) for the materials of construction in the structural members and connections.

Structural framing systems and components shall be designed with adequate stiffness to have deflections, vibration, or any other deformations within the serviceability limit of building or structure.

However, in special cases where the design of a structure or its components cannot be covered by the provisions of BNBC, other relevant internationally accepted codes referred in BNBC may be used.

Forces imposed by unusual vibrations and impacts resulting from the operation of installed machinery and equipment shall be determined separately and treated as additional live loads. Live loads due to vibration or impact shall be determined by dynamic analysis of the supporting member or structure including foundations, or from the recommended values supplied by the manufacture of the particular equipment or machinery. A guideline can be taken from BNBC 2020 to estimate the effects for this kind of loading. Any established method (time history analysis *etc.*) for the dynamic analysis and design (for machine loading) might be adopted to ensure durability of the structure (foundation, frame and slab).

Seismic detailing shall be applied for reinforced concrete structures subjected to earthquake loadings according to seismic design categories following code provisions of BNBC 2020.

In main control room building, all structures shall be designed to carry the loads imposed by the structure itself, together with minimum floor live load (including stairs) of 5.0kN/m² (minimum) or in accordance with an approved standard or code of practice. The roof shall be designed for 2.5 kN/m² live load.

An external concrete open staircase shall be provided up to panel room floor. An internal concrete staircase shall be provided up to the roof. The roof shall be a flat in-situ concrete slab designed for 2.5 kN/m² live load. For other buildings shall be designed as per latest BNBC.

The roof shall be waterproofed with application of two non-toxic components acrylic polymer modified cementations coating of minimum 1.5mm thickness for water proofing of roof which consists of powder and liquid acrylic emulsion; under a protective cover of patent stone/tiles. For waterproofing system minimum roof slope 1:150 shall be maintained.

Downpipes shall be of 100mm diameter uPVC pipe placed outside the wall but shall be enclosed in a facing brick buttress. There shall be at least one downpipe per 100m² of roof. The Bidder shall guarantee the roof against leaks for a period of 3 years from the Taking over Certificate date. The roof shall project at least 450mm beyond the face of all walls or 150mm

beyond the face of all columns whichever is greater to form a sunshade and rain shelter to the walls below. The upper surface of this projection shall be sloped and a drip provided.

The main entrance to all buildings shall be shaded, either by a projection of the roof over the entrance veranda or by a separate roof at a lower level. This area of roof shall also be waterproofed and drained by rainwater pipes.

The roof parapet wall shall be about 1.0 meter high with an in situ concrete coping of 75mm with dpc below it. Facing bricks/sand stone/fair face concrete or combination of them may be used at exterior wall surface in order to render aesthetic view of the control building. An architectural feature shall be provided by panels of open decorative block work to ensure good air circulation over the roof. Minimum three open decorative blocks of size 1000mm X 500mm should be provided on each side in solid portions of parapet wall.

The head of each downpipe shall be fitted with an enlarged hopper of 200mm and purpose made cast iron grill set into a recess in the roof projection.

All external walls of main control room building/SPR shall be minimum 230mm first class brickwork plus one layer of approved facing bricks/sand stone. External walls of other buildings shall be minimum 230mm first class brickwork plus one layer of approved facing bricks/sand stone or rendered with cement render and painted as required by the architectural plan. The internal walls shall also be generally of minimum 115mm thick first class brickwork. Internal walls and ceiling outside & inside of false ceiling shall all be rendered and receive one sealer coat plus two finishing coats of emulsion paint. Externally, rendered walls shall receive primer plus two finishing coats of acrylic external quality paint or similar approved.

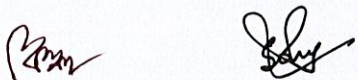
Particular attention must be given in the design of buildings and layouts to fire prevention and safety of personnel at all times. Buildings housing switchgear and control equipment shall be designed as far as practicable to exclude pollution under all likely weather conditions. Fire-proof or flame-retarding materials are to be used for floor, wall and ceiling finishes. Where areas are designed as having a fire resistance rating then materials shall be shown to have passed approved standard tests for that class of fire resistance.

The minimum height of ground floor of two story control room building shall be 3.6 meter and the minimum height of first floor control room shall be 4.5 meter. False ceiling should be provided in the control room floor. In the switchgear rooms, minimum 1 meter clearance shall be provided over the switchgear to the underside of the roof slab but the Bidder shall provide a greater clearance if it is required to remove equipment. The clearance maybe reduced below down stand beams provided no equipment is required to be removed from the top of the switchgear. All rooms in any building in a story shall be of same height.

The false ceiling shall be made from non-combustible materials, and shall be easily removable to provide easy access to small power cables. Suspended ceilings, with acoustic tiling and incorporating lighting and air-conditioning fixtures shall be used in corridors, offices, toilet, control and SCADA rooms of the buildings and as per schedule of finishes.

All doors opening outwards from the buildings shall be provided with panic latches or bolts which override any locking device, for escape in the event of fire. All doors shall be provided with overhead door closures of adequate capacity. Door labels incorporating electrical hazard warning in Bangla and English shall be fixed to each entry door. Vision panels shall be provided to frequently used doors.

Window openings shall be fitted with protruding concrete sunshades above and at the sides of the openings.



The domestic water supply system shall include all plumbing, underground pipework, high and low level storage tanks, valves, fittings and pumps (including the provision of a standby pump) for the provision of a pressurized water supply system for the static water tank and all buildings within the compounds.

On completion of the installation and prior to putting to use, the system shall be sterilized in accordance with an approved Code of Practice.

The Bidder shall be responsible for the provision and installation of a water supply serving the substation buildings. Every cistern, sink, basin, etc., shall be provided with a stop-cock in the supply pipe adjacent to the fitting. Each basin, sink and shower unit is to be provided with both hot and cold water. Provision shall be made for connection to the drinking water supply.

Each Toilet shall be provided with 1 no. western type WC, 1 no. wash-hand basin, 1 no. wall mounted mirror, 1 no. towel rail etc. all necessary fittings and accessories shall be provided.

Battery rooms shall be supplied with sink and drainer & exhaust fans (if no air conditioning).

Air conditioning units shall be provided in rooms. Air conditioned rooms shall have a false ceiling such that the overall thermal transmittance of the roof shall be below 0.45 Watts/m²°C. The false ceiling shall be made from non-combustible materials, and shall be easily removable to provide easy access to small power cables.

The Bidder shall provide the fire/heat detector and portable fire extinguishers for main control building and local control houses. The fire extinguishers shall be of the dry chemical type suitable for the protection against Class A; B; C; fires. Each fire fighting unit should be clearly marked as to its type and method of operation and of refillable-type cylinder. The details of installation for the fire/heat detector and portable fire extinguishers shall be provided to the Employer for an approval.

