15.0. SAFETY IN CONCRETE WORK

15.1. GENERAL PROVISIONS REGARDING USE OF CONCRETE

a. All construction with the use of concrete or reinforced concrete shall be based on plans including specification of steel and concrete and other material to be used in such construction –

   i. Giving technical details regarding methods for safe placing and handing of such materials and indicating the type, quality and arrangement of each part of a structure of such construction; and

   ii. Explaining the sequence of steps to be taken for completion of such construction;

b. Formwork and shores used for concrete work shall be structurally safe and properly braced or tied together so as to maintain position and shape of formwork or shores;

c. Formwork structure used shall have sufficient catwalks and other secure access for inspection of such structure if such structure is in two or more tiers;

d. No machinery or any object should fall below by using wire nets, screen nets etc.

15.2. PREPARATION AND POURING OF CONCRETE AND ERECTION OF CONCRETE STRUCTURE

a. A building worker handling cement or concrete shall –

   i) Wear close-fitting clothing, gloves, helmet or hardhat, safety goggles, proper footwear and respirator or mask to protect himself from danger in such handling;

   ii) Keep as much of his body covered as is required to protect himself from danger in such handling;

   iii) Take all necessary precautions to keep cement and concrete away from his skin in such handling;

b. Lime pits shall be fenced or enclosed and filled and emptied by such devices, which do not require workers to go into the pit;

c. Moving parts of the elevators, hoists screens bunkers, chutes, grouting equipment used for concrete work and of other equipment used for storing, transport and other handling ingredients of concrete shall be securely fenced to avoid contact of building workers with such moving parts;

d. Screw conveyors used for cement, lime and other dusty materials shall be completely enclosed.

15.3. BUCKETS

a. Concrete buckets used with cranes or aerial cableways shall be free from projections from which accumulations of concrete could fall;

b. Movements of concrete buckets shall be governed by signals necessary to avoid any danger by such movements.

15.4. PIPES AND PUMPS

a. A scaffolding carrying a pipe for pumped concrete shall be strong enough to support such pipe at a time when such pipe is filled with concrete or water or any other liquid and carry the combined load of the all the building workers who may be on such scaffold at such time, safely;

b. Every pipe for carrying pumped concrete shall be –

   i) Securely anchored at its end point and at each curve on it;

   ii) Provided near the top of such pipe with an air release valve;

   iii) Securely attached to a pump nozzle by a bolted collar or other adequate means;

c. The operation of concrete pumps shall be governed by standard signals;

d. Building workers employed around a concrete pump shall wear safety goggles;

15.5. MIXING AND POURING OF CONCRETE

a. The concrete mixture shall not contain any material, which may unduly affect the setting of such concrete, weaken such concrete or corrode steel used with such concrete;

b. When dry ingredients of concrete are being mixed in confined spaces such as silos –

   i) The dust shall be exhausted at the time of such mixing and

   ii) In case the dust the dust cannot be exhausted, as specified, the workers shall wear respirators at the time of such mixing;

c. When concrete is being tipped from buckets, building workers shall be kept out of the range of any kickbacks of such buckets;

d. Loads shall not be dumped or placed on settling concrete.

15.6. CONCRETE PANELS AND SLABS

a. All parts of a concrete panel or concrete slab shall be hoisted uniformly;

b. Concrete panels shall be adequately braced in their final positions and such bracings shall remain in such positions until such panels are adequately supported by other parts of the construction for which such panels are used;

c. Temporary bracings of concreter panels shall be securely fastened to prevent any part of such panels from falling when such panels are being moved.

15.7. STRESSED AND TENSIONED ELEMENTS

a. Building workers shall not stand directly over jacking equipment while stressing of concrete girders and beams is being done;

b. A pre – stressed concrete unit shall not bee handled except at points on such unit and by the devices specified for such work by the manufacture of such devices;

c. During transport, pre-stressed concrete girders or concrete beams shall be kept upright by bracing or other effective means;

d. Anchor fittings for pre-tensioned strands of pre-stressed concrete girders of concert beams are kept in a safe condition in accordance with the instruction of manufacturer of such anchor fittings;

e. Building workers shall not stand behind jacks or in line with tensioning elements and jacking equipment during tensioning operations of pre-stressed concrete girders of concrete beams;

f. Building workers do not cut wires of pre – stressed concrete girders or concrete beams under tension before such concrete used of such girder or beams is sufficiently hardened.

15.8. VIBRATORS

a. A building worker, who is in good physical condition, shall operate vibrators used in concreting work;

b. All practical measures shall be taken to reduce the amount of vibration transmitted to the operators working in concreting work and

c. When electric vibrators are used in concreting work

   i) Such vibrators shall be earthed;

   ii) The leads of such vibrators shall be heavily insulated; and

   iii) The current shall be switched off when such vibrators are not in use.

15.9. INSPECTION AND SUPERVISION

a. A person responsible for a concreting work shall supervise the erection of the formwork, shores, braces and other supports used for such concreting work, make a through inspection of every formwork to ensure that such formwork is safe, regularly inspect the formwork, shores, braces, reshores and other supports during the placing of concrete, keep all records of inspections referred to above at the workplace relating to such inspection and produce them for inspection upon the demand.

b. Any unsafe condition, which is discovered during the inspections, shall be remedied immediately.

15.10. BEAMS, FLOORS AND ROOFS

a. Horizontal and diagonal bracings shall be provided in both longitudinal and transverse direction as may be necessary to provide structural stability to formwork used in concreting work and shores used in such concreting work shall be properly seated on top and bottom and secured in their places;

b. Where shores used in concreting work rest upon the ground, base plates shall be provided for keeping such shores firm and in level;

c. Where the floor to ceiling height of a concreting work exceeds 9 m or where the formwork deck used in such concreting work is supported by shores constructed in two or more tiers, or where the dead, live and impact loads on the formwork used in such concreting work exceed 700 kilogram per m^2, the structure of such formwork shall be designed by a professional engineer in the relevant field and the specifications and drawings of such formwork kept at such construction site and produced on demand.

d. Where a professional engineer designs the structure of the formwork used in concreting work, such engineer shall be responsible for the supervision of construction and the stability of such structure.

15.11. STRIPPING

a. Stripping of formwork used in concreting work shall not commence until the concrete on such formwork is fully set, examined and certified to this effect by the responsible person and record of such examination and certification is maintained;

b. Stripped forms in concreting work shall be removed or stock piled promptly after stripping from all areas in which building workers are required to work or pass;

c. Protruding nail, wire ties and other formwork accessories not required for subsequent concreting work shall be pulled, cut or otherwise made safe.

15.12. RE-SHORING

a. Re-shoring used in concreting work shall be provided to a slab or beam for its safe support after its stripping or where such slab or beam is subjected to superimposed loads due to construction above such slab or beam;

b. The provisions applicable to shoring in a concreting work shall also be applicable to reshoring in such work or pass.