Technical Specifications and Method of Measurements

BATCODA Technical specifications and method of measurements

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General Requirements

- General
- Site descriptions
- Quality assurance
- Project records
- Site facilities
- Cleaning up
- Insurance and bonds
- Units of measurements

Excavation and Earthwork

- Site clearance
  - Bushes, vegetation, existing structures,
- Excavation and cart away
  - Removal of top soil, 200-300mm
  - Bulk, Pit, Trench
  - Excavation in ordinary soil
  - Rock Excavation
    - Soft rock
    - Hard rock
    - Boulder
  - Shall be measured as the net void created with allowance offset of maximum 250mm working space
  - Excavation shall be measured in successive stages of 150cm from starting level

….Excavation and Earthwork

- Fill
  - In successive stages not exceeding 200mm watered and compacted
  - Fill material
    - Excavated fill
    - Selected excavated fill
    - Selected borrowed fill
- Disposal
  - Shall be measured net volume arising from the void created by the excavation less excavated fill.
  - Include stockpiling, loading, transporting, dumping and wheel spreading at tip
- Slopes to embankments, cuttings, shoulders, ditches etc
  - shall be measured by length and shall be understood to cover the girth
- Sundry items - Termite proof solution, gravel sub-base, hardcore

....Excavation and Earthwork

ITEM	DESCRIPTION	UNIT	QTY	U.PRICE	TOTAL P.
	A. SUBSTRUCTURE				
	1. EXCAVATION & EARTHWORKS				
1.1	Clear off the site to an average depth of 30cm	m^2	316.20		
1.2	Bulk excavation to reduce level from the natural ground				
	in ordinary soil level to a depth not exceeding 50cm.	m^3	158.10		
1.3	Excavate for isolated footings, in ordinary soil to a depth				
	not exceeding 150cm from stripped level.	m^3	348.78		
1.4	Excavate for trench foundation in ordinary soil to a depth	m^3	316.89		
	not exceeding 150cm from stripped level.				
1.5	Back fill around foundation with selected material from				
	off site and well ram in layers every 20cm interval.	m^3	305.95		
1.6	Back fill under hard-core with selected material fill from				
	approved source and well rolled every 20cm. interval.	m^3	137.82		
1.7	Remove surplus excavated material to a distance not				

Concrete work

- Cast-in-situ
  - Concrete premixed at a batching plant and transported to the work site or concrete whose ingredients are transported to the site and mixed just before casting in place
- Prefabricated concrete
  - fabricated (manufactured) in a factory and brought to the site
    - does not require formwork
    - needs a special care when connecting the different elements
    - fast to construct building,
- Pre stressed concrete

....Concrete work

- In-situ concrete
  - Delivery and storage
    - Cement
      - bags or containers in an enclosed ventilated space, off the ground,
    - Aggregates
      - Stockpiled on clear hard surface
      - Different grades should be stocked separately
    - Water
      - Piped or otherwise stored in an enclosed container free from contamination

....Concrete work

- Gauging and Mixing
  - When mixing on site use impervious gauge boxes or containers of accurate size
  - concrete shall be mixed in an approved mechanical batch mixer.
  - Hand mixing should be avoided, if unavoidable add 10% more cement
  - Admixtures shall be used as directed by manufacturers.
- Transporting
  - as rapidly as practicable by methods, which will prevent segregation or loss of ingredients

....Concrete work

- Placing and Consolidation
  - Concrete must be placed before setting has commenced
  - No dropping from a height exceeding 2m
  - Make sure no rebar is displaced
- Bonding
  - In case of construction joints the hardened surface must be dampened and cement grouted with same mix proportion used just before continuing with the fresh concrete
- Finish to concrete surfaces
  - Trowel finish
  - Non-slippery finish
  - Scratch finish
  - Bush hammer finished

....Concrete work

- Curing & Protection
  - concrete shall be protected from premature drying and excessively hot temperatures and loading for at least 28 days starting from the date of casting.
  - the surface of concrete should be continuously kept wet for at least seven days after casting
  - Where the temperature is excessively high the surface of concrete shall be covered with absorptive mat, fabric or sand and continuously kept wet

....Concrete work

- Method of measurement
  - In measuring concrete differentiation should be made for:
    - Plain and reinforced concrete
    - Below and above grade works
    - Classes of concrete
    - Foundations
    - Ground and suspended slabs, beams and lintels,
    - Walls
    - steps, staircases, and landings etc.

....Concrete work

- Shall be understood to include gauging, mixing, casting in place, and curing
- Shall be measured in volume except:
  - Ribbed slabs measured by area stating thickness
  - Grouting and filling which should be enumerated stating size
- No deduction shall be made for voids up to 0.25m^2 in area.

....Concrete work

- Testing
  - Cube test
  - Slump test
  - Structural test
  - Ingredient material test
  - Constructed elements shall be evaluated for verticality and horizontality.
    - Accordingly, levels of floors slabs, beams, lintels, etc, intended to be horizontal shall not slope more than 6mm in 3m. Errors in plumbing (vertical elements) shall not be more than $\pm$ 6mm in 3m

....Concrete work

- Grades of Concrete
  - C5 - lean concrete, to protect the structural concrete from damage, which is usually caused by dust. Thus dust blinding is required.
  - C15- for totally supported structural elements
  - C20- used for slabs; the mix proportion is 1:2:4
  - C25 – Commonly used grade of Concrete (1:2:3)
  - C30 –Used for chemical stores and nuclear plants

Concrete Formwork

- A temporary support for in-situ concrete, designed and constructed in timber or metal and capable of withstanding the live and dead loads imposed on it, fully preventing leakage of concrete

– Design

- Formwork and false work shall be designed to include assumed value of live loads, dead load, weight of moving equipment operated on formwork, concrete mix, height of dropping concrete, vibrator frequency, ambient temperature, and other factors pertinent to safety of structure during construction.

....Concrete Formwork

- Erection
  - Rubbish shall be removed from the interior of the forms before concrete is placed.
  - Washout holes shall be provided to facilitate cleaning.
  - Formwork surfaces in contact with concrete shall be cleaned and thoroughly wetted and treated with approved non-staining mould oil or other composition.
  - Side footings of forms may be omitted and concrete placed directly against excavation if approved by the Engineer. If omitted a minimum additional coverage of 50mm of concrete of the same quality shall be provided on each side.

....Concrete Formwork

- Removal
  - No undue deflection or damage whatsoever shall be caused to a structure by the removal of formwork.
  - In no circumstances, shall formwork be struck until the concrete attains a cube strength of at least twice the stress to which it may be subjected at the time of striking.
  - No formwork shall be removed until the concrete has hardened sufficiently.

….Concrete Formwork

- Period of removal (minimum)
  - Vertical formwork to columns, walls and beams: 16 hrs
  - Soffits formwork to slab 21 day
  - props to cantilever slabs 14days
  - Soffits formwork to beams 21days
  - Props to cantilever beams 14 days

….Concrete Formwork

- Formwork shall be measured by area,
  - The net area in contact with the finished face of concrete with no allowance made for passing at angles, overlaps and intersections
- Measurement is understood to include
  - Construction and removal of formwork
  - Making good of concrete honeycombs.
  - Making good of concrete surfaces to attain the standard of finish desired by the specified type of formwork.
  - Angles & returns.
- Differentiation should be made
  - Depending on the position, difficulty and quality of face of concrete elements

Reinforcement

- Reinforcement work shall be understood as the supply and fixing of reinforcement bars including ties and chairs
  - Bars shall be secured against displacement by formwork construction or concrete placement
  - bars shall be tied by 1.6mm mild steel wire
  - No concrete shall be cast until reinforcement has been checked and approved by the engineer

….Reinforcement

- Storage
  - Shall be stored protected from rain and in an off the ground position to prevent rust
- Measurement
  - Reinforcement shall be measured by the net weight of bars set in position without allowance for ties and spacers
  - Allowance shall be made for overlaps only if indicated on drawings or where the length of the bar reaches the maximum standard production limit.

Concrete ancillaries

- expansion joints and permanent or temporary embedded materials like conduits anchor bolts and water stops etc., are measured in ml or enumerated stating size