INTRODUCTION TO SPECIFICATION

SPECIFICATION

Specifications describe the nature and the class of the work, materials to be used in the work, workmanship etc. and is very important for the execution of the work. The cost of a work depends much on the specifications

Drawings + specification =

Purpose of giving Specifications

- The cost of a unit quantity of work is governed by its specifications.
- Specification of a work is required to describe the quality and quantity of different materials required for a construction work and is one of the essential contract documents.
- This also specifies the workmanship and the method of doing the work. Thus specification of a work serves as a guide to a supervising staff of a contractor as well as to the owner to execute the work to their satisfaction.

- A work is carried out according to its specification and the contractor is paid for the same. Any change in specification changes the tendered rate.
- As the rate of work is based on the specification, a contractor can calculate the rates of various items of works in tender with his procurement rates of materials and labour. Thus tender rate without specification of works is baseless, incomplete and invalid.
- Specification is necessary to specify the equipment tools and plants to be engaged for a work and thus enables to procure them beforehand.
- The necessity of specification is to verify and check the strength of materials for a work involved in a project.

Types of Specifications

- **General Specifications**

  In general specifications, nature and class of works and names of materials that should be used are described. Only a brief description of each and every item is given. It is useful for estimating the project. The general specifications do not form a part of contract document.

- **Detailed Specifications**

  The detailed specifications form a part of a contract document. They specify the qualities, quantities and proportions of materials and the method of preparation and execution for a particular item of works in a project. The detailed specifications of the different items of the work are prepared separately and they describe what the work should be and how they shall be executed. While writing the detailed specifications, the same order sequence as the work is to be carried out is to be maintained.

  Detailed specifications consists of:

- General provisions
  - Conditions of contract
  - Depend on nature of work
  - Relating to documents
  - General obligations of the contractor
  - Conditions relating to labour
  - Subletting, execution of work
  - Measurement and payment
  - Default and non-completion settlement of disputes and specific conditions etc..

- Technical provisions
  - Shows desired quality of final product
  - Details of inspection and test
  - Deals with specifications of materials, workmanship, performance and proprietary commodities
- Standard specifications
  - Strandadized format.
  - Lengthy process of wording will be avoided.
  - Saves time, labour and cost.
  - Eg: earth work, brick work, etc.
- Can be used in Cpwd, Mes, Railway dep.

Essential requirements of specifications

Subject matter:

- The subject matter of the specification should relate to the information required for the contractor after the contract is given to him.
- The requirements which are to be enforced only should be included in the specification.

Grammar:All sentences should follow the rules of grammar. Abbreviations:

- Well known abbreviations in the building industry should be used. Development of style:
- The main aim is to resent a clear picture of facts. The style of arranging of ideas should be clear and brief.

Selection of words:

- Suitable words in the desired meaning should be used. Words having more than one meaning or unfamiliar words shall not be used.

Accuracy:

- The information given in the specification should be complete and correct. Information should not be repeated.

Clearness

- As far as possible the information should be clear. It should state whether the contractor shall or shall not do. In fact the parties, owner and contractor should follow the same sense.

Brevity:

- Sentences should be short simple and concise. Straight forward specification would be clearly understood by the persons filling the tenders. The brevity is the essence of specifications.

Practical limits & commercial sizes:

- The specification should be framed within the practical limitation of the materials and workman ship. It should not specify practical impossibilities. It should specify the use of commercial sizes and pattern of materials available in the market.

Fairness:

- The specification should be fair and should not be framed in such a way so as to throw all the risks on the shoulders of the contractors. Likely hazards, difficulties should be specified so as to give a clear picture of the work to the contractor.

Steps involved in specification writing:

- Earthwork excavation

  Starting of work- Workmanship- excavated material- protection to existing services- measurement.

- Cement concrete for foundation

  Mix proportion- cement mortar- aggregates- mixing- placing- ramming- curing- measurement.

- Random rubble masonry in CM (1:5)

  Properties of stones - dressing - soaking in water - minimum and maximum of each course (layer)
  - mix proportion - mortar thickness - workmanship bond stones - scaffolding - measurements.

- Coursed rubble masonry I sort in CM 1:5

  Properties of stones - dressing - soaking in water - height of each course - mix proportion - mortar thickness - workmanship - bond stones - scaffolding measurements.

- Brickwork in CM 1:5

  Properties of bricks - size of bricks - soaking in water - mix proportion -- mortar thickness - workmanship - bond- placing - scaffolding - measurements

- RCC slab 12cm thick proportion (1:1.5:3)

  Mix proportion - cement - fine aggregate - coarse aggregate - water - water cement ratio or slump
  - type of reinforcement - centering - laying reinforcement- mixing - laying and compaction - curing

- finishing of exposed surfaces - measurement.

- RCC sunshade

  Proportion - cement - fine aggregate - coarse aggregate - water cement ratio of slump - type of reinforcement - centering - fixing and tying grills mixing— laying and compaction curing - finishing of exposed surfaces - measurements. Coursed rubble masonry in CM 1:5

- Plastering with cement mortar 1:5- 12mm thick

  Preparation of surfaces to be plastered - removal of existing mortar on the surface - watering - mix proportion - plastering thickness - finishing - curing – measurement.

- Pointing with cement mortar 1:3

  Preparation of surface to be pointed - removal of existing mortar watering - mix proportion - pointing type - workmanship - mortar thickness -- finishing curing - measurement.

- Flooring with mosaic tiles

  Properties - cement mortar (1:3) preparation of bedding with 12 cm thick - laying tiles workmanship polishing - measurement.

- Laying of stoneware pipes

  Excavation- pipe diameter- preparing the surface with slope- joining the pipes- inspection- covering the surface- measurement.

- Surface dressing over existing one

  Preparation of the road surface - spreading the metal – rolling applying binding material - Applying stone chips - rolling - gradient - camber - seal coat – application- measurement.

- Gravel packing for revetment

- Preparation of surface - watering --mixing the gravel - ramming –slope- finishing- measurement.

- Rough stone dry packing for aprons

  Properties of stones - height - filling the gaps – slope- modelling – finishing- measurement.

- Strutting to centering for RCC works

  Type of surface - height - type of wood - shuttering - centering - Re-use of shutters- connections
  – measurements.

SPECIFICATION FOR DIFFERENT ITEMS

Specifications for the following items –Bricks; sand; cement; coarse aggregate; water; reinforcement; storing and handling of materials; Earth work in foundation; PCC; RCC; First class brick work in cement mortar; half brick thick partition in cement mortar; reinforced brick work; DPC; glazed tiles in skirting and dado; cement plaster; joinery in wood, steel & aluminium; painting to walls –emulsion, enamel paint ; painting to joinery ; varnishing ; French polishing ; based on surveys and Current trends.

Specifications for various materials Cement

Cement shall be fresh Portland cement of standard ISI specifications. It should have the required tensile and compressive stresses and fineness. The colour of the cement should be uniform grey colour. Initial setting time should be about 30 minutes for ordinary cement. Final setting time should be 10 hours.

- **Sand**

Sand should be clean, free from dust, dirt and organic matters. Sand shall be of hard, sharp and angular grains. Should pass through a screen of 5mm but completely retained on 0.07mm mesh. The fineness modulus of sand should be 2.5 and 3.0.

- **Coarse aggregate**

A good aggregate should have Clear, strong, tough, angular with sharp edges and cubical

in shape. Size varies from 15mm to 40mm. As far as possible graded aggregate to be used.

Mass concrete- 40 mm

Reinforced concrete – 20mm

- **Reinforced steel** Steel

types:

- Mild steel – Ultimate tensile strength 4200kg/m3
- Medium tensile steel- Ultimate tensile strength

5000kg/m3 - Deformed bars and Cold twisted bars

- High tensile deformed steel

- Should be free from corrosion, rust, scales, oil, paint etc.
- Capability to bent without fracturing.

- Joints to have an overlap of 40 times the diameter of bar and has to be staggered.
- Bigger dia bars to be joined by welding

Earthwork in excavation in foundation:

- **Excavation**

Foundation trenches shall be dug out to the exact width of foundation concrete and the side shall be vertical. If the soil is not good and does not permit vertical sides, the sides should be sloped back or protected with timber shoring. Excavated earth shall not be placed within 1m (3') of the edge of the trench.

- **Finish of trench**

The bottom of foundation trench shall be perfectly levelled both longitudinally and transversely and the sides of the trench shall be dressed perfectly vertical from bottom. The bed of the trench shall be lightly watered and well rammed. Excess digging if done through mistake shall be filled with concrete at the expense of the contractor. Soft or defective spot shall be dug out and removed filled with concrete or with stabilized soil. If rock or boulder are found during excavation, these should be removed and the bed of the trenches shall be levelled and made hard by consolidating the earth. Foundation concrete shall not be laid before the inspection and approval of the trench by the engineer-in-charge.

- **Finds**

Any treasure and valuables or materials found during the excavation, shall be property of the Government.

- **Water in foundation**

Water, if any accumulates in the trench should bailed or pumped out without any extra payment and necessary precaution shall be taken to prevent surface water to enter into the trench.

- **Trench filling**

After the concrete has been laid masonry shall be constructed the remaining portion of the trench shall be filled up with earthinlayer of 15cm (6") and wateredand well rammed. Theearth filling shall be free from rubbish and refuse matters and all clods shall be broken before filling. Surplus earth not required, shall be removed and disposed and site shall be levelled and dressed.

- **Measurement** The measurement of the excavation shall be taken in cu m (cu ft) as for rectangular trench bottom width of concrete multiplied by the vertical depth of foundation from general level and multiplied by the length of trenches even through the contractor might have excavated with sloping side for his convenience. Rate shall be for complete work for lift, including all tools and plants required for the completion of the works. For extra lead of 30m and extra lift of 1.5m separate extra rate is provide

Excavation in saturated soil:

Excavation in saturated soil or below sub-soil water level shall be taken a separate item and shall be carried out in the same manner as above. Pumping and bailing out of water and removal of slush shall be included in the item. Timbering of the sides of the trench if required shall be taken under a separate item and paid separately.

Lime concrete in foundation:

- **Materials**

All materials shall be per standard specification. Coarse aggregate shall be hard, well-burnt or over burnt brick ballast of 40mm gauge. It shall be deep cherry red or copper colour and shall be clean, free from dust, dirt and ther foreign matters. It shall be homogeneous in texture and roughly cubical in shape. Ballast which appears porous or shows signs of saltpetre shall not be used. Brick ballast of 20 per cent pass through a mesh of 25mm. any rejected material shall be removed from site of work within 24 hours.

- **Fine aggregate**

It shall be of surkhi or sand or cinder as specified and clean and free from dust, dirt, and foreign matters. Surkhi shall be made of well burnt brick or brick bats (not over burnt) and shall pass through a sieve of 2.5 meshes per sq cm (144 meshes per sq in). Surkhi as preferable better concrete.

Lime shall be white fat lime (unless otherwise specified) and shall be freshly burnt and free from ashes and other foreign matters. Lime shall be slacked at site of work and screened through a sieve of three meshes to a cm (8 meshes to an inch).

- **Proportion:** The concrete shall consist of 1 cu m of brick ballast, 0.32 cu m of surkhi (sand or cinder) and 0.16 cu m of white lime in the proportion of 100: 32: 16 by volume.

- **Mixing**

Mixing shall be done on a clean water light, masonry platform of sufficient size. Brick ballast shall be staked in a rectangular layer of uniform thickness usually 30cm (12”) high and well soaked with clean watera period of at least three hours.Lime and surkhi shall be measured with wooden box in the proportion of 1:2 and mixed thoroughly dry to have uniform colour. The dry mix of lime and surkhi shall be spread over the staked ballast required thickness to give the specified proportion. Then material is mixed at least three times. Clean water is then added slowly for mixing purpose. Concrete shall be mixed only for day’s work, old and slate concrete shall not be used. For big work the mixing shall be done by machine. The water shall be added slowly to the required quantity and the mixing shall be continued for at least one minute, till a mix of uniform colour and workable consistency is obtained and should be such that the ballast does not separate