

PARTICULAR SPECIFICATIONS**NAME OF WORK : REPAIR/MAINT OF PERIMETER, SECURITY LIGHTS AND PERIPHERY STREET LIGHTS OF INF SCHOOL AND REPAIR/MAINTENANCE OF STREET LIGHT, FLOOD LIGHT, HIGH MAST LIGHT & GATE LIGHT AT DUNN MARG, HPP, GOLF VIEW, INF MESS, MUSEUM, STN HQ, DSOMI, MALL ROAD, PO ROAD AND OTHER AREA UNDER GE (MAINT) INF SCHOOL MHOW****1. GENERAL:**

1.1 The work under this contract shall be carried out in accordance with Schedule 'A' provisions, particular specifications, General specifications and other provisions in MES Standard Schedule of Rates 2009 (Part I) and 2020 (Part II).

1.2 The term "General Specifications" referred to here-in-before as well as referred to in IAFW-2249 (General Conditions of Contracts) shall mean the specifications contained in MES Standard Schedule of Rates, IS and any other standard Engineering books.

1.3 General Rules, specifications, special conditions and all preambles in the MES Schedule shall be deemed to apply to the work under this contract, unless mentioned otherwise in these documents. In case of any discrepancy or variation, the provisions in these documents shall take precedence over the aforesaid provisions in the MES Schedule. The term "as specified" wherever appearing in tender documents relates to relevant particular specification and in its absence general specifications.

1.4 Particular specifications given hereinafter are in brief and are meant only to particularise, amend and emphasise the specifications given in MES Schedules. In respect of such items of work for which particular specifications are not given in Schedule 'A' or in these particular specifications, specifications given in the relevant Indian Standards or code of practice and MES Schedule shall be followed.

2. SAMPLE:

Materials required for incorporation in the work shall bear ISI mark or shall be best available and shall be approved by the Accepting Officer before incorporation in the work.

3. SCOPE OF WORK:

The work under this contract include for the full and completion of all works as described in Schedule 'A' and Particular Specifications. The actual location and place of work involved under this Contract Shall be shown to the Contractor by Engineer – in – Charge at the time of execution.

4. CONFORMITY WITH INDIAN ELECTRICITY ACT, RULES ETC:-

All electrical work shall be carried out ;in conformity with the requirements of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 framed there under and fire insurance act as applicable and also the relevant regulations of electric supply authorities concerned as amended from time to time.

5. EXECUTION OF WORK:

The work of electrical, installations shall be carried out under the supervision of a person holding a certificate of competency issued by the recognized authority.

PARTICULAR SPECIFICATIONS (Contd...)**6. TESTING GENERAL:**

All electrical work shall be systematically tested by the contractor in presence of G.E to ensure compliance with the specification laid down. Test results shall be recorded and signed by the contractor & Engr-in-Charge. If the results are not acceptable, all repairs and replacements and extra work of removal and relaying or re-fixing shall be carried out by the contractor at his expense & installation re-tested, until test results indicate compliance with the prescribed requirements. The contractor shall supply all the necessary apparatus, labour and instruments or equipment's required for testing.

7. SAFETY PRODUCERS AND PRATICES:

The contractor shall ensure to provide workmen the safety devices and appliances and safety procedures for working on low, medium and high voltage and apparatus and safety practices listed in IS – 5216 – 1982 shall be followed to the extent applicable by the contractor and his workmen.

8. FIRE SAFETY:

All electrical equipment's installed by the contractor shall satisfy the requirements laid down in IS – 1646 – 1982 and IS – 3034 – 1981.

9. RECORD OF INSTALLATION:

On completion of work the contractor shall submit to GE (Maint) Inf School, Mhow, the complete schematic diagram of equipment connections, route plan for over head line & underground cable work.

10. GENERAL/ ELECTRIFICATION:

- 10.1 The installation shall strictly comply with the provisions contained in the latest edition of the Indian Electricity rules and IS-732. Code of practice for electrical wiring and fitting in buildings as applicable to these works except where this regulations and rules are modified by these specifications.
- 10.2 All electrical work shall be executed properly by skilled licensed electricians under the supervision of suitable qualified electrical supervisors. The contractor on demand by Engineer-in-Charge shall produce such evidence of qualifications of his workman. Supervisor(s) either at the time of commencement of work or at any time thereafter during the contract period.
- 10.3 The position of electrical fittings and fixture shall be shown to the contractor by the Engineer-in-Charge at the time of execution.
- 10.4 The run of wire shall be marked on the walls and soffit of roof/ floor slabs for the surface wiring.
- 10.5 Approval of the Engineer-in-Charge shall be obtained in writing before fixing plugs, teak wood boards, fittings etc.,
- 10.6 Looping in system of wiring shall invariably be used throughout the installation.
- 10.7 All electrical fittings and wiring shall be clear off doors windows and to other openings
- 10.8 All places where wiring has to be lead through wall or roof necessary conduits shall be provided with polythene bushing on either side to avoid any injury to the cable. The rate quoted in Schedule 'A' shall be deemed to include the cost of such conduits and bushings.

PARTICULAR SPECIFICATIONS (Contd...)**11. GENERAL REQUIREMENT:**

General requirement shall be followed all as specified in clause 19.2.1 to 19.2.8 of MES Schedule.

12. MATERIAL AND SAMPLES BOARDS:

12.1 All materials shall confirm to relevant IS specification or to BSS, if ISS is not available.

12.2 Approval of GE referred to in clause 29.2 on page 19.4 of the MES Schedule Part I shall be in writing.

12.3 Approved samples shall be labeled as such and signed both by the contractor and the Engineer-in-Charge they shall be with the custody of Engineer-in-Charge till final completion of the work. The materials shall be brought to site by the contractor in the manufactures original packing with seal intact or with makers

12.4 Type of Electric Supply:

Type of electric supply will be AC 415 Volts, 3 phase and 240 Volts single phase at 50 cycles.

12.5 Screws Nails etc.,

All screws used in the work shall be chromium plated iron screws as approved by the Garrison Engineer. Cover for MS boxes shall be fixed with chromium plated iron screws.

12.6 Cables:

All cables (except flexible cables) to be used in the works shall be of indigenous make conforming to the following Indian Standard Specification including amendments if any, IS – 1596 for polythene insulated and PVC sheathing IS – 694 for PVC insulation and IS 398-1976 for aluminium conductor.

13. CONDUIT, CONDUIT ACCESSORIES AND CONDUIT WIRING:

Non metallic rigid PVC conduits shall conform to IS – 9537 (Part – III) medium grade and bear ISI mark. The diameter of conduit shall be as specified in clause 19.125 of MES Schedule.

13.1 Conduit wiring on Sub Main:

The conduit wiring shall be as described in clause 19.25 and 19.125, to 19.128.1 of MES Schedule Part – I. Number of wires that can be drawn through the conduit shall be as laid down in IS – 732.

13.2 Wiring in Conduit Surfaces or Concealed:

Wiring in conduit shall be carried out all as indicated in Sch 'A' and all as specified Clause 19.25(b) 19.101, 19.102.1 to 19.103.3, 19.126 to 19.132.5 of MES Schedule Part – I.

13.3 Rawl Plugs:

Only rawl plugs of correct size as approved by the Engineer – in – Charge shall be used. Holes for rawl plugs shall be made with the punching tools of the correct size and plugs fixed as per manufacturer's instructions.

13.4 In case of conduit wiring, all accessories like switches, socket outlets, call bell pushes & regulators shall be fixed in flush pattern inside metal boxes. Accessories like ceiling roses, brackets, battens, stiff pendants etc., shall be fixed on metal outlet boxes all as specified in Clause 19.115 of SSR Part-I.

13.5 Electrical Test:

On completion of wiring, the whole installation shall be tested in accordance with IS – 732 of 1963 clause (a), (b) and (c) and a test certificate for each building as per Appendix 'B' of the above IS be rendered, jointly signed by the contractor and the Engineer – in – Charge.

PARTICULAR SPECIFICATIONS (Contd...)**13.6 Light Fittings:**

Light fittings shall be of approved make with ISI mark and shall conform to the description given in Schedule 'A'. Unit rates for various fittings shall be deemed to include for fixing the fittings and connecting up complete with necessary connections, cables etc., all as directed. All the electric fittings shall be approved by the Garrison Engineer before incorporation in the work. Location and fittings shall be measured in advance on walls and as approved by Engineer – in – Charge.

13.7 LIGHT FITTINGS PARTS / FIXTURES:

All the spare parts and fixtures to light fittings mentioned in the relevant item of Schedule 'A' shall be supplied by the contractor. The spares and fixtures to be provided shall be purchased from the authorized dealer of the firm and purchase vouchers shall be produced for verification and records. Make of spare parts/ fixtures and its size/ capacity etc., shall be as per original parts and shall be approved by Garrison Engineer before incorporation.

14. DISTRIBUTION BOARD AND MCBs:

Provide distribution boards and MCBs as indicated in Schedule 'A' and drawings as applicable. Miniature circuit breaker shall comply to the requirement of IS- 8828-1996. The MCBs shall have rupturing capacity of 10 KA. The terminals of MCBs should be brought out sufficiently to connect cable lugs directly. No adopter should be used for terminating the cables. The MCBs should have quick-break-trip free mechanism to ensure that contact cannot be closed against persistent fault. Bus bars shall be electroplating copper tin plated and rated 200 Amps. Exposed faces of sheet steel enclosures shall be painted with epoxy polyester powder coating at factory. Neutral has same number of outgoing holds as the number of MCBs. Unit rate in Schedule 'A' shall also be deemed to include for all internal connections in the distribution board and bus bar system is completely insulated and fitted in PVC channel to avoid accidental toner, bus bar available in single phase and 3 phase shall be colour coated suitable for both flush and surface mounting

15. MOULDED CASE CIRCUIT BREAKER (MCCBs)

- 15.1 Moulded case circuit breaker shall be suitable for operational voltage of 415 V, AC 50 HZ, 3 phase 4 wire system for a rated current and ultimate breaking capacity as specified in Schedule 'A' and conform to IS 13947 (Part 3, 1993) and IEC – 60947 (Part 2). MCCBs shall be of adjustable thermal and adjustable magnetic setting unless otherwise specified.
- 15.2 MCCBs shall be of compact and elegant design suitable for reversible load and line terminations without affecting its performance. MCCBs shall be suitable for fixing flush on the panels and shall be provided with handle operating mechanism including Rotary Handle vari-depth type. The insulating case and cover of MCCBs shall be made of high resistant and lame retardant thermosetting insulating materials. The switching mechanism shall be quick make, quick break and trip free. The position of the operating knob / handle shall clearly indicate ON, OFF and TRIP position.
- 15.3 Each pole shall be provided with a pair of contacts, which shall open at a high speed over a large distance under short circuit faults. The special designed arc chutes of insulating materials shall be provided to contain the arc by providing effective arc quenching device.

PARTICULAR SPECIFICATIONS (Contd...)

- 15.4 The tripping mechanism shall be hydraulic type of Electronic release or thermal magnetic release for protection for over load and short circuit as per the details given in Clause No. 19.100.14.5 of MES Schedule Part – I. Under voltage trip, mechanical interlocks etc shall be provided as per standard practice and ISS.
- 15.5 Under voltage trip shall be designed to operate when the control voltage drops below a tripping threshold i.e., 20% to 70% of rated voltage and shall be suitable for operation on 230 V / 415 V AC. The terminals shall be suitable for copper or aluminium terminations depending on the type of cables specified in Schedule 'A'.
16. **LED LUMINARIES:-**
- 16.1 LED luminaries shall conform to IS 16101-2012 specification for LEDs and LED Modules.
- 16.2 LED luminaries shall be energy saving, environmental friendly and long life.
17. **PAINTING:**
- 17.1 **GENERAL:**
- (a) The contractor shall make his own arrangement for the supply of paints approved manufacture in sealed containers.
 - (b) All paintings as far as possible shall be carried out in dry weather and neatly out in all edges. Surface shall be projected and clear off as necessary.
 - (c) All iron and steel work to be painted shall be scrapped free from dust, scale, etc., with steel brush and shall be cleared before painting.
 - (d) All surface to be painted shall be prepared all as specified in MES Schedule and passed by Engineer-in-Charge before painting.
 - (e) All paints unless otherwise specified shall be of quality not inferior to that specified in the Indian Standard Specification (ISS) mentioned in MES Schedule.
 - (f) The priming coat shall be redone if more than 6 months have lapsed after it was applied before applying under coat at no extra cost to Govt.
 - (g) In addition to the General Condition given in clause 17.3 of MES Schedule Part – I
 - (i) Contractor shall execute painting under the guidance of the manufacturer representative if so ordered by Garrison Engineer.
 - (ii) The exact tint shall be decided by the Garrison Engineer.
- 17.2 **PAINTS AND ALLIED MATERIALS:- (Aluminium Paint)**
- (a) Paints and allied materials, compatibility of paints etc. shall be as specified in clause 17.2.1 to 17.2.5 of MES schedule Part – I.
 - (b) The contractor shall inform the Garrison Engineer well before placing bulk orders for materials, the name of the brands and manufacturer paints be proposes to used in the work and submit samples thereof and obtain prior approval of Garrison Engineer. Paints shall be 1st quality as approved by G.E.

PARTICULAR SPECIFICATIONS (Contd...)**17.3 WORKMANSHIP:**

Workmanship shall be in accordance with section 17 of MES Schedule Part – I 2009.

18. LIGHT FITTINGS

18.1 The quoted rate for fixing of light shall be deemed to include for fixing the fittings and connecting up complete with necessary connectors, cables etc., all as directed by Engineer - in - Charge.

18.2 Light fittings to be procured under this contract shall of make all as described in the relevant item of Schedule 'A'. These fittings shall be approved by GE before incorporation. Reconditioned fittings are not acceptable and shall not be incorporated in the work.

19. EARTH WORK EXCAVATION:**EXCAVATION:**

Excavation shall be carried out in soil as indicated in Schedule 'A'. Tenderers attention is invited to the fact that the width of a trenches for laying cables shall be according to the authorized widths as per clause No.3.2.3 in section 3 of MES Schedule Part – II and depth of trench shall be as per clause No.19.74.1 of SSR Part – I. Even if due to practical considerations, the contractor for excavates the trenches to a width / depth greater than the authorized widths yet the contractor shall be paid only according to the authorized width / depth and nothing extra shall be paid for.

20. RETURNING, FILLING, RAMMING AND REMOVING:

20.1 Refilling the trenches shall be carried out until the laying & jointing of cables have been passed by the Engineer – in – Charge & the necessary tests have been carried out.

20.2 Approved excavation earth free from cinders, ashes, slag, rubbish, vegetable or organic materials shall only be used for refilling.

20.3 The earth shall be filled in regular layers not exceeding 25 cm thick each well watered and rammed to ensure the greatest amount of compaction and solidity. The surface of the filling shall be dressed fair to levels on the directed by Engineer – in – Charge.

21. CONCRETE:

21.1 Coarse aggregate for all concrete shall be broken or crushed stone conforming to Para 4.4 of MES Schedule 2009 (Part I).

21.2 Fine aggregate for all concrete work shall be naturally occurring sand conforming to Para 4.4 on of MES Schedule 2009 (Part I). The grading of fine aggregate (sand) shall be Grading Zone 1to III given in para 4.4.7 (2) MES schedule 2009 (Part I)

21.3 Fine aggregate (sand) shall be stored at site on brick platform or by using any other approved method so as to avoid contamination or risk of shoveling up earth or other impurities when being used.

21.4 Coarse aggregate and sand shall generally conform to samples kept in GE"s office except for grading and deleterious materials which shall not exceed the limits specified in Para 4.4.3 of MES schedule 2009 (Part I). The proportion and type of cement concrete with the maximum size of aggregate shall be all as mentioned in Sch 'A'.

PARTICULAR SPECIFICATIONS (Contd...)**21.5 FORM WORK**

Refer clause 4.11.6.1 to 4.11.6.5 of MES Schedule 2009 (Part I). Also refer to clause 7.15 of MES schedule 2009 (Part I). The form work shall be rough finish for the concrete surface which is either hidden from view or is specified to be separately finishes with plastering. However the contractor will be allowed to use steel form work in lieu of timber form work without any extra cost to Govt. Use of interior form work as per local practice will not be permitted.

22. SAND FILLING FOR CABLE CUSHIONING:

Sand for cable cushioning shall be obtained from river bed free from foreign matter and conforming to relevant IS codes and samples should be kept in Garrison Engineer Office. For laying of cable in trenches, provision of sand cushioning shall be carried out all as specified in clause 19.75 and 19.77 of MES Schedule Part-I.

23. BRICKS FOR CABLE PROTECTION:

Bricks shall be ordinary burnt brick of sub class 'B' bricks. The size of bricks shall be 230mm long, 115mm wide, 75mm high with the tolerance of +/- 8% on the dimensions. Bricks shall be without frogs but trade mark name shall be engrave on top of bricks irrespective of what is specified in SSR Part – I. Bricks shall have minimum crushing strength of 35 Kg per SqCm and maximum water absorption of 20%. The bricks shall conform to the requirement given in Para 5.6 of MES Schedule of rate 2009 (Part-I).

24. LT UNDER GROUND CABLE:

24.1 The type and sizes of cables, their voltage rating and core construction shall be as specified in Schedule 'A'.

24.2 Underground cables shall be laid in trenches / walls / through pipes / floor / on pole as specified in Schedule 'A' and section 19 of SSR Part – I. Sand cushioning, brick protection, jointing of cable and terminal boxes and testing shall be carried out all as specified in section 19.75 of SSR Part – I, 2009.

25. CABLE, LAYING AND RECORDS:

25.1 The following essential data shall be furnished by the contractor as cable record of all buried cable installations :-

- (a) Factory certificates of each cable drawn shall be furnished by the contractor.
- (b) Size and make of cable
- (c) Cross sections showing where cables are laid in pipes or trenches giving their size, type and depth.
- (d) Position and depth of all pipes, ducts, etc., which are met and obstructions to the cable route.
- (e) Record of accurate lengths from joint to joint and phase sequence between joint of each of cable run.

PARTICULAR SPECIFICATIONS (Contd...)**25.2 TESTING OF CABLES:**

XLPE/ LT cables shall be megger tested by HV 2500/ 5000V before jointing as well as after completion of jointing of cable. Cables shall be tested for :-

(a) TESTING DURING LAYING:-

- (i) Continuity
- (ii) Absence of cross-phasing
- (iii) Insulation resistance to earth
- (iv) Insulation resistance between conductor to earth

(b) TESTING AFTER LAYING AND JOINTING:-

- (i) Insulation resistance test-sectional and overall
- (ii) Continuity test-sectional and overall
- (iii) Full load test
- (iv) Earth test.

25.3 Before & after laying and connecting the cable, the insulation resistance of every circuit shall be measured with 1000 VDC megger from phase to phase and from phase to earth in presence of GE or his absence the authorized representative. All the results shall be tabulated and submitted to Engineer – in – Charge duly signed by the contractor and authorised MES representative.

25.4 Cables shall not be bent to small radius while laying in trenches, pipes, surfaces/ ducts. The minimum safe bending radius shall be taken 12 times the dia of cable.

25.5 Cable Jointing shall be in accordance with section 19.85 of MES Schedule Part – I 2009. All jointing of cable in joint boxes etc., shall be done strictly as per manufacturer's instructions. The joint shall conform to relevant IS. Each jointing shall be inspected & passed by Engineer – in-Charge. The PVC cable shall be terminated through a gland, made of steel of suitable size. Before making joints in cables, sufficient loops shall be provided for future maintenance.

26. INSULATORS:

- (a) The type, size and voltage rating of insulators shall be all as described in relevant item of Schedule 'A' and as per SSR part-I clause No. 19.54 and 19.6.
- (b) Insulators shall be free from breakage, chipped spots, cracks, scratches and bars unglazed areas.
- (c) Pin type insulator shall comply with IS – 1445 – 1997 and IS – 731 – 1971, the insulator shall in one piece and shall have a groove on the side and a hole for a cotter pin and two galvanized bolts and nuts with a pair of straps.
- (d) Disc type insulator shall comply with IS – 731 – 1971 dimensions shall be as per IS – 3188 – 1980. Disc insulator shall be in one piece.
- (e) Insulator fitting shall comply with the requirements of IS 2486 – 1971 (Part-I) and dimensional requirements shall be as per IS 2486 – 1974 (Part- II).

PARTICULAR SPECIFICATIONS (Contd...)**27. TUBULAR STEEL POLES SWAGED:**

Swaged tubular poles shall comply with the requirements of IS-2713 (Parts 1 to 3) of 1980 and as specified in Clause No. 19.3 of SSR Part – I. The designation, length and size of poles to be provided shall be as specified in Schedule 'A'. a pad of cement concrete 150mm thick shall be provided at the bottom of the pit before the pole is erected. The pole shall be encased in cement concrete, the foundation being continued upto 20 cm above the ground level and tapered to form a collar and as specified in Clause No. 19.51 pf SSR Part – I. The mix and size of concrete foundation shall be as specified in Schedule 'A'.

The excavated earth shall be refilled around concrete foundation and consolidated. Poles shall be procured from any of approved manufacturers listed here-in-after.

28. EARTHING:

28.1 The earthing shall be in accordance with section 19 clause 19.137 of MES Schedule Part – I and as per electrical plate No.3, 4 & 5 of SSR Part-I, earthing with galvanized iron/ copper/ Pipe technology as described in Schedule 'A' and the work shall be executed in the presence of MES representative. Excavation for earth pit may be in any type of soil, excavation shall be passed by Engineer-in-Charge before filling in. Surplus soil if any shall be removed to a distance not exceeding 50 meters and the site left clean and tidy. Concrete in earth pit shall be 1:3:6 type C-1 using 20mm graded stone aggregate.

28.2 All metal works associated with wiring system other than current carrying parts including the cable sheathed and armoured conduit, ducts and box shall be connected to the earth continuity conductor as required under Indian Electricity Rules 1965 and IEE wiring regulations. The earth terminal of socket outlet etc. shall be connected to the earth continuity conductor. The sizes of all the earth continuity shall be as specified in respective Schedule 'A' items. Testing of earthing shall be carried out as per clause No 19.146 of MES Schedule Part-I.

28.3 The maximum continuity resistance from any point of the installation including the earth continuity conductor and earth lead to the earth pit shall not exceed 1 ohm.

29. GI PIPES FITTINGS:

GI pipes and fittings shall be procured by the contractors and confirm to IS 1239 (Part I)-1979. Tubes and fittings shall be cleanly finished, well galvanised in and out, reassembly straight and shall be free from scale, cracks and other defects and all as specified in clause No.18.4 of MES Schedule Part I .

29.1 DANGER NOTICE BOARD / PLATES :

Danger notice board/plates shall be provided at locations as directed by Engineer-in-Charge. The size and thickness of board/plate shall be all as specified in Schedule 'A'. Danger notice board shall comply with IS 2551 – 1982. Rear side of plate shall be finished with enameled paint.

PARTICULAR SPECIFICATIONS (Contd...)**30. LT PANEL BOARD**

- 30.1 This shall be metal clad compartmentalized and fabricated to form a rigid free standing deed iron support with CRCA sheet steel enclosure. The sheet steel in the switch gear panel shall not be less than 3 mm thick. Thickness of panel board shall be as specified in Schedule 'A'.
- 30.2 Switch board shall be totally enclosed, dust and vermin proof, opening for natural ventilation shall be provided and shall have screens of grills made out of GI wire mesh to prevent lizards entering inside. Neoprene gaskets shall be provided on doors with removable covers, glands plates switch board dust and vermin proof. The switch board shall be suitable for operation in the tropical climate and under ambient temperature.
- 30.3 20.3 All joints and connections shall be made of galvanised or cadmium plated high tensile steel bolts, nuts and washers screwed against loosening. The switch gear shall be designed to ensure maximum safety during operation, inspection, connection of cables and maintenance of system energised.
- 30.4 20.4 Access from front side shall be through hinged doors. Switches, ammeters, voltmeters, indicator lamps etc., shall be mounted on doors. Compartment doors shall be interlocked against opening when the MCCB is in 'ON' position. However it shall be possible to by-pass this interlock for inspection purposes when required

31. STAY ASSEMBLY:

- (a) Stay assembly shall comprise to stay clamp, stay wire, stay insulator, stay grips, thimbles, stay bow, stay rod and stay plate.
- (b) Stay clamp shall be made of mild steel flats and shall be galvanized.
- (c) Stay insulators shall conform to IS – 5300 – 1969.
- (d) Wire for stay grip shall be of grade 4 quality with minimum tensile strength of 700 N / Sq.mm and shall conform to IS – 2141 – 1979.
- (e) Thimble shall comply with the requirement of 2315 – 1978.
- (f) Stay bows shall be of mild steel, galvanised of 14 mm dia and 40 Cms length.
- (g) Stay rods shall of mild steel, galvanised having a tensile strength of not less than 420/ N Sqm. Stay rods shall be of the dia as directed by Engineer – in – Charge shall be 1.8 metre long.
- (h) Stay plates shall be of mild steel galvanized, 6 mm thick of size as directed by Engineer – in – Charge.
- (j) Nominal dimensions of the component parts of stay assembly set shall be all as per clause 19.55.1 of MES Schedule Part – I
- (k) Stay assembly shall be provided all as specified in clause No. 19.55, 19.55.2, 19.55.3 and 19.55.4 of MES Schedule Part– I

PARTICULAR SPECIFICATIONS (Contd...)**32. STAY WIRES:**

- (a) Stay wire shall be of grade 4 quality with a minimum tensile strength of 700 N/Sqmm and shall conform to IS – 2141 - 1979
- (b) Stay wire shall be free from scales, irregularities, imperfection, flaws, splits and other defects. The Zinc coating shall be smooth, even and bright.
- (c) Construction details of stay wire shall be all as specified vide clause No. 19.7.1 of MES Schedule Part – I (2009)

33. CEMENT**33.1 General : -**

Cement required for the entire work under the concrete shall be procured, supplied and incorporated in the works by the contractor under his own arrangement. Cement shall be of tested quality and shall comply with the requirements mentioned in the drawings, MES Schedules, IS Specification as amended and particular specifications given hereafter.

33.2 Type of Cement for the subject work shall be Ordinary Portland Cement of Grade-43 (Forty Three) in accordance with IS-8112 of 1989 or Portland Pozzolana Cement (IS : 1489-1991(Part-I)). Mixing of OPC & PPC shall not be allowed in the work and only one type of cement shall be used in a particular building.

33.3 While using the PPC, following requirements shall be met by the contractor: -

- (a) PPC shall meet the strength criteria of 43 Grade OPC as laid down in IS 8112-1989.
- (b) The minimum period before striking formwork given in clause 11.3.1 of IS : 456 of 2000 shall be suitably increased at site by the GE. The contractor shall not claim anything extra on this account.
- (c) The contractor shall submit the following certificates from the manufacturer of the cement for every batch of cement: -
 - (i) The quality of fly ash is strictly as per IS – 1489 (Part-I) – 2002.
 - (ii) Fly ash is inter-ground with clinker and not mixed with clinker.
 - (iii) Dry fly ash is transported in closed containers and stored in silos. Only pneumatic pumping has been used.
 - (iv) The fly ash is received from thermal power plant using high temperature combustion above 1000° C has only been used.

SOURCES OF PROCUREMENT

(a) Cement shall be procured by the contractor directly from any of the following main producers of cement (for OPC & PPC) : -

- | | |
|-------------------------------|--------------------------------|
| (i) M/S ACC | (ii) M/S Birla Corporation Ltd |
| (iii) M/S Jay Pee Rewa Cement | (iv) M/S L&T Ltd |
| (v) M/S Gujrat Ambuja | (vi) M/S JK Cement |
| (vii) M/S Century Cement | (viii) M/S Maihar Cement |
| (ix) M/S Rajshree Cement | (x) M/S Madras Cement Ltd |

PARTICULAR SPECIFICATIONS (Contd...)

(xi) M/S Ultratech	(xii) M/S Vikram Cement
(xiii) M/S Andhra Cement Ltd	(xiv) M/S Dalmia Cement (Bharat) Ltd
(xv) M/S The India Cement Ltd	(xvi) M/S Mangalam Cement
(xvii) M/S Mysore Cement Ltd	(xviii) M/S Grasim Cement
(xix) M/S DLF Cement	(xx) M/S Lakshmi Cement
(xxi) M/S Shree Cement	(xxii) M/S Prism Cement
(xxiii) M/S JK Shakti Cement	(xxiv) M/S Nuvoco vistas corporation Ltd.

(b) In case the estimated total requirement of cement for the work is less than 1200 bags cement can be procured from the authorised dealers/distributors of manufacturers of above firms. However contractor shall submit test certificate for the batch issued by the manufacturer.

(c) The contractor shall furnish the particulars of the manufacturer of cement alongwith the date of manufacture to the Garrison engineer for every lot of cement separately. The cement so bought shall be fresh and in no case older than 90 days from the date of manufacture. The GE shall verify the document in support of the purchases of cement. Before placing order of supply of cement by the contractor, he shall obtain written approval from the GE regarding name of manufacturer, quantity of cement etc. Cement shall be procured for minimum requirement of one month and not exceeding the requirement of the same for more than two months at a time. The cement shall be consumed in the work within three months after receipt. Cement shall conform to the requirement of IS specification and each bag of cement shall bear relevant ISI mark.. The weight of each consignment shall be verified by the GE and recorded. The content of cement shall be checked at random to verify the actual weight of cement per bag. However, the content of cement per bag shall be 50 Kg only subject to tolerance given in Clause 9.2.1.1 and Annexure 'B' of IS-8113 and clause 10.2.1.1 and Annexure 'B' of IS – 1489 for OPC and PPC respectively.

33.5 TESTING OF CEMENT

(a) The contractor shall submit the manufacturer's test certificate in original alongwith test sheets giving the results of each physical test as applicable in accordance with relevant IS provision and the chemical composition of the cement or authenticated copy there of, duly signed by the manufacturer with each consignment, as per the following IS provisions: -

- (i) Method of sampling for hydraulic cement as per IS-3535-1986.
- (ii) Method of physical test for hydraulic cements as per IS-4031.
- (ii) Method of chemical analysis of hydraulic cement as per IS-4032-1985.

(b) The test certificate and test sheet shall be furnished with each batch of cement. The Engineer-in-Charge shall record these details in cement acceptance register to be maintained by him which will be signed by JE (Civil), Engineer-in-Charge, Garrison Engineer and the Contractor as given in the format as per Appendix 'B'.

(c) The contractor shall however, organize setting time and a compressive strength test of cement through designated laboratory on samples collected from the lot brought at site before incorporation in work. The contractor will be allowed to use the cement only after satisfactory compressive strength of seven days. To meet this requirement contractor is required to keep minimum 10 days stock before any new lot is brought at site, which can be used, in the work. The contractor shall be required to remove the cement not meeting the requirement from site within 24 hours. Seven days strength test will be relied upon to accept the lot of cement to commence the work. 28 days compressive strength test will be the final criteria to accept/reject the lot.

(d) The random samples as per relevant IS shall be selected by GE before carrying out testing. The record of such samples selected by the GE for testing shall be properly maintained in the 'Cement Testing Register' giving cross reference to relevant consignment of cement and quantity received etc.

(e) Cost of transportation of samples to the approved laboratory/test house and all testing charges including cost of sample shall be borne by the contractor.

PARTICULAR SPECIFICATIONS (Contd...)

(f) The contractor shall be required to set up adequate testing facilities at site to the entire satisfaction of GE for conducting setting time test and compressive strength test as per IS codes referred to hereinbefore for the samples collected from the lot brought at site. These tests be carried out within 7 days of receipt of cement at site. The tests can alternatively be carried out at the Zonal laboratory, or any other recognized laboratory so designated by GE.

(g) The GE shall carryout independent testing as per the tests mentioned in the 'CEMENT SUPPLY AND ACCEPTANCE REGISTER' (as per Annexure 'C') of random samples of cement drawn from various lots, if sample fails in 7 days compressive strength. The testing shall be carried out through National Test House, SEMT wing of CME Pune, Regional Research Laboratories, Government approved Laboratories, Zonal Laboratories/IIT Kanpur as per IS-3535-1986, (Method of sampling hydraulic cement), IS-4031 (Method of physical test for hydraulic cement) and IS-4032-1985 (Method of chemical analysis of hydraulic cement) referred to above. The decision as to where the testing of cement is to be done shall be taken by GE. In case the cement is not of requisite standard despite manufacturer's test certificate, the contractor shall remove the total consignment from the site at his own cost after written rejection order of the consignment by the GE. The cost of test shall be born by the contractor irrespective of the results of testing.

(h) The Contractor shall submit original purchase vouchers for the total quantity of cement supplied under each consignment to be incorporated in the work. All consignments received at the work site shall be inspected by the GE along with the relevant documents to ensure the requirements as mentioned hereinbefore, before acceptance the original purchase vouchers and the test certificates shall be verified for subject contract and defaced by the Engineer-in-Charge and kept on record in the officer of the GE duly authenticated and with cross reference to the consignment/control number recorded in the "Cement Acceptance Register". The Cement Acceptance Register shall be signed by the JE (Civil), Engineer-in-Charge, GE and the contractor. The contractor shall maintain schedule of supply of cement for each consignment.

(j) The Accepting officer may order a board of officers for random check of cement and verification of connected documents during the currency of contract.

33.6 STORAGE/ACCOUNTING/PRESERVATION OF CEMENT

(a) Cement shall be stored in covered godown over dray platform at least 20 cm high in such manners as to prevent deterioration due to moisture or intrusion of foreign matter. In case of store room the stack should be at least 20 cm away from floors and 60 cm from walls. The stacking of cement shall be done as specified in relevant IS. The storage accounting and preservation of cement supplied by the contractor shall be done as per standard Engineering practice till the same is incorporated in the work and the cost of the same shall be deemed to be included in the unit rate/ amount quoted by the tenderer. The EIC shall inspect once a day to verify that cement lying at site is stored, accounted, preserved and maintained as per the norms. The cement shall be stored so as to differentiate each tested and untested consignment separately with distinct identification. If the GE is not satisfied with the storage/preservation of cement, he may order for any test (s) of cement as applicable for that consignment to ensure its conformity to the quality mentioned in the manufacturer's test certificate. The contractor shall bear the cost of necessary testing (s) in this regard and no claim whatsoever shall be entertained.

(b) Stacking of cement shall be done as per relevant IS and as under: -

(i) Each cement consignment shall be stacked separately and removal shall be made on the basis of First in First out.

(iii) Adequate top cover will be provided.

PARTICULAR SPECIFICATIONS (Contd...)

(iv) Stacks in no case shall be higher than 12 bags. The maximum width of each stack shall be 3.00 m. If the stack is more than 7 to 8 bags high, the bags shall be arranged in header and stretcher fashion, i.e. alternatively lengthwise and crosswise so as to pile together and avoid topping over.

(iv) Adequate space shall be kept between two stacks.

(c) Cement godown shall be provided with two locks on each door. The key of one lock at each door shall remain with EIC or his representative and that of the other lock with the contractor's authorized agent at site of works so that cement is removed from the godown only according to daily requirement with the knowledge of both the parties. During the period of storage, if any cement bag(s) is found to be in damaged condition due to whatsoever reason, the same shall be removed from the cement godown on written orders of the GE and suitable replacement for the cement bag(s) so removed shall be made and no claim whatsoever shall be admissible on his account.

(d) In case more than one type of cement is used in the work for different buildings i.e. Ordinary Portland cement or Portland Pozzolana Cement, both type of cement shall be stored separately as directed by the Engineer-in-Charge to avoid mixing of these type of cement. Separate record shall be maintained including the location/items where these type of cement are used.

(e) Cement shall be removed from the store only according to daily requirement with the knowledge of both the parties and the EIC and the contractor shall record daily consumption of cement in cement consumption register, which shall be signed. Cement constants given in Appendix 'A' to E-in-C's branch letter No 19280/E8 dated 03 May 1976 shall form the basis of consumption of cement for various items of works unless specifically indicated otherwise.

(f) In case the consumption of cement as per cement consumption register is found to be more than the estimated quantity of cement due to whatsoever reason, the contractor shall not have any claim whatsoever for such excess consumption of cement.

33.7 SCHEDULE OF SUPPLY

The contractor shall procure the cement timely as required in accordance with CPM chart agreed between GE and the contractor. The contractor will forfeit his right to demand extension of time if the supply of cement got delayed due to his failure in placing order in time to the manufacturer.

33.8 MEASUREMENT AND PAYMENT OF CEMENT

(a) The entire quantity of cement shall also be suitably recorded in the measurement Book for record purpose as Not to be abstracted before incorporation in the work and shall be signed by the Engineer-in-charge and the contractor.

(b) The payment shall only be allowed after production of original purchase vouchers, certified copies of test certificates from manufacturer for each consignment and results of testing carried out in laboratory on receipt of cement (7 days compressive test) are found satisfactory after testing as at site as per condition 64 of IAFW-2249. Rate of cement given in SSR shall be applicable for cement irrespective of type and grade of cement specified for use in the work.

PARTICULAR SPECIFICATIONS (Contd...)**34. ACSR CONDUCTOR:**

- (a) ACSR conductor shall conform to the requirement of IS- 398 – 1976 and method of stringing shall be as specified under IS-5613. ACSR conductor shall be made of seven or more than Aluminium and galvanized steel wires built up in concentric layers. The centre wire of galvanized steel and outer layers of wire of Aluminium. Stranding and size of conductor shall be as specified in Schedule 'A'. Natural grease shall be applied between the layers of the wire. ACSR conductor shall have a breaking strength of not less than 250 Kg.
- (b) Workmanship for providing shall be as specified in clause No. 19.10 and 19.56 to 19.65 of MES Schedule Part – I (2009)

35. DEMOLITION/DISMANTLING/TAKING DOWN

- 35.1 The work ordered to be dismantled shall be carefully dismantled so as to retrieve maximum serviceable materials. Dismantling/demolition work is under taken by the contractor and inventory of all materials, fittings and fixtures, which are considered useful, shall be made and signed by the Engineer-in-Charge and the contractor.
- 35.2 All materials, serviceable / unserviceable except those as mentioned in credit schedule shall be Government property and deposited in MES stores yard duly neatly stacked without extra cost to Government. All serviceable materials as declared by the Engineer-in-Charge shall be handed over to MES authorities. The contractor shall be responsible for the safe custody of serviceable materials and shall be removed to MES store yard without any extra cost to the Govt and written receipt for the same shall be obtained.
- 35.3 All unserviceable materials as declared by the Engineer-in-Charge shall be disposed off as directed. Debris shall be removed from site at the earliest to ensure safe and adequate working space. Any damage caused to the adjacent structures during dismantled/demolition due to carelessness and negligence of the contractor shall be made good by him at his own expenses.
- 35.4 Dismantling / demolition work shall be carried out with proper precautions all as specified in clause 21.4 to 21.7 of the MES Sch Part I & as directed by the Engineer-in-Charge.

36.0 LOSSES DUE TO IN-ADEQUACY

- 36.1 The contractor shall be responsible for among good damage occurred due to inadequate experience of staff deployed by him and the negligence in the workmanship. The decision of the Accepting officer shall be final and binding with regard to a particular defect breakage of any part existing structure or system irrespective of the fact as to whether he attended the same or not under subject work but damage cause due o his negligence.

37. SITE CLEARNACE

- 37.1 After completion of work, the site shall be cleaned neat tidy & cleared off the rubbish/unserviceable materials to the satisfaction of Engr-in-Charge without any extra cost to Govt.

PARTICULAR SPECIFICATIONS (Contd...)**38. PURCHASE VOUCHERS**

38.1 The contractor shall, if requested by the Engineer-in-Charge, furnish all necessary documents to establish that the materials supplied conform to the specifications laid down in the Contract. The contractor shall submit purchase vouchers issued by the manufacturer or their authorized dealer, along with the corresponding e-way bills, for all applicable items for which payment is claimed in the Running Account Receipts (RAR) and the final bill.

However purchase voucher in respect of cement, steel, cable, GI pipe, Junction box, paint, light fitting, LED light, lamp, automatic street light switch, LED strip, street light panel, MCB, DB etc. will be submitted by the contractor before claiming payment and purchase vouchers for the same will be produced to Engineer-in-Charge for their verification.

38.2 While making payment for the materials and/or against work done through running payment or final bill. A Genuineness certificate/undertaking shall be endorsed along with other requisite documents as under: -

(A) GENUINENESS CERTIFICATE/UNDERTAKING:-

CA No :

Name of Work :

CA Amount :

Name of contractor :

I, the undersigned, hereby certify and undertake that all the purchase vouchers submitted by me under the scope of this contract are true, genuine, and authentic. I further confirm that the materials mentioned in these vouchers have been actually procured, delivered at site, and utilized in the execution of work strictly as per the terms and conditions laid down in the CA.

.....
Signature of contractor
Dated:

(B) CERTIFICATE:-

CA No :

Name of Work :

CA Amount :

Name of contractor :

It is hereby certified that materials brought to the site and/or incorporated into the work have been physically inspected and verified. The materials conform to the specifications, quality standards, and requirements as stipulated in the CA.

.....
JE
Dated:

.....
Engineer – in – Charge

This certificate shall be countersigned by the GE.

Signature of Contractor

AGE (Contracts)
For Accepting Officer